Leapfrog Leaders

How lowlighting content, and highlighting cognitive structure and dynamics can leapfrog leaders to the next level

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We need leaders who can execute at the Strategic, Operational, and Tactical (SOT) levels. But, research shows it takes time for skills to develop at all three levels—too much time. Why does it take too much time? First, because expertise is borne of experience. An expert's intuition requires time on task — mistake-making, in-the-trenches, experiential learning that cannot be replaced by any amount of formal training, and this happens over time. Second, the cognitive skills required at one level of SOT, *appear* different from those required at another level of SOT. For example, tactical thinking is seen as a different set of skills than those needed for strategic thinking. In this paper, we propose that while number 1 above is a necessary condition, number 2 above is not. Leaders can be taught to "leapfrog" from a tactical understanding, to an operational understanding, to a strategic one, not *only* by spending time in those new areas of leadership, but by learning new structural thinking approaches informed by Systems Thinking (DSRP) and Systems Leadership (VMCL). These structural approaches to thinking offer the underlying principles of both systems thinking and systems leadership.Once understood, they are easily applied across strategic, operational and tactical contexts as well as problem solving. This paper offers an overview of three things necessary for this application: (1) the four underlying Structures (DSRP) of systems thinking; (2) the powerful dynamics among them; and (3) the four inherent functions of all organizations that guide systems leadership (VMCL). We review individual thinking and leadership skills that can enhance one's ability to think complexly when faced with complex phenomena and that can significantly reduce learning and preparation time in developing leaders. We propose that these three skills allow the organizational leader to benefit from far transfer by applying complex cognitive algorithms that they possess at one level (one that is experientially well known to them) to other levels of scale (those that are less experientially known to them). We describe these thinking skills and then apply them to two real-world case examples: (1) military leadership and (2) corporate leadership.

SOT | leadership | DSRP | VMCL | leapfrog effect | CAS | thinking skills | far transfer

1. What is SOT?

SOT, refers to three levels of military planning that include: Strategic, Operational and Tactical. Generally speaking, operational levels of planning connect the detailed tactical level to a higher level strategy and vision(1). SOT is, "One of the most useful military concepts for business" and:

> it provides a frame-work for understanding organizational leadership, dynamics, and management, as well as their interplay in achieving results. The framework also helps to generate optimal alignment between strategy, the operational level plans that break the strategy into manageable pieces, the institutional systems and processes needed to enable successful execution, as well as the tactics, techniques, and procedures that are applied by the organization's front-line employees and supervisors in their day-to-day jobs and tasks.(2)

In simple terms SOT is defined in military doctrine,

> The Strategic level deals with "WHY and WITH WHAT we will fight and WHY the enemy fights against us...the Operational level of war determines WHAT we will affect, with WHAT courses of action, in WHAT order, for WHAT duration, and with WHAT RESOURCES...the tactical level of war deals with HOW we fight(3, 4).

Significance Statement

This paper applies existing knowledge about the elements of systems thinking to a widely used decision making framework called SOT. SOT stands for Strategic, Operational, and Tactical - which are are thought to be the three levels of problem solving. More specifically, this paper offers readers insight into the skills needed at each level of decision making; as well as how to develop them through an understanding and application of the basics of systems thinking and leadership.

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SOT can be thought of as "levels" and therefore is often framed using a metaphor of elevation where the Strategic is the 100,000 foot level, Operational is the 50,000 foot level, Tactical is the 1,000 foot level, and ground-level or "sea-level (0 feet) is the the individual and task level 1.

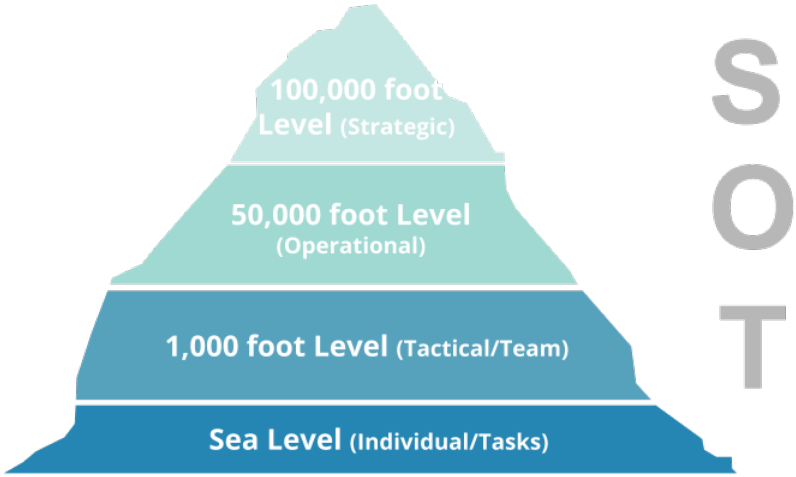

Fig. 1. SOT Scales

SOT is a useful framework for military and business leaders. But, current day leaders in a VUCA(5) (Volatile, Uncertain, Complex, and Ambiguous) reality must do more than command and control from a distant hillside. They must ensure that S, O, and T levels are integrally aligned. They must be fluid in their ability to traverse quickly between levels. This skill takes time and experience to master. Yet, we increasingly need more leaders to master it, in faster time, with less field experience. But how? It may be impossible to erase the need for time-tested experience, but can we significantly reduce the time-on-task it takes to gain these skills?

2. The Developmental Costs of Getting to SOT

Organizations want individuals who are agile and can operate a VUCA world. The challenge comes with the implementation of the necessary framework that can create the knowledge, skills, and behaviors for leaders to operate in the ambiguity. For example the Army takes a three-pronged approach to leadership. It is based on educational experiences, on the job training, and experiential opportunities in concert with a lot of repetition and the ability to fail fast and fail often. The educational portion happens at each level. Initial entry, at the 4 year mark, 10 mark, and 20 year mark. At each engagement there is a deliberate decision to pull the leader toward operating at the strategic level. Frameworks are presented, practiced and reinforced in the sterile environment of a classroom setting, and then immediately leveraged in the next assignment. The foundational education is ingrained in the student at an accelerated pace through crucible experiences, experiences that create high-stress. The real cost to transitioning leaders to an SOT way of operating is through time and repetition. The fiscal cost for resident education can be in excess of $50,000 per student for a year, excluding individual salaries. Once students operate in their net organization, they might find themselves in a crucible experience at the Joint Readiness Center where the Army practices combat maneuvers each month. The cost of this experience is approximately one-million dollars per day and enables the training of over 11,000 Soldiers at one time during a 30-day evolution. These combined experiences create a mental model that allows the leader to operate in uncomfortable situations in a comfortable way because they already have a boundary condition. Even if the situation is completely new, the systems thinking framework of DSRP is baked into military frameworks organically. Leaders have created routines and can recombine or “audible” to create effective outcomes.

3. Leapfrogging Leaders to Minimize the Developmental Cost of SOT

The developmental costs of SOT’ing are expensive. Identifying ways to decrease the time-to-skill represents a significant efficiency and cost savings. Leapfrogging* is a systems concept that is used to describe situations where a set of steps or evolutions, considered necessary, are skipped or “leapt over.” This paper attempts to deconstruct some of the necessary skills leaders must develop in order to become “leapfrog leaders”—to skip some (not all) of the steps and experience needed prior to demonstrating a skill in the area of SOT’ing. Additionally, Leapfrog Leaders understand and apply systems thinking (DSRP)(6–12) (See 1) and systems leadership (VMCL†)(13–15)(See 2). A meta-analysis of the interdisciplinary literature on cognition(6) on systems thinking(10) reveals four universal patterns that provide the underlying structure of systems thinking and mental models. These four skills are:

* A classic example of a “leapfrog” technology and its leapfrog effects is the mobile phone and the fact that a fair amount of less developed countries “leapfrogged” over the industrial era need for telephone poles and infrastructure and adopted cellular phones and networks.

