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**NAVAL
POSTGRADUATE
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MONTEREY, CALIFORNIA

THESIS

**THE HOLISTIC TARGETING (HOT) METHODOLOGY AS
THE MEANS TO IMPROVE INFORMATION OPERATIONS
(IO) TARGET DEVELOPMENT AND PRIORITIZATION**

by

Christopher Scott Ieva

September 2008

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**THE HOLISTIC TARGETING (HOT) METHODOLOGY AS THE MEANS TO
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PRIORITIZATION**

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ABSTRACT

The Joint Publication 3-13 Information Operations (IO) states that both IO planning and targeting should be fully integrated with all joint planning and targeting efforts. However, this thesis' research with IO Subject Matter Expertise (SME) on IO targeting and practice suggests the existence of a fracture in the integration process. The most challenging doctrinal, technical, and practical integration challenge stems from the second phase of the Joint Targeting Cycle: Target Development & Prioritization. In response to this challenge, this study proposes five recommendations to enhance IO integration into the Joint Targeting Cycle: the use of interim IO Joint Munitions Effectiveness Manual (JMEM) techniques to better forecast cognitive effects, the adoption of the Measure of Worth (MOW) model to assess IO effects, the HOT methodology to develop and prioritize IO targets, the use of compendium software facilitate targeting problem understanding and the network analysis tool, Palantir, as an efficient and tailored semi-automated means to holistically prioritize and develop targets.

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I. INTRODUCTION

A. THE CHALLENGE OF INFORMATION OPERATIONS TARGETING

The Global War on Terror (GWOT) fathered a fascinating series of observations concerning the common perception of the conflict's complexity. Many of the GWOT's participants have developed the tendency to equate the war with not only playing chess, but playing a game of "three-dimensional" chess.¹ One British general officer took it one step further by stating,

It's hard pounding. This is as complex as I've ever seen anything I've ever done. This is really difficult. This is three-dimensional chess in a dark room.²

In the majority of the chess metaphor references, it was never mentioned that they had to possibly compete against a fellow player in a difficult game. Thousands of years of recorded human history have demonstrated that humans are ruthlessly cunning, resourceful and smart. Therefore, the mechanics of chess itself is not the source of complexity; instead, the complexity derives from the mental abilities of your opponent. The frequency of the chess metaphor suggests an increased challenge in addressing the human element of warfare. Many of these challenges possess intangible qualities because they reside outside the

¹ Some references include the phrase "four-dimensional chess" to possibly include time as the fourth dimension in addition to the three spatial dimensions.

² DefenseLink News Transcript: DoD News Briefing with Lt. Gen. Lamb from Iraq, 8 July 2008, <<http://www.defenselink.mil/Transcripts/Transcript.aspx?TranscriptID=3870>>.

physical domain. This chess anecdote supports the growing relevance of informational and cognitive domains.

Shifting to macro view of the GWOT, the United States' grand strategy continually emphasizes the importance of information. Campaign names such as Operations IRAQI FREEDOM and ENDURING FREEDOM promote the concept of ideology as an instrument of national power. Even the phrase GWOT itself possesses clear informational relevance. After all, terror is not a physical enemy, but a tactic.³ Therefore, in addition to the tactical and operational levels of war, one observes an increasing role for strategic military operations in the information and cognitive domains. Across the levels of war, it is the convergence of the physical, information, and cognitive domains that ultimately produces the GWOT's complexity.

Information Operations, or IO, operates in the areas where the physical, informational, and cognitive domains converge. IO is described as the integrated employment of Electronic Warfare (EW), Computer Network Operations (CNO), Psychological Operations (PSYOP), Military Deception (MILDEC), and Operations Security (OPSEC), in concert with specified supporting and related capabilities, to influence, disrupt, corrupt, or usurp adversarial human and automated decision making while protecting our own.⁴ On closer examination, the process of IO targeting represents the implementation level where targets residing in the physical, informational and cognitive domains are prosecuted.

³ Bard E. O'Neill. *Insurgency & Terrorism: Inside Modern Revolutionary Warfare*. Washington: Brassey's (US), 1990.

⁴ United States Joint Chiefs of Staff, Information Operations. (Washington, DC: Joint Chiefs of Staff, 2006).

Doctrinally, IO's targeting process is executed through the joint targeting cycle. The joint targeting cycle is a six phase process designed to select and prioritize targets in order to match an appropriate response with given operational objectives and environments.⁵

Phase two of the joint targeting cycle involves the development and prioritization of targets. This phase identifies, researches, develops, "vetts" and validates potential targets for approval and action during a given time period.⁶ Although these actions can apply to any target residing in the physical, informational, and cognitive domain, IO target development and prioritization possesses nuances that account for the multiple domain convergence. Although we know chess's eventual purpose is to successfully target and cause a favorable effect upon the opposing player's king, the greatest challenge lies in knowing where, when, and how to target an opponent's piece as part of an overall coherent campaign to produce the conditions for ultimate victory. Since the joint targeting cycle makes no distinction between lethal and non-lethal effects, IO's doctrine, supporting technology, and practices serve as significant inputs to second phase of the joint targeting cycle.

When viewing military doctrine, technology and practice, determining the actual cause and effect inter-relationships between these three areas becomes a tautological exercise. Does military doctrine drive technology and practice or vice versa? If one subscribes to

⁵ United States. Joint Targeting. Joint pub, 3-60. [Washington, D.C.]: Joint Chiefs of Staff, 2007.

⁶ Ibid.

the "necessity is the mother of invention" philosophy, then perhaps practice drives doctrine and technology. One could obtain better success in proving that the chicken did in fact come before the egg, or vice versa. In order to achieve the integrated employment of IO's capabilities, doctrine, technology and practice must be aligned.

From an IO target development and prioritization position, a dilemma arises when the current doctrine, technology and practice are not efficiently aligned to better support the commander's objectives. This possible fissure generated the primary research questions for this research.

- What modifications to the joint targeting cycle are required for the efficient integration of IO target development and prioritization?
- Does the current definition and practice of Measures of Effectiveness (MOE) lack the ability to ascertain actual progress towards meeting a targeting effect or objective?
- Do the contradictory aspects of IO core, supporting and related capabilities preclude the use of a holistic target development and prioritization method?
- Is there an automated or software solution to translate doctrine into practice while still incorporating existing and emerging technology?

Based upon research and examination of current IO doctrine and targeting practice, this thesis determined that inconsistencies existed in both the doctrine and practice. The role of technology, an essential element of IO's core, supporting and related competencies, only magnifies the divide. On a favorable note, the existing doctrine and practice does provide sufficient flexibility to permit more

efficient target development and prioritization solutions. This doctrinal flexibility serves as the maneuver space for interim and durable IO target development and prioritization recommendations.

In this maneuver space, this thesis puts forward five recommendations to enhance IO target development and prioritization: the use of interim IO JMEM techniques to better forecast cognitive effects, the adoption of the Measure of Worth (MOW) model to assess IO effects, the HOT methodology to guide target development and prioritization, the use of compendium software facilitate targeting problem understanding and the network analysis tool, Palantir, as an efficient and tailored semi-automated means to holistically prioritize and develop targets. The recommendations made to improve IO phase two target development and prioritization possess the following caveat:

On this uneven playing field, we will be confronted by enemies who adhere to no rules, while many of our actions or inactions may have strategic consequences. Accordingly, the Marine Corps cannot be wedded to a particular method or mode of war. It cannot assume there will be technological silver bullets or doctrinal formulas that ensure military success.⁷

⁷ United States Marine Corps, Marine Corps Vision and Strategy 2025 publication, 2008.

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II. UNDERSTANDING INFORMATION OPERATIONS (IO) TARGETING

A. IO BACKGROUND

1. Joint Information Operations (IO) Doctrine

Prior to examining the joint doctrine for IO, it is best to explain the purpose and framework of doctrine in the military profession. From a joint definition, doctrine consists of the fundamental principles by which the military forces or elements thereof guide their actions in support of national objectives. It is authoritative, but requires judgment in application.⁸ Alternatively, the United States Marine Corps puts forward that doctrine establishes the fundamental beliefs on the subject of war and the practice of that profession.⁹ Despite the difference between principles and beliefs in the respective doctrinal definition, both viewpoints heavily convey a sense of collective necessity in its eventual application. For this thesis, doctrine will be viewed and utilized as a common understanding in the approach of achieving a commander's stated objective or intent. From this definition, doctrine should never be prescriptive. Instead, it must possess adaptive qualities to ensure the functional applicability of the stated common view across a full range of situations.

⁸ Department of Defense Dictionary of Military and Associated Terms, 2007, Defense Technical Information Center.

⁹ United States Marine Corps, Tactics (Washington, DC, U.S. Marine Corps, 1997).

Joint Publication 3-13: Information Operations is the source document for all joint IO doctrine. From this publication, IO's principal objective is to gain and maintain informational superiority for the United States and its allies.¹⁰ In keeping with importance of the integration of IO, the Joint Publication 3-13 presents two main points. First, it stresses the use of the Joint Operational Planning Execution System (JOPES), the joint targeting cycle and targeting coordination board for all IO planning and coordination. Secondly, in planning and execution, the publication treats IO as a single entity. Although the JP 3-13 identifies and separates the core, supporting and relating IO capabilities, it adopts a general approach to better facilitate the goal of integrated employment.¹¹ Since the thesis' primary research questions focus on phase two of the joint targeting cycle, the research will next look at joint targeting doctrine.

2. Joint Targeting Doctrine

Joint Publication 3-60; Joint Targeting is the lead document for all joint targeting doctrine. Even though this thesis makes an emphasis by prefacing the term targeting with the words IO or non-lethal, joint doctrine makes no such distinction. Joint targeting possesses four principles stating that all targeting should be focused, effects-based, interdisciplinary and systematic. In examining the targeting process as it relates to IO, some key points

¹⁰ United States Joint Chiefs of Staff, Information Operations. (Washington, DC: Joint Chiefs of Staff, 2006).

¹¹ Information Operations Roadmap publication, 2003, Dept. of Defense.

emerge. First, IO's inherent cognitive complexity impedes the traditional targeting capability to effectively align effects with objectives. Secondly, from an informational and cognitive perspective, the term Measure of Effectiveness (MOE) struggles to accurately capture complete progress because it may only focus on indicators of positive attainment. Thirdly, beyond the usage of the joint targeting cycle, the doctrine does not advocate any adherence to a single targeting methodology. Finally, and most importantly, the four principles of joint targeting are equally applicable with all IO capabilities. In summary, no doctrinal conflict exists between IO and joint targeting. While some challenges exist in the integration of IO in the process, the JP 3-60 provides sufficient room to put forward doctrinally compliant solutions for the thesis' primary research questions.

3. Joint Targeting Cycle

The joint targeting cycle is a logical six phase process designed to select and prioritize targets in order to match an appropriate response with given operational objectives and environments.¹² Joint Publication 3-13 suggests IO targeting should be integrated into the joint targeting cycle. From a targeting standpoint, an actual target is an entity or object considered for possible engagement or action.¹³ The term target can apply to adversarial, neutral or even possibly friendly entities or objects. While the Joint Targeting Cycle is coherent,

¹² United States. Joint Targeting. Joint pub, 3-60. [Washington, D.C.]: Joint Chiefs of Staff, 2007.

¹³ Ibid.

logical and procedurally effective, its origins primarily stem from aviation-delivered fires. The cycle evolved from strategic bombing in the Second World War to its present day manifestation during the first Gulf War.¹⁴ The cycle's origin suggests a vast long standing body of corporate knowledge on the lethal fires perspective of the cycle's application. This corporate knowledge is analogous to invisible glue that keeps the cycle together for efficient lethal targeting. In its current form, the cycle represents an appropriate balance of art and science incorporating the principles of effects-based targeting, but it still does not effectively incorporate the information and cognitive domains(see Figure 1). Next, the thesis will briefly discuss each phase of the cycle through an IO lens followed by a brief summary of the results to promote greater understanding of this thesis' major research questions.

¹⁴ Robert P. Winkler, Joint Forces Staff College (U.S.), Joint Advanced Warfighting School, and National Defense University., The Evolution of the Joint ATO Cycle, Joint Forces Staff College, Joint Advanced Warfighting School, 2006.

