2006 CCRTS

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Title of Paper:

Re-Architecting the DOD Acquisition Process: Transition to the Information Age

Topics:
Policy, C2 Experimentation, C2 Concepts and Organizations

Name of Author:
Kevin Brown

Point of Contact:
Kevin Brown

Name of Organization:
- Massachusetts Institute of Technology -
Engineering Systems Division
- Booz Allen Hamilton -

Complete Address:
2100 Patty Lane, Vienna, VA, 22182
Telephone / Fax: 617-943-7785
E-mail Address:brown_kevin_m@bah.com

ABSTRACT

The military is in the midst of significant change due to the Department of Defense (DoD) Transformation Planning Guidance, a significant part of which is the implementation of Network-Centric Warfare (NCW) theory. Unfortunately, the existing DoD acquisition process poorly develops the weapons and other systems needed to realize the full potential of transformation in NCW. The current military acquisition process was designed around, and was effective for, the pre-transformational platform-centric military structure. The military's fundamental shift to network-centric systems, made possible by the information age, will require broad changes in both the organization and policy of the DoD development process.

The goal of this paper is to present a new acquisition system that will align the DoD development process with the transformation guidance, while integrating state-of-the-art business practice and technology solutions. This paper reviews the DoD Transformation Planning Guidance and the NCW transformation goal, and compares them to the transformation roadmaps of the Army, Navy, and Air Force. J. Forrester type system dynamics models are used to describe the various existing acquisition systems. Finally, the process yields a recommended alternative acquisition architecture to efficiently implement DoD transformation guidance while supporting the development of net-centric capabilities.

PART I

1 - Introduction

Increasingly there is concern with the nation's ability to rise and meet future world threats, and its ability to adjust quickly enough to handle them. There is also concern that the military will not be able to transform swiftly enough to achieve the goals and capabilities NCW Theory espouses. The Office of Force Transformation provides high level visions of where the military should go, but it lacks a clear map on how to get there. This paper looks at what is necessary to transform the military from a platform-centric industrial-age institution to a new agile organization operating efficiently as a self-synchronizing machine.

Through the study of historical military evolutions and transformations, patterns will be established through the use of system dynamics models which will help identify a possible course for the future. A fundamental question to be addressed in the paper is the difference between reform, evolution and transformation. History is full of examples of continuous evolution, but true transformations are unique major events in history. While focusing on DoD acquisition processes we will look to identify modern indicators of true transformation and what is required to continue to achieve transformational goals.

1.1 - Scope/Goal

The goal of the paper is to architect a system which will ensure the transformation of the military for superiority in the Information Age. The scope of the problem is based upon the needs of the architectural changes required. This is in contrast to carefully scoping a problem to ensure self-contained solutions can be developed. Here, whatever change in scope that is necessary to address the challenges identified in the defense acquisition system will be studied to create a complete picture of the transformation problem.

Additional areas for consideration when studying transformation include the military acquisition system, national intelligence agencies, joint forces commands, defense industry partners and the functions of the national government. All of those large systems have major effects on the transformation of the Department of Defense. Therefore, they are included in the scope of the paper, though a high-level analysis of those will be maintained when creating the models.

1.2 - The Process of Architecting NCW

Network-Centric Warfare (NCW) theory proposes significant military advantage through novel applications of digital technology providing situational awareness and self-synchronizing actions. To reach awareness needed to achieve self-synchronization NCW must have a high degree of inter-connectedness between military units, leaders and other information. NCW capabilities are thus an emergent property an organization displays when it has complete situational awareness and clear objectives. After studying Network-Centric Warfare Theory and fully understanding all the inter-connectedness it requires, it became apparent that the theory itself requires an appropriate organization to exist prior to the emergence of NCW capabilities.

A fundamental difference exists between understanding how a network works and the theories behind NCW. The problem is most people (Moray 164-169) do not see the subtle but important differences and worse yet they think that just connecting something with another something produces NCW Effects.

Therefore a fundamental understanding of NCW is critical, since the emergence of that theory integrated with today's new technology is what constitutes a fundamental transformation. Here it will be illustrated that the concepts, principles and theory behind NCW, when appropriately employed with fundamentally different tactics, will produce this military transformation. The combined process of understanding the theory, governmental policy effects, current technology capabilities and building an acquisition process that supports all of those issues *is* the process of architecting NCW transformation.

1.3 - Project Description/Method

The paper will look at the DoD Transformation Planning Guidance (TPG) and compare that to the responses each of the branches provided, as directed by the DoD TPG. Careful review using architectural framework analysis and by building system dynamics models will help illuminate good alignments or weaknesses between the plans and the guidance given. The project will then take those dynamics models and analyze them for waste, competition and other issues associated with limiting the transformation process.

By studying the dynamics models and understanding NCW Theory and the transformation goals, a new model will be proposed that best integrates all the needs of the various branches and the DoD as a whole. In addition, if there are other issues, such as the management of the Defense Industry, that arise in the process; those issues will be taken into consideration. The first two parts of the paper will describe the background information required prior to any new transformation architecture is recommended. It will be through the process of understanding the issues currently at hand which will allow the recommendations to support the proposed new acquisition architecture. This new model will implement solutions to the issues identified and then connect those solutions together to develop the new acquisition architecture.

After the new dynamics model is built to address the operational flow of resources, money or support, further refined in the future based on procedural requirements and oversight could be discussed. Again, this new model proposed here, is not intended to provide a final perfect solution, but rather is a starting point for further refinement and development. The paper was conceived with an unbounded scope to allow freedom of concept development to allow the introduction of new ideas or concepts which could better support the transformation of the DoD to the Information Age.

The new model will work to integrate all the issues associated with the transformation and offer a new possible solution to the question of how to achieve transformation. But of course one can not look forward clearly until they have studied the past.

1.4 - NCW Concept A Revolution in Military Affairs

There are numerous books and papers written on the Network-Centric Warfare (NCW) concepts and how to best employ them in modern war. In this section I will briefly introduce the most important aspects of NCW as it effects or drives the transformation of the Department of Defense. It is important to understand that this new thought process is driving the transformation goals of the military and it effects or touches on all aspects of the transformation programs. This transformation is also a critical time in military warfare since it represents a new epoch in war theory. In each epoch, change inevitability causes friction amongst the leaders and shapers of the "establishment", but worst of all it is a competency-destroying activity. This results in having many high-level leaders worry about the security of their areas of responsibility and often times they resist such changes. As a result, this transformation has been compared with the transformational impact of the French concept of the *levee en masse* during the Napoleonic period. Just as the application of the aircraft technology was hotly debated during its introduction to military use the proper application and understanding of information technology begins its struggle to transform the U.S. Military in the Information Age.

Network-Centric Warfare (NCW) is an emerging theory of war in the Information Age. It is also a concept that, at the highest level, constitutes the military's response to the information age[i]. The term network-centric warfare broadly describes the combination of strategies, emerging tactics, techniques, procedures, and organizations that a fully or even a partially networked force can employ to create a decisive warfighting advantage[ii].

When these attributes are integrated, the military advantage of such a system should be significant. To further emphasize the importance of NCW transformation, the President and the Secretary of Defense have stated that it supports four major defense policy goals: assuring allies and friends; dissuading future military competition; deterring threats and coercion against U.S. interests and if deterrence fails, decisively defeating any adversary[iii].

Network-Centric Operations are the examples of networking on the battle field to support or prove NCW tenets or principles. The study of memoirs from leading generals, operators, soldiers and my personal experience with networked military equipment in combat continuously indicates that NCW is not only a solid theory of war but proving to be a tremendous advantage. Examples of the value of NCW continue to become ever more complicated and diverse. The result is a sudden and almost uncontrollable development of weapons and sensors which espouse to be NCW-capable but may in fact be developing at a fielding rate which may be counterproductive to the NCW Theory as a whole. We will discuss that in more detail in Part III of the paper. In the near term, NCW is causing fundamental and radical change in development purchasing, and in the way future wars will be waged.

PART II

2 - Introduction of the Analysis Method

Part II of the paper will introduce the use of systems dynamics as a method to look at the total transformation system to evaluate it from a policy level perspective. Use of the system dynamics model is not commonplace, but the best single summary of what systems dynamics does is captured in the below quote.

> *"The approach proposed uses the modeling techniques of system dynamics. The field of system dynamics, created at MIT in the 1950's by Jay Forrester, is designed to help decision makers learn about the structure and dynamics of complex systems, to design high leverage policies for sustained improvement, and to catalyze successful implementation and change. Drawing on engineering control theory and the modern theory of nonlinear dynamical systems, system dynamics involves the development of formal models and simulators to capture complex dynamics and to create an environment for organizational learning and policy design."*(Leveson)

System dynamics is a technical method which provides a systematic means of tracking the stocks and flows of material, money, effort or time. It also allows the inclusion of factor effects on the stocks and flows. A factor effect could be anything which has an effect on the system. This process will develop a graphical model which will link the numerous effects on the transformation system. Once these models are developed, a new analysis of the transformation plans will appear for comparison and study.

This new perspective should illustrate the need to change the focus of the transformation from a purely branch specific or DoD specific plan to a new view of governmental policy on transformation. This change in scope will allow inclusion of any factor to the system dynamics model which has some effect on the transformation process. The model must have some stock and flow[iv] elements in it for analysis which is why our model uses the acquisition system to "measure" transformation.

System dynamics identifies effects in systems which reinforce desired flows. The ability to identify these effects is extremely important when conducting enterprise architecting. The DoD acquisition system has numerous control loops in it and patterns which are both reinforcing and rather counter productive. The rivalry between the branches can be healthy at times since they are each independently working to maximize the value they provide to the Joint Forces Commanders, but they are doing it at the expense of working together and at the expense of other critical systems in the acquisition process.

In addition to looking at inter-branch competition, the systems dynamics model will look at how politics, culture and economics play in the acquisition process and ultimately the transformation process. Finally, the additional wild card that is not significantly discussed anywhere in the transformation process, other than how to do business, is the integration of the industrial partners of the branches. The commercial companies have a large effect on many other factors in the system dynamics model and are barely discussed in the DoD and its transformation architecture. These are all elements which have very

powerful feedback loops in the transformation process but are not discussed in the transformation plans of the branches. Those issues will be included in the analysis.