† VMCL are the four functions of Systems Leadership—Vision, Mission, Capacity, and Learning

Structural Patterns	Co-implying Elements		
Making Distinctions (D): Distinguishing one idea/thing (an identity) from another idea/thing (other).	identity (i)	$\leftrightarrow$	other (o)
Organizing Systems (S): Grouping ideas together into part whole systems.	part (p)	$\leftrightarrow$	whole (w)
Identifying Relationships (R): Seeing action & reaction relationships between and among ideas.	action (a)	$\leftrightarrow$	reaction (r)
Taking Perspectives (P): Looking at ideas or systems of ideas from different points of view.	point (ρ)	$\leftrightarrow$	view (v)

Table 1. Basic Universal Structures of Cognition/Systems Thinking

Systems thinkers make distinctions (identity-other) between and among things and ideas. They consciously use distinctions to challenge existing norms, labels, and definitions and to identify biases in the way information is structured. Systems thinkers know that changing the way ideas are organized changes meaning itself. They constantly consider context by asking "what is this a part of?" in order to see how things fit into larger wholes than is normally done. They identify relationships (action-reaction) between and among things and ideas. Systems thinkers use relationships to show dynamical interactions between things and ideas, including feedback loops to show reciprocal relations. They look at ideas from different perspectives (point-view) and understand that every time we make a distinction (including identifying relationships and systems), we are doing so from a particular perspective. Systems thinkers use perspectives to rethink distinctions, relationships, and/or systems. They move beyond human or animal perspectives (i.e., "perspectives with eyes") by taking conceptual perspectives (i.e., seeing a phenomenon from the perspective of an idea or thing). Leaders can learn these four patterns and their eight elements in literally a matter of minutes. This first step is the easy part of learning systems thinking. The next step, turns out to be significantly more difficult for people to master. Not because it is inherently difficult to master however, but because our education and training from an early age often either thwarts our natural inclination to think in (fractal, combinatorial, exponential, nonlinear, recursive, or systemic ways,)or because it encourages the opposite sorts of thinking (e.g., linear causality, discrete categorization, strict hierarchies, and scale-dependent models). This second step, is to practice the art and science of "mixing and matching" 4 simple things that can create an infinite amount of adaptivity and complexity. Leaders—especially military leaders—who learn this second step well, will be more capable of applying understandings that are "old hat" and understood to novel situations. Systems Leadership (VMCL) offers the four functions that occur naturally in all systems, as applied to human organizations:

Four universal functions:
Vision (V): The future or goal state.
Mission (M): The elements of daily work needed to accomplish the Vision.
Capacity (C): The System of systems in an organization that make it possible to do the mission.
Learning (L): The purposeful efforts to seek and use feedback to improve an organization's capacital systems.

Table 2. The VMCL Theory of Systems Leadership: Universal Functions of Organizations

Of particular note is not only the four components of VMCL shown in Table 2, but also the *critical coupling between and among them*(13). In other words, there must be a notable and direct relationship between the daily work explicated in the mission (M) and the goal articulated in the Vision (V). Additionally, all systems should be expressly designed to execute the mission. Lastly, any system or organization will only thrive if it purposefully seeks and responds to feedback from its external environment—this is how organizations become both *agile and adaptive*. Leapfrog Leadership requires an understanding and application of systems thinking and also systems (organizational) leadership. This foundational understanding further yields important practices that comprise the daily work of Leapfrog Leaders. In this paper we will transform SOT from an adjective into the verb, "SOT'ing." We define SOT'ing thus:

The Leapfrog Leader is the leader who identifies and practices strategies to leapfrog the learning curve of SOT'ing, thus decreasing the net-amount of time-on-task it takes to develop the ability to fluidly traverse the SOT scales. There are eight strategies we've identified that Leapfrog Leaders utilize:

SOT'ing Leapfrog Leader Skills:

> **SOT** *verb.* The ability to simultaneously think and take action at strategic, operational, and tactical levels and to move fluidly between them to achieve goals, insight, and alignment; moving from forest to trees and back with ease. verb: SOT, as in "go SOT that!"; 3rd person present: SOT's; past tense: SOT'd; past participle: SOT'd; gerund or present participle: SOT'ing SOT'd, SOT'ing, SOT it! *The new guy SOT'd so unexpectedly well that everyone wondered how he had leapfrogged his way to this ability without the requisite amount of experience.*

1. **Lowlighting**(Content): Avoiding the content-bias that things that look different ARE different;
2. **Highlighting** (Structure): Seeing the structural patterns and similarities across SOT scale rather than seeing the differences in the content;
3. **Mixing**: Mixing atomic structures (DSRP) in simple ways to yield more complex molecular structures that act as placeholders for necessary information (i.e., structural predictions);
4. **Fractaling** (Structure): Seeing the fractal structures are repeating across SOT scale. Realizing that the effective complexity of SOT scales is equal;
5. **Throughlining**: Seeing the throughline that connects the storyline across SOT scales (e.e.g, asking: how does x play out at lower/higher scales;
6. **Elevationing**: Realizing that SOT scale differences are caused by the perspectival transformations of "elevation" (e.g., 100k, 50k, 1k); and
7. **Grounding**: Utilizing an approximating and incremental approach (ST Loop) and getting constant real-world "on the ground" feedback that causes mental model adaptation.
8. **Functional Naming**: Name things at the S-level for their POSIWID purpose (functions) so that at the O and T levels a task is contextualized by its purpose (i.e., makes throughlining possible).

All of these skills are based on DSRP Systems Thinking and some on VMCL Systems Leadership. If we think of the DSRP structures (and elements) as "atomic" the list of SOT'ing skills above are "molecular"—that is, they are composites of one or more of the atomic elements. Let's go through each one.

Lowlighting and Highlighting. In over two decades of developing and researching the development of systems thinking skills in populations from k-12 classrooms to corporate boardrooms, including middle management and c-suite management of fortune 100 companies and governmental and nongovernmental organizations we have learned that there are two critical challenges that aspiring systems thinkers must overcome. These challenges exist for several reasons: (1) they are not obvious so they are not easy to identify, (2) they are not always intuitive especially in regard to the social training we receive from an early age that either rewards us for doing the opposite or fails to incentivize us to develop these skills, and (3) few have made these skills explicit such that an aspiring leader can purposefully and consciously understand them and choose to develop them. The two skills are quite simple: (1) lowlight content and (2) highlight structure. Let's explore each and then see how they work together.The first step in SOT'ing requires leapfrog leaders to lowlight content and highlight structure (and occasionally alternate between the two). Lowlighting content actually helps leaders to avoid the content-bias that things that look different are different. Rather, because leaders can lowlight content (for a brief or prolonged moment depending on the circumstances) and subsequently highlight underlying patterns and structures, *they are able to see that things that appear wildly different on the surface, are in fact structurally similar or the same.*

Lowlight Content. It is anathema to lowlight content. We pride ourselves on knowing, learning, and reciting content which consists of the details or the nitty gritty facts or observations of the actual situation. From an early age we are tasked with identifying the details of a novel and reporting them or with answering the question with specifics and detail. How then can it be said that such detailed content should be lowlighted or even temporarily ignored? The answer is two-fold. First we should lowlight the content details precisely because we have been taught to highlight it almost exclusively, at the expense of seeing important patterns and connection between and among information that can shape our decision-making.We are biased toward content. In other words, if the goal is to stand up straight and we know that you have a tendency to lean left, then you must over adjust to the right in order to find the center. The second reason is that in any given system under observation there are surface level details that we see but there is also the underlying structure we often miss in our assessment of things. We all know that a capable lawyer, for example, can argue convincingly the facts to sway your opinion. Yet, only when one looks at the underlying structure of the argument can one identify its flaws. Of course, we are not advocating that the details don't matter. They do matter, a lot. *But our bias toward the details and away from the structure means that we must "find our center" and, at least temporarily in our analysis, lowlight or ignore the content detail.* It should be noted that even when we have worked extensively with aspiring systems thinkers and they have come to understand and agree with the points above, it remains challenging for them to actually do it in practice. We see them inevitably lean back to their default or learned settings and over-rely on the content of the situation.

Highlight Structure. When we say highlight structure we mean highlight the DSRP structures and elements. Let's take a look at a simple case example which also happens to be the origin story for graph and network theory (one of the most pervasively used and interdisciplinary tools in the science toolbox). Leonid Euler was a polymath who lived in 18th century Prussia. He solved one of the unsolved problems of his day called the Konigsberg problem(16). The city of Konigsberg, Prussia was made up of four land areas divided by river tributaries and connected by 7 bridges. The people of Konigsberg always wondered if it were possible to visit each land area while only crossing any of the seven bridges once. It was a question that laid beyond their mathematical grasp. Euler had an idea. He abstracted the land masses to simple nodes and the bridges to edges or relationships as shown in Figure 2.