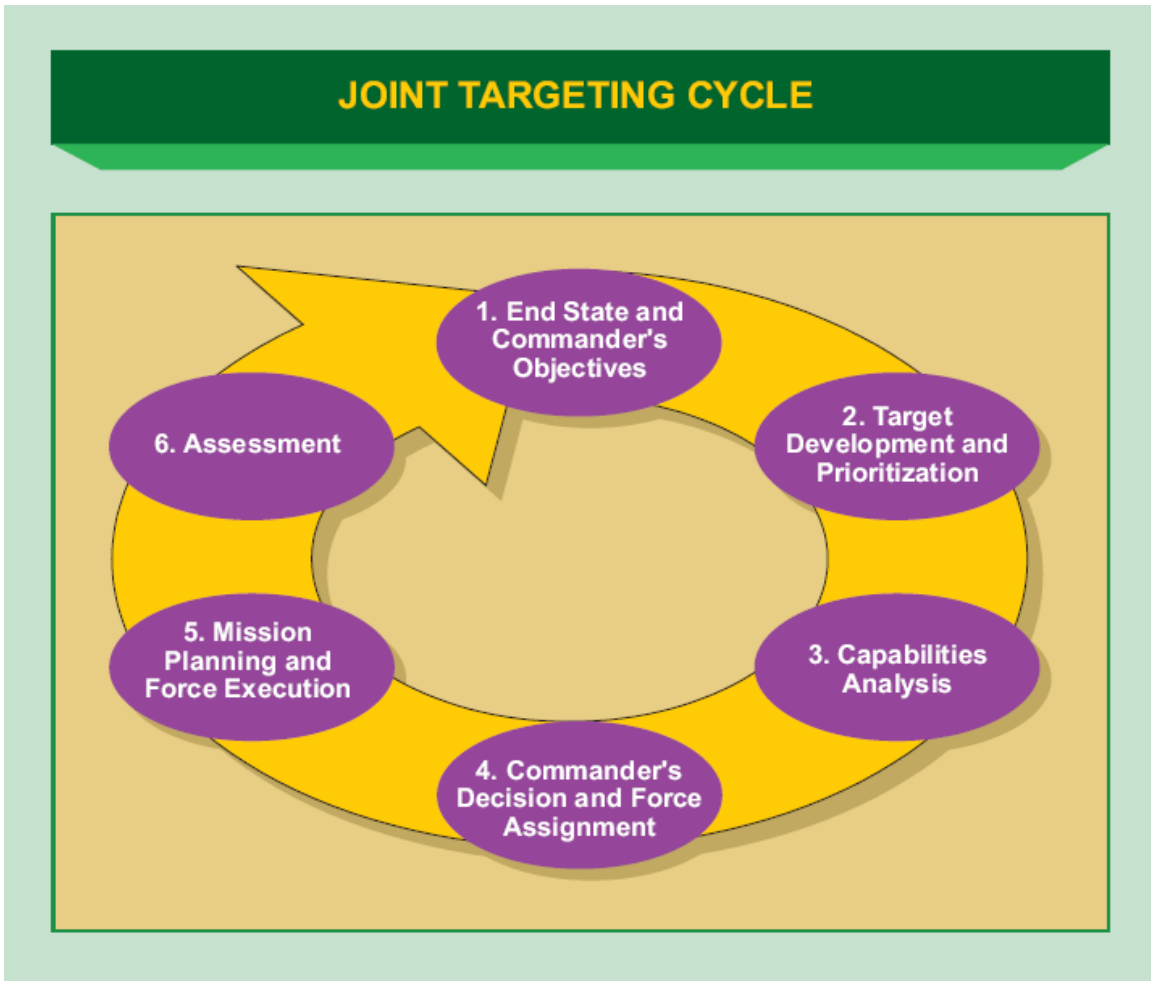


Figure 1. The Joint Targeting Cycle¹⁵

B. PHASE 1: END STATE AND COMMANDER'S OBJECTIVES

The commander's objective serves as the entire impetus for the targeting cycle. The end state drives the targeting cycle, so that all subsequent phases should support the higher objective instead of performing targeting simply for the sake of targeting. Of significance, once the targeting cycle has been initiated, the assessments from phase six of

¹⁵ United States. Joint Targeting. Joint pub, 3-60. [Washington, D.C.]: Joint Chiefs of Staff, 2007.

the cycle directly influence the creation of future objectives. Since, IO effects support the attainment of higher objectives, there are seldom pure IO objectives. Consequently, phase one outputs are identical for all types of targeting. In review, phase one of the joint targeting cycle efficiently translates in nearly all types of targeting examples.

C. PHASE 2: TARGET DEVELOPMENT AND PRIORITIZATION

Phase two presents the most intricate challenge in the integration of IO into the joint targeting cycle. This phase identifies, researches, develops, vets and validates potential targets for approval and action during a given time period.¹⁶ Phase two requires significant rigor, intelligence fusion, and problem understanding to generate validated target sets.

From a development perspective, potential targets in the informational and cognitive domain significantly differ from their physical counterparts. If an informational domain is described by flow and content, a high probability exists that the informational target is part of a greater network. A network represents a complex system that possesses physical, informational, and cognitive components. If the cognitive domain is described by values and beliefs, it is hard to isolate what the actual target is or is not. Consequently, IO target development adds increased complexity to an already difficult phase.

¹⁶ United States. Joint Targeting. Joint pub, 3-60. [Washington, D.C.]: Joint Chiefs of Staff, 2007.

A similar challenge arises in the (now) nominated target's prioritization. In both cases, the prioritization challenge is severe due to the intricacy of the solution. In many cases, the solution is not a definitive answer, but a best case approach based on a stakeholder's position. These IO informational and cognitive nuances in the target development and prioritization phase suggest a distinct, but not doctrinally exceptional, methodology could aid in this phase.

D. PHASE 3: CAPABILITIES ANALYSIS

The purpose of the capabilities analysis is to weigh the relative effectiveness and efficiency of the available forces as an aid to achieving the objectives set forth by a commander.¹⁷ The analysis requires specialized knowledge about a given friendly asset or resource to achieve a stated effect. In terms of proficiency, the capabilities analysis should seek efficiency while incorporating the potential overall risk to mission and friendly forces. While many IO capabilities may lack the same broad degree of knowledge as an equivalent lethal fires asset, IO capability experts do exist. Accordingly, from an IO perspective, the gap between lethal and non-lethal targeting can be crossed through a personnel staffing solution or through information sharing.

E. PHASE 4: COMMANDER'S DECISION AND FORCE ASSIGNMENT

Although the purpose of phase four is nearly self explanatory, some IO considerations should be brought forward. In lethal targeting, the commander's approval

¹⁷ United States. Joint Targeting. Joint pub, 3-60. [Washington, D.C.]: Joint Chiefs of Staff, 2007.

authority and force assignment is tied to physical boundaries. However, many of IO capabilities can easily transcend physical boundaries. Nearly every core, related and supporting capabilities possess a very large effects footprint. Beyond capabilities, IO can be employed not just in war, but in peacetime. This full conflict spectrum makes IO targeting tied to other instruments of national power beyond military operations. As a result of this factor, IO tends to require a higher level of approval authority. In some cases, an IO capability's approval authority may reside above the authority of the commander who is actually running the targeting cycle. This IO distinction does not represent a doctrinal or methodological problem, but an approval coordination issue.

F. PHASE 5: MISSION PLANNING AND FORCE EXECUTION

The purpose of phase five is to task subordinates to execute a given targeting plan. From a lethal perspective, tasked tactical commanders may have to conduct dynamic targeting within this phase. This process is called find, fix, track, target, engage and assess or F2T2EA.¹⁸ High value or high payoff emerging targets found during F2T2EA can be identified for Time Sensitive Targeting (TST). TST essentially compresses the joint targeting cycle within phase five to accommodate for the emerged target.¹⁹ While the concepts found in F2T2EA and TST can loosely translate into IO, they do not always procedurally match. However, since the F2T2EA process is being done at the operator

¹⁸ United States. Joint Targeting. Joint pub, 3-60. [Washington, D.C.]: Joint Chiefs of Staff, 2007.

¹⁹ Ibid.

level, the actual sub steps contained in phase five, F2T2EA for non-lethal force application remain outside the purview of the targeting process. Therefore at the phase level of the joint targeting cycle, phase five works for both lethal and non-lethal targeting. As a result, IO may not be performing an exact version of F2T2EA, but still executes a functional equivalent.

G. PHASE 6: ASSESSMENT

Phase six represents a considerable challenge for successful integration of IO in the joint targeting cycle. Since, by definition, targeting is the process of selecting and prioritizing targets and matching the appropriate response while considering operational requirements and capabilities, one must be able to reasonably forecast an intended effect.²⁰ A barrier to matching IO effects with objectives is the current unavailability of an effective IO Joint Munitions Effectiveness Manual (JMEM).²¹ A JMEM is a comprehensive source of information concerning weapon effectiveness, characteristics, and employment requirements.²² Since IO's core, supporting and relating capabilities are both heavily resident in the information and cognitive domains and are diverse, it is a great challenge to possess a single source that can provide a corresponding IO measure of effectiveness, characteristics, and requirements. The utility of an IO JMEM equivalent predicates itself on the assumption that the cognitive

²⁰ United States. Joint Targeting. Joint pub, 3-60. [Washington, D.C.]: Joint Chiefs of Staff, 2007.

²¹ John Loper. "RE: IO JMEM." E-mail to author. 12 August 2008.

²² United States. Department of Defense Dictionary of Military and Associated Terms. [Washington, D.C.]: Joint Chiefs of Staff, 2007.

dimension, regardless of core, supporting and relating capability used, is the most important dimension.²³ Due to the unpredictability of human nature, the current effects prediction barrier complicates the traditional application of targeting experience to the IO process. Another IO problem related to phase six of the targeting cycle is the time required to collect, analyze and produce an accurate assessment. Ideally, to make the cycle work, the output of phase six should be the input to phase one. This is true in both the lethal and non-lethal targeting cases. However, many IO capabilities such as PSYOPs and Civil Military Operations (CMO) may require months or years to receive accurate assessments. In the context of the targeting cycle, this may not be timely enough to drive subsequent targeting evolutions. To add more friction, in this interim period, subsequent cycles could have been altered the initial assessment. While the concept of assessment is equally applicable in the lethal and non-lethal context, IO's ability to render timely, accurate and relevant assessments to support the joint targeting cycle is far more difficult.

H. SUMMARY OF IO PERSPECTIVE TO THE PHASES OF THE JOINT TARGETING CYCLE

Doctrinally and functionally, IO works in all phases of the joint targeting cycle. In terms of IO suitability, phases one and three possess no functional and doctrinal problems making them highly efficient cases. Phases four and five represent cases where there are no doctrinal

²³ United States. Naval Doctrine Publication 6: Naval Command and Control. Washington, DC: Dept. of the Navy, Office of the Chief of Naval Operations and Headquarters, U.S. Marine Corps, 1995.

issues, or limited functional IO problems. Though not a highly efficient case, these phase four and five functional problems can be solved through proper staff sourcing, integration, information management and approval authority procedures. While the joint targeting doctrine supports the inclusion of IO in phases two and six, the phase's functional problems could impede overall targeting efficiency. Moving beyond the sequential phases of the cycle, the functional inefficiency of the two phases make them closely related. If IO targets lack the complete ability to be assessed in phase six, they may also lack the ability to be originally developed in phase two. This suggests that phase two target development requires a limited ability to forecast the desired effect in order to develop potential targets and then prioritize the validated targets. Therefore, from an IO perspective a discrepancy exists not only in phases two and six, but between the two phases. Despite their numerical order, phases two and six are directly linked in an IO targeting environment.

This phase two and six discrepancy presents the greatest challenge but also possesses the greatest area for improvement. While Joint Publication 3-13 states that the joint targeting cycle should be used, it does not specify an explicit doctrinal, methodological, or procedural means of how to work inside the two phases of the greater cycle. Additionally, the joint targeting cycle has always been a dynamic process. The principles of Effects Based Targeting (EBT), Time Sensitive Targeting (TST) and Special Operations Force (SOF) targeting have put forward distinct best practices that work well within the greater joint targeting

cycle.²⁴ This establishes a precedent for the incorporation of emerging Tactics, Techniques, and Procedures (TTPs). In keeping with the scope of the thesis, the research will focus on the second phase of the joint targeting cycle, but will address elements of phases two and six that are interdependent. In looking at the discrepancies, the author researched comparable problems to gain a better research foundation and perspective.

I. INFORMATION OPERATIONS TARGETING REPRESENTS A "WICKED PROBLEM" DILEMMA

1. What are Wicked Problems and Social Messes?

Interestingly, many characteristics of IO targeting phase two and six discrepancies also surface in the field of wicked problem sets. After performing a literature review on the subject of wicked problems, three prominent perspectives on the topic emerged. Rittel's and Webber's work in organizational development, titled *Dilemmas in a General Theory of Planning*, initially coined the term wicked problem. Building upon Rittel and Webber's work, Conklin's book, *Dialogue Mapping: Building Shared Understanding of Wicked Problems*, essentially shares a mutual understanding of the overall belief, but expands on the body of research by addressing the area of a team's shared understanding as

²⁴ Targeting, 2006; U.S. Air Force, Joint special Operations Task Force Operations, 2007; Joint Chiefs of Staff., Commander's Handbook for Joint Time-Sensitive Targeting, 2002; United States Joint Forces Command, Joint Warfighting Center [and] Office of the Secretary of Defense, Joint Warfighters Joint Test and Evaluation, Integration of Special Operations Forces into the Joint Targeting Process, 2003; U.S. Army Command and General Staff College, Time Critical Targeting: Predictive vs. Reactionary Methods: An Analysis For The Future, 2002. Defense Technical Information Center.

it relates to wicked problem definition and approach. Along a similar line of logic, Horn specifically looks at the social mess problem in a series of graphically oriented presentations or slides by employing visual analytics to better understand social problems. Although the entire scope of research on this area is considerably profound, this thesis will only select and discuss specific wicked problem characteristics to promote a better understanding of the IO targeting problem.

Wicked problems represent highly complex dilemmas that, when addressed, can only achieve a relative degree of success. Wicked problems are dynamic, unstable and unpredictable. First, intrinsic wicked problem complexity cannot be truly appreciated until an initial solution has been proposed. This idea implies the use of an iterative or a continuous solution program. However, due to the problem's dynamic complexity, the previous iteration's variables have already been altered, thereby inhibiting the likelihood of eventual or complete problem mastery.²⁵ Therefore, a given solution is generally applicable only once. Second, wicked problems have no right or wrong answers.²⁶ Instead, a proposed answer improves, worsens or maintains the undesirable symptoms of the root problem. Finally, in tackling wicked problems, one affects the very nature of the problem.

An ever present element in the wicked problem involves social complexity. Social complexity is a function of the

²⁵ W. J. Rittel and Melvin M. Webber, Dilemmas in a General Theory of Planning, (Berkeley: Institute of Urban & Regional Development, Un of California], 1972).

²⁶ Rittel.

number, position, background, organizational distinction, group dynamics and individual personalities of the team tasked to treat the wicked problem.²⁷ The inherent diversity of social complexity tends to create divergent outlooks on problem definition. Without mutual understanding on problem definition, the likelihood of producing a satisfactory solution for all stakeholders remains unlikely.

