Combining Operations Research, Business and Knowledge Tools to Combat Drugs

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ABSTRACT

For the past 40 years, the U.S. Government has been involved in the war against illegal drugs. The total direct and indirect cost of the illicit drug trade to the U.S. economy has been estimated to be approximately $200 billion annually. Despite the expenditure of nearly a trillion dollars and the involvement of multiple federal, state, and local government agencies, many argue that we are no better off, and some would say worse off, than what we were when we started. Further complicating the problem is that while each of the various agencies involved brings unique and complementary capabilities to the overall initiative, their efforts lack unity of purpose due to differences in priorities, authorities, and culture. In light of these grim facts, U.S. Joint Task Force North (JTF-N) has spearheaded an initiative to improve cooperation among the stakeholder agencies and change the approach to the war on drugs. Understanding that no one agency possesses all the required knowledge to solve this massive problem, JTF-N brought together over 20 government agencies in a series of facilitated workshops designed to enable the sharing of knowledge and lessons among participating agencies. Borrowing techniques from network analysis, Lean manufacturing, and operations research, JTF-N developed the Counter Transnational Organized Crime (C-TOC) Systems Analysis Framework (SAF) to elicit the insights of the assembled experts and create new knowledge about the domain. Through a series of large-group facilitated discussions and war-gaming, underpinned by the C-TOC SAF, the JTF-N team was able to incorporate participant insights into the framework in order to identify capability gaps, intelligence gaps, and opportunities to synchronize operations. This paper will describe the C-TOC SAF as well as the facilitation and war-gaming methods used to collaboratively develop alternative approaches to conduct counter drug operations and improve combined agency performance.

ABOUT THE AUTHOR

John Nelson is a Project Manager with Dynamics Research Corporation. A retired Army officer, Mr. Nelson has managed a number of knowledge management and analytical projects for a variety of Federal Government and Department of Defense clients. Mr. Nelson has assisted organizations to develop frameworks to solve complex analytical problems and facilitate large scale problem solving seminars and workshops. He has extensive experience managing communities of practice; designing and implementing collaborative portals; and developing and conducting knowledge management training. Mr. Nelson has conducted knowledge assessments, developed knowledge management strategies, and guided the implementation of knowledge management programs for several organizations. Mr. Nelson is a 1987 graduate of the United States Military Academy at West Point and holds Masters of Science degrees from the University of Central Florida in both Training Simulations and Engineering Management. Mr. Nelson is a Master Certified Knowledge Management Professional (MKMP) and a Certified Lean Six Sigma Master Black Belt.

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INTRODUCTION AND BACKGROUND

The fight against the illegal trafficking of drugs in the United States has taken a tremendous toll both economically and socially. The economic costs are staggering. The United States has spent over $1 trillion over the past 40 years and many would argue that the problem of illegal drugs in the country has only gotten worse. Annually, the total economic impact to the U.S. approaches a staggering $200 billion through the combination of costs incurred by the criminal justice system, crime victim costs, health costs, productivity costs, and other crime costs (National Drug Intelligence Center, 2011). These costs are shared between the national, state, and local levels. In recognition of the multifaceted nature of the drug problem, the current National Drug Control Strategy clearly states that the U.S. approach to fighting drugs includes "prevention, early intervention, treatment, recovery support, criminal justice reform, effective law enforcement, and international cooperation" (National Drug Intelligence Center, 2011, p. iii).

The National Drug Control Strategy (NDCS) directs that the U.S. – in close collaboration with international partners – conducts activities to disrupt the flow of illicit drugs at the source, in transit and once they arrive here in the United States. A key component of that effort is to identify the vulnerabilities of drug trafficking organizations and attack them. Beyond just a direct attack upon the material flow of illicit drugs, the strategy also dictates targeting the leadership of drug cartels and their finances. Achieving all of these objectives requires improving our knowledge of drug trafficking organizations through information and intelligence sharing.

In November of 2012, Joint Task Force-North (JTF-N) hosted the second in a series of large-scale, interagency, collaborative problem solving events to address the flow of illicit drugs into the United States, with a specific focus on methamphetamine production and distribution networks. The purpose of this paper is to describe the emerging Counter-Transnational Organized Crime (C-TOC) Systems Analysis Framework (SAF) developed and used by JTF-N and their partners as an alternative approach for disrupting the flow of illicit drugs into the United States in order to meet the National Drug Control Strategy's objectives. Additionally, this paper will detail the process for applying the framework in large-scale collaborative events with counter drug subject matter experts (SMEs). Ultimately, the implications, insights and lessons learned for both the analytical approach and the counter drug domain derived during those events will be shared.