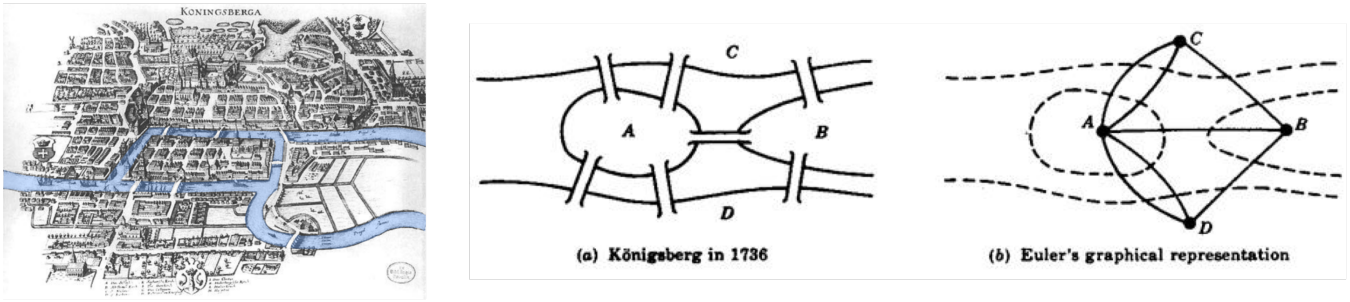

Fig. 2. Lowlighting Content, Highlighting Structure

This "simplification" lowlighted the bewildering detail of the actual city and highlighted its underlying structure, allowing Euler to solve the puzzle: it turned out not to be possible. In the process, Euler had invented what would become known as modern graph or network theory. Decades of our research shows the specific things systems thinkers do, irrespective of topic or context. First, they are aware of the structure underlying their thinking and know that what they know evolves from listening to external feedback. As a result, while they factor their mental models into discussion, they also question the accepted constructs (especially during problem definition processes). They also provide new constructs, and are open to changing their own mental models to better fit the reality of any given situation. Leapfrog Leaders often recognize that invisible structures may be at play that shape the behavior of actors or agents in the situation at hand.

Mixing. Mixing refers to the habit of mixing (and matching) the atomic structures (DSRP) in simple ways to yield more complex molecular structures that act as placeholders for necessary information (i.e., structural predictions(17–19)). The purpose of *structural* mixing using DSRP is to create *structural* predictions. Structural predictions are predictions that the leapfrog leader makes about the likely structures that exist in the system under review. These probable structures are, as you might expect, structural and do not at first have content (information) contained in the structure. But, the existence of the structure necessitates information and therefore tells the leapfrog leader what specifically to look for. For example,if we use the part-whole cognitive algorithm and you tell me that there are three villages (in a known insurgent area) that you need to better understand we can immediately know that there might be parts of the villages that are of importance. We might use the perspective algorithm to figure out which. So, for example, we may want to use the perspectives of leadership, resources, historical, and risk to break down the villages into parts. As an example of the structural predictions, the combination of these structures yields a structural framework that requires "answers" to be "filled in (See Figure 3."

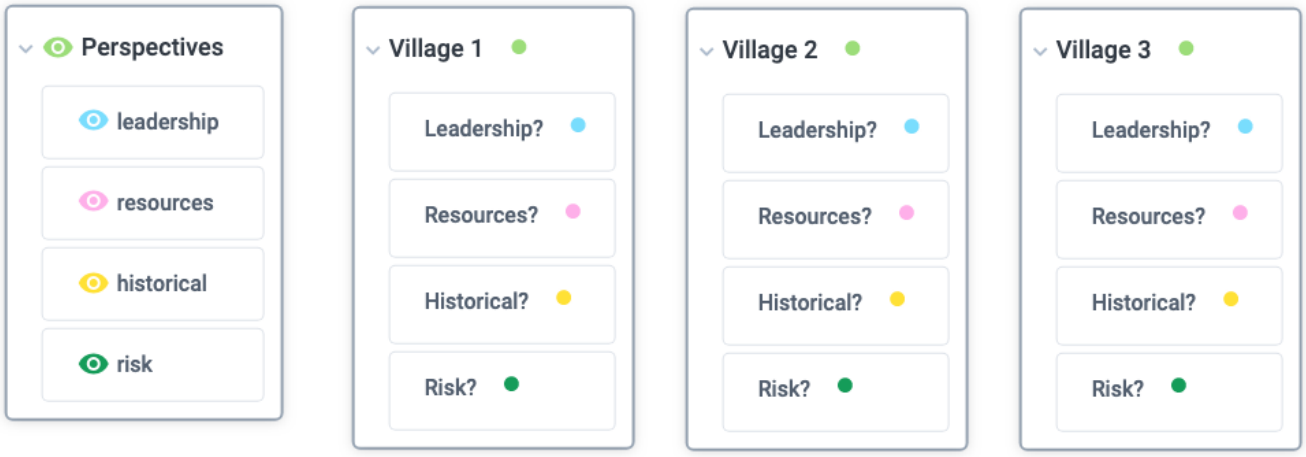

Fig. 3. Using Probable Structure to Generate Organized Information

Mixing and matching the atomic structures can occur at a basic level (involving the DSRP structures or "Pattern level") or at a more advanced level by mixing the elements (i.e., identity-other, part-whole, action-reaction, point-view). Let's take a look at beginner-level mixing:

Mix & Match	**Distinction**	**System**	**Relationship**	**Perspective**
Distinction	—	"Distinguish the System" means take any grouping of elements and give it a name	"Distinguish the Relationship" means to label any Relationship between two things/ideas	"Distinguish the Perspective" means to contrast an existing Perspective to consider alternative points of view
System	"Systematize the Distinction" means break any thing/idea down into parts	—	"Systematize the Relationship" means break any relationship down into parts	"Systematize the Perspective" means break any Perspective down into parts
Relationship	"Relate the Distinction" means relate any thing/idea to other things/ideas	"Relate the System" means relate all the wholes to other wholes or relate the parts of the whole to each other	—	"Relate the Perspective" means look for relationships between or among different Perspectives
Perspective	"Perspectivize the Distinction" means to take a perspective from any idea/thing.	"Perspectivize the System" means to turn any System into a perspective in which its parts might have slightly different views on things	"Perspectivize the Relationship" means to turn any Relationship into a perspective and see what it sees	—

Table 3. Mixing DSRP Patterns to form new structures that require new Information (i.e., structural predictions)

You can also mix and match at the element level which is slightly more advanced but creates a plethora of structural predictions that can cause the Leapfrog leader to better understand the system.

		D		**S**		**R**		**P**	
	Mixing	**identity**	**other**	**part**	**whole**	**action**	**reaction**	**point**	**view**
D	**identity**	–	other becomes identity	part becomes identity	whole becomes identity	action becomes identity	reaction becomes identity	point becomes identity	view becomes identity
	other	identity becomes other	–	part becomes other	whole becomes other	action becomes other	reaction becomes other	point becomes other	view becomes other
S	**part**	identity becomes part	other becomes part	–	whole becomes part	action becomes part	reaction becomes part	point becomes part	view becomes part
	whole	identity becomes whole	other becomes whole	part becomes whole	–	action becomes whole	reaction becomes whole	point becomes whole	view becomes whole
R	**action**	identity becomes action	other becomes action	part becomes action	whole becomes action	–	reaction becomes action	point becomes action	view becomes action
	reaction	identity becomes reaction	other becomes reaction	part becomes reaction	whole becomes reaction	action becomes reaction	–	point becomes reaction	view becomes reaction
P	**point**	identity becomes point	other becomes point	part becomes point	whole becomes point	action becomes point	reaction becomes point	–	view becomes point
	view	identity becomes view	other becomes view	part becomes view	whole becomes view	action becomes view	reaction becomes view	point becomes view	–

Table 4. Mixing at the Element level to create new structural predictions)

Even though the four structures of (DSRP) are quite simple, the brain is using D, S, R, and P simultaneously and in many combinations to create patterns of thought. Systems thinkers are aware of this - and as result, mix and match D,S,R, and P in many ways. Tables 3, 4, and 5 provide a few examples of how these mixings occur.

Mixing includes the use of element-based and Pattern-based thinking. Where a set of Patterns or elements or both are combined and recombined to create increasingly complex structures despite a simple set and repeating algorithm.

Fractaling. Fractaling means seeing the fractal structures are repeating across SOT scale. Realizing that the effective complexity of SOT scales is equal. The next step in understanding why "leapfrogging the SOT skillset" is even possible is fractaling. That is, because work at S, O, and T scales is fractal in both (1) its DSRP structure and (2) its effective complexity. Let's agree that a visual representation of "effective complexity" is the interconnected system of 5 items (the "pentagram system") in Figure 4. In other words, when you see the pentagram network, you think "that's a bunch of stuff that's interconnected, likely has a bunch of perspectives and subparts, etc." or in short, "it's complex."