Another element to the wicked problem deals with technical complexity.²⁸ Technical complexity does not relate to a single item of technology. Instead, technical complexity involves the integration of the multiple components as part of larger system where each part possesses its own unique set of requirements. It is a system of systems problems that absolutely requires a holistic approach to achieve a solution. For example, in looking at Figure 2, one can visually appreciate the effect of technical complexity. The figure represents the architecture of the Global Information Grid (GIG) for a typical lethal targeting function. Beneath the surface complexity of the GIG diagram, lies an even deeper reservoir of technical expertise required to make the GIG functional. However, this technical expertise requires a great deal of individual specialization. This system requires integrated solutions, but there is not one single source solution. As technology increases, the concept of technical complexity becomes more pronounced in the wicked problem set framework.

²⁷ E. Jeffrey Conklin, Dialogue Mapping: Building Shared Understanding of Wicked Problems (Chester, England: Wiley, 2006).

²⁸ Conklin.

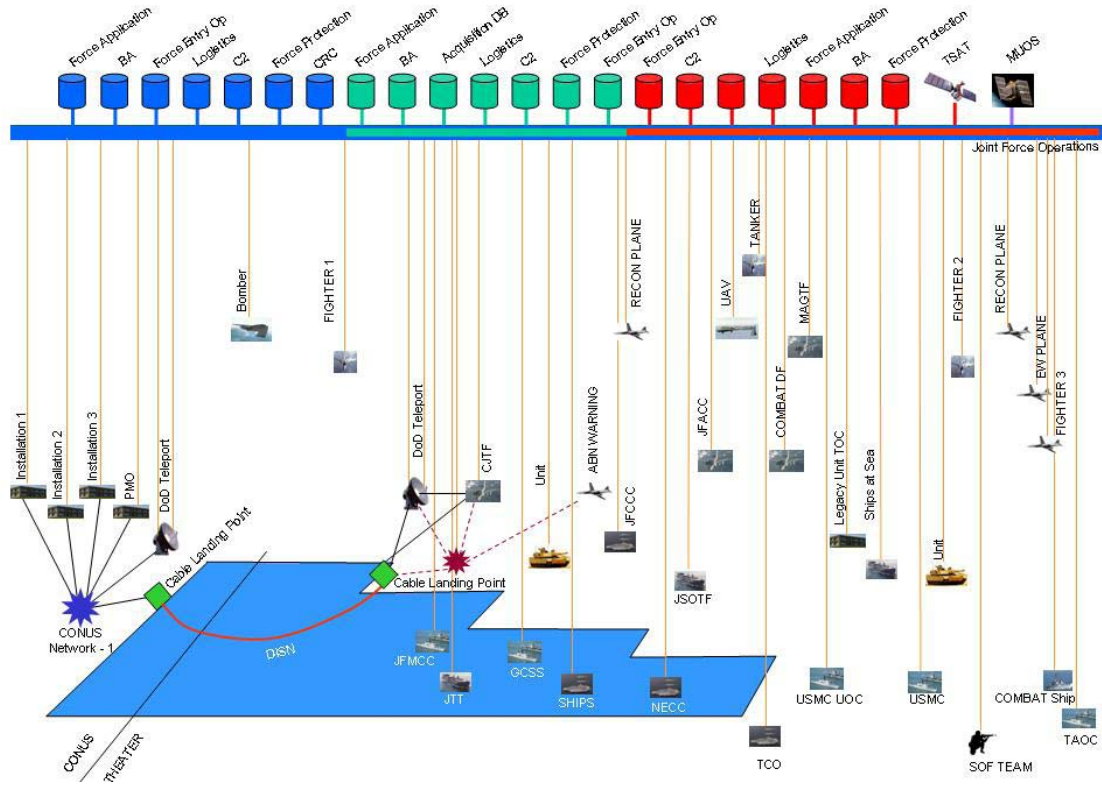


Figure 2. Targeting Global Information Grid (GIG)²⁹

In many respects, military professionals have historically known and appreciated the concept of wicked problems. From classical to current military theorists and practitioners, war's complexity and ambiguity is well documented. Clausewitzian ideas on the fog of war, friction, and uncertainty clearly appreciate the wicked problem phenomena. However, the speed of technology combined with the impact of social complexity involved in planning, coordination, decision making, assessment, command and control makes the wicked problem increasingly more relevant and troublesome to military operations.

²⁹ Department of Defense Global Information Grid Architectural Vision, 22 June 2008 <<http://www.defenselink.mil/cio/nii/docs/GIGArchVision.pdf>+global+information+grid>.

2. Characteristics of Wicked Problems and Social Messes

Based on the literature review of the wicked problem set, Conklin's characteristics best correspond to IO targeting. Conklin characteristics of wicked problems are as follows:³⁰

- The problem is not understood until after formulation of a solution.
- Stakeholders have radically different world views and different frames for understanding the problem.
- The problem is never solved.
- Constraints and resources to solve the problem change over time.

3. Relevancy of Wicked Problems and Social Messes with the IO Targeting

Based upon the definitions and characteristics of wicked problems and social messes, a strong correlation exists with IO targeting problems. Since Conklin's list of the characteristics of wicked problems speaks directly to the target development and prioritization process. First, in terms of social complexity, the sourcing, organization and manning of any type of effects cell creates multiple stakeholder positions. These stakeholder positions create different views on problem definition and solutions. Secondly, technology inherent with IO's core, supporting and related capabilities represents a form of technical complexity. Secondly, as it specifically pertains to IO

³⁰ Conklin.

targeting, the conventional linear standpoint of numerically ranking targets by a singular value or by their accessibility (the low- or high-hanging fruit paradigm) creates a false sense of knowledge in tackling the problem. The linear ranking assumes a perfect solution. In wicked problems, there is only better or worse based upon one given set of problem definition. So there are multiple sets of linear rankings versus an absolute tiered system. Finally, critiques of Effects Based Operations (EBO) regarding its utility and viability beyond closed based targeting problems support the applicability of the wicked problem set to IO targeting.³¹ For complex environments, the informational and cognitive domains, it is prudent to keep the wicked problem set in mind to avoid overreaching predictions. While the wicked problem set may not be exceptionally new to military professionals, awareness of the phenomena promotes greater appreciation and understanding of IO targeting complexity.

J. CRAFTING IO TASK AND EFFECTS STATEMENTS

1. Current IO Task and Effects Statement Techniques

Since Joint Publication 3-13 focuses on broad IO doctrine, it does not explicitly provide a means to develop IO task and purpose statements. However, the Joint Information Operations Planning Course (JIOPC) does put forward an interim means of assembling useful IO task and effect statements. IO tasking statements possess a task, target and a purpose. This tasking statement is linked with an intended effect. The effect statement includes the

³¹ General J. N. Mattis. "Assessment of Effects based Operations." 14 August, 2008.

target and its impact on the system.³² By combining tasks with their associated effect, this method supports higher objectives, allowing for the successful integration of multiple IO tasks to support a given effect into the overall plan. The understanding of this technique provides the reader with a basic foundation for future comprehension of the proposed IO targeting solutions contained in chapter IV of the thesis.

2. Current Doctrine on Crafting Lethal Task and Effect Statements

In 2000, the United States Marine Corps and the United States Army doctrinally codified the operational and tactical Essential Fire Support Task (EFST) methodology as the most efficient and understandable means by which to integrate all source fire support through the use of the Task, Purpose, Method and Effect, or TPME, format.³³ By definition, EFSTs prioritize and integrate fires with maneuver to achieve an end state. The task portion puts forward a targeting objective against a specific target to affect one or all of its functions. The EFST task statement methodology constrains the targeting objective to best explain what lethal fires can achieve as a targeting objective. The targeting objectives include Divert,

³² Joint Force Staff College (U.S.), Information Warfare Division, Joint Information Operations Planning Handbook (Norfolk, Va.: Joint Forces Staff College, 2008).

³³ During Operation Iraqi Freedom (OIF 04-06), the author, serving as a rifle company commander and the company's fire support team leader, included an attached Tactical Psychological Operations Team (TPT) in the company's fire support plan EFST methodology during two major clearing evolutions, Operation MATADOR and SPEAR, thereby treating the TPT as a supporting arm on equal footing with Fixed Wing and Rotary Wing Close Air Support, armed Unmanned Aerial Vehicles, 81mm mortars and 60mm mortars.

Destroy, Delay, Disrupt and Limit. The relatively few objectives promote clarity and mutual understanding of what fires are trying to accomplish, not how they do it. The EFST purpose statement connects fire with maneuver by establishing the rationale for the supporting arms. The EFST method statement coordinates the integration of various supporting arms by putting forward a trigger to initiate the EFST, a priority of use of the fires, allocation of supporting arms and restrictions on their employment. The method paragraph can utilize a narrative format that includes the Priority, Allocation, and Restrictions (PAR) sub-paragraphs or simply the bulleted PAR acronym. The final EFST statement, effects, puts forward the total effect yielded by the contributing assets in the symphony of supporting arms integration.³⁴ For example, mortars could achieve a suppressive effect on an enemy air defense asset in order to allow fixed wing aircraft the ability to destroy an enemy tank section that the enemy air defense asset was guarding. In this case, the overall fires effect was one air defense asset suppressed for a given period of time and the tank section destroyed. However, the tank section's destruction enabled the supported maneuver element the ability to cross a kill zone that the now destroyed enemy tank section previously blocked. EFSTs provide tactical and operational leaders the deliberate and hasty ability to effectively plan, allocate and coordinate lethal fires using an objective based methodology. However, translating the EFST to look at Effects Based Targeting (EBT) has generated

³⁴ United States Marine Corps, Fire Support Coordination in the Ground Combat Element. (Washington, DC: Headquarters, U.S. Marine Corps, 2001).

some criticism that the EFST methodology is more objective based versus effects based.³⁵ Despite the valid counter argument for EFST's suitability for EBT, the EFST framework does possess value in that its design simplifies the means to express a targeting intent while integrating all fire support assets to achieve a higher objective. As a result, priority is placed upon creating better objectives not better effects.

The relevance in understanding the EFST concept for an IO targeting thesis is twofold. First, the recent development of the EFST suggests that even at the tactical and operational level methodological changes were required for successful combined arms integration. Secondly, the method represents a means of conceptual grouping the IO task and effect statements to attain better capability integration. The understanding of EFSTs enables the reader with entry level knowledge to better understand the proposed phase two targeting solutions contained in Chapter IV of the thesis.

³⁵ Analysis of the Application of an Effects-Based Approach to the Conduct of Joint Close Air Support, 2006, Defense Technical Information Center.

III. UNDERSTANDING AND IDENTIFYING IO TARGET DEVELOPMENT AND PRIORITIZATION DIFFICULTIES IN PRACTICE

A. PURPOSE BEHIND UNDERSTANDING IO TARGETING PRACTICE

In using the collective aspect of effective doctrine, the practice of IO targeting should generally align with existing published doctrine on IO targeting. Therefore, research data gathered from questionnaires and interviews conducted with Subject Matter Experts (SMEs) who have performed targeting could indicate the strength of correlation between actual IO practice and doctrine. This research's purpose is to gather empirical data from IO related SMEs on two subject areas. First, are IO SMEs using the principles and precepts of Joint targeting Doctrine (3-60) in their target development and prioritization? Second, from a general perspective, what sources, techniques and procedures are most prevalent?

B. METHODOLOGY USED IN UNDERSTANDING IO TARGETING PRACTICE

The methodology used was an initial questionnaire sent to a pre-identified IO Targeting SME population. The twenty-six respondent member population included all armed services, several Department of Defense personnel, and echelons of command from the company to the Functional and Geographic Combatant Command level. Respondents were asked to answer seven questions on Target Development and Prioritization doctrinal sources, references and tools (See Appendix). In the second portion of the questionnaire,

respondents were asked to evaluate on a scale from one to five their IO targeting methodologies, including the strength of the principles of the joint targeting process, on area of operations specific relevancy, and applicability to neutral and adversarial audiences (See Appendix). During the final portion of the questionnaire, respondents were given the opportunity to provide subjective comments to amplify earlier answers or provide general opinions. Upon compiling the data, numbers of answers by category were used to present the findings of the questionnaire. The outputs of the compiled data and subjective assessment were used to conduct follow-on interviews with selected respondents for greater clarity and understanding about IO practice and doctrine.

C. IO TARGETING RESULTS

1. Respondent Demographics

A. Service or Department.

Service	Number of Respondents
Marine Corps	10
Army	8
Navy	6
Department of Defense	2

Table 1. Number of respondents by service

B. Rank.

Grade	Percentage of Respondents
0-3	3
0-4	8
0-5	11
0-6	2
GG-14	2

Table 2. Number of respondents by rank

C. Billet. Due to various self classifications, the general category "IO or Effects Cell Staff" was utilized to represent the respondent's billet.

Billet	Number
IO or Effects Cell Staff	14
IO Planner	6
Operations Officer	2
Intelligence Officer	2
Company Commander	2

Table 3. Number of respondent by billet

D. Military Occupational Specialty (MOS) or Equivalent

MOS	Number
FA-30	7
Infantry	6
Naval Flight Officer	4
Contractor	3
Intelligence	2
Information Warfare	2
Communications	2

Table 4. Number of respondents by MOS

E. Area of Operation (AO).³⁶

Area of Operation	Number
Iraq	20
CENTCOM	2
PACOM	1

³⁶ During the questionnaire process, the author attempted to obtain respondents from United States Southern Command. Unfortunately, personnel from United States Southern Command's J-39 department were unable to complete the provided questionnaire but stated that their strategic function oriented their IO efforts differently. Specifically, United States Southern Command viewed specific targets as in the arena of tactical and operational IO. From the perspective of IO target development and prioritization, the United States Southern Command has a unique emphasis on strategic communication combined with a comparatively more permissive environment and it is unfortunate that their efforts could not be included in the results of this study. Additionally, based upon organizational and timing issues, United States Africa Command and Combined Joint Task Force Horn of Africa were not included in the questionnaire results. Respondents who provided a sub-region to theatre geographic classification were listed by their provided area or country.