Analytical problem

Unlike a traditional enemy that a military force faces, a transnational criminal organization's objectives are not defined in terms that relate to the political control of a territory or state. Rather these organizations are business and like legitimate businesses, their ultimate goal is to make money. However, existing military doctrine, such as Counter Insurgency (COIN) and Network Centric Warfare (Netwar) that have been successfully applied against other adversaries, assumes an enemy with a political rather than a financial motivation. It follows then that in order to successfully disrupt the activities of TOC organizations, it is necessary to model and analyze TOC organizations as businesses.

A significant difference between TOC and legitimate business is that TOC organizations attempt to make money with impunity (Sullivan, 2012). This distinction affords TOC organizations a range of options to carry out their daily operations that legitimate businesses do not have. A quick review of open source media sources quickly shows that extortion, bribery, blackmail, torture and murder are among the more common tools TOC organizations employ. Since in some cases members of certain TOC organizations have had significant military training, they are well versed in conducting military style operations. So much like La Cosa Nostra, TOC organizations present largely a law enforcement problem yet one with a capacity to present a significant military challenge as well.

The challenges in fighting this threat to national security are not only those associated with the enemy. The National Drug Control Strategy recognizes this challenge as one involving federal, state, local, and tribal law enforcement agencies and provides for: improved intelligence exchange and information sharing; state and local law enforcement access to federal information; promoting law enforcement collaboration along drug-trafficking corridors; coordinating efforts to secure U.S. international borders; and developing a plan to interdict the flow of currency and weapons among other interagency coordination efforts (National Drug Intelligence Center, 2011). However, a significant gap still remains connecting these efforts into an overall effort that creates organizational synergies between them. While each of these efforts relies upon interagency coordination, there does not exist what would be called in military terms unity of command or effort. Each of these various agencies at the federal, state, local and tribal levels has their own unique lines of authority, legal authority, funding streams, and – most importantly – objectives. As such, each organization has the autonomy to pursue its own operational agenda without deference to other agencies' objectives. Therefore, the motivation for an organization to cooperate with other agencies is for its own benefit rather than to benefit the effort as a whole. Add to that the sensitivity surrounding the reluctance of organizations to share information impacting law enforcement cases and the requirements of the military information classification system, it becomes like tearing a page out of the script of a primetime crime drama. This leads to limited information sharing on a case-by-case, need-to-know basis rather than fostering the free flow of information between agencies.

THE COUNTER TRANSNATIONAL ORGANIZED CRIME (C-TOC) SYSTEMS ANALYSIS FRAMEWORK (SAF)

In order to address the complexities of countering TOC, JTF-N concluded that current analysis methods done in isolation were inadequate. As a consequence, they sought to combine the strengths of existing analytical techniques into a new framework, the Counter Transnational Organized Crime (C-TOC) Systems Analysis Framework (SAF). The C-TOC SAF, depicted in Figure 1, integrates four specific analysis approaches: the Missions and Means Framework (MMF), Network Analysis, Value Stream Mapping, and the Theory of Constraints. Individually, each of these approaches provides insight into how TOC organizations operate but individually fall short of providing a comprehensive picture. Each of these tools provides the analyst a unique lens through which to view TOC organizations. Combined together, they create a holistic view of TOC operations and correspondingly, provide insight into how to defeat them.

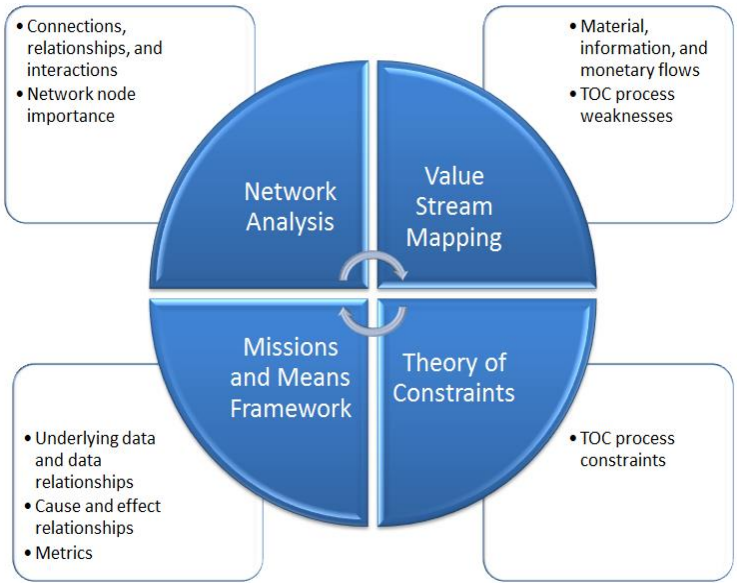

Figure 1: C-TOC-SAF

The MMF forms the backbone of the C-TOC-SAF. The MMF allows for the detailed analysis of the capabilities of multiple entities interacting within a system and how interactions between entities impact their capabilities. The MMF describes the battle space in seven levels (Figure 2):