Mix & Match	Example
Combine R and D: make a relationship a distinction, which means defining relationships as ideas or things rather than just noting connections between objects (i.e., "R-things"(20));	When thinking through two or more MEDEVAC activities at the tactical level, partnerships at the operational level, or structures, principles or functions at the strategic level, identifying the relationships between or among them can be critically important.
Combine R, D, and S: after distinguishing relationships, "zoom into them" by deconstructing them into part-whole systems (i.e., RDS(19), which means relate two things, distinguish or identify the relationship, and systematize or recognize its parts as belonging to a system);	Building off of the above example, some of these relationships can be quite complex and should therefore be thought of as whole systems as well. These systems can be made up of myriad elements including: actual people, resources, or divisions or more conceptual purposes, principles, or cultural norms.
Combine R and S (intra-system): see the organization of parts and the interrelationships between parts (i.e., "part parties") in a novel way;	Take any system of parts and look at the relationships among them. This includes a team of people and their team dynamics or a system consisting of groups of people (divisions, battalions, companies, countries), resources (helicopters, supplies, etc), and norms (country or battalion specific norms) and the interrelationships among them.
Combine R and S (inter-system): use relational channels or "R-channels" to compare the relationship between two wholes by comparing the relationships between their parts;	Same as above but rather than internal to the system, looking at external to the system. How does the US Special Forces system interact with the Italian, Polish, and Spanish systems, and the Hub system? (i.e., part-parties(21)) How do the parts of one system mimic or analog the parts of another system? (i.e., R-channels(22))
Combine P and S: break down perspectives into sub-perspectives in order to avoid the homogenous perspective thinking error (i.e., assuming any group is characterized by a single perspective);	Avoid assuming that "all Spanish soldiers" will conclude the same thing. Or, that "all Special Forces units see things the same way." Question whether there might be a system of Perspectives rather than a single homogeneous perspective.
Combine P, S, and D: see that distinct objects or ideas can be grouped/related in various ways according to a perspective, and thereby avoid thinking errors brought about by categorizing; and	Once you're done mapping out your system, look at it from different perspectives (either actor perspectives like this or that group of soldiers or conceptual perspectives like "safety," "maintenance," or "cost/benefit") and consider how the Ds, Ss, and Rs might look very different from that perspective.
Combine P, S, R, and D(23): realize every complex topic or phenomenon is a massively relational, perspectival network where: (A) every edge (line indicating a relationship) could be a distinguished node (the object connected by a relationship); and (B) where every node must be distinguished, could be a system in and of itself, could be a perspective (point or view), and could be related to or the relationship between other elements.	Build an "ecological model" of your entire system where every node may be: (1) considered a salient perspective that sees different aspects of the system in different ways, (2) any two nodes may have a salient relationship, (3) any node may be an unrecognized bias (distinctions), and (4) every node may be a salient subsystem with effective complexity to the whole it is a part of.

Table 5. Mixing Examples

Figure **??** then explains that regardless of whether you're at the S, O, or T level of scale, all of these systems are equivalent in their effective complexity.

For example, the number of things one needs to think of strategically OR the number of things one needs to account for in designing a brochure (if done right) OR the number of things one needs to think of to run a company OR the number of things one needs to think of in order to implement a forward operating base are not meaningfully different in their complexity. It is roughly the same number of things and those things have relationships, perspectives, and subsystems. If that statement sounds false to you, consider the item in that list that would likely be considered the least complex (designing a brochure) and reflect on the amount of work and expertise that goes into designing, choosing, and using fonts alone. Still don't agree? Interview a world class designer, a Michelin-star chef, or a four-star general, about their thinking process and you will see that the effective complexity they consider is equivalent.

What do we mean by effective complexity (EF)? Defining complexity quantitatively is difficult and there are many differing candidates used as models for doing so based on the purpose. However, generally speaking we can say that "effective complexity" or *EF is the concise description of the regularities of a set.* What we mean by this is that if you have a set of things that make up some slice of reality and you are able to offer a concise description for that set, this is called Algorithmic Information Content (AIC)—which while useful for many things is not a good measure of effective complexity. But, if we are able to develop a concise description of the *regularities* (the patterns) of the elements in the set, that is effective complexity. And, for all intents and purposes, even if not quantitatively, that's what a leader is doing when they say, "I think the market is going to move in this direction so we should choose strategy Z over Q." That leader is building a mental model (hopefully taking into account data from the real world) and based on patterns in the data they think they're seeing, they are thinking from a strategic lens (or an operational or tactical one) to determine the course of action that best addresses that mental model. The mental model is the concise description of the regularities. Now, *identifying a concise mental model of the regularities of a system* will be *more* or *less* difficult for the leader depending on the *type* of system they are dealing with. For example, in Figure 6, we see 5 different *types* of systems generalized: simple systems and random (stochastic) systems are relatively easy to identify concise descriptions for; complicated system are relatively easy to see the regularities in but hard to capture in a concise way; chaotic systems are difficult to describe concisely and can be difficult to identify regularities in (as they are on the edge of randomness; but complex systems, if understood deeply, reveal relatively simple and concise descriptions. Many of the systems that leaders are most baffled by are complex systems.

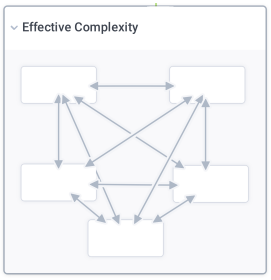

Fig. 4. Representation of Effective Complexity

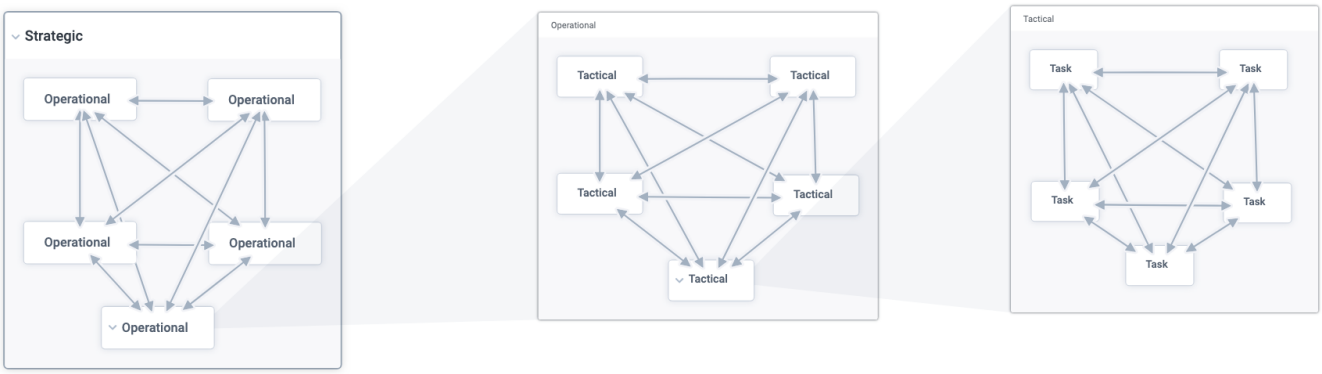

Fig. 5. Representation of Effective Complexity Being Equivalent Across S, O, T, Scales

Why is a recognition that effective complexity is equivalent across SOT an important metacognitive realization and skill? The answer is simple. It is because we generally don't think that this is the case. We are biased toward the unfounded belief that the "big picture" is more complex than the details, even as we lament that "the devil is in the details." Our disposition is that leaders and strategists are dealing with big, heady complex issues and those of us "grunts" in the trenches are not. The truth is that the successful grunts in the trenches are taking in and calculating and navigating just as much complexity. The unsuccessful ones are not. But this same principle applies across all S, O, T levels. The distinction to be made isn't between "Strategy, Ops, and Tac folks;" the distinction that matters is between "*successful* Strategy, Ops, and Tac folks" and "*unsuccessful* Strategy, Ops, and Tac folks." Once this distinction is made, we can help leapfrog leaders to make the next behavior-changing realization: *if what I am doing at the Tactical level is structurally no different in its process NOR in its complexity than what is done at the Operational or Strategic levels, then I already have those skills! Those skills are therefore transferable!*

The educational research on transfer (learning something in one domain and transferring it to another) is well-trodden. This would not be the first time that merely the metacognitive awareness of transferability would increase transfer.