EUCOM	1
Afghanistan	1
Arabian Gulf	1

Table 5. Number of respondents by AO

F. Unit Echelon.

Echelon	Number
Battalion	7
Task Force	6
Combatant Command	3
MEF	3
Corps	3
Division	2
Brigade	1
Company	1

Table 6. Number of respondents by unit echelon

2. Respondent Assessments

A. Did you use the Joint Publication 3-60 Targeting as a source or reference for your target development and prioritization?

	Iraq	CENTCOM	PACOM	EUCOM	Afghanistan	Arabian Gulf
Yes	3	1	0	1	1	0
No	17	1	1	0	0	1

Table 7. Number of respondents by AO who used the JP 3-60

B. Have you ever read or referenced the JP 3-60 Targeting Publication for target development and prioritization?

	Iraq	CENTCOM	PACOM	EUCOM	Afghanistan	Arabian Gulf
Yes	7	1	1	1	1	1
No	13	1	0	0	0	0

Table 8. Number of respondents who have read the JP 3-60

C. What process did you use to develop and prioritize targets?

Process	Number
Meetings and/or Targeting Boards	12
Translating Commander's Objectives and/or intent into Targeting Solutions	4
Effects Based Targeting	3
Nodal Analysis	3
SOP	1
Service Planning Process	1
Civilian Marketing Techniques	1
Classified	1

Table 9. Targeting processes used by respondents

D. Was the process based on joint or service doctrine?

	Iraq	CENTCOM	PACOM	EUCOM	Afghanistan	Arabian Gulf
Yes	15	0	1	1	1	1
No	5	2	0	0	0	0

Table 10. Number of doctrinal based targeting processes used by respondents

E. If the process was informal, please provide a brief summary of the process used?

- Only five respondents answered this question.
- With one exception, the answers involved an informal approval process submitted to a commander.
- The one exception detailed how different paths and level of approval were used for individual core, supporting and related IO capabilities.

F. Did you use a (any) tools to support your target development and prioritization?

- Only three of the respondents identified explicit tools beyond synchronization matrices.
- One of the respondents who answered in the affirmative discussed difficulties in making the tools "stick"; as a result, the process usually reverted back to standard PowerPoint-style briefings.

3. Respondent Ratings

The respondents were asked to rate the strength of their target development and prioritization processes on a scale of one to five, with one (1) being the lowest and five (5) being the highest. The results were averaged, and are presented below.

- The process was effects based: **3.6**
- The process was interdisciplinary: **3.9**
- The process was focused: **3.6**
- The process was systematic: **3.5**

- The process was effective: 3.3
- The process used was consistent: 4.0
- The process used was a byproduct of my theatre of operations: 3.9
- The process used would be applicable to neutral audiences: 3.6
- The process used would be applicable to adversarial audiences: 3.6

4. Respondent Suggestions

The following are selected suggestions from the respondent group:

- Utilize civilian marketing techniques for target development and prioritization.
- Employ existing targeting tools such as IOPC-J and Vision.
- Expand the 3-60 doctrine to include non-lethal targeting.
- Formalize processes to better develop and prioritize targets.
- Increase the speed of the process.
- Better integrate IO into existing processes versus being an afterthought.
- Adopt AJP 3.0 NATO Information Operations Doctrine because it is a superior doctrinal source.³⁷

³⁷ The author researched IO doctrine from NATO, the United Kingdom and Canada as part of the literature review for this thesis. Beyond several instances of exceptionally informative ideas on unique perspectives, subtle nuances and the clearer linkage of IO with the instruments of national power, the author did not find any distinct examples on targeting as it would directly apply to this thesis.

5. Conclusions

Based upon the biographical data and quality of the answers, the respondents possessed vast IO experience amongst a joint, diverse and multi-faceted population. However, while the principles of joint targeting doctrine are being applied, limited collective doctrine, procedures or techniques are being used in the practice of IO target development and prioritization. During the interview process, several explicit friction points were identified. First, personality and perception of non-lethal effects cell or targeting board participants in the targeting process inhibited integration and target development and prioritization. Second, the lack of a distinct methodology beneath the phase level of the Joint Targeting Cycle produced individually unique solution methodologies. Thirdly, especially in Iraq, the data suggests a gap between joint doctrine and practice; even though, the Iraq data derives from primarily from respondents performing IO targeting functions, but not serving in an explicit IO targeting billet at lower echelons of command, the Finally, the paradigm of segregating targets as lethal or non-lethal visibly marginalizes integration. However, despite the described problems, the respondent's ratings consistently leaned towards high strength in evaluation of their own individual processes. Therefore, the problem with IO target development and prioritization lies in the realm of developing a workable methodology within the existing Joint Targeting Cycle to enhance phase two, target development and prioritization.

From a problem identification position, this study's research has identified joint IO and targeting doctrinal inconsistencies, connected attributes of wicked problem set to highlight the difficulties with developing and prioritizing targets, and captured empirical data that suggesting that if the existing doctrine is even used or referenced, no distinct methodology surfaces. As a result, an IO target development and prioritization deficiency exists with the existing practice, doctrine and supporting technology. Next, the thesis will put forward five recommendations involving practical, methodological and technological solutions to aid in the improvement of the IO target development and prioritization.

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IV. IO TARGET DEVELOPMENT AND PRIORITIZATION RECOMMENDATIONS

A. INTERIM IO JMEM TECHNIQUES

The purpose of interim IO JMEM techniques is to enhance phase six (assessment) of the Joint Targeting Cycle due to its correlation to phase two (target development and prioritization). Since IO target development and prioritization requires some ability to forecast effects, the stated lack of a complete IO JMEM impedes this process. To address, but not solve, the vital IO JMEM question, three analogous case examples: parole boards, predictive markets, and jury consultation are presented as interim methodological ideas for an IO JMEM equivalent. The use of these recommended interim techniques improves the ability to develop and then prioritize targets.

1. Parole Boards

The general concept of parole boards represents a close comparison to an IO JMEM. Parole is defined as a period of conditional community supervision following a prison term. If one views the incarceration process as rehabilitation instead of pure punishment, the success of a parole board recommendation aligns well with IO effects prediction, especially target development. Conceding the difficulties associated with a narrow criminal target audience, the act of discretionary parole board release is very similar to building target folders that possess physical, information and cognitive attributes.

Department of Justice (DOJ) statistics indicate that parole boards have a low rate of success in predicting recidivism. The parole population is primarily split between mandatory and discretionary release cases. As of 2004, mandatory releases comprised 52% of the parole population. Discretionary releases, this study's focal point of interest, comprised 31% of the parole population.³⁸ From 1995 to 2004, only 46% of the parole population actually completed their assigned release programs. Of those who failed, nearly 39% returned to incarceration. Surprisingly, discretionary parolees only achieved a 5% better performance over mandatory release parolees in re-arrest rates.³⁹

The difficulty of behavioral prediction for all categories of parole presents an interesting study. Criminal psychologists and correctional experts seek to successfully identify key predictive factors in order to improve discretionary parole decisions. A recent study of statistically large parole groups for prediction of violent recidivism provides greater insight in the difficulty of cognitive predictability. The large group of violent offenders consisted of generalized aggressors, family only aggressors, and non-family only aggressors. The study further subdivided the three groups by coding criminals by eight concrete "predictability factors." Predictability factors included, among others, demographics, prior criminal history, substance abuse history and coded dynamic

³⁸ Lauren E. Glaze, Seri Palla, and United States Bureau of Justice Statistics., Probation and Parole in the United States, 2004 (Washington, DC: U.S. Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, 2005).

³⁹ The Urban Institute, Study Finds Parole Has Little Effect on Rearrest Rates (Washington,DC: The Urban Institute, 2005).

predictors. By applying a univariate optimal discriminate analysis to develop a measurable test statistic, the study reached conclusions about the strength of predictability for violent recidivism. The test statistic, labeled Effect Strength of Sensitivity (ESS), ranged from 0 to 100. Attaining no improvement in predictability achieved a 0, while achieving absolute predictability would score a 100. ESS rated at 50 or higher indicates strong predictability. Despite the high trend of national recidivism rates, no single predictability factor achieved an ESS greater than 20. By statistically aggregating individuals based on multiple predictability factors, an ESS of 50 could be attained for the generalized aggressor group.⁴⁰ Despite concrete procedures, statistical rigor and application of professional art, the study achieved mixed results even in predicting behavior in the case of violent recidivism. From an IO targeting perspective, the ability to determine an exact probability of influence is extremely low, but could be slightly effective.

As a result, this technique possesses three implications for IO target development. First, if a parole board, who possesses the freedom to collect predictability factors and interview its targets, lacks the ability to accurately predict behavior then how well can an IO targeting cell perform? This observation supports that behavior prediction represents a complex versus closed system. As a result, a possibility exists in over

⁴⁰ L.J. Stalans, et al., "Identifying Three types of Violent Offenders and Predicting Violent Recidivism while on Probation: A Classification Tree Analysis." Law and Human Behavior 28.3 (2004): 253-71.

estimation in the target development process.⁴¹ Secondly, the inclusion of predictability factors can be used as data entries during a target's development as a feasible means of ensuring the target's physical domain is connected to its informational and cognitive attributes. Finally, the strength of the developed target based upon number and significance of predictability factors serves a crucial factor in its eventual prioritization. Though mostly applicable to target development, the parole board technique greatly assists the vetting and validation of targets across all domains.

2. Predictive Markets

Once a target has been nominated and approved for action, it has to be prioritized. Applying this study's understanding of the wicked problem set, it is assumed that this priority is not an absolute ranking. Instead, the priority represents a relative standing based on objectives, stakeholder position and changes in the operational environment. The priority is dynamic, not static. However, at some point in time in the operational environment, a target needs a priority because one will never have unlimited time, assets, and resources. The predictive market technique enables developed targets to be prioritized in both a timely, responsive and effective manner to complete phase two prioritization.

⁴¹ General J. N. Mattis. "Assessment of Effects based Operations." 14 August 2008.

The ability to aggregate the collective intelligence of groups serves as an excellent method to predict outcomes.⁴² Field experiments have demonstrated that the predictions made by statistically large groups and expressed in a market format tend to outperform those of the experts in horse betting, political campaigns and actual stock markets.⁴³ This concept is not a fluke: the average guess of a statistically large population regarding the number of jellybeans in a jar will generally be within 3% of the actual count and will most likely outperform the best individual guess.⁴⁴ Many large and successful corporations such as Google use internal predictive markets as forecasting tools.⁴⁵ The website Hollywood Stock Exchange (www.hsx.com) utilizes a rule-based protocol to convert movie and celebrity box office results into a fictional Hollywood dollar stock value. Based upon their overall portfolio performance, online investors possess the ability to exercise full trading options on either a pure entertainment or competitive basis. While this is not a pure predictive market, a high correlation exists between the Hollywood Stock Exchange stock price prior to a movie's opening day and the actual box office results.

⁴² James Surowiecki, The Wisdom of Crowds: Why the Many are Smarter than the Few and How Collective wisdom Shapes Business, Economies, Societies, and Nations (New York: Doubleday, 2004).

⁴³ Robert William Hahn and Paul C. Tetlock, Information Markets: A New Way of Making Decisions: AEI-Brookings Joint Center for Regulatory Studies; Distributed to the trade by National Book Network, 2006).

⁴⁴ Surowiecki,

⁴⁵ Official Google Blog: Putting Crowd Wisdom to Work, 23 June 2008 <<http://googleblog.blogspot.com/2005/09/putting-crowd-wisdom-to-work.html>>.

Predictive markets should not be confused with the act of consensus building. Instead, predictive markets are dynamic processes that express the likelihood of an event occurring through the value of market shares. Nor should predictive markets be confused with traditional intelligence functions. The vital aspect of intelligence involves the dissemination of an assessment in order to permit friendly utilization. Therefore, many good intelligence predictions do not evolve into fulfillment because a friendly action prevents the analysis from reaching fruition. Unless a commander chooses to employ an ambush-type tactic, many good intelligence assessments never come to pass. Despite its potential, the government's proposed utilization of the failed 2001 DARPA terrorist predictive market results would not yield pure results because speculators would hedge bets knowing the government could not ignore a high probability terrorist event.⁴⁶ In a purely interactive market, traders would treat events as independent entities. However, if the agency hosting the market makes decisions predicated on the market developments, that independence is lost, since traders will base their actions on a combination of the probability of an event occurring and the probability of the market host taking preventative action. Therefore, the possibility of host intervention could make a military predictive market ineffective unless measures are taken to retain event independence.

Although many commercial software solutions exist to implement predictive markets, a simplistic IO JMEM

⁴⁶ Robert Looney, "DARPA's Policy Analysis Market for Intelligence: Outside the Box or Off the Wall?," Strategic Insights II.9 (2003): 27.

predictive market could be established inside a targeting board. One could use a confidence vote system per event or create an internal competitive market system comparable to well known Fantasy Football Leagues. The strength of a developed target's prioritization for a given targeting objective or plan suggests a direct correlation with its priority. A predictive market or some equivalent system could harness the experience, skill and wisdom of professionals as corollary means to prioritize targets.