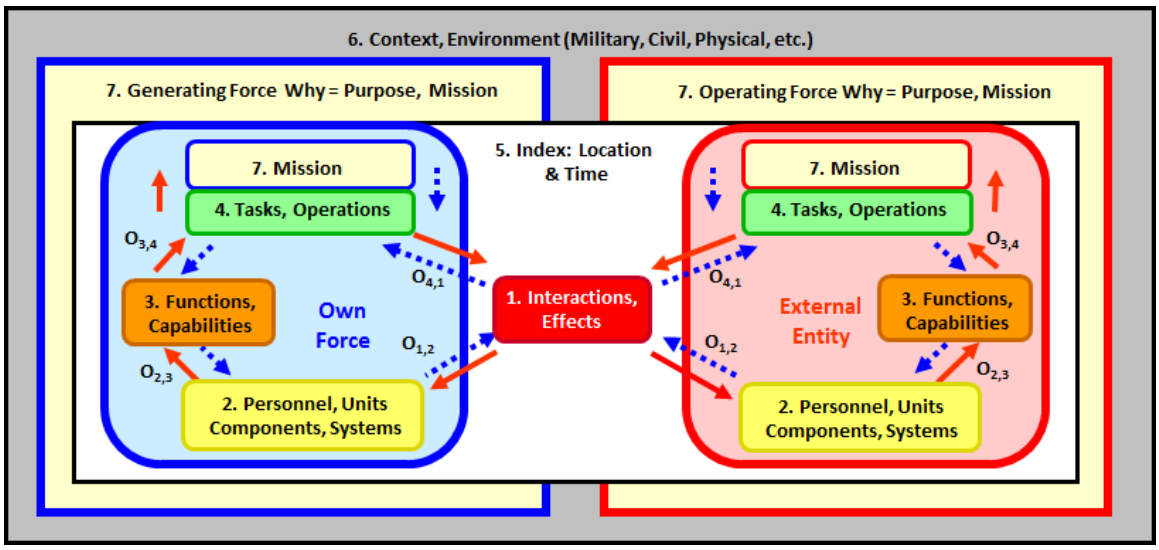

Figure 2: Missions and Means Framework

Connecting the levels of the MMF are operators that describe the process for transformations that occur at one level due to changes at another level. For example, when the two entities depicted in Figure 2 above (Own Force and External Entity) interact with one another (level 1), state changes occur at level 2 (personnel, units, components, and systems) for both the Own Force and the External Entity. If for example, this interaction results in a number of units being destroyed, there is an impact on its capabilities and ability to perform certain functions (level 3). This change in turn has an impact on what tasks and operations the organizational entity can execute (level 4) and ultimately the missions (level 7) it can perform. These interactions could also have an impact on the civil, political and military environment, represented by level 6. Thus the intent behind the MMF is to provide a structured framework through which one can analyze how even the smallest change at one level can have a ripple effect throughout the other levels (Sheehan, Deitz, Bray, Harris, & Wong, 2003).

Another aspect of the MMF is that it allows for the analysis of the relationship between tactical, operational, and strategic levels. In the simplest terms, a subordinate organization's ability to perform its mission directly impacts the ability of its higher organization to perform specific tasks or operations (level 4). The converse is likewise true. Moreover, if an operation of either the subordinate or higher organization impacts the environment, those environmental impacts are experienced by both the higher and subordinate units alike. The recent U.S. experience in various theaters frequently demonstrated that tactical actions – the actions taken by units operating in the field – could have operational or even strategic impacts (Tisserand, 2006). Events such as unintended civilian casualties or instances of individual unit soldier misconduct occasionally caused significant operational and even strategic consequences that commanders had to contend with.

One of the most vexing aspects of the drug cartels is that they act as highly adaptive criminal networks (Miklaucic & Brewer, 2013). In contrast to hierarchical forms of organization, networks are characterized by "decentralization, greater autonomy, informal chains of authority, and dispersed communications flow" (Dean, 2011, p. 45). The high number of connections that exist between actors, enables networks to be more "resilient to disruption" than traditional hierarchies (Dean, 2011, p. 39). By analyzing TOC organizations through social network analysis, researchers gain an understanding of the relative importance of nodes in the network – each node representing a given actor – based on the number of connections there are to the node and the strengths of those connections. Network analysis can reveal information concerning the overall structure of the organization as well as the interdependence of actors. Furthermore, network analysis enables the study of how the network may change as nodes or the connections between nodes are severed (Arquilla & Ronfeldt, 2001). Network analysis fits into level 2 of the MMF by describing the relationships between personnel or units, represented as nodes. Since multiple personnel or units connected together can form a larger system, by coordinating their efforts they can have unique capabilities and can perform certain functions (level 3) that they could not have performed individually. Hence, if the correct nodes or connection between nodes in a TOC network are successfully targeted, it would have some

impact on the TOC organization's ability to function. It also follows that by targeting nodes in the TOC network that have little connectivity with the rest of the network, U.S. agencies and their partners may have little to no effect on TOC operations.