Through-Lining. Remember that through-lining simply means seeing the line that connects the storyline across SOT scales (e.g, asking: how does x connect to or play out at lower/higher scales? Movie directors and fiction writers are used to talking about the "through-line" as an important variable of a good script. It's something of an intangible thing that one knows quite easily if it exists or if it doesn't. Google defines it as "a connecting theme, plot, or characteristic in a film, television series, book, etc. as in "despite the differences between the two seasons, there are still through lines."

So, despite the differences between the Strategic, Operational, and Tactical levels of scale, there are—or rather should be—throughlines. As a leapfrog leader one must remember this and train their people to remember this. It takes only a second to ask yourself as you're about to do a task how it is connected to the bigger picture. The more one does this simple cognitive act, the more one is capable of doing it effectively. Each time your mind quickly traverses from sea-level to 100,000 feet and back—passing through the S, O, and T levels—it burns the neurons of seeing the forest and the trees together as one. What starts out slowly and clumsily quickly becomes a neurological and cognitive ability that is done fluidly, readily, and easily. Throughlining (See Figure 7) also provides a critical check that there is alignment between the S, O, and T levels, something every Leapfrog Leader should be constantly monitoring.

In addition, Throughlining can be used to understand complex adaptive systems in what the Cabreras call "CAS Analysis." CAS involves agent actions at one level multiplying into effects (usually emergent ones) at another level. Think about complex adaptive systems (CAS) and look for the rules followed by independent agents that collectively lead to large-scale emergent phenomena; and struggle through the intricacy of complex mental models to identify leverage points or to organize them in a new way that causes the models to be simpler and easier to comprehend. CAS Analysis is a particular type of analysis that uses "throughlining" in order to connect the emergent properties of a system with the simple rules followed by agents.

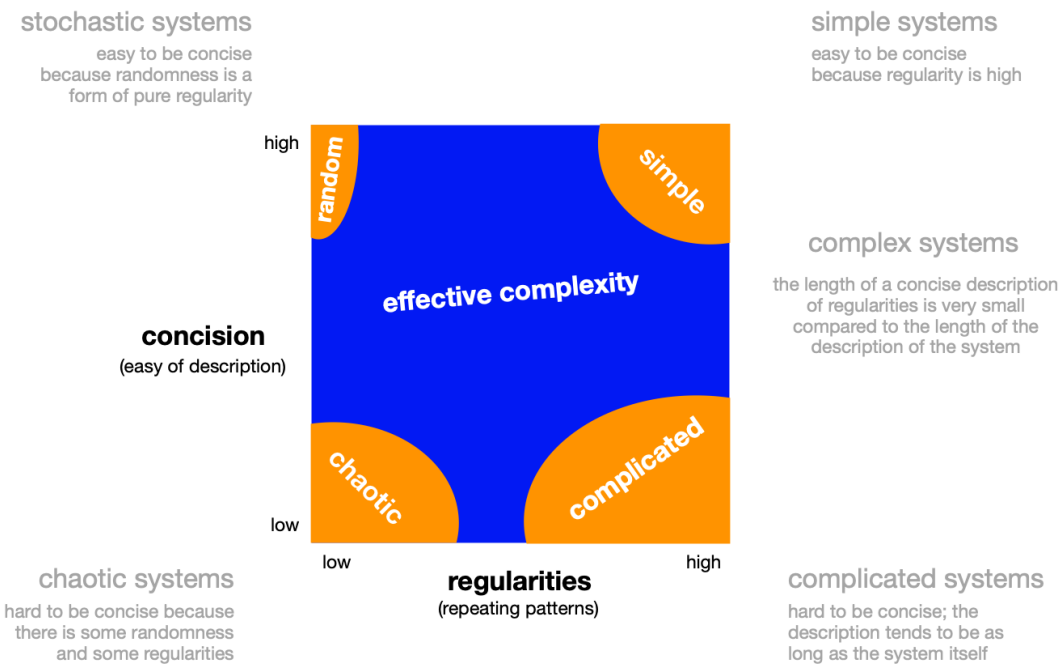

Fig. 6. Effective complexity and 5 types of systems

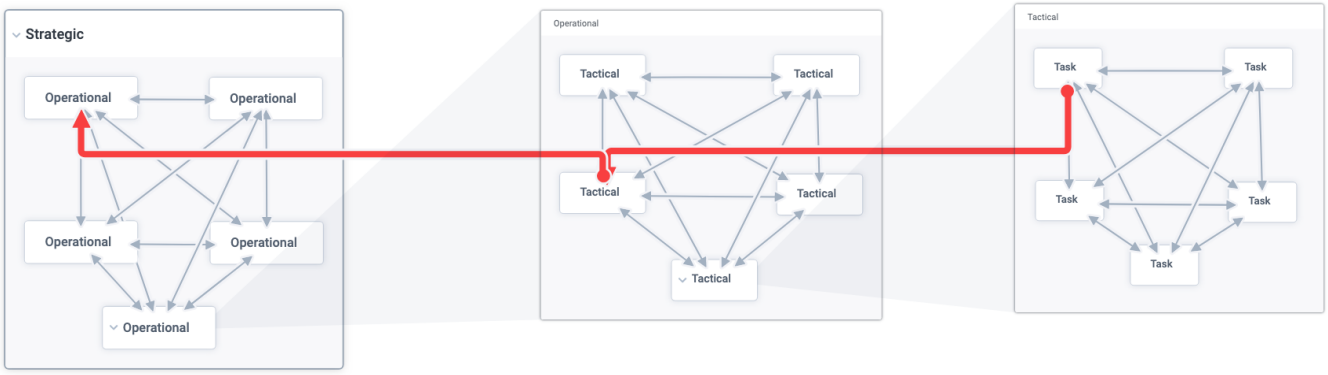

Fig. 7. Throughlining Across SOT

Identifying a throughline between the simple rules and the emergent strategic outcome, especially when dealing with complex and adaptive systems like the ones we describe in the cases below, may be the only way to connect what happens at the big picture and what happens at the little picture because in CASs, the "micro begets the macro." A recent and poignant example of this can be understood by looking at the COVID-19 crisis. The micro behaviors of millions of individuals (e.g., mask or not, quarantine or not, 6 feet distancing or not, handwashing or not, etc. lead to the macro and emergent statistical patterns (i.e., contagion, spread, death, etc)).

Elevationing. Remember from above that "Elevationing" means realizing that SOT scale differences are caused by the perspectival transformations of "elevation" (e.g., 100k, 50k, 1k). In other words the leapfrog leader needs to be aware (metacognitive) that what is being seen, highlighted, made salient, etc. is simply a function of the elevation. Imagine for example, slowly rising up from the ground in a hot air balloon. As you are leaving the Earth's surface, you're paying attention to trees, telephone poles and electrical wires. Soon, you might keep an eye out for small aircraft or storm clouds looming on the horizon. Continue on and the air is getting thinner and the concern is for oxygen saturation. Your concerns change because your elevation is changing. But your view is also changing. When you are higher up you don't see more—you see the same amount. But you do see *different things*. You see a wider expanse of ground. But also, certain details begin to fade from your view while others emerge. You might see patterns of traffic that are more difficult to see lower down. But, you may also no longer see the patterns that connect one backyard to another. A Leapfrog leader (and systems thinker) wants to ensure that they are constantly grounding (connecting their mental model to reality and getting feedback). They want to ensure that the mental models they are building (the patterns they are seeing and acting upon) are verified by reality at every level of scale. Taking a

military example, we may be hearing things from locals that contradict what we are seeing at the largest scales. In business, we may be hearing things from customers that contradict the statistical patterns we are seeing in the data. "Elevationing" *doesn't* mean that S *outranks* O and O *outranks* T, like the ranks of the officers who manage those realms. It means that the mental models that are being created and the data being generated at all SOT levels is being pooled and compared and contrasted to look for discrepancies and validations. It means that the room where S is occurring there should be some O-types and some T-types and vice versa. *Leadership-by-walking-around* is equal parts elevationing and grounding.

As a leapfrog leader, when you're in the Tactical *Mode*, put on a Strategic *Hat*. Swap "Hats in Modes." That is, put on a Strategic Hat as a perspective on what you're seeing Tactically or Operationally, and vice versa. Put on a Tactical Hat when you're in Strategy Mode. That's "elevationing." The things you see as you do this Mode/Hat swapping will all take various DSRP and VMCL forms, but remembering to do it is the skill of elevationing.

Functional Naming. Functional naming refers to the act of naming things at the S-level for their POSIWID purpose (functions) so that at the O and T levels a task is contextualized by its purpose.