The model is comprised of five basic components: the effects variable, the effects connection, DoD Transformation Pillar stocks, transformation stocks and flows. The effects variables are any of the words in the model which are connected by an effect connection. An effect is anything which has an influence on other connection. This model considers any effect to include political effects, cultural effects, monetary support, leadership support or lack of support, and any other effect or factor that should be considered in the model which will have an influence on the acquisition or transformation process. The effect connection is the thin blue line which shows on what elements in the model the effect factor directly touches.

A series of connecting effects factors and effects connectors show that there are secondary effects pushed through the system through the effects connectors. The green/circle elements in the model are the DoD Transformation Pillars. These are included to show the link between the transformation pillars and how they are stocks of supporting or blocking effects on the transformation system. The Pillars are connected by flows, which are the double lined arrows that include valves described by words which explain how the flow moves. For example, a stock of concept developments requires a collection of technical requirements to occur which will allow the concept development stock to move to another stock point where technical requirement generation will be needed before the concept could move further. The flow should be conceptually thought of as a collection of something which needs another effect on that stock to move it. Just like the real world, having great ideas is one thing, but having the money or political support to move the idea to future testing is another. Therefore every stock requires some other factor effect to be added to it to keep it moving. This results in a surprisingly realistic model of the real acquisition process. Since either money, necessity, political or military support is required at every step of the development acquisition process, this is the same perspective we will apply to the whole DoD Transformation process. The valves are on the flow and it is important to understand that the valve could be opened or closed based on the effects on that valve by the system. We now have all the basic components which, in a simplified manner, will yield emergent properties in the DoD Transformation process.

3 - Department of Defense Transformation Plan Analysis

The Department of Defense Transformation Planning Guidance describes the vision for transformation as requested by the Secretary of Defense in conjunction with the Office of Force Transformation. This System Dynamics model, shown in Figure 1, represents the DoD Transformation architecture and dynamics as described in the DoD TPG. This could be considered the “ideal vision” for the transformation and represents what the DoD would like to have happen. The system dynamics model is a perspective of the transformation using the DoD TPG as the basis for the model and only includes factors and elements discussed in the DoD TPG. Numerous factors were discussed by the model and a significant portion of the document was dedicated to assigning responsibilities to subordinate organizations Those are not included in the model since this is not an organizational chart, it is an effects-on-process model. Additionally this model could be given increasing levels of complexity, as could all the models in the paper, but this model provides only the necessary connections to illustrate the emergent properties of the DoD transformation architecture as espoused in the DoD TPG.

Included on the bottom of the models is a generic product development process to keep the transformation aligned with a more familiar mental model most people have. The DoD Transformation is in effect a massive product development process and it is important to not lose track of where in the process the transformation activities are in the generic development process.

3.1 – Description of the DoD Transformation Vision

The system dynamics model of the DoD TPG Architecture is comprised of three major groups which represent the major factors in the transformation process. The first major group is the acquisition stock and flow elements which are described by the red boxes. This single acquisition development process represents all the branches of the military in a process model view only. Later views will show how each of the independent branches operates inside the DoD transformation process. The acquisition development process is supported directly by the Four Pillars of Transformation which are shown as green circles. The Four Pillars of Transformation are the fundamental elements the DoD considers essential in the transformation process. They are essential in tracking concepts discussed in the various models and they also provide stock and flow effects directly onto the acquisition development process. Finally, all the factor effects outside the stock flow system are shown above or below the stock flow models. They represent all the elements which have a nearly direct effect on the previous stock/flow elements. The stock/flow process will be discussed from the DoD TPG Ideal Model.

First the "Fundamental Concept Development" stock which is moved forward in the process by developing the technical requirements for the fundamental concept. After enough technical requirements are developed, the concept is allowed to "flow" through the gate illustrated by the hour glass symbol on the arrow. A stock of "Technical Requirements Generation" occurs, and the "Concept Development" process continues to refine the concept by further refining the requirements. This is the iterative loop, better known as the spiral development process. This process is also used on concepts to grow and refine the requirements as necessary. *This process becomes increasingly complex and important as the systems developed tend to be more software based.*

The next step in the process is a flow gate, which has identified sufficient technical requirements with enough resolution to require the application of innovative technology solutions. This is the flow gate which requires technology from industry or research organization to contribute to the problem-solving process needed to move the concept through another gate in the process. The next stock is the "Innovative Application of Technology." As mentioned previously, the requirements will necessitate innovative technology applications and architecting the idea into a working concept. The "Transformation of Innovation to Concepts" gate allows concepts which have both refined requirements and acceptable technology applications to move forward to another stock, "Concept Testing of Transformation." This point in product development concept phase is different than in the military acquisition process, as espoused by the DoD TPG. Here the "Concept Testing and Transformation" stock has to be supported in two places to move forward.

First the "Proven Concepts must be implemented by the Branches" gate flows to the "Joint Operational Concepts are implemented by all the branches" stock. At the same time, "Tested Concepts move to acquisition system" gate must flow to the "Transformation Technology Purchases and Acquisition" stock. This is where the idea of both joint concepts and joint purchasing fielding provides the stock of "DoD Transformation propagates through the Military." It is when both the acquisition system and the joint concepts are acting and purchasing along the same innovative concept that the true transformation occurs. If it is just a concept, then it is never more than an idea, and a concept employed without the right tools is doomed to failure. Additionally, purchasing technology without integrating it into the proper concepts is merely an evolution of tools with only technology being used to ease the effort required by the military.

While this may appear trivial, understanding that both concepts and tools when employed in innovative and revolutionary ways is when true transformation occurs. This is a critical step the in the DoD TPG and is well understood in the document.

The Pillars are considered stocks just like the red boxes in the acquisition process, but they embody additional factors the DoD considers essential to support the transformation process. Using that definition, they are applied and considered as stocks also. The Pillars represent support or resistance to the transformation process.

What is most interesting about the Four Pillars is their multiplicative effect on the transformation process. In the red blocks, the stock moves out with one flow, with the exception being the "Concept

Testing and Transformation" stock, but that is an anomaly for this type of system. The Pillars have multiple flows out with the exception being Pillar Three. Pillar Three only has one point in the system where it substantially helps the transformation: at the beginning, so it is not a multiplicative stock. But one could argue that effective concept development may be one of the most important steps in the development process since it is required to start the whole thing. The other Pillars are all multiplicative stocks and feed into the acquisition transformation process at multiple places. This is essential to transformation success since there must be continued support for each concept as it is moved through the product development process.

3.2 - Dynamics of the Architecture

When the entire dynamics model is reviewed from the perspective given in Figure 1 - DoD TPG Architecture - Ideal Vision Model, the additional factor effects are included in the system and it becomes significantly more complicated. Yet this model is still considerably simplified to allow for conceptual understanding of the transformation process. Through the course of this paper, NCW theory has been extensively discussed and its effect on the model is widespread. If the Joint Network-Centric Warfare Theory were not included in the DoD TPG, the model would look nothing like this current model but rather a more typical waterfall type development process. Having the three pillars on one side of the process is essential to the NCW Theory. *It is the integration of innovative concepts, with the intelligence agencies and joint military operations which is the heart of the NCW Theory and will be the backbone of the transformation to the Information Age.* The connectedness of the effects factors between Pillars Three, Two and One is essential to develop useful NCW capabilities. The model shown here illustrates both how NCW is well understood by the DoD and that the DoD recognizes how it must be constructed to get the NCW effects as espoused.

Pillar Four of the DoD TPG plan is also a critical pillar in the process. This is arguably the most important pillar since it provides a three fold supporting effect to the transformation acquisition process. Developing transformational capabilities supports concept development, innovative technology applications and the actual acquisition of the new equipment. Pillar Four also is fundamental in developing the cultural change in organization to help ensure flexibility in the branches and agencies. While it is not shown with a connection to Pillar One and Pillar Two, it is without a doubt connected to those pillars by its effects in the organizations. But Pillar Four is placed on the other side of the development process because it is more of a working and doing element in the transformation process, while the other three pillars are more concepts and plans. If the technology, innovative solutions and acquisitions did not occur, then the system will not transform but merely evolve.

The emergent property of this model reveals the insight and understanding of the DoD and that the process should work as described in the DoD TPG. It also shows that there are political and cultural issues to contend with, but they are considered and included in model none-the-less. The model also compares nicely with the standard product development process and represents very similar thinking to established development processes.

This model and the DoD TPG does not spend much time at all discussing two extremely important aspects of the transformation process, the effects of commercial industry on the process and logistical issues associated with the transformation. While the DoD TPG does mention a shortened "Logistics Tail" and other subtle indications that logistics are a concern there is very little specific discussion about how to manage those issues. While DOTMLPF is discussed many times and it could be argued that the logistics and business aspect of the transformation address these issues, they are left rather ambiguous in the DoD Ideal Model and will require follow up of those issues in later sections of the paper.

4 - Army Transformation Roadmap Analysis

Using the Army Transformation Roadmap as the primary document to develop the Army's Transformation Dynamic Model Figure 2 - Army Transformation Dynamics Model, represents the real dynamics of the Army transformation process. The model is at the core similar to the DoD TPG – Ideal

Model but has several significant differences. The first significant difference is the movement of Pillar Three to the bottom of the product development process. Again, the red boxes represent the acquisition product development process and have significantly the same steps in the development process. The second major difference from the DoD TPG model is the movement of the "Integration of the Joint Forces Concepts" box. These two major changes produce a fundamental difference in the model and the Army acquisition process. This model also illustrates how the Army works to mitigate external factor effects on its system especially those which are outside of Army control. An example would be Joint Forces Concept development imposed on the Army Acquisition system. The Army system works by taking the guidance given by DoD TPG and includes it in its system but does so in the most minimalistic way possible. In summary, the Army is implementing the DoD TPG according to the solution neutral guidance given by the DoD.