Value Stream Mapping and the Theory of Contracts are methods borrowed from the business domain. Value Stream Mapping, popularized in the Lean manufacturing world, is an especially powerful tool for visualizing and analyzing the flow of material through a series of processes that transform raw materials into a product (Rother, Shook, Womack, & Jones, 1999). In addition to material flows, Value Stream Mapping also depicts the communication flows that control the various processes. In the manufacturing world, the objective of Value Stream Mapping is to provide the means to identify waste and inefficiencies in these flows and create ways to reduce these inefficiencies. The hypothesis behind the C-TOC SAF is that if Value Stream Mapping can be used to analyze and improve flow in legitimate businesses, it could also be used for exactly the opposite purpose: to identify ways to disrupt the flow of a system in an illicit business.

For illustrative purposes, consider the notional TOC organization value stream depicted by Figure 3. Along the bottom of the value stream map is the flow of material through the value stream. The flow begins with raw materials, transported by ship to a port of entry (POE) later transported by other means of transportation, chemical

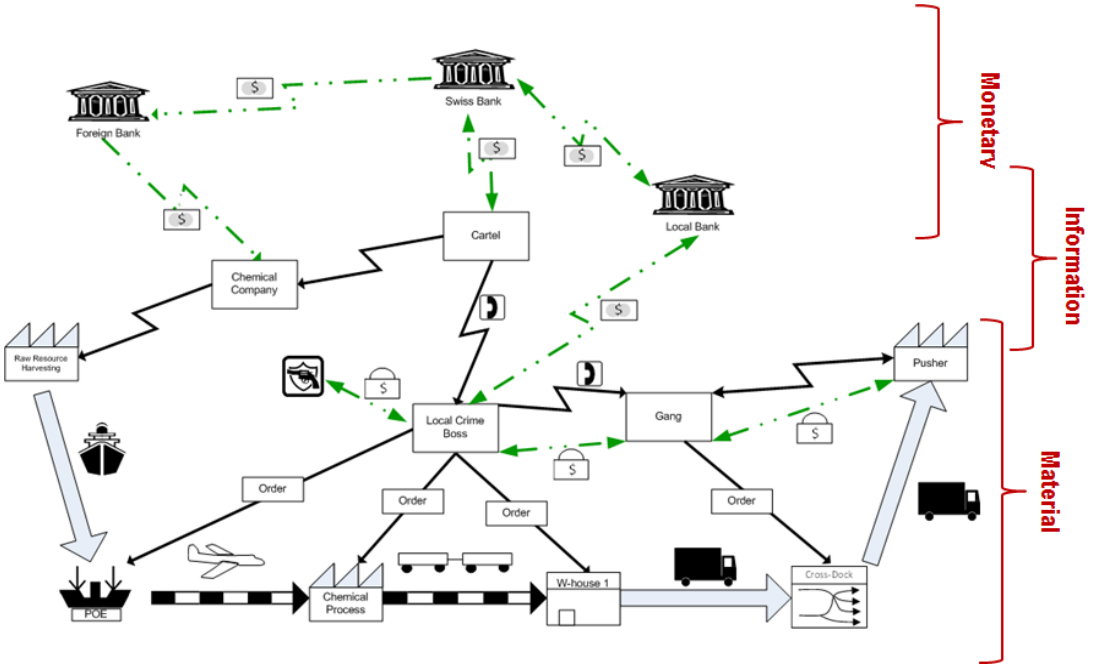

Figure 3: Notional TOC Illegal Drug Flow Value Stream Map

processing, warehousing, cross docking and ultimately arriving at the drug pusher. It is important to note that this simplified abstraction does not show the flow of every raw material through the system. Analysts and subject matter experts (SMEs) select the raw material that contributes the most to the overall product. For example in the automobile industry, value stream maps often begin with source of steel, even though many other raw materials are eventually incorporated into the final product. The idea behind this approach is that this simplified abstraction enables SMEs to "achieve a breakthrough in shared consciousness of waste and to identify systematic opportunities for eliminating waste" (Jones, Womack, 2009, p. 3).