POSIWID is a systems term developed by Stafford Beer(24) that is an acronym for the "purpose of a system is what it does." The idea behind POSIWID can be viewed two ways. Either all systems have a POSIWID purpose (meaning that whatever the system is doing or does is its purpose) or the definition of a system need not include purpose. Either way, *purpose* is somewhat unnecessary or ill defined as an objective reality that can be known other than retrospectively. In other words, *who* is defining the purpose?

Thus, utilizing VMCL we establish the *envisioned purpose* of the larger system using the Vision (V) and the Mission (M) tells us the elements we must do repeatedly to bring about that Vision. This means that the Mission is a concise description of the regularities of the system that must be repeated to lead to the system-level properties. The Capacital system of systems are things we need in place in order to ***do*** the Mission and Learning systems are the things we need in place to continuously improve our Capacity to do Mission. *Functional naming* comes into play when we think about these Mission Capacity, and Learning systems and what they need in place to accomplish them. For example, we'll use our own Lab's Mission-Vision to "Engage, Educate, and Empower 7 Billion Thinkers." In order to do this Mission we need a few systems in place. We could choose the traditional systems like Sales, Marketing, Human Resources, Engineering, etc. But instead we use functional naming to accomplish two things: (1) establish a mini-POSIWID for the system and (2) to create something of a constant reminder or throughline for any of the operations that occur within that system. This constant reminder contextualizes specific tasks in order to ensure a throughline. Our functionally named systems communicate the intended POSIWID such that we can always assess whether the system is matching up to what it was intended to do:

- **GenRev**: a system that generates revenue
- **PartnerRev**: a system that generates revenue for and with partners
- **SysCap**: a system that develops capacital systems that other systems need to operate
- **BuildTribe**: a system that builds a committed tribe of supporters
- **SeeFeedback**: a system that ensures we get timely feedback
- **GetPeople**: a system that attracts, recruits, onboards, and keeps the very best people
- **Innovate!**: a system that innovates new things
- **MissionMoments**: a system that ensures that mission moments (any moment where a customer touches up against the organization) are sacrosanct

Grounding. Grounding means utilizing an approximating and incremental approach (ST Loop) and getting constant real-world "on the ground" feedback that causes mental model adaptation. The ST Loop (Figure 8)is the most basal mental model of systems thinking. It is simple but sublime. Many people underestimate it because it is so simple, yet few people or organizations truly live up to what this simple model illustrates is critically important.

The important takeaways from this simple model are:

1. To recognize that everything we believe, think, assume, or conclude is a mental model. To see that mental models are ever-present.
2. That these mental models are not the same as the real world reality. The map is not the territory. Our mental models are approximations of reality. We must test them against reality in order to assess how good of an approximation they are.
3. When we test our mental models against reality, we must pay attention for the all-important feedback we receive. This feedback comes in the form of information which must inform our mental models to improve them.
4. We take this information and structure it using thinking (DSRP) to form new mental models and the process incrementally and cyclically begins again.

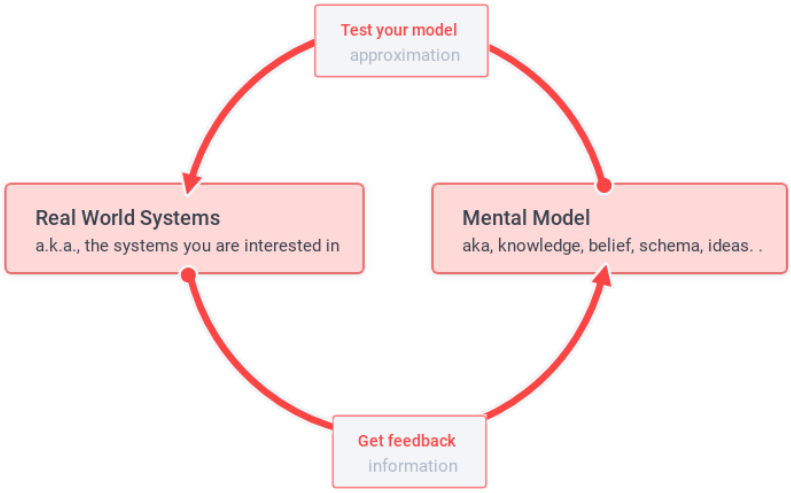

Fig. 8. ST Loop(11)

We consistently hear that this model is too simple to be of profound importance. Yet, despite the fact that this model has been around for between 70 and 1,400 years[‡], it is curious that so few people or organizations are able to follow it. Take for example the standard development paradigm where an organization (say a technology company) hires the best folks it can find, gives them a big budget to build a new product. The team disappears into a special facility and reappears 12 months later with a product that is provided to consumers. Consumers quickly dismiss it as not useful. This could have been learned on a much quicker timescale within a month of starting with a minimum viable product (MVP). You might say, that's basically design thinking, we already do that. You'd be right! Design thinking is currently immensely popular since it appeared on the scene a decade ago. Yet, the basic algorithm for design thinking (incremental realism) is no different from the ST Loop, which has been around for 1,400 years! Clearly, we could learn a lot from implementing this too-simple model.

4. Case Example 1: Military Strategy, Operations, and Tactics Are Not Independent Actors

It is well established that for organizations to thrive, they must have individuals who can communicate a vision and then develop clear pathways to implement methods to accomplish tactical tasks. Organizations will succeed or fail based on their ability to operationalize a strategic vision that meets the expectation that increases value.

Many have believed that all this requires is a big thinker and a lot of doers. Although in previous decades, that way of operating has been more than sufficient to meet productivity levels, ensure happy investors, and the C-suite is achieving its bonus marks. In the new standard, this is a woefully inefficient way to operate. Organizations at all levels are Complex Adaptive Systems or CAS. With the introduction of technological advancements, each level requires some measure of strategy and tactics. The ability to operationalize is the glue that juxtaposes strategy to tactical objectives for the leader, manager, or doers'. The ability to operationalize is the secret sauce. Most visionary thinkers are not remarkable doers. Most doers are very detailed oriented and are not abstract thinkers. There is a huge need across organizations, industry-agnostic, for systems thinkers who can leverage the DSRP framework to operationalize a vision to implement the tactical task. Some may believe that strategy, operations, and tactics are mutually exclusive events. They are not. For organizations to thrive in the new normal, and leverage an innovative hybrid operating model, it will be imperative to understand that each level requires a SOT approach.

Let's take a real-world scenario as a case example. In this example we will see a military leader (Hise), utilizing the Strategic, Operational, and Tactical Model (SOT) to navigate the Reception, Staging, Onward Movement, and Integration (RSOI) process utilized by the Army whenever there is an organizational transition from one place to another. In this case we will illustrate the places where SOT'ing skills are in play.

In July 2009, I was teaching Mathematics at the United States Military Academy and was called to transition back into the force as a Battalion[§] Operations Officer for a unit in the midst of a Mission Readiness Exercise for its upcoming deployment to Iraq. During this exercise, the organization was removed from Iraq and "remissioned" to Afghanistan. This was because the operational environment was changing, and the requirement to support U.S. forces in western Afghanistan had increased. Although the Western portion of the country was controlled by coalition forces from Italy, Spain, and Poland,, there were over 2,000 U.S. Army and Special Forces Marines as well. The sheer number of soldiers in the combat zone created a reciprocal (and severe) need for Medical Evacuation assets (such as HH60 Medical Evacuation Helicopters, Trauma trained Paramedics, medical equipment to sustain life while in transit), called in the military "MEDEVAC.".

[‡]This history depends on who is credited with the idea: Lao Tzu (500AD), Thales (624/623AD), Galileo Galilei (1564-1642), René Descartes (1629–1649), Norbert Wiener (1894–1964), Karl Ludwig von Bertalanffy (1901–1972)(10)

[§]"A U.S. Army battalion includes a battalion commander (lieutenant colonel), executive officer (major), command sergeant major (CSM), headquarters staff, and usually three to five companies, with a total of 300 to 1,000 (but typically 500 to 600) soldiers"(25)

Along with this need for a MEDEVAC came a unique challenge: a MEDEVAC company[¶] is not equipped for sustained, entirely independent operations. Army Aviation, similar to commercial transportation and distribution networks, are built in a hub and spoke configuration. A MEDEVAC organization is ill-equipped to function at an optimal level without a base battalion headquarters or a hub for all enterprise activities, such as aviation, maintenance, and flow of various personnel (e.g., medics, pilots, etc.). This created a *new* requirement for a battalion headquarters. I was tasked to be the advance-party to set up this headquarters for the soon-to-arrive 750-Soldier and 50-helicopter organization.