4.1 - Army Current Architecture

At the core of the Army transformation is the acquisition process. It is very similar to the DoD – Ideal Model but the placement of the Joint Concepts block is more than halfway through the system and it is primarily focused on the Army Battle Management System which incorporates the Joint Operational Concepts. This fundamental difference means the Army is not considering the Joint Operational Concepts until the product in acquisition is nearly completed, or at least after the significant design parameters of the product have been established. Joint Operational Concepts are considered during concept development in the acquisition process but it is on the level of email traffic or requirements documents being passed for review. There is a limited connection between Joint Operational Concepts and acquisition concept development at the initial stages of product development. This has resulted in a catch phrase of "Born Joint" which describes the goal but is more often used to address the lack of initial integration.

The integration of joint operational concepts, "Born Joint", in the early development process of the branches is a fundamental feature in the development of the next generation defense acquisition architecture. To have joint functional concepts integrated late in the design process results in significant network-centric warfare theory principles being left out of the design at worst or added later as a modification at best. Developing this process, "Born Joint", an integrated joint concept of technology which maximizes tactics, operational theory and technology all in one system is the ultimate goal of the new acquisition system. Currently the Army is successfully getting two of those three elements in its development system; tactics and technology.

The Army system minimizes the integration of other branch requirements by pushing the joint forces concepts late in the development process and only allows limited connectivity. The concept development and testing process of the Army, as currently architected is a very capable and effective system. The concern is how to better integrate joint forces requirements and develop systems which will better allow the principles of NCW to emerge. This current architecture will not allow that to occur naturally.

Another key issue with moving Pillar Three near Pillar Four is the lack of connections between Pillar One and Pillar Three. This is a poor architecture if the point of NCW is to find innovative concepts using the intelligence agencies of the US to our advantage. It is common knowledge in both the military and commercial communities that users are the innovators of the world. (Hippel)

4.2 - Dynamics of Army Transformation Architecture

Overall, the Army Model shows what the Army leadership wants: to maintain control over their own process. Army thinking is "they know best and should decide what is best for the Army". This paper does not argue that point, but only illustrates that the Army needs to integrate capabilities across all the branches. The best option for all the branches is to maximize the integrated development and tactics used in Joint Operations, and especially concerning issues around NCW Theory. The Army wants to architect its own command and control system and get the other branches to interface with it. This is an attempt to ensure the Army is the lead branch in future conflicts and hopefully secure more funding for

future Army modernization. While it is noble to constantly strive to provide the best possible capabilities to the DoD, it is also a challenge to balance the tendencies to develop greater capability or developing Joint Capabilities. Again, cultural issues in the branches and at the joint forces level appear to be the primary factors for deciding this balance. (Grossman)

The Army model represents how it will work to meet the requirements placed on it by the DoD TPG and still maintain its own independence while also leveraging the other branches to work in the Army system. This goes fundamentally against the DoD NCW Theory and limits the transformation of the DoD to the Information Age Architecture.

Finally, there is little discussion on logistics and business practices. These are fundamental gaps in the architecture which are found by their omission. Realizing gaps of omission are often the most difficult ones to spot, but here the model allows enough factors to be discussed, organized and illustrated that additional considerations can be included and tracked. The integration of commercial industrial partners is only discussed by changing the acquisition process and business processes. Fundamental regulation changes are going to be needed to address these issues. This will be discussed in greater detail later in the paper. It is sufficient for now to say that those two issues are critical and will need to be addressed in the future.

5 - Navy Transformation Roadmap Analysis

The Navy Transformation Model is fundamentally the same as the Army's model but with different specific technical processes and institutions. However, this does not equate to a different development process. While the Navy Transformation Roadmap discusses Seabasing concepts and other concepts the Navy is developing, they use fundamentally the same process as the Army. The Navy does the same thing as the Army by providing a patch work of stop-gap solutions to express how the Navy is meeting all the DoD TPG directives, yet it still maintains its own separate concept development process. The Navy is exploring capability-improving concepts that tack on network-centric warfare capabilities, but it is not fundamentally a joint concept development process.

The Navy actively works to develop its own platforms as it sees fit and then modifies the communications interface to meet the directives of the DoD. Fundamentally, it appears as though the Navy is not re-architecting the naval fleet to best balance the needs and requirements of all the branches but how to best achieve its own missions.

The Model as shown in Figure 3 - Navy Transformation Dynamics Model again it illustrates the fundamental architecture of the acquisition system and how the Navy works to keep factor effects not in its control as removed as possible from the development process.

5.1 - Current Navy Architecture

Since the Navy model is generally similar to the Army model, only differences will be discussed between the two branches. As shown in the Figure 2 and 3, the core of the Navy system and its placement of the Pillars in the system is exactly like the Army's. As mentioned previously, the culture of the Navy wants to ensure its development is kept in house and appears to limit its concept development between the branches. Also, there is still a large divide between the Navy concept development capabilities Pillar Three and Pillar One, Intelligence. This again is fundamentally flawed if there is to be creativity between the branches and the intelligence community.

The Navy architecture is perfectly designed to develop large-scale platform type systems, just as the Army was designed to develop large-volume platform type systems. This architecture is also useful when considering that most naval projects span decades in contrast to Army systems. Additionally the Navy's architecture is established well enough to continue regardless of the numerous project manager rotations that occur in naval project development process.

5.2 - Dynamics of NavyTransformation Architecture

The Navy Model fundamentally illustrates that differences between the Army and Navy are in the product and cultures only. There is no great influencing factor anywhere in the DoD TPG that would suggest that either the Army or Navy should consider changing the acquisition product development process fundamentally. *This interesting fact is relatively confusing since the DoD calls for the Navy to transform to meet the challenges the DoD TPG raises, but the fundamental changes required to meet those challenges needs to be instituted at the DoD level.*

By establishing this architecture and set of goals, the Navy is working to ensure minimal required integration with the Joint Operational Concepts. However, if it is required to substantially take part in them, it is offering its services as the premier force for providing the command and control of the next conflict. This is interesting since the Army mentioned the same benefits of its system. Again, because the Navy has the same architecture as the Army, there is an inherent conflict or rivalry that is developing. The challenge for the transformation architects is to harness this rivalry into a competition which will benefit the DoD as a whole and not just the Navy or Army.

6 - Air Force Flight Plan Analysis

The Air Force has a fundamentally different architecture in its product development process and reflects its mission and goals in its architecture, this shown in Figure 4. The Air Force moved the Joint Operational Concepts and requirement generation process to the beginning of its acquisition development process. This fundamental shift is relevant for several reasons. First, the technology and process required to develop military aircraft and spacecraft is a much more complex series of balancing trade-offs than on a ship, tank or truck. Therefore the requirements must be more precisely controlled prior to development.

Just like the other two branches, the Air Force works hard to keep its development process control and stay insulated from the effects of Joint concepts and intelligence organizations. This decision is to limit project scope drift and to ensure the Air Force maintains tight control over project development. What is fundamentally missing in the Air Force Flight plan is the integration of industrial partners and how to manage those relationships. This again is an error of omission in the architecture and will be discussed in greater detail later.

6.1 - Current Air Force Architecture

Discussions of the Air Force Model have indicated that there is some very good logic in the architecture. The idea of not building a product until the concepts have been fully developed allows the requirements to be clearly developed and applied in the acquisition process. But there is another motive the Air Force embeds in this development process, which is the ability to take the fully developed requirements and work the system as they and their industrial partners see fit. This allows the Air Force the ability to keep DoD influence and changing trends in the DoD off its product platforms.

Joint Concept requirements generation at the beginning of the product development process means that the Air Force approval given for a project can almost ensure that the project will get funding until completion. Since the Air Force can always point out that they are working to build a product that was jointly conceived and developed and with few other alternatives in the development process line, they can put pressure for continued funding. In other words, the Air Force Architecture is for both product development reasons but also political and financial reasons.

The Air Force has developed this architecture not to undermine the DoD but to ensure that it is capable of developing what it believes is the best most capable product. But the question is, “Does the product produce the most benefits across all the branches and best support the DoD as a whole?” Based on the architecture, it limits the ability for the other branches to put mission needs requirements on the Air Force development process and likewise for the Army and Navy.

6.2 - Dynamics of the Air Force Architecture

The Air Force model is a better example of how to get requirements into the product development process, but there is another error of omission here: time. The large amount of time it takes to produce a concept, fully test the concept, and develop all the specific requirements prior to developing a product is not the method of choice in a fast paced, competitive world. The model shows the benefits of the joint concepts integration up front in the process, but all the models lack input from the other branches to jointly optimize capabilities and share responsibilities clearly. *De-lineated responsibilities by physical domains, land, water, air or space is no longer a viable solution.* Due to technology, the boundaries of responsibilities have slowly yet steadily overlapped to the point where Air Force and the Army missions are so similar that large percentages of their missions could be easy given to either branch.

Again, the question or redundancy versus waste starts to be raised when we look at the architecture of the defense forces and the capabilities they all have. Using the Air Force model as the catalyst for discussion on this point, if the branches were truly integrated and interoperable, the capabilities of the Army Ranger units could be modified to serve also as Air Force special rescue, or some other mix. But the bottom line is if they train together and work together to share capabilities and funding, there could be orders of magnitude improvements in capabilities, training, interoperability and an increase number of personnel capable of completing a wide variety of missions.

7 – Complete DoD Architectural View

Understanding how each of the branches system works is just the first step in developing and understanding the total system. The first model introduced was the DoD TPG –Ideal Vision, how the DoD envisions the transformation and where it is suppose to go and the capabilities the new system should have. The total system is presented for analysis and is shown in Figure 5 – Total DoD Acquisition Dynamics Model.

The model includes the three branches as they operate in reality and includes the connections to the joint operational concepts box. The model includes simplified connections between the major political effects on the system, and it shows the production line of joint concept projects, such as the Joint Strike Fighter, JSTAR, JTRS, etc. It also includes the effects of inter-branch rivalry and inter-branch needs and how this affects the product development process.

The model also shows the relative location of the intelligence agencies and further demonstrates the gap between NCW Theory and what the current acquisition system is producing. The pillars are still illustrated by green circles and shows that there are several redundant pillars in the acquisition system. The intelligence agencies are still removed from the concept development process and have an even smaller effect on concept development than illustrated in the branch specific models show.