Also depicted in value stream maps are communication flows, shown above and connected into the material flow. These are the specific telephone calls, word-of-mouth exchanges, faxes, computerized inputs/outputs, etc. that direct and coordinate the processes in the system. In traditional Value Stream Mapping, there exists an unspoken assumption that the flow of money into the business will occur as planned. This is not the case with TOC organizations. Disrupting TOC organizations access to monetary resources would effectively stop the material flow of illicit drugs through the value stream. Therefore, JTF-N adapted the Value Stream Mapping process to include

the monetary flows that fuel TOC businesses in the value stream. Moreover, rather than trying to find opportunities to eliminate waste in the value stream, the process was adapted to find those opportunities to disrupt all three of those flows (monetary, information and material). Like network analysis, Value Stream Mapping provides information to inform level 2 of the MMF. This analysis focuses on the TOC organization's ability to produce and distribute its product. So in one sense it is more focused than the network analysis but, since it only analyzes the flows associated with the primary material flow, it does not provide the breadth that network analysis does.

Because of the graphical nature of the value stream map and the simplified view of the span of the value stream from raw materials to final product on the street, it provides an abstraction of the problem that enables collaborative discussion on the implications of various courses of action at the operational level. An abstraction in the form of a model provides one path to knowledge formation (Deitz, Bray, & Walbert, 2013). Experience from the Counter Methamphetamine Kaizen event in November 2012 demonstrated that because of its relatively intuitive format a value stream map requires little more than a brief explanation to the participants before it can be a useful analytical tool. Participants did not have to become experts in the Value Stream Mapping process. They were able to almost immediately understand the map, discuss its implications, make revisions, and identify potential areas for targeting the TOC organization.

Much like Value Stream Mapping, the Theory of Constraints is often used in the business world to study and then improve flow through manufacturing processes. The underlying principle of Theory of Constraints is to identify the system's constraints and then direct all efforts toward overcoming those constraints (Goldratt & Cox, 2004). For example, consider the simple system represented in Figure 4. While each process has a different capacity, the capacity of the entire system is limited to 300 units/day, the maximum capacity of the chemical process. The chemical process is the primary system constraint. As such, in order to improve flow through the system, all efforts should initially be directed towards increasing the capacity of the chemical process until it is no longer what limits the system. As we did with Value Stream Mapping, if we "turn the framework on its head," the chemical process is also the same process we should first look to constrain further in order to disrupt flow through the system. Further limiting the chemical process, even by the smallest amount, has a corresponding impact on the overall flow capacity of the system. By contrast, not until any other process is constrained to a level below 300 units/day does that impact the system's overall capacity. So what Theory of Constraints analysis does within the C-TOC SAF is provide an indication as to are the potential high value targets within the TOC organization value stream.

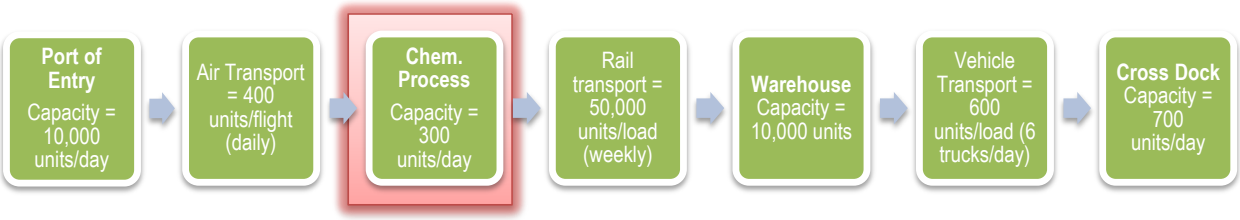

Figure 4: Simple Processing System

FACILITATION

Kaizen Framework

Bringing together a large group of individuals into a conference or seminar to produce any tangible outcome is fraught with issues and problems. But in November 2012, that is precisely what JTF-N attempted to do. In the late summer early fall of 2012, the JTF-N Knowledge Management Office announced their intention of hosting a large scale collaborative event to tackle the problem of forging a new way ahead for the counterdrug effort. The invitation list included over 75 individuals representing a host of Department of Defense and Federal Government agencies including:

- Department of Homeland Security, Operations Coordination and Planning
- Drug Enforcement Administration, El Paso Division
- Drug Enforcement Administration, El Paso Intelligence Center
- Drug Enforcement Administration, Mexico City Office
- Department of Homeland Security, Border Intelligence Fusion Section

- Customs and Border Patrol, Air and Marine Operations Center
- Customs and Border Patrol, National Targeting Center
- Customs and Border Patrol, Office of Field Operations
- Embassy of the United States in Mexico, Narcotics Affairs Section
- Federal Bureau of Investigation
- Joint Interagency Task Force South (JIATF-S)
- Joint Interagency Task Force West (JIATF-W)
- National Methamphetamine and Pharmaceuticals Initiative
- Office of Naval Intelligence
- Office of Defense Coordination, Mexico City
- U.S. Army Material System Analysis Activity
- U.S. Northern Command (J2, J5, J9)

The word Kaizen comes to us from the two Japanese words – Kai and Zen – which together have become loosely translated to mean continuous improvement or change for the better. Kaizen events are typically short duration problem solving sessions, typically lasting anywhere from one to five days – not including preparation in advance – designed to bring together groups of experts to tackle specific process related problems (Vitalo & Butz, 2003). There is no standard configuration for a Kaizen event; rather the structure is adaptable to the specific problem being tackled. To address the C-TOC problem set, the facilitation team, in conjunction with the JTF-N Knowledge Management Office, developed a Kaizen event agenda following a Focus, Evaluate, Solve, and Act structure. This structure is both easily understood by participants and is oriented on the production of outcomes in the Act phase. Each of the four phases is discussed further below.