3. Jury Consultation

Jury consultants are cognitive and legal experts tasked with the study of juries, legal opponent strategy and witness testimony to produce the most favorable outcomes for their clients.⁴⁷ Jury selection serves as a hybrid method to support both an interim target development and prioritization technique. The use of Jury consultation speeds the phase two process by not wasting time developing targets that will eventually lack a high priority. Consequently, the process yields both High Payoff Targets (HPTs) and High Value Targets (HVT) simultaneously. In summary, the process simultaneously relates development with prioritization to identify HVTs and HPTs for further vetting, validation, approval and prioritization for a given course of action.

DECISIONQUEST, an industry-leading jury consultant company, ethically claims to make the best case possible for

⁴⁷ Neil Jeffrey Kressel and Dorit F. Kressel, Stack and Sway : The New Science of Jury Consulting (Boulder, Colo.: Westview Press, 2002) 302.

their client.⁴⁸ While similar to traditional marketing, jury consultation aligns with IO because consultants must remain highly cognizant of their message effects to neutral and hostile audiences. From an effects perspective, jury consultants primarily possess two strategies to support their clients. During the *Voir Dire* or jury selection process, consultants attempt to stack perspective juries to their client's advantage.⁴⁹ During the trial, consultants attempt to analyze individual jurors' cognitive profiles and the jury's inter- and intra-relationships in hopes of building the best case via the most appropriate medium, approach and testimony. From the comprehensive analysis, consultants build mock juries to model, test and validate viable trial courses of action.⁵⁰ In most cases, the consultants attempt to sway rather than decisively win whole juries. In some instances, consultants are fully aware that they will lose the case, but attempt to reduce the sentence or financial penalty. Great difficulty exists in evaluating jury consultation effectiveness due to unknown speculation on how a case might have ended if a consultant had not been used. As a matter of self-interested practice, the industry maintains an unassuming profile due to the very real possibility that its services provide an unfair legal advantage.⁵¹ At the same time, the industry's growth and

⁴⁸ Trial/Jury Consulting, 23 June 2008
<<http://www.decisionquest.com/>>.

⁴⁹ Kressel, 302.

⁵⁰ Mock Juries, 2006, 22 August 2007
<<http://www.decisionquest.com/aboutus.php?AboutusID=1>>.

⁵¹ Kressel, 302.

prominence provides a measure of merit.⁵² Even though jury consultants operate in a controlled environment, their job is not trivial. Beyond the courtroom, successful companies like DECISIONQUEST incorporate parallel activities such as strategic communications to win the case in the media before, during and after the case. Finally, DECISIONQUEST conducts a post-trial analysis, a process similar to the targeting step of combat assessment, to ascertain detailed insights for future application. This comprehensive approach allows DECISIONQUEST to apply gained experience in future cases.

The mock jury approach combined with full trial supporting activities provides a relevant solution to target development and prioritization processes. Therefore, this technique puts forward a best practice means of de-selecting identified targets as candidates for vetting. This paradigm shift improves development and subsequent speed, relevance and efficiency.

B. ADOPTION OF THE MEASURE OF WORTH (MOW) MODEL

What gets measured gets attention.

-R. G. Eccles

Assessment of measured success serves as a vital component of IO target development and prioritization. Present conventional wisdom suggests the greatest challenge to measuring success involves proper and complete information collection followed by intelligence analysis. However, the adoption of Measures of Effectiveness (MOEs) as

⁵² Decisionquest, Decision Quest: Making the Best Case Possible, 2007).

the means to track true progress exists as the largest obstacle to effective IO assessment. In turn, based upon the stated link between phase six and two, targets subsequently cannot be fully developed and prioritized. MOEs, by definition, fundamentally cause assessment confirmation bias in IO regardless of the quality of collections and intelligence. Even worse, MOEs fail disastrously in the cognitive domain. The stated failure in proper analytical process causes IO practitioners to seek out supportive indicators while possibly avoiding or missing negative signs. To prevent inherent bias, IO requires an approach to account for success, failure and the unknown. The implementation of the proposed Measure of Worth (MOW) model would greatly increase the quality of assessment and target development and prioritization. .

In combat, regardless of the domain, one is fighting an active, determined and clever opponent. War by nature is complex, not simple. Measure of Effectiveness (MOE) is defined as a way to "determine whether IO actions being executed are having the desired effect toward mission accomplishment: the attainment of end states and objectives."⁵³ In both definition and practice, MOEs only capture success oriented indicators. Collection management that is focused only on achievement may entirely miss indicators of failure. Moving away from the familiarity of the term, the singular perspective might not provide an accurate assessment of the true situation. For example, the memory of the statue of Saddam Hussein being toppled in

⁵³ United States Joint Chiefs of Staff, Information Operations. (Washington, DC] Joint Chiefs of Staff, 2006).

Baghdad during Operation Iraqi Freedom I suggested a massive upwelling of popular support for coalition forces. However, the two photos shown below demonstrate how seeking the positive can truly bias an assessment. The near Baghdad picture (Figure 3) suggests a measure of effectiveness: masses celebrating the demise of Saddam's regime. The far Baghdad picture (Figure 4) illustrates that the masses were limited and isolated. Due to the scene's promise, the magic of the moment and the admiration of U.S. service members, the event was only measured from a positive perspective. A better concept is definitely required.

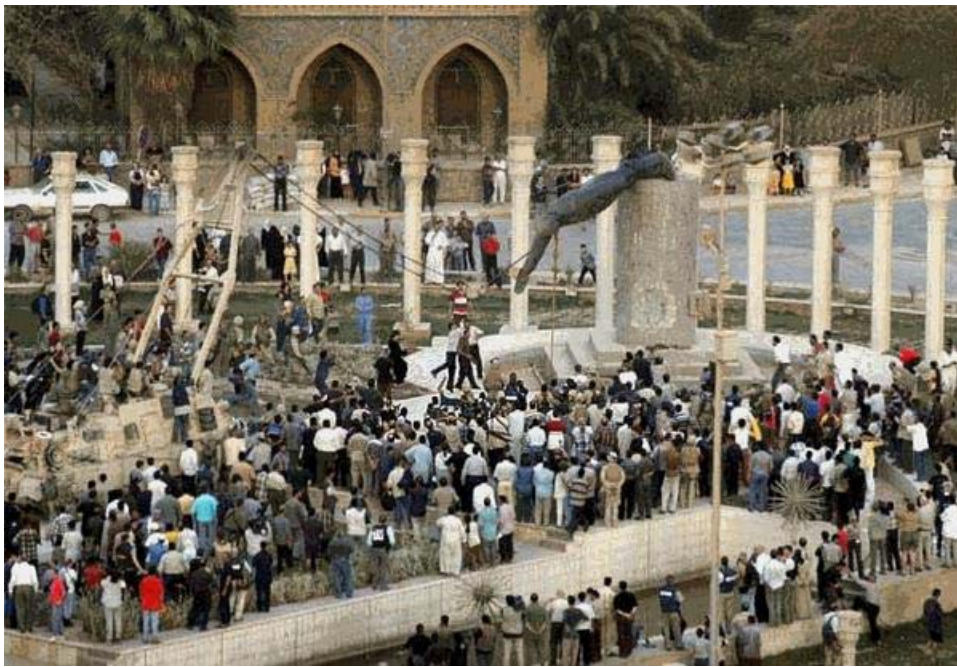


Figure 3. Baghdad Near Picture (www.google.com)



Figure 4. Baghdad Far Picture (www.google.com)

*Reason and free inquiry are the only effectual
agents against error.*

-Thomas Jefferson

The proposed worth model facilitates free inquiry by approaching the IO assessment and target development and prioritization problem from a complete perspective. The model involves three sequential reduction components: filters, bins and qualifiers. First, filters collect possible indicators that can become Measures of Worth (MOW). MOWs would be defined as indicators that could possibly provide value in assessing an effect. Using the MOW convention, analysts would lean towards data inclusion even if it lacks completeness. Next, MOWs are processed into bins based upon their classification. The bins are segmented as follows:

- Positive Indicator (PI). Indicates that the associated MOW confirms success towards the stated objective or effect.
- Unknown Indicator (UI). Despite possessing ambiguous qualities, the MOW requires further analysis and development.
- Negative Indicator (NI). Identifies that the associated MOW confirms failure towards the stated effect.

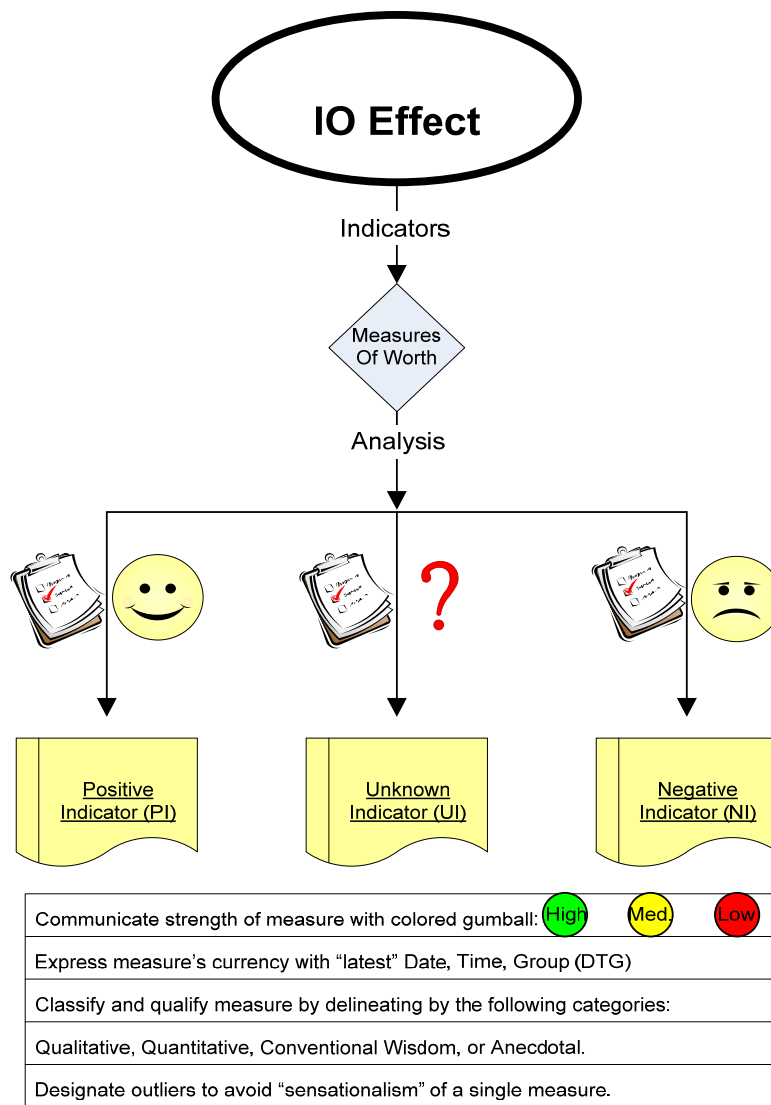


Figure 5. Measure of Worth (MOW) Model

Qualifiers provide amplification to the grouped measures. The aim of qualifiers is to facilitate judgment through the employment of operational art versus absolute statistical inferences. This aim implies that one NI may outweigh several PIs or vice versa depending on content; either way, judgment is critical. Four primary qualifiers have been created to support weighting various measures:

- Confidence of Assessment. The use of high, medium, and low expresses the strength of a given measure. The colored "gumball" model promotes quick and efficient understanding.
- Classification of Measure Type. Qualitative and quantitative are self explanatory, but conventional wisdom relays a measure from a popular perspective. Finally, anecdotal measures convey the human experience through story.
- Time Currency. A decay time is associated with any measure, so measures must explicitly state their latest update time.
- Outliers. Designates sensational events that are anomalies. Although an event may qualify as a statistical outlier, one should remember that it is sometimes the sensational event that captures the imagination of the influence audience.

The adoption of the MOW model represents an analytical and briefing change versus a real operational change. Analogous to a hockey player's plus-minus rating, the MOW model allows commanders to grasp the true picture of IO effectiveness. In hockey, the plus/minus rating of a player is determined by measuring the number of goals scored versus the number of goals scored by opponents while that player is

on the ice.⁵⁴ Applying war theory, one understands that many indicators require development either through time or analytical rigor to comprehend effects. Transition from the MOE to MOW doctrine would greatly enhance the ability to conduct IO targeting because it strengthens the link between phase two target development and prioritization and assessment.

C. THE HOLISTIC TARGET (HOT) DEVELOPMENT AND PRIORITIZATION MODEL

It suddenly dawned on me that most people running from the law don't eat out. They order pizza.

-Cynthia Brown, of the Butler County Child Enforcement Agency in Ohio, on her inspiration to place wanted posters of child-support scofflaws on local pizza boxes in an effort to turn up the heat on deadbeat dads and moms.

The clever idea of targeting deadbeat dads and moms through pizza boxes best represents the concept of the HOT target development and prioritization model because it would not be immediately apparent that pizza boxes related to deadbeat parents (See Figure 6).

⁵⁴ NHL.com - Rulebook, 23 June 2008
<<http://www.nhl.com/hockeyu/rulebook/>>.