7.1 - Current Architecture

From the upper right section of the model, the influence of the Army, Navy and Air Force Needs are shown to have effects on numerous other elements in the system. Most importantly the Army, Navy and Air Force each have an effect on the Joint Concepts development and acquisition system. This effect could have a change in the joint acquisition system at each step of the development process. This may be considered a positive as it allows changes and refinement at numerous steps of the process. The problem is each time there is a change or refinement to the scope or concept of a project that will require a certain level of rework. (Ulrich) This is often considered one of the largest factors for why joint concept and development is often slow and over budget.

Another element in the model is “Combat Politics.” This effect has all three branches influencing it also and those “Combat Politics” spill over into both “Transformational Politics” and Pillar One. It is important that the needs of the branches are heard, but the process in place now is complex and requires rigid control on the part of branch general officer leadership.

“Inter-branch Politics” feeds into “Transformational Politics” and into Pillar One. This captures the fact that at all levels of bureaucracy they include branch politics. This also feeds down to the Joint

Acquisition process and effects it at each level. The model represents these connects in a minimalistic manner, and it could be assumed that the real world is even more complex and requires much more feedback and agreement prior to forward movement of the acquisition process.

The top most part of the model shows the simplified effects of congressional actions on the acquisition system. The "congressional military vision" affects all the branches at many levels of the process. The Secretary of Defense obviously affects numerous other transformational factors as well as the "Presidential Military Vision." "Intelligence Community" effects are also very prevalent at this point in the process and generally inhibit transformation due to the secretive cultures of those organizations. What is really important to pick out from this section is the numerous different factors pulling or pushing the Joint Concepts and acquisition system. The complex interaction of all these factor effects on "Congressional Funding" is the final effect which really decides the architecture of the military.

The effect of the "Congressional Funding" on the Transformation and the "Office of Force Transformation Guidance" shows the difference between the innovative thought leaders in the DoD and what the politicians are willing to fund and want produced. What is even more important is to understand that in reality the vast majority of the budget decisions for the military are often worked by the staffers under each political leader.[v] The most important aspect of this sectional view is to understand that politics and congressional funding is an absolutely critical part of the acquisition system, but they should not use technical decisions to decide which systems to fund. The current dynamics system allows that to happen.

The two other major factor effects in the system not previously mentioned are the "Joint NCW Theory" and "Political Influences on Total System" effects. Both of those factor effects touch all levels of the system and on all the branches. The important part of the NCW factor effect is that it either effects at the very beginning of the development process or it is tagged on at later stages of the system to comply with DoD TPG directives. A large number of the projects fall into that category.

7.2 - Dynamics of the Total DoD Architecture

The fundamental architecture is obviously designed to support a platform centric acquisition system not a NCW system. There are errors of omission in the current model since there is little to no discussion on the integration of industrial partners or the complex logistics associated with the purchase of high-tech defense industry products. There is a large gap between high-level strategic thinkers and the thoughts and needs of the lower-level tactical thinkers. This is sometimes is likened to senatorial decisions on systems which combatant leaders will have to use. There is a big difference over who is purchasing the system and who is using it. This leads to another issue with who should make the final decisions. *Currently it is the one with the money makes the decision when in fact it should be the one with the most knowledge on the subject of which the decision will be made.* Again, this often is due to the fact that the current system has too many participants with too many motives to function effectively. The final most glaring error in the current system is a general mismanagement of the defense industry as a whole.

All of the aforementioned issues and concerns are integrated in the following model which represents the proposed architecture for DoD transformation. Many of the issues raised in here have extensive background research already completed and many of those findings and conclusions align with the recommendations in Part III. It is important to understand that the next part of the paper represents a possible architecture that does not attempt to change the factor effects that exist in the system, but embraces them as part of the national culture and only tries to guide their influence. Part III will explain this concept in detail.

PART III

8 – Recommended DoD Acquisition Architecture

The following recommended DoD acquisition architecture uses several principles in its development. Each of the principle ideas is based on heuristics of working with the government, military or industry partners. Additionally, since political issues will always be a relevant and complicating factor, an assumption must be made that the recommended architecture should be the optimal organization in an apolitical environment. Political necessity can and will always be added to a system. Since the recommended architecture considers optimal operational efficiency before political needs, theoretically the result will be technically practical. To ensure a technical and practical architecture is developed, the flowing additional principles and assumptions were used during the new architecture development:

- Current organizations and capabilities must be kept in place
- Different concept development processes in each branch provide the benefit of additional potential solutions
- Each branch has a complete acquisition process with several redundant components
- Joint acquisitions is the most difficult and least economized
- Joint acquisitions will continue to grow in the future
- Competing visions are inhibiting joint acquisitions
- Efficiency in acquisition occurs when the buyer, supplier, user and appropriator are all in agreement
- The acquisition system is not highly regarded by combatant commanders
- An acquisition system's customers are combatant commanders, service members and congressional leaders; each must be served equally
- Rivalry restricts efficiency and it is inhibiting execution of NCW Theory
- Competition in an industry generally improves an organization
- Prestige, recognition and financial reward significantly improve creativity, productivity and efficiency
- Political influence on technical decisions leads to sub-optimal designs
- High-level strategic thinkers are generally not best qualified to make technical decisions
- The finest technical experts are often forced into actions based on political desires
- Every member of the government is working to best represent their responsibilities in the best interest of the nation and service members
- Defense Industry partners are motivated by financial rewards
- The Defense Industry is not optimally managed by the government and its continued survival is critical to national security
- Distribution of defense contracts should include strategic analysis to ensure long term national defense production capabilities

The goal of the new architecture is to address all the issues and problems mentioned previously in this paper and to apply the most innovative use of modern business practices to date. In addition to the above fundamental considerations, simplicity of organization and minimal but effective oversight are also critical to a successful system. The next section will introduce the new system and provide a comparison between the current and new systems. The blocks and pillars are the key features to look at in the comparison. They represent the fundamental changes to the system, while the factor effects are kept since they can not realistically be removed from the system. Additionally, the factor effects represent numerous levels of oversight and needs requirements which also cannot be removed from the system.

8.1 – The New DoD Architectural Model

For clarity of discussion the new DoD architectural model as proposed in Figure 6, will be henceforth referred to as, "The New Model". The existing acquisition system as modeled, Figure 5, will be referred to as, "The DoD Current Model. Figure 5 and Figure 6 are provided for a direct visual comparison between the current model and the new model. There are numerous changes between the two models. Each of the major changes of the system are summarized here to understand the scope of the new concept model.

Each of the branches has major acquisition activities, with the actual procurement process removed and placed under "The Blue Box". "The Blue Box" will be introduced in the following chapter but for now consider it a new organization. "The Blue Box" name was selected for the paper since it is a solution neutral concept name. Had another descriptive name been selected, readers would develop a pre-conceived idea on what the organization is supposed to do, and attribute current or similar organizational characteristics to the new proposed organization based on its name. In order to consider this new concept with an open mind it is better to have a name not associated with any known organization.

Again, "The Blue Box" will function as the major acquisition agent for the DoD, but each of the branches is left with extremely robust concept development capabilities and all original research laboratories, organizations and institutions which facilitate transformational capabilities. The three branches will send concepts forward for competition at "The Blue Box". Each branch will have more robust rapid combatant commander purchasing authority than currently allowed, but the major acquisitions process will be removed from branch operations to allow better branch focus on warfighting operations.

The political effects on the acquisition process can be mitigated by focusing political influence in the Joint Operational Concept development stage of the process. This would be the earliest point in the acquisition process where major system purchases are discussed. This is why it is important that the political effects factors are integrated at that point of the process rather than later in the process. Also, each of the branches has a controlled access point for joint concept development but after the requirements and concepts are developed, "The Blue Box" integrates those requirements with the best current technology for purchasing and fielding. The idea is to keep high level strategic thinkers focused on their responsibility and allowing the technical experts to focus on the processes of screening, selecting, testing, purchasing and fielding the best total solution to the requirements jointly developed by the political system and the joint forces command.

The New Model effectively has three major components: (1)the political, intelligence and joint forces command; (2)"The Blue Box" acquisition system; and (3)the three branches together which represent major concept development and testing. Embedded in the model is a controlled interface method for Defense Industry partners.

The New Model is recommended for several overarching reasons the reader should be mindful of when considering the specific aspects of the model. First, NCW Theory requires a fundamentally different requirements gathering and acquisition process than that of the platform-centric Industrial Age. The current acquisition system is not capable of producing such systems on a grand scale, especially with the level of complexity of new systems. Second, necessity is the mother of invention and our service members are our competitive advantage for their creativity and innovative problem solving capabilities. Third, excessive detailed political oversight in acquisitions, concept development, transformation, and operational activities are blurring the lines on what the political responsibility to the military system is. This blurring of responsibilities and how detailed the political oversight is getting to be when recommending military decisions is also further inhibiting efficient acquisitions and DoD transformation especially in concept generation/guidance, capability requirements and line-item ordering of military weapons system. Controlling this process and better allowing the integration of those political needs/desires in the acquisition system will help ensure both political desires are well understood and military needs are well fulfilled.

Finally, a new organization built on prestige, expertise and <u>rewarded in completely different fashion than any other government organization</u> needs to be established to entice and retain the nation's

absolute best and brightest to help architect and purchase the most important systems the US will buy: its national defense. Previously, the system has worked through shear determination and massive spending. Today, there needs to be a balance of effective and efficient purchasing. "The Blue Box", is a possible start for architecting a new military acquisition culture which could be the envy of the business world.

8.2 - New Model Sectional Explanations

As mentioned previously the New Model is comprised of essentially three main sections; the Concept Development Process, the Joint Operations and the "Blue Box".

8.2.1 – The Concept Development Process

The Concept Development Process will have two primary responsibilities; to deliberately test and evaluate concepts for future development, and to provide rapid acquisition capability to the combatant commander.

As proposed these branch systems remove the burden of major acquisition operations from each branch—for example, the actual purchase of tanks, planes and ships—thereby allowing the branches to focus on developing better test requirements, theories and concepts prior to the actual acquisition of the product. This defines the first primary responsibility of the Branch Concept Development process. Currently, habitually inadequate requirements cause exponential cost overruns. Since this system facilitates more thorough development of requirements and testing of concepts, it addresses this critical issue in the acquisition and fielding of major systems. Removing major purchasing activities from the branch minimizes political influence on the combatant commander's purchasing activities.