One of the keys of the process is that the facilitation team was just that: a facilitation team. The team did not consist of a group of experts in the counter-drug world. Rather, the team's charter was to facilitate the knowledge sharing, knowledge creation and problem solving processes of the assembled SMEs. With that charter, the facilitation team needed to organize in a manner that would provide for continuous flow through the process and help them maintain their position of neutrality, particularly important when mediating debates between experts positioned on opposite sides of a given issue. The three person facilitation team consisted of a facilitation team lead, a MMF SME, and a Value Stream Mapping SME-recorder. The facilitation team lead's role was to guide the discussion and maintain the flow of the event through the agenda. He served as the "talking head" for the team and freed the JTF-N sponsor to participate in the event rather than lead the event. Since the facilitation team lead spent most of the time directing the current conversation, he relied on the MMF SME to help manage the agenda. Although actively monitoring the discussions, the MMF SME did not have the responsibility of guiding the discussion. Therefore, the MMF SME was able to constantly monitor progress against the agreed upon deliverables and to advise the facilitation team lead on agenda adjustments and lines of discussion that needed to be further explored.

The final member of the team, Value Stream Mapping SME-recorder, had the responsibility to capture the information from the discussions in a meaningful way that could be input into the C-TOC SAF components. The success of this effort was heavily dependent on the development of detailed templates in advance that allowed for rapid data entry. These included templates for capturing data to populate the various levels of the MMF and allow for the construction of value stream maps and network diagrams. But more than simply recording data, the Value Stream Mapping SME-recorder continuously monitored the process and worked with the facilitation team lead to ensure that the results of the discussions produced sufficient detail for all required data elements. Although each had a defined role, each member of the facilitation team was completely familiar with all parts of the emerging C-TOC SAF framework and maintained a constant dialogue with one another, constantly shaping the discussions and adjusting the agenda to achieve the Kaizen outcomes.

Focus

A Kaizen structure is not all that different than other problem solving structures in that establishing a clear problem statement up front is essential to ensuring you correctly solve the right problem. A key aspect of the JTF-N Methamphetamine Kaizen event was that the participants were not Kaizen process experts; rather they were a collection of SMEs who each brought to the problem a unique perspective or set of insights that needed to be considered. Their input into the problem was guided by facilitation. While many understood aspects of the problem

domain coming into the event, few if any of the participants had a holistic understanding of the problem. Depending on the particular agency they represented or function they performed, each participant looked at the problem through their own unique lens, bringing with them organizational or personal biases. Thus in order to reach some sort of consensus on a problem statement for the event, the Focus stage incorporated opportunities for representatives of each of the major agencies involved to present information about their organization or a particular aspect of the drug problem that they uniquely understood. The result of this nearly day long series of knowledge sharing sessions was an increased appreciation of the problem domain by all participants, and in particular an increased understanding of the perspective of the various stakeholders involved in the event.

In addition, the question and answer periods enabled the participants to gain a deeper understanding of organizational equities and biases. The Kaizen event was as much a social exercise as it was an intellectual one. As described earlier, part of the problem that the U.S. and it partners must wrestle with is the current lack of unity of effort. While the National Drug Control Strategy provides broad direction and mission parameters to the many agencies involved in the Drug War, it does not appoint any central authority to lead, coordinate and synchronize the effort. Hence within those broad parameters, individual organizations – each with its unique authorities, capabilities, and funding streams – establish their goals and objectives without respect to the goals and objectives of other organizations. Especially in times of tightening budgets, each organization is fighting for their portion of a reduced pot of fiscal resources. In effect, this current structure could actually serve to encourage competition between agencies rather than full scale cooperation, which could become especially acute if an agency perceived that another agency was "treading upon its turf" or attempting to gain control of what it perceived to be under its purview. For many of the participants, the Focus sessions of the Kaizen event provided the first glimpse into the other organizations involved and began to break down some of the natural barriers to communication and dialogue. Establishing a collegial foundation among the Kaizen participants was an essential piece to building a sense of teamwork among the participants that would not only enable knowledge sharing and creation during the Kaizen event, but would sow the seeds of collaborative action between the participating agencies after the event when they may attempt to place the C-TOC SAF into action.