I had to quickly deploy to Kandahar from my home-base Germany, and then to a former Soviet Base that had not been occupied since 1989. There I began to see a few of the things that were needed. I needed to:

1. figure out how large quantities of equipment and personnel would flow into the country from Germany and then from Kandahar, in southern Afghanistan to Shindand in western Afghanistan near Herat;

2. engage with the existing U.S. forces in the region (partnering with the U.S. Air Force, Navy, Army, National Guard, and Reservists who were tasked with building a new airbase that we would occupy);

3. simultaneously, to develop relationships with the coalition forces;

4. perform a daily assessment of capacity for my team to coordinate all of these partnerships.

More generally, I had to:

1. determine our *strategic* goals;

2. *operationalize* those goals; all while

3. while at the *tactical* level implement a critical "node" that would function as a hub to manage the flow of equipment and personnel.

This was made even more challenging due to my parent organization in Kandahar actively engaging in warfighting throughout their area. This was the very definition of "asymmetric warfare"—warfare that The disparity is so extreme that traditional warfare cannot be waged. Instead, the weaker force tends to rely on guerilla tactics, meant to weaken the larger force's resolve to continue fighting over time.

Also, *each element* of our ecosystem had its own *strategic*, *operational*, and *tactical* level. For example, developing relationships with the coalition leaders had strategic implications for helicopter operations in the region (e.g., how so?). I had to create a meaningful relationship with the Spanish regional construction team so that later I could negotiate the placement of soldiers inside their footprint to conduct forward arming and refueling points. Without this Forward Arming and Refueling Point in their location, we would be unable to reach our units 50-miles north of their position due to the limited range of the helicopters. At the same time, the relationship developed with the Italian Senior Leadership would in turn provide critically important protection of soldiers during the movement of construction material and personnel needed to build the base, which was in turn required to ease the burden of our soldiers in Kandahar.

Because we had MEDEVAC services, the Italians knew that if they had injured soldiers, we could evacuate them to the next line of critical care and help keep their soldiers alive. At the operational level, we had to think strategically about how and where we placed our deployed headquarters, which would become the central hub for our operation in the region. This, too, required some sensitive negotiations as there was an Air Force special forces element in the area who had squatted in the most desirable place for a centralized headquarters.

If we could establish this hub, then we could quickly establish the spokes of the central hub and begin to operate. This is an example of why it is necessary to not only be able to *think strategically*, but also to understand how to *operationalize within ambiguity*, and *think tactically* about how it all might be implemented and make an overall impact. Suffice to say, it was a complex set of moving parts under a strict deadline.

The new standard will require organizations to be comprised of individuals who are equipped to lead through the friction created in this Vulnerable, Uncertain, Ambiguous, and Complex (VUCA) environment. Strategic leaders will need to be strategic integrators, which means using DSRP, VMCL, and the various SOT'ing skills:

1. Making *distinctions* large and small: Afghanistan is not Iraq. Identifying groups and actors in the area.

2. Constructing related *systems of systems* of salient elements including large macro systems and breaking them down into smaller subsystems. Deconstructing the complex problem into systematic smaller parts.

3. Recognizing the *relationships* near and peripheral, and

4. Ensuring we taking multiple *perspectives* and remaining open to other perspectives, especially those that might be different from our own.

[¶] A Medical Air Evacuation "Company" or MEDEVAC is an organization comprised of 15 HH60 Blackhawk Helicopters and 80 Soldiers(pilots, medics, mechanics, administrators); [ATP 4-02.2 Medical Evaluation].

5. Understanding that organizationally, no matter what organizational model or framework we are using, there are four functions that must be considered: *Vision* (goal state), *Mission* (repeatable actions), *Capacity* (energy/ability to do Mission), and *Learning* (ability to receive and utilize feedback)

6. Alternatively *Lowlighting* (content) and *Highlighting* (structure) in order to see underlying patterns and structures at play;

7. *Mixing* (structures) in order to make structural predictions and "see more" than what is obvious;

8. *Fractaling* (structure) in order to see that the effective complexity at every level is roughly the same;

9. *Throughlining*, *Functional Naming*, and *Elevationing* (from SOT perspectives) in order to connect the specific tactical activities through operational activities to strategic objectives; and

10. Constantly *grounding* in order to ensure that our mental models are constantly updated and grounded in real-world feedback.

5. Case Example 2: Business Strategy, Operations, and Tactics are Not Independent Actors

SOT in Four Maps Let's switch gears from a military case to a midsize business case. In order to ground the case in something practical and tangible, we'll review how the actual SOT'ing process (much of which occurs cognitively and socially) looks like in a team management software. For example, on the left side of the software (See Figure 9), each employee would see three main sections in their "favorites" area. These three sections correspond to the three SOT levels:

1. The 100k foot VMCL Strategic Picture

2. The 50k foot Operational Picture,

3. The 1k foot Weekly Tactical Sprint, and

4. The Ground Level Individual List of To Do's

All workers or members of the team are guided to these SOT maps as core to their daily, weekly, quarterly, and annual practice.

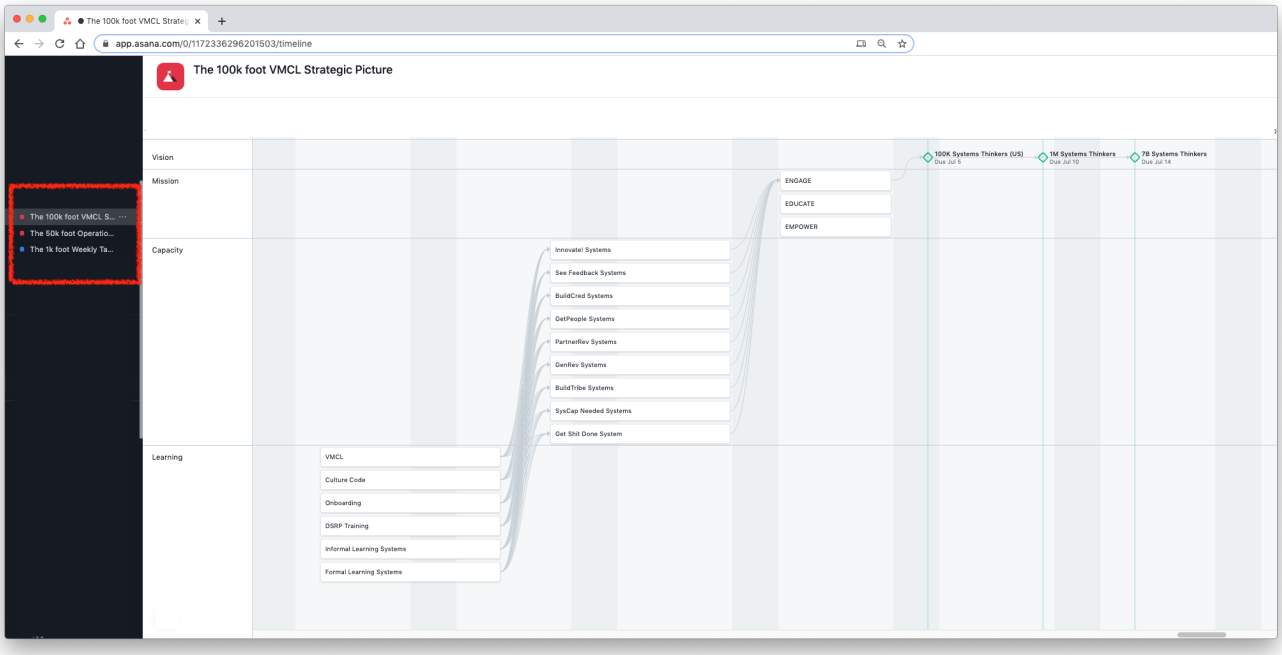

Fig. 9. Illustration of software system being used in a way to put 3 maps (S, O, and T) front and center for all employees in their sidebar (map shows S level)