Nevertheless, the ability to rapidly purchase off-the-shelf combat systems—the second primary responsibility of the Branch Concept Development process—remains critical to sustaining the advantages of the US Military. These off-the-shelf purchases then become the primary interface between the combatant commander and the Defense Industry, as the branches' interface with industry during development of new systems is minimized. Figure 10-4 also shows that research facilities, lessons learned, training commands and other educational organizations all contribute to concept development and testing. One of the keys to military success in the Information Age is the ability to identify, test and field cutting edge capabilities and creative solutions faster than the enemy. By focusing on the two primary responsibilities, this architecture streamlines this process and produces a great emergent property as a result--a controlled interface between the Defense Industry and the military branches.

One of the weaknesses with the current system is a lack of this clear interface between combatant commanders and their Defense Industry partners. The New Model suggests that if each Defense Industry partner has a representative within each research organization and concept development process, they minimize sales force requirements through maximizing exposure to the system which makes purchases, and can integrate necessary cutting edge industrial weapons technology into future concepts. Having the Defense industry focused in a much smaller number of places, but better integrated, increases efficiencies of sales and technology distribution for both the military and Defense Industry, but more importantly gives the combatant commander access to all the state of the art weapons technology in a single system.

8.2.1 – The Joint Operations

The interactions of the congressional activities, intelligence community, and joint forces culture are discussed also in the New Model. This new system would require much greater controlled interaction between the branches, joint forces command and congressional activities.

The New Model maximizes congressional input in the Joint Forces Command and on the branches at a level where early decisions can produce productive decisions – "Born Joint". The New Model recommends having political and joint forces concepts and requirements collected and distributed through the Joint Forces Command. The joint forces command would provide the direct interface with congressional requirements and Defense Industry partners. The concept behind this architecture is to maximize inter-agency cooperation at the highest conceptual levels, and, once concepts are agreed upon,

to push technical decisions down to "The Blue Box" where the nation's best technical experts are available for making those decisions. This New Model works to contain interagency politics to one section of the acquisition process but allows the actual acquisition process to produce the best DoD-wide technical solution based on agreed upon previous inter-agency decisions.

The output of the Joint Forces part of the system is a unified and clear concept which can be released for technical development and testing. Currently that process is very laborious and still produces products which are not universally embraced by the branches since there may be ill feelings or rivalry between the branches.

8.2.3 – "The Blue Box"

This part of the model will only work if a critical organization is created and allowed to develop– "The Blue Box." "The Blue Box" is the single largest new element in the system. "The Blue Box" represents the fundamental change from a platform-centric industrial age organization to the Information Age. "The Blue Box" will only be briefly introduced here; however the following chapter will discuss how "The Blue Box" will work in great detail. For now we will only discuss what "The Blue Box" will do.

In order to standardize the acquisition and fielding process, "The Blue Box" will be the only agency to develop concepts received from the branches for possible acquisition and fielding. In the new system, "The Blue Box" is the single major acquisition system within the DoD which synchronizes the efforts of three branch acquisition systems, whereas the current system has four independent major branch acquisition systems, which is fundamentally against NCW Theory. "The Blue Box" will also provide **two-way** communication between the branch and Joint Forces Concept Development Processes. This process will allow the branches the ability to compete to produce concepts and will help share inter-branch requirements. The idea is to foster a controlled competitive environment in the concept development phase of the acquisition system, as opposed to the currently uncontrolled branch competition. For example, each branch will have an opportunity to present a concept to compete for DoD fielding. Once the concepts have been submitted and tested by "The Blue Box" the Joint Forces Command will then select from the data collected to determine the concept to be developed. When approved by both the Joint Forces Command and congress, as appropriate, then the fully tested and selected concept will move to the actual acquisition and development process managed by "The Blue Box".

All of these issues are illustrated in the system dynamics model which clearly illustrates that producing better DoD wide systems having inter-branch competition is healthier for the DoD than having three competing systems. By having three concept development systems working on the same problem, which they will all eventually use, this is more in line with NCW Theory than the current organization. This is especially important since software requirements are significantly more complex and detailed than hardware specifications, thus, the use of a single major fielding organization like "The Blue Box" more closely allows the fielding of universally DoD compatible information systems, i.e. GIG compliant.

8.3 – Summary Goals of the New Model

The new model retains several advantages of the current system. It reduces funding waste in the government's acquisitions system and produces better products through controlled competition between branches. It fosters creative innovation by tapping directly into individual branch development systems. Finally, it aligns the acquisition system to meet the strategic and technical needs of our military in the information age.

9 - A New Organization – "The Blue Box[vi]"

As we have seen, "The Blue Box" represents an entirely new organization for the government, yet it can be established using existing acquisition organizations to prevent the loss of current product development processes which have proved effective. Interestingly, the structure of this new organization

results from a look at the transformation of the Department of Defense and the application of Network-Centric Warfare Theory. The study of these two operations independently would not recommend the development of an entirely new organization, but when management of the Defense Industry and strategic resilience in defense capabilities of the country are considered together, it becomes increasingly obvious that this kind of drastic change is necessary.

This concept is presented for consideration to look at the problem from a new perspective, without the limits of reality placed on the concept. "The Blue Box" as described here is not the definitive solution, but a starting point for where the DoD acquisition process should go. The next sections will describe the basic characteristics of the new organization.

9.1 – Functions of "The Blue Box"

The five primary functions of "The Blue Box" are briefly introduced here. Each of the functions will be imbedded in separate departments, and the interface between the departments is an important part of the organization. Each of these primary functions is strategically important to the US and should be resourced accordingly.

The first function is of "The Blue Box" is to act as the single DoD wide acquisition manager. When final decisions or recommendations are to be made on the actual DoD architecture, these decisions will still be left with the Secretary of Defense to make. As the single DoD-wide acquisition management agency, yet to be identified emergent properties will be discovered by having the best and the brightest in the industry co-located. This organization also reduces the number of major acquisition processes from four to one. This emergent property occurs from the consolidation of activities operating at a very slow clockspeed.[vii] Since the large projects are slower, having more running in one location increases the likelihood of cross project learning.

The second function is to act as the DoD joint architect. This is an absolutely critical role for future technology development in the Information Age. What allowed the internet to grow and produce the benefits we are hoping to build into our defense infrastructure are standardized interfaces and formats. This is no different than what the military is trying to do with intelligence information: develop a standard which will allow all branches to view and use timely intelligence in a secure format.

The third function is to collect the concepts for testing and competition. This is another critical change to the current system. Of course there is concept testing and competition today, but not on a fundamental level as recommended here. As Figure 6 illustrates the three branches present their concepts for testing, evaluation and competition at the "The Blue Box." The idea here is to provide a reason why each of the branches should work to incorporate the other branches requirements into its concept design process to help the concept have a better chance of selection by "The Blue Box".

The fourth function is to provide two-way requirements communication between "The Blue Box" and the Joint Forces Command, the branches, and the Defense Industry. One of the major issues our current acquisition system has is the massive web of agencies and organizations across the country. "The Blue Box" introduces a consolidated and organized communication structure to help speed the discussions, technical requirements and issues that are part of military development process.

The fifth primary function of "The Blue Box" is to take all the other primary functions and package them for other governmental agency use and be the new national acquisitions expert in conjunction with the Government Accountability Office (GAO). "The Blue Box" will provide the process and tools expertise to help manage the acquisition process and teach those to other governmental agencies while the GAO can ensure the proper independent oversight is still maintained.

9.2 – Operations of "The Blue Box"

"The Blue Box" will not operate like any other government agency in existence today. "The Blue Box" will require completely new regulations for the people who will work in it especially since there is so much at stake in the acquisition of future defense systems and ultimately the security of the United States. They should be hired by merit and released by merit, not by time in office. Pay should reflect comparable positions in private and commercial industry. This is essential to help establish "The Blue

Box" as the pinnacle of a professional career. The employees in the "The Blue Box" are the *best of the best* in their technical fields and they understand all the issues the Joint Forces command is pushing down. They must be able to understand all the issues going into the acquisition of such major systems. "The Blue Box" must have the respect, prestige and pay that reflects the responsibilities it has. If "The Blue Box" is developed correctly, and rewarded accordingly, then aspiring young engineers and military personal will strive to make working at "The Blue Box" a personal and professional life goal.

The government should develop this system to better reward those individuals and provide them with both a reason to continue to serve the nation and be rewarded for their efforts accordingly. The mix of military and civilian backgrounds, 50%-50% respectively, in "The Blue Box" is also important to ensure that military necessity and realistic understanding of the operating environments of these military systems is considered, and to balance academic dreaming in the acquisition system.

One final operating consideration is the inclusion of Defense Industry Partners permanently in "The Blue Box." This is important because they represent all the vast capabilities of their companies, and the better they understand the military requirement the better they can all compete to meet those needs. This is an idealistic concept but it definitely should be a considered a starting point for development of "The Blue Box" concept.

"The Blue Box" would initially consist of six departments which embody the above primary functions and represent an initial concept development design. They are presented below for consideration but no further discussion is necessary: Project Management Department; Concept Collection, Competition and Testing Department; Requirements Management and Communication Department; Innovation in Technology, Tactics and Procedures Department; Product Architecture and Integration Department and The Acquisition Department.

9.3 – Objectives of "The Blue Box"

There are many objectives of "The Blue Box" and most likely as the concept is refined and discussed, further additional objectives are going to be realized. The primary objectives as envisioned have been mentioned in many other locations in the paper, but for a quick summary a list is provided below.