With the organizational briefings and introductions completed, the facilitation team conducted a collaborative discussion with the over 70 participants to craft an agreed upon problem statement and outcomes for the Kaizen event. The discussion of the problem statement brought to the forefront more of the organizational divides that characterize fight against the TOC drug business. While the first murmurs of dissent among the participants began to arise, agreement was initially reached. Yet, imperfect as they were, the problem statement and outcomes provided focus for the group moving forward. It established a sense of ownership in the process and created the initial understanding of how they might be able to contribute to the event during the course of the week.

Evaluate

The evaluate stage of a Kaizen event begins the detailed analysis of the problem space. It's at this point that the facilitation team introduced and explained the C-TOC SAF to the participants of the Kaizen event. The primary vehicle the team used to describe the C-TOC SAF was the value stream. Analyzing a problem as complex as the counter drug problem requires a modeling abstraction that contains sufficient detail to accurately describe the complexities of the interactions between actors and how those interactions change various attributes of the actors and the environment. The MMF provides that detailed abstraction. However, what the MMF offers in detail it fails to provide in accessibility. One of the simplest models that shows the entirety of the MMF is displayed in Figure 2 above. While it is a useful tool for discussing the theory behind the MMF, the expansive charts and templates to capture the necessary data to complete an MMF analysis make it unwieldy as a discussion tool for domain analysts. Although the MMF helped the participants to organize the vast amount of data about the TOC organizations and U.S. agencies and their partners, it simply does not provide a visualization of the flow from the beginning to the end of the illicit drug production and distribution system. On the other hand, with little explanation, a value stream map provides an abstraction of the problem that is immediately accessible and understood. Similarly, basic network diagrams are also easily understood with relatively little explanation. Thus the facilitation team took the approach of using value stream maps and network diagrams to anchor the discussion among the collected group of SMEs.

In February of 2012, JTF-N had conducted its first Kaizen event to begin the development of the C-TOC SAF. During the event, the participants developed draft value stream maps and network diagrams as a proof of concept for the C-TOC SAF. Over the ensuing months, the participating agencies continued to vet and refine these products

which became the baseline for the November 2012 Kaizen event. During the November event, the facilitation team led a series of working sessions to refine the value stream maps. In order to better facilitate discussion, the team divided the participants into smaller groups, with each group working on a particular portion of the maps. Each of the members of the facilitation team paired up with one of the groups and guided the discussions, asking questions to spark thought and initiate dialogue. After making initial refinements, the groups were rotated so that over the course of the Kaizen event, every participant had on opportunity to lend their expertise to refining the value stream maps and network diagrams. Seeing the entire value stream and TOC network from end to end was an eye-opening experience, leading one of the participating intelligence analysts to comment that for the first time she was able to understand where her daily intelligence work fit into the larger counter-drug fight.

Solve

The Kaizen event reached its climax in the war-gaming of various courses of action. The purpose of the war-game was to provide insights into the impact of targeting specific nodes within the TOC value stream. The facilitation team used templates based on the MMF to methodically capture data from the war-game as the participants discussed attacking selected nodes / vulnerabilities. The facilitation team divided the Kaizen participants into three teams: U.S. and U.S. partner nations, TOC organizations, and a "white cell" who arbitrated the results. Using the value stream map as their discussion tool, the U.S. and U.S. partner nation team developed potential courses of action to disrupt the flow of illicit drugs. The facilitation team then led a group discussion following an *action*, *reaction*, *counter-action* sequence. As each of the U.S. and U.S. partner nation actions were announced and recorded, the participants representing the TOC organizations discussed and announced their reaction. The U.S. and U.S. partner nation team was then afforded the opportunity to develop a counter-action. The "white cell" adjudicated the outcomes of the interactions; these included the degree to which each side – U.S. and U.S. partners and the TOC organizations – were aware of the other's actions and the overall effect of the interactions on the operational environment and the force capabilities available to each side. As the white cell considered the effects, the facilitators encouraged discussion between the participants to provide their perspectives on the environment and the various actors. This resulted in a more complete and shared understanding of the problem set by all sides, as well as ensured that the white cell had a more complete grasp of the various factors impacting the interactions between the sides.

Act

In the final phase of the Kaizen – Act – the facilitation team led a discussion of the participants to identify the key learning points over the course of the week. As before, the participants were divided into subgroups for the initial discussion. After each subgroup had developed a list, each group briefed the participants in the other groups. After achieving consensus among the members about the main points, the facilitation team and JTF-N staff constructed the out-brief for the event and associated position paper.

LESSONS LEARNED

Throughout the course of the planning, preparation, and execution of the November 2012 Kaizen event, numerous lessons were learned by the JTF-N staff, the Kaizen participants, and the facilitation team. These can be roughly divided into two groups: those referring to the analytical framework and those that are specific to the C-TOC domain.