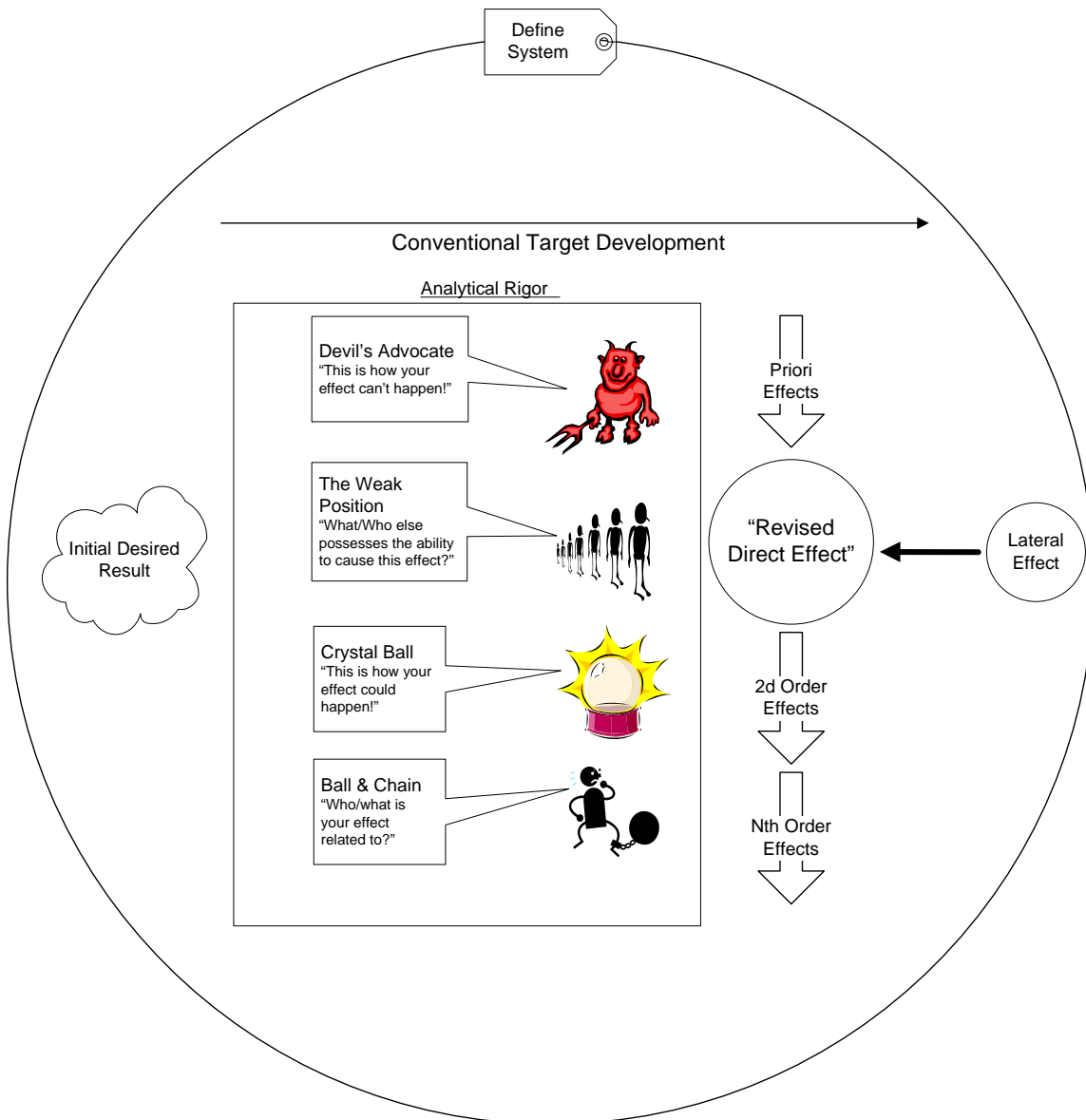


Figure 6. HOT Target Development and Prioritization Model

However, after reading the scenario of how to address dead beat parents, the idea makes perfect sense. Deadbeat parents on the run would tend to order out for delivery pizza. By placing a wanted poster on a pizza delivery box, a message is literally being delivered to dead beat parents and the person delivering the pizza. Therefore, the information

either supports the capture of the target or influences the target to turn themselves over to a local law enforcement agency. From this example, HOT represents a full option analytical framework that effectively decomposes targeting problems, and then externalizes targeting solutions.⁵⁵ Most importantly, the model incorporates cognitive heuristics to promote good decision-making and intervene in the case of bad practice.

The HOT model does not follow any explicit steps, procedures or cycles, but anchors itself to the second phase of the Joint Targeting Cycle: target development and prioritization.⁵⁶ Complex IO problems rarely find solutions in linear thinking. Instead, the model connects conventional thinking and dynamic relationships with decision-making heuristics to form the central guiding principle in developing and prioritizing a targeting solution. The heuristics rely more on military art and experience than on strict scientific adherence to the absolute fundamentals of targeting, systems engineering, psychology or behavioral science. In order to explain the model, groups are presented by their structure, purpose and relationship.

Defining the system determines the scope and perspective of the problem. Systems can be viewed as

⁵⁵ Heuer, Psychology of Intelligence Analysis, 1999.

⁵⁶ Joint PSYOPs Publication 3-53: Psychological Operations suggests using the Joint Targeting Cycle to demonstrate PSYOPs targeting. Joint Publication 3-60: Targeting suggests using the Joint Cycle as the method. Joint Publication 3-13: Information Operations stresses coordination. JFCs must ensure that IO planners are fully integrated into the planning and targeting process, assigning them to the joint targeting coordination board in order to ensure full integration with all other planning and execution efforts.

networks of many variables in causal relationships with one another. Systems are nearly always dynamic in nature. The governing rule in successful system definition fits the "Goldilocks" principle of finding a scope that is just right.

The Initial Desired Result (IDR) represents the raw desired targeting effect derived from the commander's higher objective. The utility of the IDR concept predicated itself upon the research finding that early rigid problem definition in a process diminishes the possibility of future alternate solutions.⁵⁷ In addition to stating the initial targeting IO effect, the IDR should capture assumptions, constraints, purpose, objective, unwanted outcomes and critical decisions as a reference point for future benefit.⁵⁸ The IDR must retain flexibility to prevent the group tendency of anchoring future discussion in order to unwisely ensure the IDR remains the ultimate effect.⁵⁹ From a process perspective, the use of the IDR serves as the figurative starting point to measure, for better or worse, how far the solution has progressed or possibly drifted.

Applying analytical rigor beyond conventional target development, HOT employs four cognitive heuristic lenses - the Devil's Advocate, the Weak Actor, Crystal Ball, and Ball and Chain - combining analysis, synthesis and intuition to ultimately express targeting solutions in a timely manner.

⁵⁷ Alexander L. George and Andrew Bennett, Case Studies and Theory Development in the Social Sciences (Cambridge, Mass.: MIT Press, 2005) 206.

⁵⁸ Gary A. Klein, Sources of Power: How People Make Decisions (Cambridge, Mass.: MIT Press, 1998) 330.

⁵⁹ Klein, 330.

Creative insight is defined as the ability to take existing pieces of information and combine them in novel ways that lead to greater understanding. Interestingly, the concept of creative insight surfaces in the writing of some renowned military theorists. Clausewitz suggested the *Coup d' Oeil*, or stroke of the eye, as one means of making decisions in the face of uncertainty. Coup d' Oeil is the rapid discovery of truth which is either not visible to the ordinary mind at all or only becomes so after a long examination and reflection.⁶⁰ In the modern era, Boyd's description of constructive and deconstructive forces in the Orient phase of his Observe-Orient-Decide-Act (OODA) loop parallels the concept of creative insight. The model requires the target to be efficiently developed from different positions in order to generate sufficient military genius to solve the problem in a timely manner. Milton Friedman stated, "Assumptions do not have to have anything to do with reality as long as they work." The adoption of prescriptive assumptions about how to solve the IDR facilitates a holistic approach to better align doctrine with practice. Targeting options are evaluated on their individual merit as opposed to a comparative basis in order to encourage multiple perspectives and, perhaps, solutions. In support of the prescriptive positions, a brainstorming process serves as the favored method to generate a large quantity of ideas, create an information-sharing atmosphere and deter group think.

⁶⁰ Carl von Clausewitz, Michael Eliot Howard, and Peter Paret, On War, (Princeton, N.J.: Princeton University Press, 1976) 717.

In some cases, decision-making weakened by uncertainty produces a mindset that is not sufficiently grounded, but that, in the short term, favors an already established belief or decision structure. While useful under certain circumstances, the described influence of transformation, or wishful thinking, could produce expectations inconsistent with achievable results.⁶¹ The Devil's Advocate position utilizes a "pre-mortem" strategy to visualize ways the IDR can *not* reach attainment.⁶² Two important results are captured from this position. First, the Devil's Advocate position determines IDR feasibility and scope. Second, from a "red hat", or hostile force perspective, the Devil's Advocate position generates an event template to forecast dynamic enemy, neutral audience and environment changes to balance expectations. This can include enumerating effects that the planners do wish to see come to fruition. The use of the Devil's Advocate heuristic marginalizes influences of transformation upon the targeting process.

Many decisions suffer from an "illusion of control" due to an overestimation of individual impact on a system's ultimate outcome.⁶³ The Weak Actor position envisions alternate actors, actions and events that might achieve the IDR. The imaginary restraint of power adopted in the Weak Actor position creates the paradigm of a desperate mindset. Desperate thinking trumps typical risk adverse mentalities

⁶¹ John D. Steinbruner, The Cybernetic Theory of Decision: New Dimensions of Political Analysis (Princeton, N.J.: Princeton University Press, 2002).

⁶² Klein, 330.

⁶³ Ellen J. Langer and Robert P. Abelson, The Psychology of Control (Beverly Hills: Sage Publications, 1983) 311.

and the intoxication of power to produce unconventional solutions. For example, as part of typical target development, a commander's objective may not be synchronized with the target audience, which could ultimately diminish the feasibility of achieving the necessary effects. Instead, the Weak Actor position may suggest pre-planned, on-call IO targeting options predicated on the materialization of favorable condition necessary to make the effect feasible. For example, a general anti-insurgent effect may only work if it occurs when the insurgent group commits a mass atrocity versus if it were introduced randomly. The position requires extreme tactical patience because the Weak Actor position may not fit with a pre-planned timetable.

A negative logic approach provides a means of reaching decisions by effectively eliminating non-feasible approaches. This cognitive process, called inferences of impossibility, allows economy of decision making because it is easier to disprove than prove an option.⁶⁴ The saying, "Because that's the way it has always been done" expresses the concept to a partial extent. Obviously, planners must avoid re-inventing the wheel while actively seeking insightful leverage points to solve previously unsolvable problems. The Crystal Ball position theorizes possible ways to solve a problem without imposing any constraints. Options previously viewed as being "off the table" are now adopted for analysis. The Crystal Ball metaphor enables planners to bypass real and artificial constraints to produces new solutions.

⁶⁴ Steinbruner.

The Ball and Chain metaphor examines known and possible relationships between the IDR and other nodes. Nodes related to the IDR combined with qualitative analysis provide mental simulation to forecast intentional and unintentional nth order effects. Graphic visualization uses the spatial positioning of nodes, characteristics of nodes such as color, shape, and size, and characteristics of edges such as texture and color to communicate as much information as possible within a single graph. Commercially available social network analysis tools like Palantir, UCINET, Netminer3, Pajek and Krackplot provide a relatively easy means to graphically convey complex relationships.⁶⁵ Much like an iceberg, the Ball and Chain position shows what is lurking beneath the surface from a relationship perspective.

The use of four heuristic lenses along with conventional target development may not appeal to targeting experts, experienced analysts and talented decision-makers. However, research demonstrates that only experienced professionals perform just as well using an intuitive based decision-making model.⁶⁶ So how could experience possibly hurt? Consider the following example of how talented, experienced and intelligent individuals make mistakes. Skilled chess players possess the ability to reconstruct a piece position in near perfect form after only a brief exposure due to the game's pattern analysis. In a study, chess grandmasters possessed the ability to recall the exact

⁶⁵ International Network for Social Network Analysis, 23 June 2008
<<http://www.insna.org/>>.

⁶⁶ Klein, 330.

position of every piece on the board: the average participant could only remember six pieces. However, both the average participant and grandmaster scored equally if the disposition of the same number of pieces was completely random.⁶⁷ Grandmasters lost their edge because their pattern analysis abilities were marginalized through the very randomness of the pieces. In short, one remains an expert only as long as one is playing one's own game and is playing under the game's assumed rules. Even though the board looked like chess, it was not, so it was an equal playing field for both grandmaster and average-Joe alike. Even worse, when experts fail, the results can be catastrophic due to the obvious fidelity placed on their decision-making stature. The HOT model advocates the use of cognitive heuristics to prevent common decision-making mistakes for beginners and experts alike.

The process of applying analytical rigor to the IDR through the stated heuristic lenses provides planners the situational awareness, knowledge and perspective to arrive at a Revised Direct Effect (RDE). If the strength of the RDE is not sufficient, it can be reprocessed as an IDR or war-gamed to provide viability. A "Priori" effect theorizes ways an RDE (now treated as a first order intentional effect) would be better targeted as an nth ordered intentional or unintentional effect. For example, the initial desired effect may have been to capture the number one ranked High Value Target (HVT#1) at a vulnerable time and location. From the Crystal Ball position, it was

⁶⁷ Adriaan D. de Groot, Fernand Gobet, and Neil Charness, "Perception and Memory in Chess: Studies in the Heuristics of the Professional Eye," Contemporary Psychology. 43.6 (1998): 416.

determined that HVT#1 would be most vulnerable while visiting a relative's house because he would feel most comfortable and would therefore reduce his security entourage. Unfortunately, insufficient intelligence exists to know his actual pattern of visits. Additionally, the amount of time, effort and exposure required to collect and analyze the HVT's visits to relatives may compromise the targeting strategy. However, the Ball and Chain position identified a series of key individual and trigger nodes that could force HVT#1's displacement. The original first order objective has evolved into a planned, intentional, nth order effect shaped by the Priori effects by using Military Deception ruse against the network in such a way to make the target move. In this case, Military Deception could be used to force the target to squirt or move, thereby setting the conditions for the physical capture. The MILDEC now achieves the 1st order effect of making the target squirt that enables the 2nd order effect of the HVI's capture. Priori effects create a phased targeting plan to generate targeting solutions favorable to meeting the RDE.