- Improve the efficiency of the realization of large joint acquisition projects
- Better provide a process which supports the development of DoD products which embody NCW Theory and the Transition to the Information Age
- Minimize political influence on technical decisions with package decision authority still given to the Secretary of Defense
- Provide a process which maximizes the consideration of strategic requirements on the acquisition system
- Better manage the Defense Industry:
    - To ensure continued survival of current Defense Industry Partners
    - To build resilience in national defense capability strategies
- Integrate and facilitate inter-branch communication, cooperation and competition
- Give the branches reasons to better support their transformational capabilities through competition
- Develop a process which maximizes the integration of technology, experts, innovation, and requirements to produce the best system architecture to support military operations in the Information Age

These objectives are based on current needs and on the current models that are available. An important concern that many critics of change espouse is that changing a system brings about emergent properties which could be worse than the current system. This is possible, but a thoughtful use of system dynamics models and a careful study of new acquisition system architectures prior to implementation mitigates those risks. For the purposes of discussion, and for developing a new system for acquisitions

and transformation, any starting point is better than none at all. The problem with large scale change, especially on this level, there is rarely a comprehensive enough initial concept which can spin off discussions and the development of new better conceptual models. If nothing else, the objective of "The Blue Box" concept is to be a starting point for better future discussions on how to transform the DoD for the Information Age.

10 - Summary Conclusions and Recommendations

This document covers very large topics such as concepts of Network-Centric Warfare, military transformation, Department of Defense Transformation Plans and a review of the military acquisition system. It also proposes a new purchasing system for the most expensive military in the world. These are huge subjects and it is acknowledged that all relevant points of discussion on such topics cannot be addressed in one paper. But the major considerations are summarized and reviewed for basic underlying issues. The use of system dynamics to view the complex acquisition system and manage the information such that it is cognitively possible is a significant step towards a better understanding of that complex system.

This paper reviewed the background concepts and ideas of the both the military past and proposed future military changes. It reviewed the acquisition system and the needs of the combatant commanders. It reviewed the needs of the government and the needs of the Defense Industry, and of course, the needs of the military personnel fighting our nation's battles. These considerations are not simple and each of the above topics represents what some people study for their whole life. This paper combines all of those systems to be better understood for future change, and argues for taking a systems perspective.

Numerous changes to the acquisition system are proposed for the future to ensure the security of the nation. At the same time the recommendations work to improve the speed and efficiency of the acquisition system while producing better final systems. The recommendations are broad and they represent fundamental changes to the system, including: (1) legislative changes for purchasing authority for the military, (2) the creation of "The Blue Box", (3) new personnel regulations for the staff working in the "The Blue Box", (4) changes to the acquisition system on a massive scale, and (5) regulations controlling the interface of the Defense Industry with the government and military. In addition to those major changes, many other changes will be required of the acquisition system to represent "The New Model" as proposed. But those changes are not too different from many changes that have already been suggested by other organizations.

John J. Hamre and the CSIS have presented a report to the Senate Armed Services Committee addressing many of the same issues raised here. Their recommendations are based on different studies and completed entirely independently of this paper. But the surprising overlap of recommendations between their report and this paper suggests the ability to visualize the entire system is important. It makes it clearer for individuals to understand the system and see what needs to be changed for the future.

10.1 – Conclusions

The paper has recommended many changes to the acquisition system and the DoD transformation process. The use of system dynamics models represents a fundamental change to the perspective and process of analyzing the system. Numerous reports use the tried and true method which includes the use of past history analysis with current conditional analysis, and then recommend solutions based on theoretical conclusions. The systems dynamics method offers an effective way to analyze and view the DoD system and the quagmire of processes and procedures it is comprised of. The new perspective this paper presents hopefully will allow a fresh look at the system, and perhaps provide new motivation for current experts to explore building these types of models further.

The scope of this project and the complexity of the system is far beyond the capability of one person in a single paper, but the freedom to explore and suggest hypothetical changes shows the promise

such a system allows. The detail in the models and system could be refined further, but the level of resolution taken was appropriate for the purpose of this paper and its conclusions.

10.2 - Recommendations

During the course of this analysis many recommendations for further study were mentioned. Below is a list of areas where greater research could lead to better insights on the system and refine further recommendations.

- Develop more detailed systems dynamics models of each military branch to identify system factor effects which most positively help the branch acquisition system.
- Expand the models of the acquisition systems to include the Defense Industry integration and its effects on the development acquisition process. How big an effect does the Defense Industry have on the individual branch acquisition system?
- Study the new models to find and evaluate the cost of all the redundant acquisition processes and support organization in the military to place a total cost savings on having one major acquisition system verses four.
- Look at overlapping missions between the services to identify how combining more service schools would build better Joint Operations Culture through training and increased redundancy in both capability and training.
- Study the cost savings of having joint training and redundant capabilities of service members to quantify how the expense of fielding technologically advanced soldiers increases capabilities verses having larger numbers of lesser trained service members.
- Build system dynamics models of the fielding, support and logistical effects on the system to be gained by having more common hardware. Real data could be quickly acquired to build a fully functional and working model for this system. The resulting data will be invaluable for future decision making.
- Most importantly, a continued congressional study of this proposal and "The Blue Box" could provide the beginnings of the next true transformation of the acquisition system for the betterment of both the military and reducing the cost of military development.

The Blue Box is such a fundamentally new organization, and embodies what should be the vast majority of the DoD acquisition and development process, it is going to require a very large facility and location to exist. The complex technical nature of modern war is going to eventually demand some form of development consolidation prior to and part of developing a Network-Centric Military.

Finally the most important recommendation is to continue the study of the transformation process using cutting edge management and engineering systems technologies. This paper represents one new way of integrating those two sciences to study a common problem. Further research on this subject using systems dynamics would continue to produce new insights and understanding of the DoD acquisition and transformation process. I would hope that this paper will be embraced and considered a starting point for further analysis and study. The application of system dynamics on military systems is new and allows the user the capability to better track and understand all the interactions occurring in the system. More importantly, this process will allow new patterns and insights to be revealed and evaluated. I am confident that continued study of this methodology-based process, and with the freedom to think, "outside the box", would produce excellent recommendations for the future. And, most importantly, this will help keep our nation best prepared for the challenges the future has in store.