Analytical Framework

The Kaizen event demonstrated to all participants that the emerging C-TOC SAF is an extremely useful framework for describing the problem space. For the first time, many participants were able to grasp the extent of the interconnected TOC networks across international boundaries from raw material extraction, through the production and distribution process, to the hands of the users. In addition, some preconceived notions of the effectiveness of targeting individual TOC network nodes were dispelled as various courses of action were war-gamed and the first and second order effects discussed. With the MMF serving as its overall underpinning, the C-TOC SAF provided a way to organize information about the environment, the interacting forces, and the effects of those interactions in a meaningful way.

In addition, business analysis techniques, particularly Value Stream Mapping proved extremely useful. The graphical aspect of a value stream map made it immediately accessible to domain SMEs. This enabled them to have

meaningful discussions about the problem space without having to understand the intricacies of the MMF. The discussion exercises – particularly the war-game guided by the value stream maps – supported the formulation of new knowledge about TOC organizations, U.S. and U.S. partners, and the environment.

The Kaizen also showed the utility of combining multiple analysis techniques, even those from different disciplines, into a larger analysis framework. Past studies using the MMF have shown the MMF to be effective for analyzing other problems, particularly irregular warfare (Bray, 2011). Applying the MMF to analyze the C-TOC problem demonstrated how the MMF, originally designed as a test and evaluation framework, has inherent flexibility. Moreover, marrying the MMF with Value Stream Mapping, combined with facilitated exercises, opened up a direct channel between operations researchers and domain experts, something that points towards the possibility of this approach being applied to an even wider variety of problem sets and domains.

C-TOC Domain

As stated previously, the C-TOC SAF enabled analysts, from a wide variety of participating agencies, to see the totality of the problem space from end-to-end. As a result, the participants quickly saw the need for increased sharing of intelligence in line with the National Drug Control Strategy. Similarly, through the war-game, the analysts saw how it was necessary to combine the functions and capabilities of multiple agencies to effectively conduct operations to target one or more nodes within the TOC value stream. Despite the National Drug Control Strategy's directive for increased cooperation and sharing between agencies, these insights underscored the reality that the various agencies involved in the U.S. counter drug effort do not truly have a shared purpose at the operational level.

The single most significant insight gained by the participants was that in order to create any significant disruption on the TOC value stream, it was necessary for the U.S. and U.S. partners to conduct simultaneous operations against multiple nodes. As the participants war-gamed courses of action that targeted single nodes, the TOC network was able to quickly react and counter by shifting its operations to redundant facilities or by employing alternative means of communications. Any disruptions to TOC network operations was only minimal and short lived. However, by targeting multiple nodes simultaneously, the U.S. and U.S. partner agencies were able to create confusion on the part of the TOC organizations from which they were not able to quickly regroup and reorganize. While the impact was not long lasting, it enabled U.S. and U.S. partners the freedom to conduct immediate follow on operations before the TOC network could fully recover from the previous action. This required coordinating efforts by integrating forces across organizational boundaries as targeting significant nodes on the value stream required a mix of capabilities that no one single agency could fully provide.

A final key insight for the participants is that they recognized the need to look at the problem space from multiple perspectives. Each framework provided unique insights into the problem. For example, while the value stream enabled the participants to visualize the entire problem space and discuss courses of action, it was the detailed data capture associated with MMF that demonstrated where capability redundancies or capability gaps existed. For instance, several agencies have intelligence gathering capabilities and field agents with the authority to make arrests. By understanding what each agency brings to the table, decision makers would be better informed in their efforts to create multi-agency task forces to conduct specific operations.

CONCLUSION

The drug war has presented numerous challenges for the country over the past 40 plus years. Despite the expenditure of a vast amount of resources and the best efforts of numerous federal, state, local, and tribal agencies, illicit drugs still present a tremendous societal and economic threat to the United States. The C-TOC SAF offers a promising new approach for analyzing the various aspects of TOC and drug trafficking in an integrated framework. The MMF – an analysis method already proven to have the flexibility for application to multiple domains – provides the overall structure behind the framework and the means to analyze the interactions between TOC organizations and U.S. and U.S. partner agencies. This enables the assessment of the effects of those interactions on the capabilities of the opponents as well as the environment. Network analysis nests with the MMF enabling an assessment of organizational structures and an understanding of how the various actors in the networks work together to form a system of systems. Value Stream Mapping and the Theory of Constraints present a simplified abstraction of the entire production and distribution system that allows domain SMEs the ability to identify

opportunities for disrupting TOC organization activities. While the long term impact of applying this approach remains unproven, the November 2012 Kaizen demonstrated its efficacy as a knowledge sharing and creation approach.

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