"Lateral" effects are designed as, but not limited to, means of synchronizing lethal and non-lethal effects. Additionally, they may enable integrated application of IO capabilities. A sniper shot that kills an insurgent placing an Improvised Explosive Device (IED) produces both a clear physical and psychological effect. The sniper kill could be considered a planned lateral effect that triggers subsequent follow on psychological operations. Doctrinally, it is understood that random psychological effects due to the nature of war do not automatically constitute psychological operations. However, the morale aspect of war plays a

significant role regardless of strict definition. As a result, Physical Attack (PA) served as the "trigger" for pre-planned IO targeting. Lateral effects serve as viable mechanisms to create opportunities for complementary and synergetic lethal and non-lethal solutions.

The most central piece of the HOT model involves the internal interaction to the planning cell to achieve solutions. Difficulties in interaction could force an open-ended approach or an iterative process solution. Regardless, the end state is not only a solution, but also a larger understanding of the targeting problem. The holistic model provides a solution to effective targeting that integrates all elements of national power from the strategic to the tactical levels of war to develop and prioritize targets.

D. CRAFTING OBJECTIVES USING COMPENDIUM SOFTWARE

Doctrinally, the start of phase two target development and prioritization begins with target identification. For IO targeting, this identification occurs across the physical, informational and cognitive domains. In the HOT method of target development and prioritization, IDR represents the convergence of phase one objectives and the phase two target identification. Applying an understanding of wicked problems⁶⁸ as the concept relates to problem definition along with the joint targeting doctrine and the HOT methodology, the compendium program serves as a technological means to effectively set in motion phase two actions. In summary, compendium serves as the vital hinge

⁶⁸ Wicked problems represent highly complex dilemmas that, when addressed, can only achieve a relative degree of success.

between phases one and two of the targeting cycle to facilitate correlation between objectives and identified targets employing the HOT methodology.

As a means to better understanding problem definition, Jeff Conklin introduced the concept of "Dialogue Mapping" as the method to facilitate shared understanding by the visualization of initial solutions. Conklin's dialogue mapping employs an argumentation design called the Issue Based Information Scheme (IBIS) to produce a framework for this problem understanding.⁶⁹ In implementation, a freeware program entitled Compendium provides the software means to efficiently perform dialogue mapping in an effect or targeting cell environment.⁷⁰ The Compendium freeware solution delivers an efficient means to define the system, establish the Initial Desired Result (IDR) and achieve IO participant targeting problem understanding.

The argumentation scheme used by Compendium employs a basic scheme of icons to illustrate and, therefore, map the given problem's complexity (See Figure 7). The software's Windows-based design and intuitive format allows an operator to instantly understand and make use of Compendium. Compendium's IBIS starts with a simple question or idea. Starting with the question or idea, the operator can link other associated icons to produce the IBIS framework. Through the process of dragging icon nodes and relationship connector lines, along with succinctly capturing text notes on each node, a better understanding of the issue begins to

⁶⁹ Conklin.

⁷⁰ Compendium Download, 10 July 2008
<<http://compendium.open.ac.uk/institute/download/download.htm>>.

emerge. As the problem receives further scrutiny, selected icons reveal hidden problem complexities that provide further understanding. The process continues until the participant group decides that it has sufficiently framed the issue to enable subsequent refinement in the problem solving process.



Figure 7. Compendium Icon Scheme⁷¹

In Figure 8, a basic IBIS scheme was created to illustrate Compendium. First, a dilemma was introduced by placing the idea icon node on the "drawing board" represented by the program's work area. Next, a "Pro" icon node and a "Con" icon node were connected to the original question. In each node, an infinite number of text details can be recorded using a note card type electronic entry format. The details are organized by individual node with an associated time and date for each respective entry. Compendium operators can now record different perspectives on the same problem over time, different viewpoints held by previous staff in the case of a turnover or Relief in Place (RIP), or note possible internal dissenting opinions. Various other icons exist such as the argument, decision, reference, and note icons for greater precision in the IBIS

⁷¹ Compendium Download.

picture. Additionally, the map node (See Figure 9) can nest an entire IBIS scheme inside the icon to capture complex subordinate problems that can be accessed if desired, but that are not necessary for the larger picture. Though seemingly elementary, the IBIS process illuminates a complex process in order to gain an understanding of problem definition.

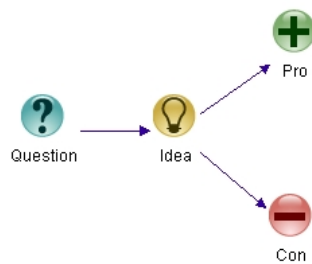


Figure 8. Basic IBIS Compendium Scheme⁷²



Figure 9. Map Node Icon for nesting IBIS Compendium Schemes⁷³

From the HOT target development and prioritization model perspective, Compendium becomes an excellent tool for system definition and crafting an IDR. To illustrate this point, this thesis used an historic best practice Counter Insurgency Operations (COIN) principle with Compendium to

⁷² [Compendium Download.](#)

⁷³ [Compendium Download.](#)

build an IDR (See Figure 10). First, the fictional effects/targeting cell started with a proven COIN objective, in this case an IDR, of isolating insurgents from their cause and support. While not an informationally pure IDR, the very COIN practical IDR represents a classic hybrid lethal and non-lethal targeting objective. Stemming from the IDR, five questions were asked and connected to the IDR. Additionally, a "Con" argument was connected to the IDR because one fictional participant believed that the word "cause" was too vague. Extending from the subsequent questions, argument and decision icons were used to classify support, using a COIN perspective, as internal support and external support. Along with the first series of questions related to the IDR, a reference node icon was used to put forward the idea as to whether Mao's popular war insurgency theory is relative to this case. This reference node can have a file imbedded inside it or contain a hyperlink for external reference. As Compendium's IBIS scheme is extended to the right, more relationship nodes are connected by the cell to visually identify inter- and intra-relationships. For the sake of brevity in the example, the effects/targeting cell put forward a more detailed IDR based on problem understanding by devising a theme of delegitimizing insurgents.

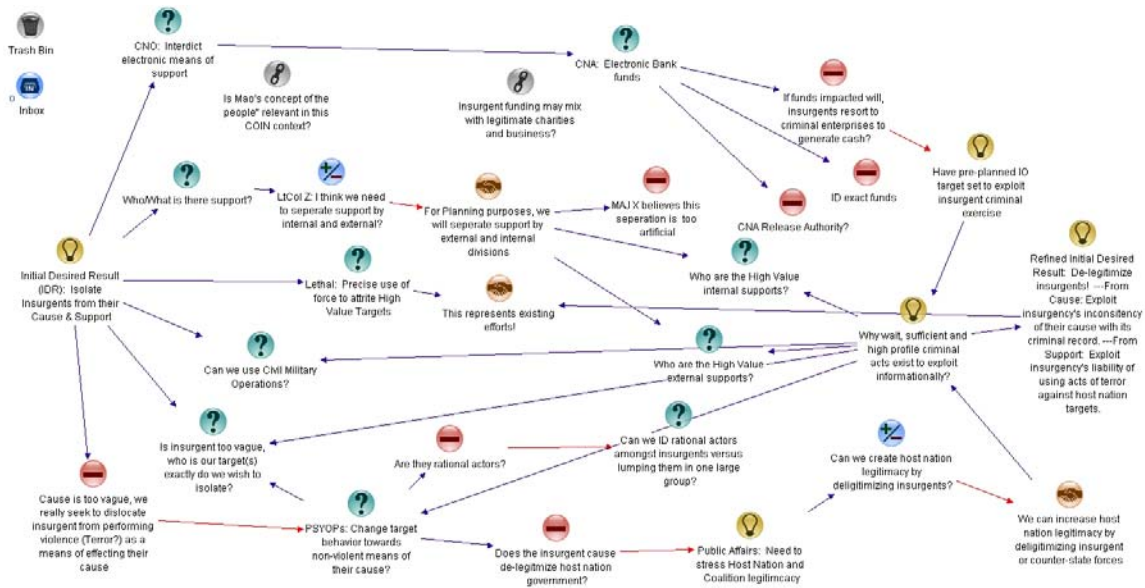


Figure 10. COIN IDR Example

While Compendium, as with most programs, is as only as good as the operator, it does provide a doctrinal, methodological and technological means to identify targets. Doctrinally, Compendium effectively connects phase one objectives with relevant phase two targets. Methodologically, Compendium facilitates the HOT's formulation of the IDR and size of the system. Though not technologically sophisticated, Compendium's construct, functionality and, ultimately, its simplicity serves as a means to better develop and prioritize targets. All together, Compendium represents a freeware solution to improve the phase two actions while adding greater feasibility to the initial steps of the HOT methodology.

E. HOT TARGET PRIORITIZATION AND DEVELOPMENT USING PALANTIR SOFTWARE

1. What is Palantir?

Palantir's enterprise software architecture provides an open platform that enables an unprecedented degree of collaboration among information analysts across organizational and geographical boundaries. Palantir's workspace is the visually intuitive front end of the platform, and provides an integrated suite of tools and technologies used in Palantir Investigations by analysts to gather, analyze, augment, and publish vast amounts of information.⁷⁴ Although primarily an intelligence analyst's tool, Palantir's relationship analysis aligns well with the HOT methodology for target development and prioritization.

2. Palantir's Relevance to Phase Two Target Development and Prioritization

As a recommendation, Palantir represents the keystone of the four other suggested improvements. Since software programs are only as good as the operator, the previous four steps exist as means to fashion superior inputs into Palantir. As a result, Palantir serves as the definitive enabler of the previous solutions because it possesses the ability to automate the study's recommendations. First, the outputs from recommended interim JMEM techniques could be used as operator inputs inside Palantir. Second, Measures of Worth (MOW) along with its associated Positive, Unknown and Negative Indicators (PI, UI, and NI) can be collected,

⁷⁴ Palantir Technologies : Products, 15 July 2008
<<http://www.palantirtech.com/products.html>>.

analyzed, processed and linked inside Palantir. Methodologically, Palantir's flexibility enables the fast and easy implementation of the HOT methodology. Next, though not compatible from a systems definition, Compendium outputs can be saved inside Palantir's database, object view or graph view as a support reference. Since Palantir, analyzes not creates, Compendium's analytical framework provides for better inputs into the Palantir database. Finally, the grouping of IO assets with its intended target and effects moves towards the creation of an EFST. Palantir's supportability of creating EFSTs facilitates the integrated employment of IO's core, related and supporting capabilities. The use of Palantir as a target development and priority tool combines its own capability with the identified best practice outputs of this study's recommendations to improve IO phase two target development and prioritization.

3. Palantir Target Development

Palantir's intelligence foundation makes it an ideal tool for the creation of target folders. Each object entered in Palantir includes properties describing the target, a smart-list history of related events performed by the target, a smart-list of related entities and the ability to "hang" notes, electronic media and documents into the object's property window. In Figure 11, a person serves as a Palantir object example, but the target folder could contain any classification of target type. Beyond individual target development, Palantir's inherent relationship analysis design allows the user to meaningfully connect individual target folders to other target folders

through actual relationships based on history, organization, affiliation or any specified criteria. An example network, depicted in Figure 12, illustrates Palantir's ability to connect individual target folders to other target folders to build a network. An important Palantir target development paradigm is that an event of any affiliation can be entered and therefore modeled into the associated investigation. This is significant for two reasons. First, events and objects related to the target can be dynamically and accurately modeled versus being compartmented or segmented into individual folders. Secondly, both intentional and unintentional tasks and effects, regardless of affiliation, can be introduced into the target development graph to be inclusive of the action and counter-action flow of warfighting. For example, a hostile protest against a friendly force's occupation of a neutral town can be modeled in the investigation since the hostile protest would possess a relationship to other objects in Palantir's repository. Therefore, the fictional protest could be modeled as an unintentional effect generated by the friendly force's occupation, an intentional effect caused by hostile design, or as both events. Beyond the causal analysis, the protest possesses temporal, geographic, qualitative attributes, and other relationships that can be captured in the Palantir investigation. Palantir's design facilitates the documentation of complex events to produce a comprehensive picture that facilitates understanding. Although this could be treated as intelligence support to IO, the analysis can be directly used by the HOT methodology because the developed system is sufficiently robust to actually prioritize targets.

4. Palantir Target Prioritization

Palantir's ability to build and expand individual targeting folders into complex but meaningful networks facilitates the ability to comprehensively prioritize targets. Palantir's intelligence analyst functionality allows it to be used to achieve prioritization solutions:

- **Rack and Stack:** Since target value can be assigned as a property in the Palantir related view window, a user can perform a data repository search based upon a target's overall value. This smart value target list could be represented through text or visually highlighted in the graph's network work.
- **Low or High Hanging Fruit.** By simply adding a target accessibility value to each possible target, a user can perform a data repository search based on perceived accessibility.
- **Any Value(s) Search.** Based on a commander's guidance, all targets or typed targets could contain a data set of evaluated values. For example, a target could contain a subjective value based on the concept of legitimacy expressed as low, medium or high. This value could be searched and then ranked to provide a list of targets based solely on the idea of legitimacy. Since friendly and neutral target audiences can be added into the Palantir repository, the IO capabilities of Operational Security (OPSEC) and Information Assurance (IA) could be enhanced by viewing friendly vulnerabilities through the valued search. Finally, since multi-variable searches can be conducted, IO planners could conduct a valued search based upon legitimacy and target value together.
- **Relationship Search.** Based on a specific target, a relationship search can be performed to provide a layered depth of closeness to the target.

- Nodal or Network Analysis. Since Palantir is a social network analysis tool, it can examine and present target sets as part of a network. Therefore, based upon the system's definition, entire networks can be targeted.