APPENDIX A

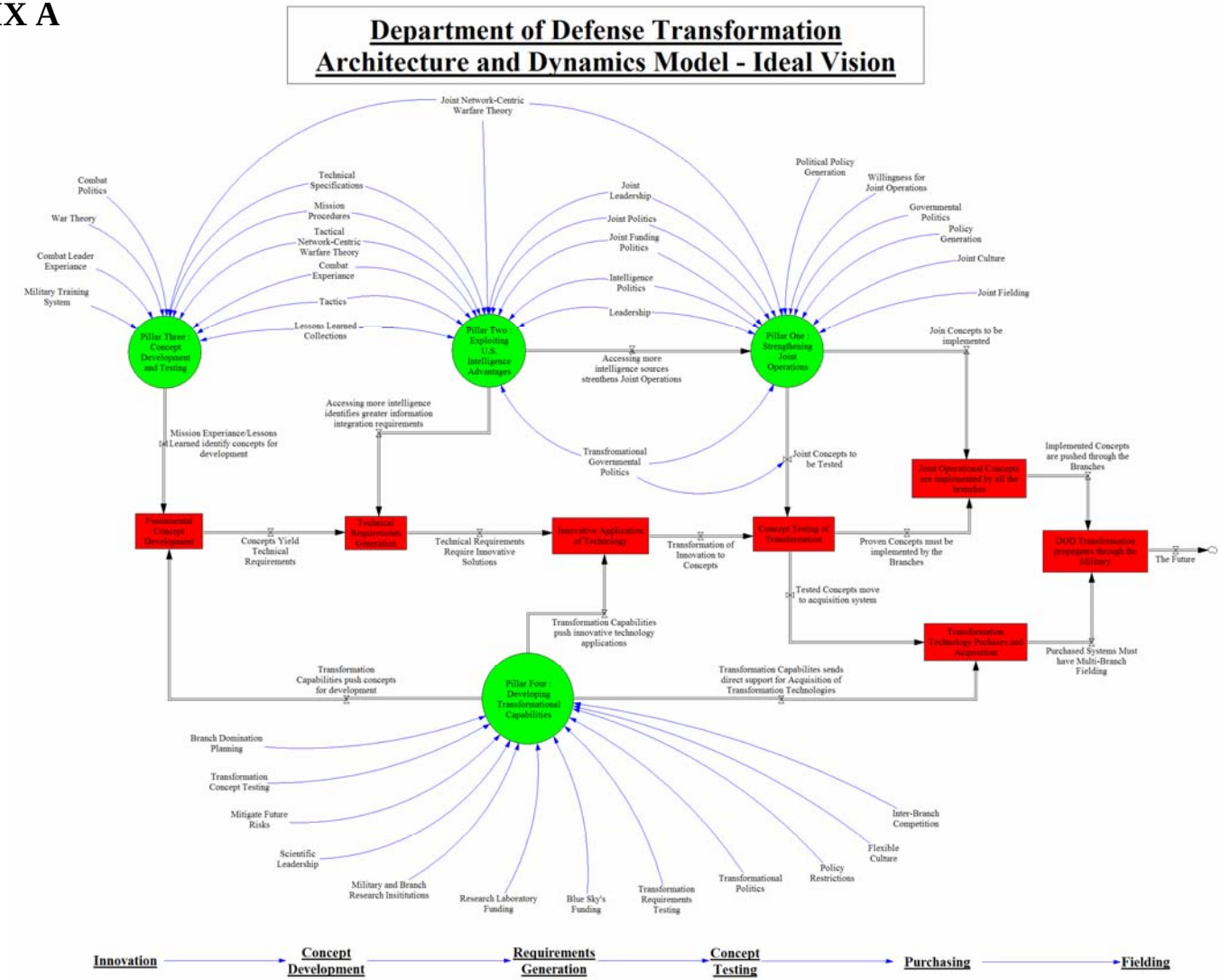

Figure 1 - DoD TPG Architecture - Ideal Vision Model

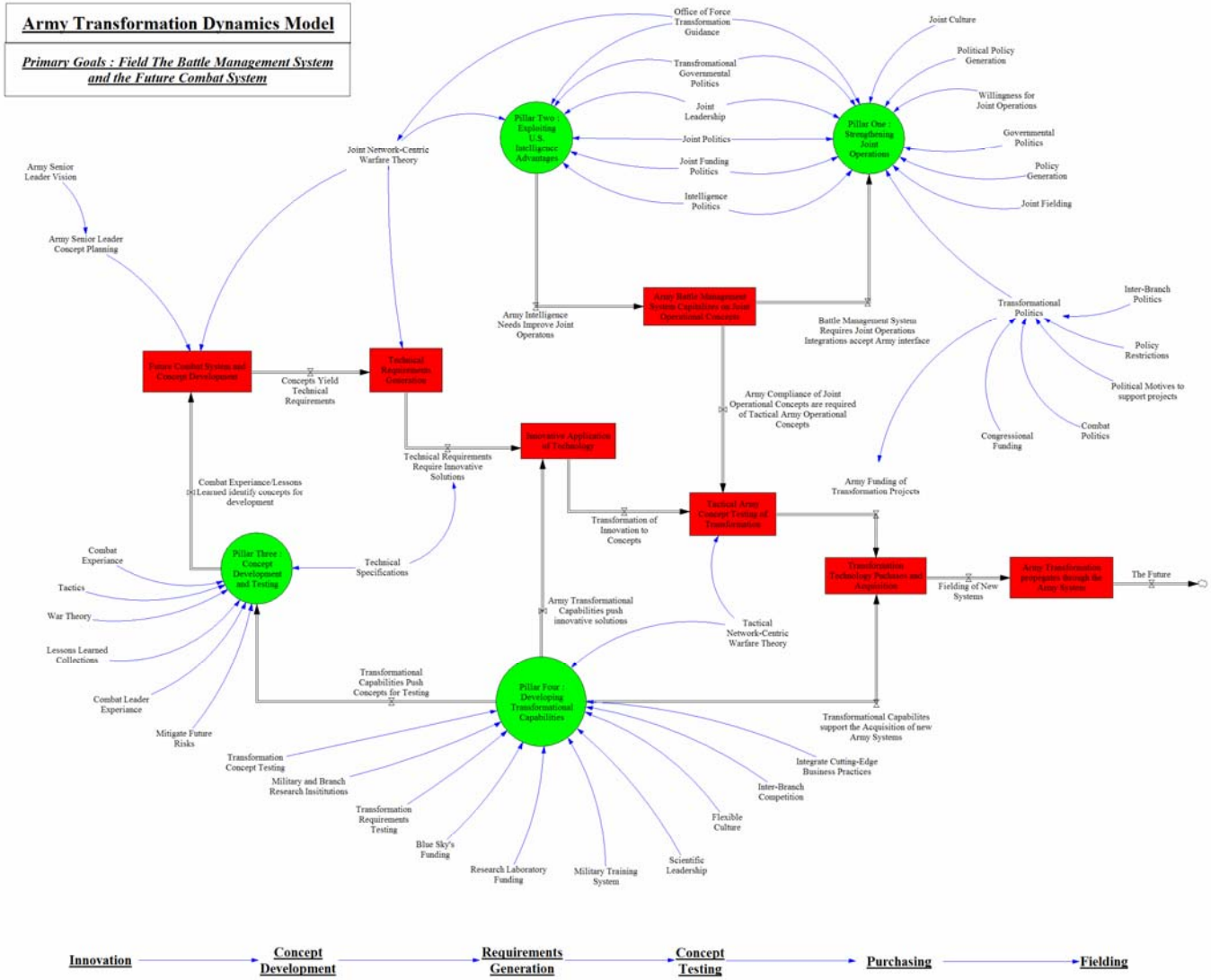

Figure 2 - Army Transformation Dynamics Model

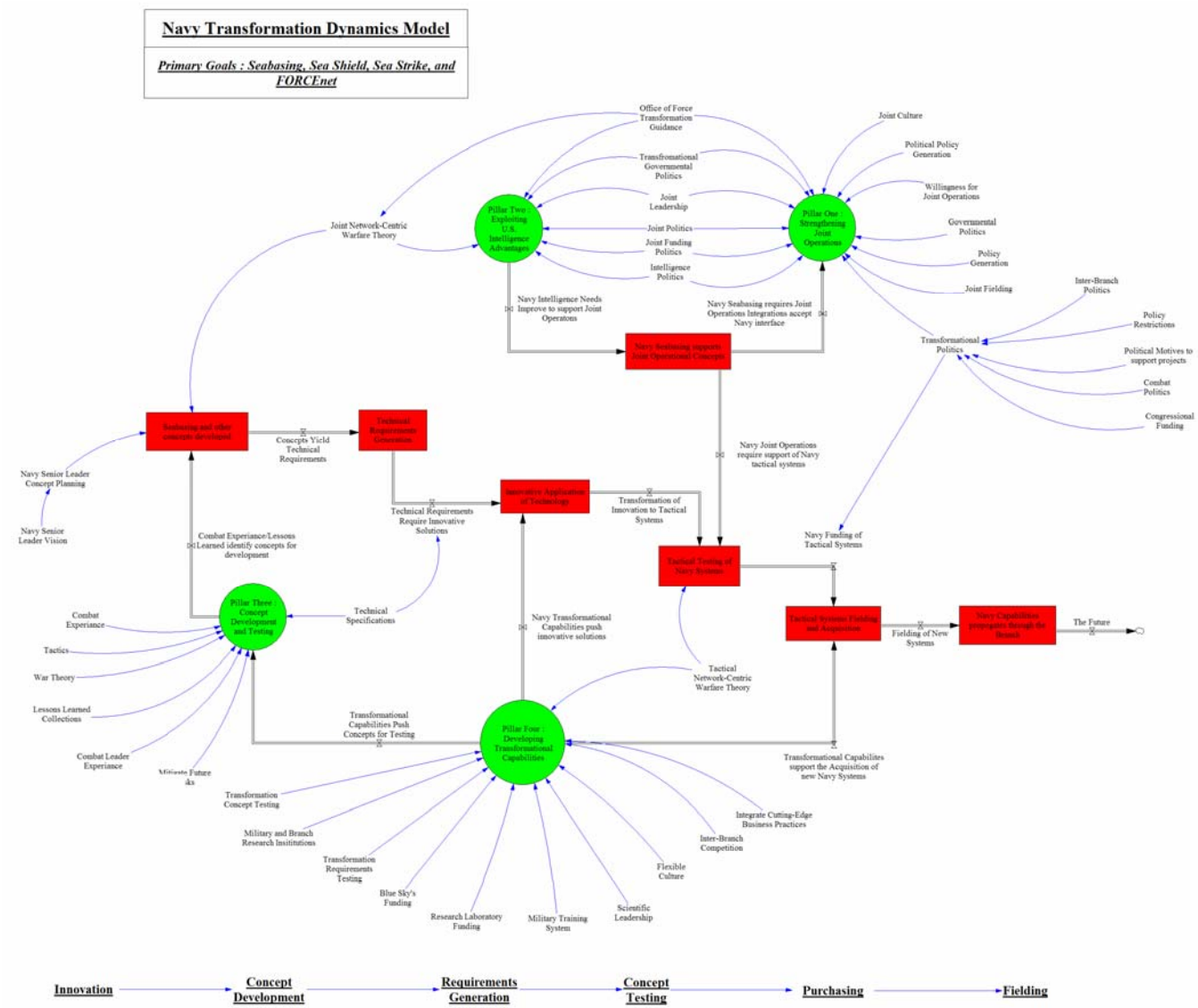

Figure 3 - Navy Transformation Dynamics Model

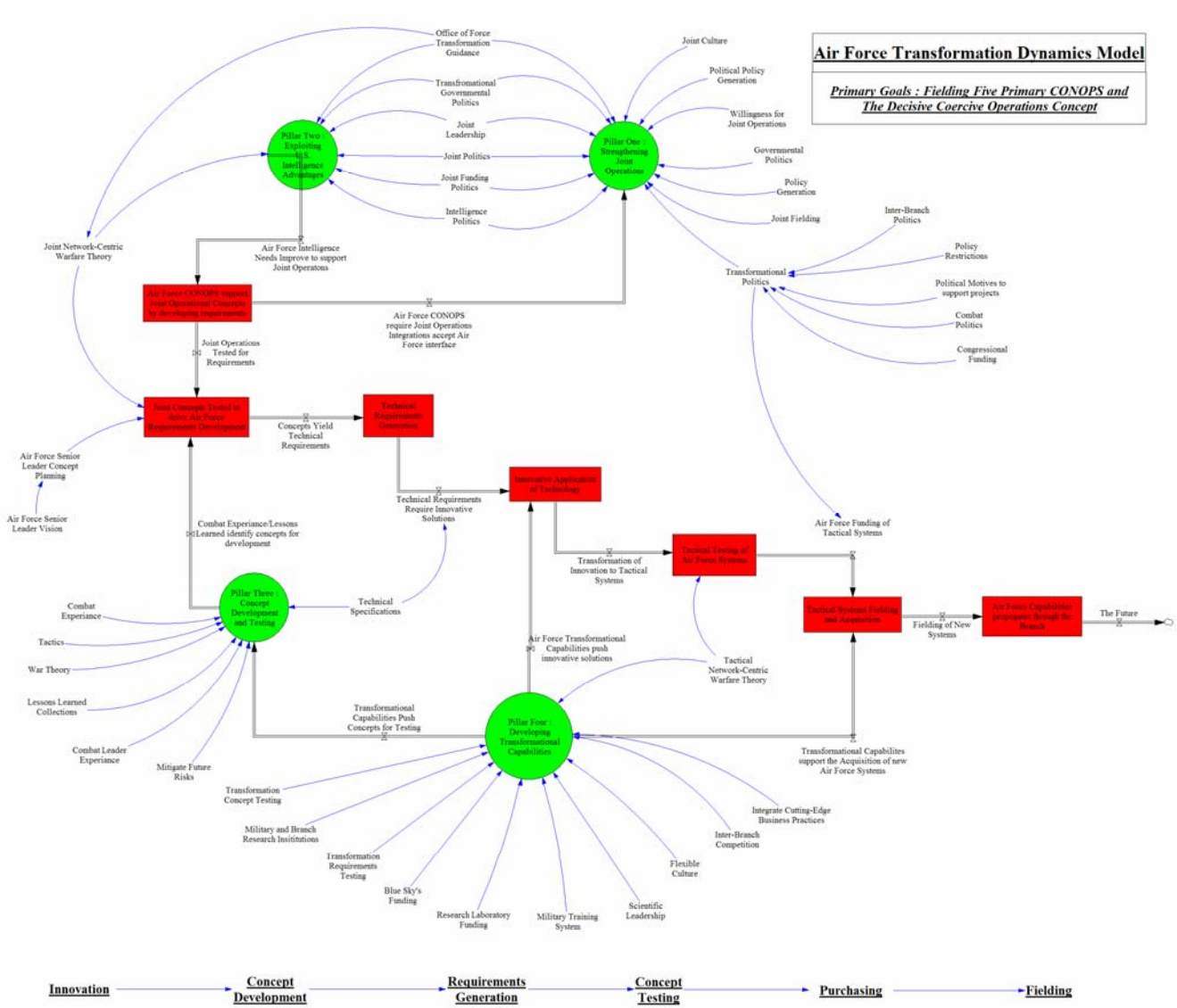

Figure 4 - Air Force Transformation Dynamics Model

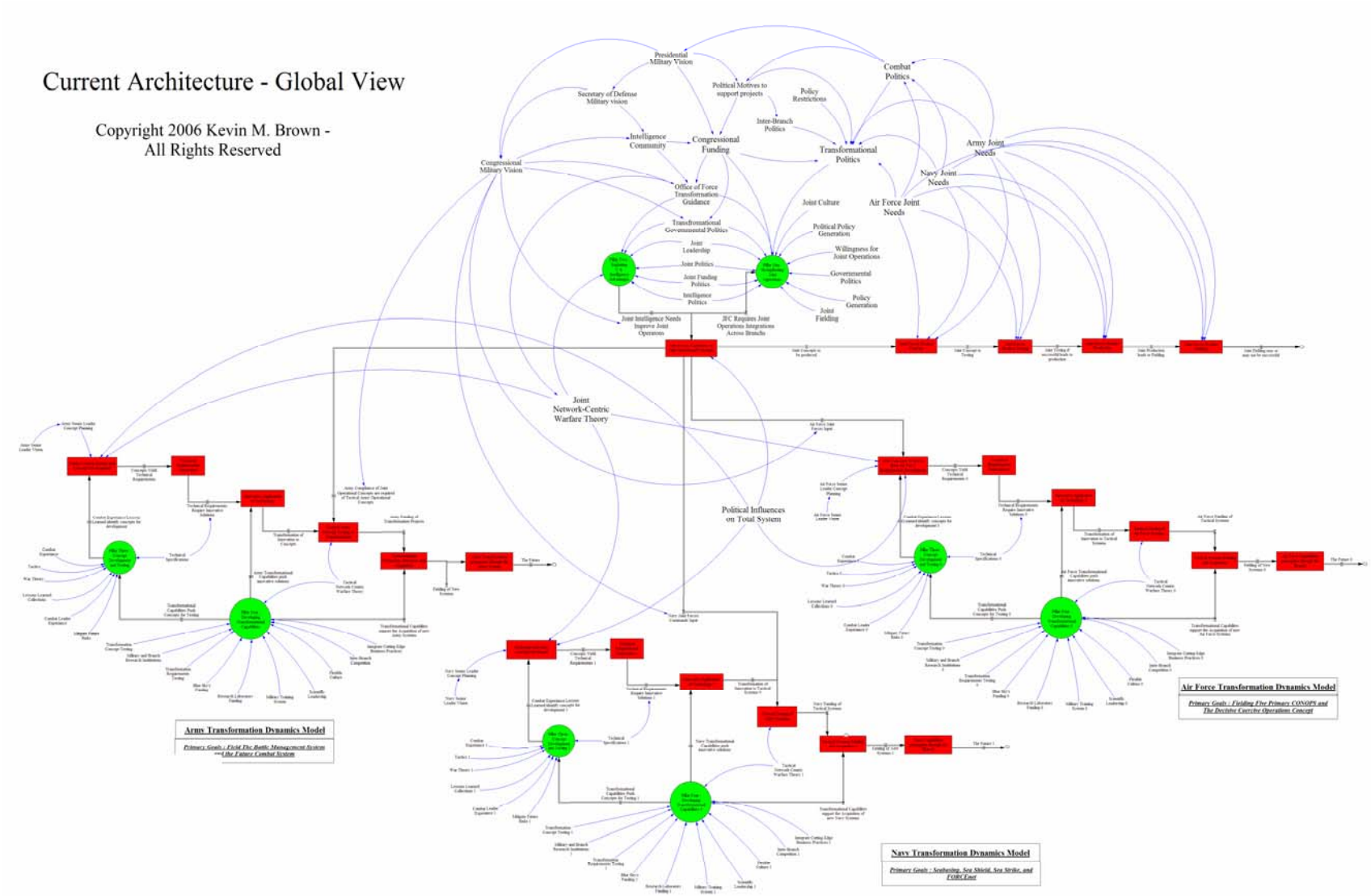

Figure 5 - Total DoD Acquisition Dynamics Model

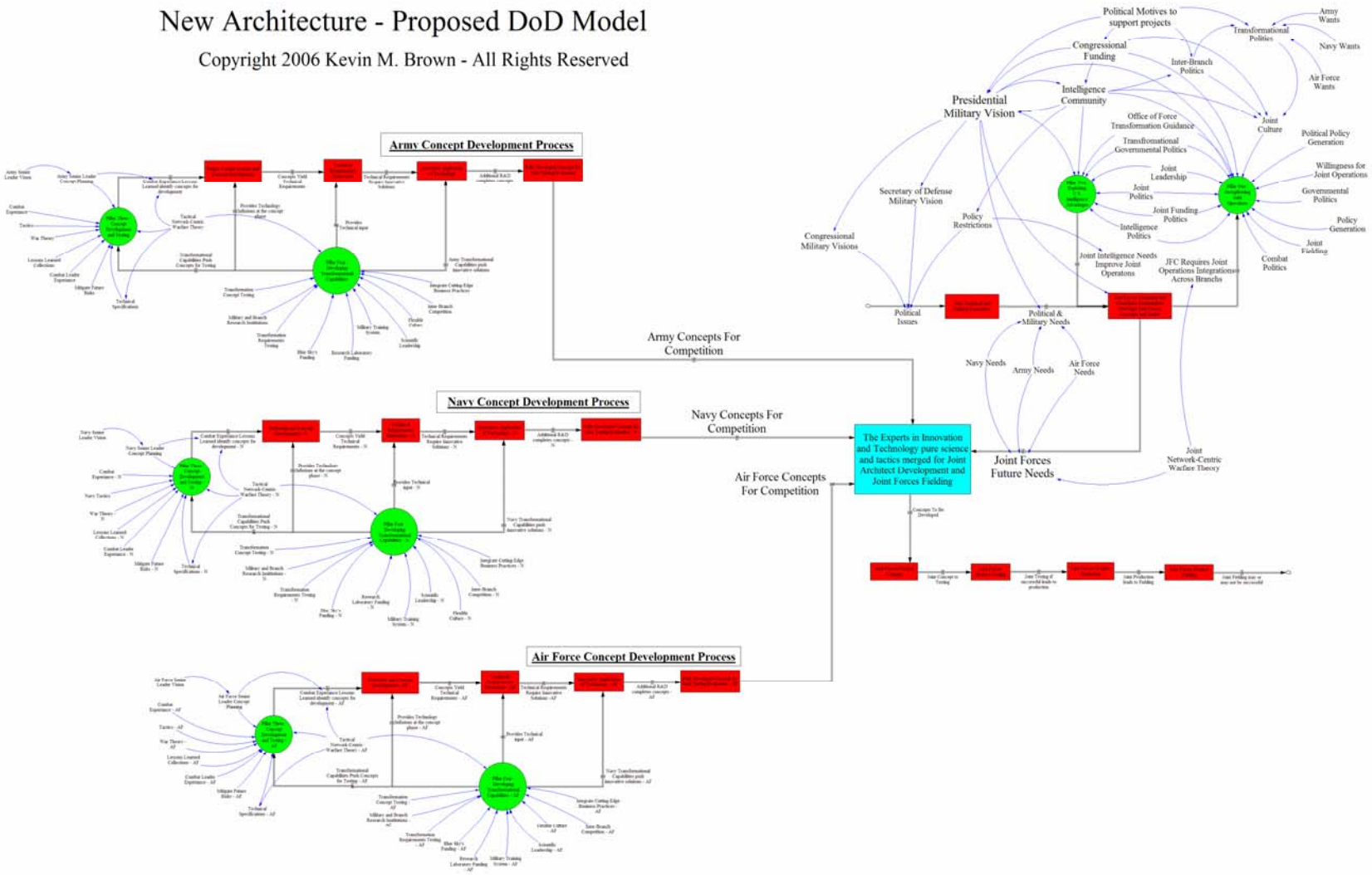

Figure 6 - Proposed New Model

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ENDNOTES

[i] Vice Admiral (Ret.) Arthur K. Cebrowski, Director, Office of Force Transformation, interview with Frank Swofford, Defense AT&L, March-April 2003.

[ii] John J. Garstka, "Network-Centric Warfare Offers Warfigting Advantage," Signal, May 2003.

[iii] *The Implementation of Network-Centric Warfare*, Office of Force Transformation, January 2005.
[iv] "Stocks and flows track accumulations of material, money and information as they move through a system. Stocks include inventories of product, populations and financial accounts such as debt, book value, and cash. Flows are the rates of increase or decrease in stocks, such as production and shipments, births and deaths, borrowing and replacement. Stocks characterize the state of the system and generate the information upon which decisions are based. The decisions then alter the rates of flow, altering the stocks…" (Sterman 102)
[v] This statement is based on personal conversations with congressional military staffers.
[vi] "The Blue Box" name was selected for the paper since it is a solution neutral concept name. Had another descriptive name been selected, readers would develop a pre-conceived idea on what the organization is supposed to do, and attribute current or similar organizational characteristics to the new proposed organization based on its name. In order to get the reader to consider this new concept with an open mind it is better to have a name not associated with any known organization.
[vii] The Clockspeed phrase as used here was popularized by Charles H. Fine, and is used here to represent his concepts as applied to the acquisition system.