5. HOT Methodology using Palantir as a Tool

Beyond the benefits of using Palantir for general target development and prioritization, Palantir's flexible design allows the user to combine the techniques for target development and prioritization with the HOT methodology. In order to explain the HOT methodology with Palantir, a simple network was created representing a fictional target system. The network involves person #1, who is an acquaintance of person #2, the boss of person #1a and person #1b and a resident of the city. Persons #1a and #1b are also known coworkers, but are not residents of the city. Person #2 is a resident of the city and an owner of the computer. This brief narrative is succinctly illustrated in Figure 13. As an assumption, the targets and the network can be developed and prioritized based upon available intelligence and targeting objectives. At this point, the HOT methodology can be applied to the network.

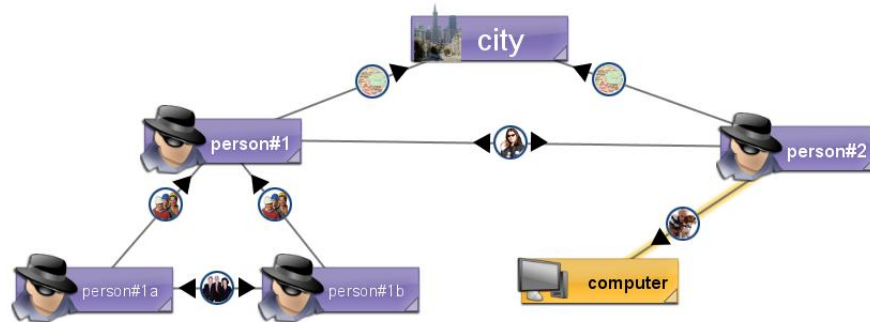


Figure 13. Sample Network, Palantir Graph View

To make use of the HOT method, IO tasks and effects are introduced into the model as entity objects. The IO task is related to the target by attaching a relationship edge between the task and target. Next, the associated IO effect stems from its target to produce the cause and effect relationship into the model. Multiple targets can be related to either the IO task or effect as it applies. In this case, an IO task is directed at the computer producing an associated effect (see Figure 14). Since person #2 owns the computer, he will also be affected. Therefore, an edge was drawn not only from the computer, but to person #2 to convey the full scope of the IO effect. More important than just the network diagram is the user's ability to explain the nature and direction of the relationship between any two objects.

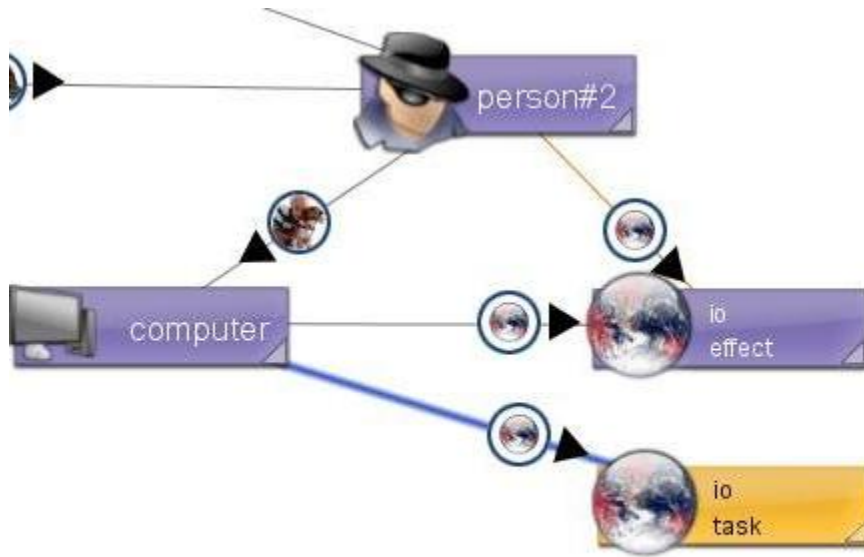


Figure 14. IO task and effect depicted on Palantir's graph view

In order to capture the HOT methodology's value in understanding complexity, individual start and end times were entered into the properties portion of the IO tasks and effects repository. In this case, both the IO task and effect possessed identical life spans, representing a CNO denial of service attack. By selecting the IO task and effect, a user can visually see the effects chain caused by the intended IO task and effect. Figure 15 illustrates the timeline view of the IO task and effect shown from 0400 to 0500 local time aided by the graph view to visually explain the targeting scheme. This targeting shows a first order example, but Palantir could enable the user to select person #2 to see the second order relationships. Although not designed for this purpose, Palantir allows its users to apply this technique that always includes the HOT

methodology's ball and chain, priori and lateral effects positions into target development and prioritization solutions. Additionally, indicators treated as MOWs can be collected and subsequently introduced into the model. Based on the HOT methodology, the MOWs can be classified as PI, UI, or NIs as they derive from an effect. These indicators can then possess attributes, relationships and temporal values of their own to further provide a complete picture, allowing the targeting cycle to function as a cycle.

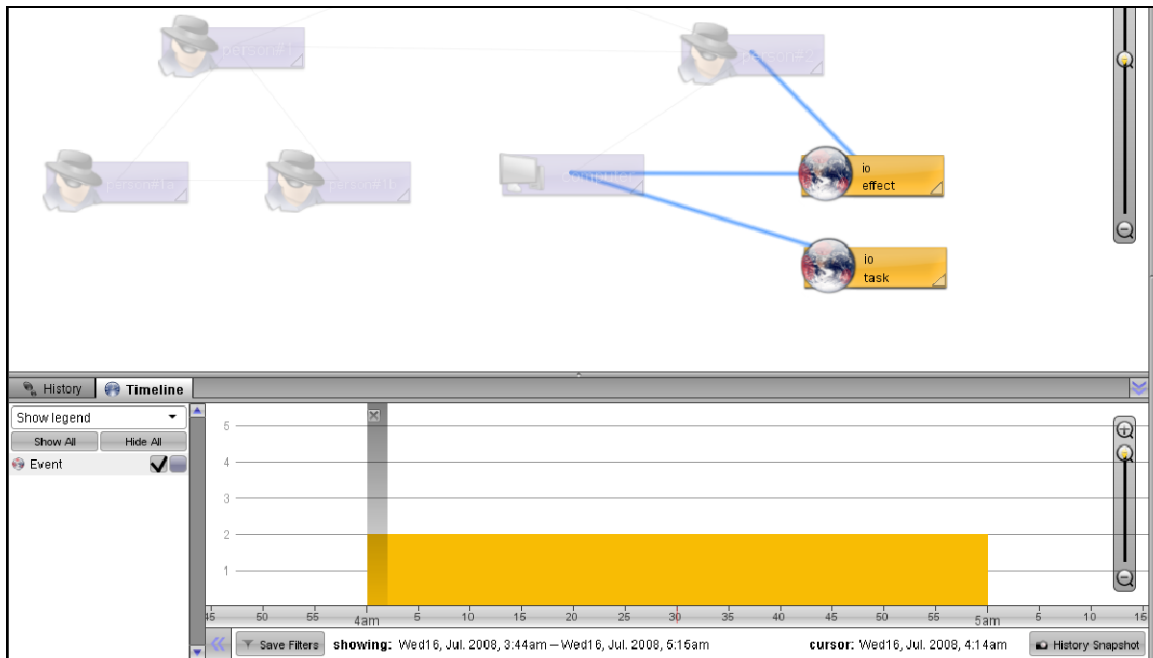


Figure 15. IO Task and Effect relationship with its associated temporal information.

One of the most important paradigms to understand with Palantir is that the software does not publish the user's work until specifically directed, thereby allowing the analyst to use the concept of competing hypotheses to arrive at the best answer possible. If an analyst is unable to

confirm or disprove one of the competing hypotheses, Palantir allows the user to save multiple investigations with different data variations on individual objects and networks. To further support this paradigm, Palantir keeps a useful "snap shot" history as the user adjusts with the investigation. At any time the user can go backwards or decide to automatically export all or selected iterations to a Microsoft PowerPoint or HTML file. This utility supports HOT methodology feasibility because planners can actually and efficiently construct the Weak Actor, Devil's Advocate, and Crystal Ball perspectives. More than just providing answers, Palantir allows for an easy iterative processes to occur.

Another advantage of Palantir's utility involves the ability to war game targeting actions. IO tasks, effects, and measures of worth can be introduced to see how a targeting scheme could play out. Palantir's visual ability to serve as a standalone briefing tool allows the preponderance of the IO targeting rigor to focus on the work instead of devoting precious time towards production and briefing. Although not designed as a targeting tool, Palantir's intelligence utility combined with its flexible relationship designs enables the HOT methodology to become a feasible answer to IO target development and prioritization.

V. CONCLUSION

A. SUMMARY OF FINDINGS

Despite finding problems with IO target development and prioritization in terms of doctrine, practice and technology, this study put forward five recommendations. Though focused on target development and prioritization, the study examined all phases of the joint targeting cycle. In this examination, relevant and connected aspects of other phases, most notably phase six (assessment), were included to ensure the study's problem definition and recommendations were not in isolation. Key summary of findings involving research findings and recommendations are listed below:

- Doctrinally, IO targeting currently lacks an independent methodology to conduct phase two target development and prioritization.
- Phase two (target development and prioritization) and phase six (assessment) are closely linked from an IO perspective despite their numerical ranking.
- IO targeting represents a military wicked problem set.
- Currently Measures of Effects (MOE) tend to only capture success, but could systemically disregard negative and undeveloped indicators.
- The present unavailability of an IO JMEM equivalent limits the ability to match non-lethal effects with a commander's objectives.
- Based on the SME questionnaire and subsequent interviews, IO practitioners understand and employ the concepts of joint targeting, but lack a

consistent and common base independent methodology and tool to conduct target prioritization and development.

- The adoption of a Measure of Worth (MOW) model would allow IO targeting to conduct better assessment of indicators by classifying whether the indicators contribute to, work against or could possibly relate to the desired IO effect. By looking at the number, relevance, and weight of the now classified Positive Indicators (PIs), Unknown Indicators (UIs), and Negative Indicators (NIs), one can determine the actual status of meeting the effect's achievement.
- The Holistic Targeting (HOT) methodology could facilitates whole and complementary targeting solutions to efficiently develop and prioritize targets.
- Compendium software facilitates the process of creating initial IO effects in support of a commander's objectives.
- Though powerful intelligence analyst tools, Palantir's relationship analysis combined with it flexible object definition allows the software to implement and automate the HOT and MOW models.

B. RECOMMENDATIONS FOR FUTURE WORK

This thesis represents an initial foray into the research of IO targeting. The principal weakness in the research involves its inability to establish a quantifiable proof of concept regarding its proposed recommendations. However, the validation of the recommendations represents a steep challenge. With this caveat in mind, several initial ideas were theorized during the course of the thesis work that appeared very suitable for future work on this thesis topic.

- Several commercially available predictive market software programs tailored for internal corporate use could be evaluated as a more elegant method to create ad hoc IO JMEMs.
- From a human factors perspective, comparative evaluations of the HOT and other target development and prioritization techniques could be conducted by actual IO effects cells. Ideally, this comparative evaluation could be done during an exercise or in a training context, yielding a mutual benefit to the participants and the researcher. The evaluation could incorporate external and internal inputs to assess the most efficient model, methodology, or technique.
- Based on classification and unclassified relevancy, real world data could be inputted into the HOT and Palantir model to ascertain different target development and prioritization solutions.
- Palantir's inherently flexible object ontology could be modified to provide an enhanced model for the IO cognitive and informational domain.
- The most ambitious proof of concept involves the building of a "virtual village" using Palantir. The virtual village concept envisions an entirely omniscient view of a given area of operation's physical, informational and cognitive composition. Palantir's geospatial plotting ability with Google Earth makes this very workable. Using a simulation format, participants conduct IO targeting using typical information and/or likely intelligence to develop applicable solutions. The simulation's solution based upon partial information is then compared with the omniscient picture to gradually identify the key independent variables required for targeting in a perfect world. From an intelligence perspective, these isolated Independent Variables (IVs) become Prioritized Intelligence Requirements (PIRs), and from a targeting perspective, the IVs materialize as either High Value Targets (HVTs) or High Priority Targets (HPTs).

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APPENDIX

Information Operations (IO) and/or Non-Lethal Effects
Targeting/Planning (Target Development and Prioritization)
Questionnaire

Point of Contact: cieva@nps.edu

1. Rank:
2. MOS or Specialty:
3. Service:
4. Years of service:
5. Billet held while conducting IO or non-lethal effects targeting:
6. Echelon of unit assigned to: (For example, Battalion or Task Force, RCT or BCT, etc)
7. Theatre of Service:
 - a. Area of Operations (if applicable):
8. Timeframe in theatre. Start (YYMMDD): End (YYMMDD):
9. Questions.
 - a. Did you use the Joint Publication 3-60 Targeting as a source or reference for your target development and prioritization?
 - b. Have you ever read or referenced the JP 3-60 Targeting Publication for target development and prioritization?
 - c. What process did you use to develop and prioritize targets?
 - d. Was the process a formally established SOP? If so, what was the source or best related source?
 - e. Was the process based on joint or service doctrine? If so, what was the source?
 - f. If the process was informal, please provide a brief summary of the process used.

- g. Did you use a (any) tools to support your target development and prioritization? If so, which one(s)?
- h. Ratings. With one (1) being the lowest and five (5) being the highest, please evaluate the strength of the following statements below on your target development and prioritization process used:
- The process used was effects based: _____.
 - The process used was interdisciplinary: _____.
 - The process used was focused: _____.
 - The process used was systematic: _____.
 - The process used was effective: _____.
 - The process used was consistent: _____.
 - The process used was a byproduct of my theatre of operations: _____.
 - The process used would be applicable to neutral audiences: _____.
 - The process used would be applicable to adversarial audiences: _____.
- i. If you could improve one aspect of the process used, what would it be?

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