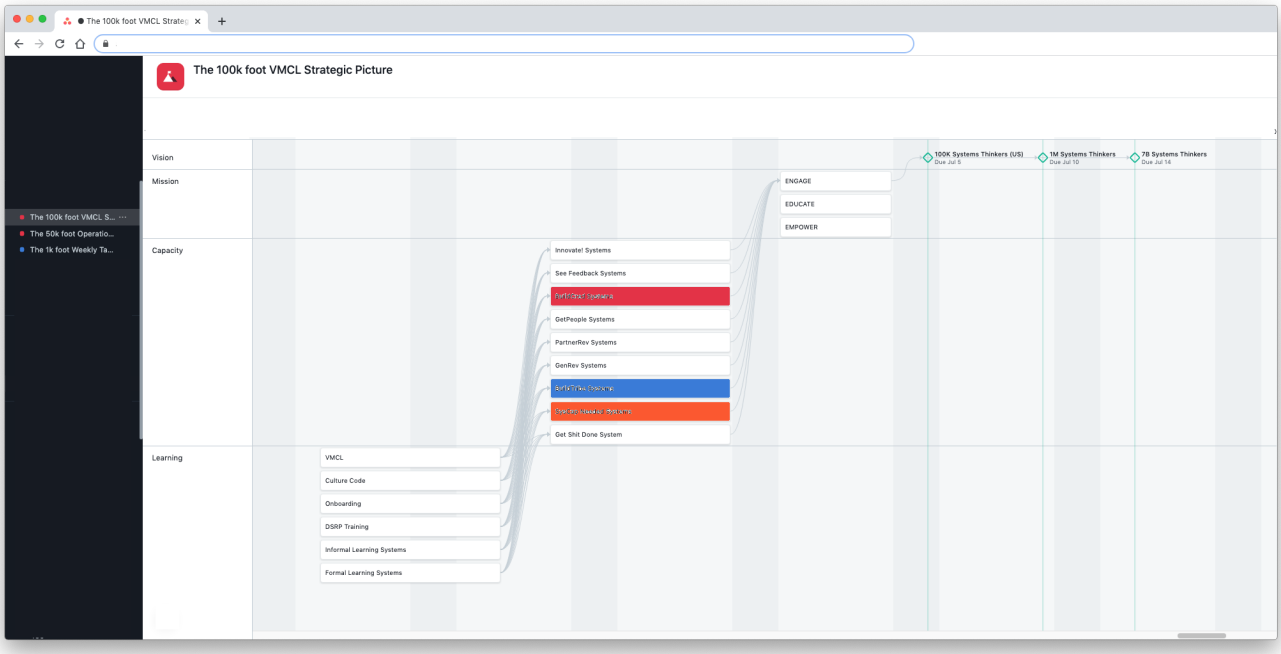

Fig. 10. Strategic VMCL Map showing Learning (L) systems improving Capacity (C) systems that make it possible to do Mission (M) and bring about Vision (V)

Strategic 100k VMCL Big Picture. The first map in Figure 10 shows the organization's "VMCL." It's Vision, Mission, Capacity, and Learning. But the map also shows how these universal functions of the organization are interrelated and dependent on each other. Learning systems drive the Capacital Systems. Capacity Systems drive the three element Mission that the organization must do everyday repeatedly, in order to bring about the Vision (which in this case has three phases).

Note the functional naming of the Capacital and Learning Systems. Each of these systems forms buckets that are full of backlog tasks that are populated as they arise. A few of the Capacital Systems are colored to show how these colors drill-down or drill-up across the SOT scale to form throughlining. VMCL planning requires:

- Utilizing the *VMCL* model and litmus checks to *distinguish* an effective *Vision* and *Mission*
- *Distinguishing* using *functional naming* of *systems* in *Capacity* and *Learning*
- Developing alignment (coupling *relationships*) between Learning systems, Capacity systems, Mission, and Vision in order to see these functions as a whole ecological system and to see Capacital systems as a nested "*system of systems*"
- Drilling down to operational and tactical (or up) using *throughlining* to see the *relationships* that cut across scale
- Utilizing various *perspectives* (including S, O, and T as perspectives, but also market forces, customers, teams, departments, etc) to not only build out the Strategic Awareness but also to evolve it and look at it in different ways

50k Operational Big Picture. The Operational Picture is the second map in the sidebar (See Figure 11) . It descends from 100,000 foot level to the 50,000 foot level (metaphorically) and looks at some relevant period (in this case quarterly) and maps the operational plan and the various dependencies. Each employee can see the various operational distinctions of importance. The way they are grouped (colors), related, and can view this operational plan from multiple selected perspectives (cost, time, team, individual, purpose, etc). Here again, you can see the colors that relate to the functional naming of Capacity Systems so that we begin to see the throughlining right off the bat and can zoom in to look at finer grain throughlining. Operational thinking requires:

- *Distinguishing* what needs prioritizing using *perspectives* as organizing frames and stopping rules
- Nesting a quarterly (or other timescale) ecology into an annual (or other timescale) ecology— i.e., nesting *systems in systems*
- Identifying key *relationships* in time to establish predecessors, etc.
- Drilling down to tactical (or up to Strategic) using throughlining to see the *relationships* that cut across scale

- Utilizing various *perspectives* (including S, O, and T as perspectives, but also competitors, partners, customers, teams, etc) to not only build out the operational plan but also to evolve it and look at it in different ways

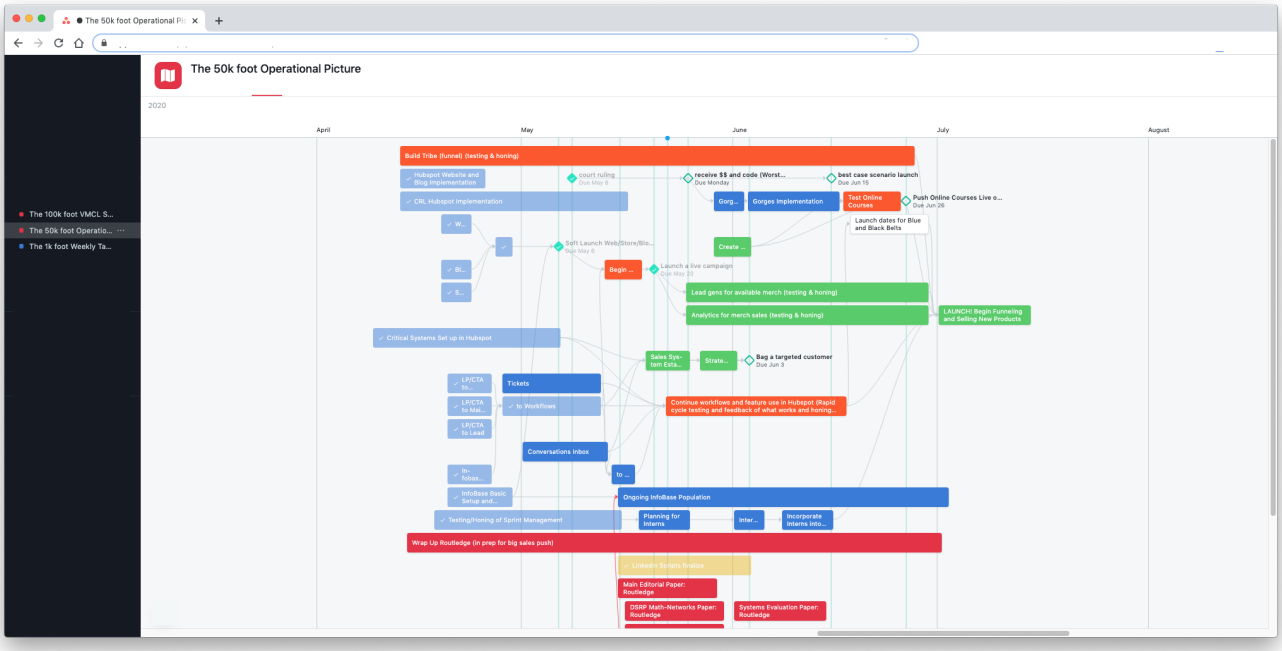

Fig. 11. Operational Map showing [quarterly] operations plan with dependencies and colored linkages to nested Strategic Level structures

1k Weekly Tactical Sprint. At the tactical level is the weekly team sprint (See Figure 12). Where tasks are brought over from backlogs of functionally named Capacital systems. Following an agile sprint or kanban style board, teams decide what comes out of the Capacital Systems, Learning, and Mission in order to decide what's on the Sprint for that week. Sprint Planning is based on:

- *Distinguishing* stories or tasks in the sprint so everyone is on the same page.
- *Nesting* tasks with subtasks and grouping in columnar formats and *systems*
- *Relating* tasks using predecessor or other types of relationships in order to see the sprint as an interconnected ecology of stories
- Taking multiple *perspectives* such as individual team members, the user or customer, the market and using Strategic and Operational perspectives on tactical level by throughlining and functional naming and grouping

Each user story or task in the sprint is marked with the color of the functionally named Capacital (or other) system so that every near-ground-level story and the various ground-level tasks associated with it can be throughlined back to 100,000 feet (See Figure 13).

Note a few things about this SOT scaling system. First, at all three levels of scale the effective complexity is roughly equivalent. It's not as if the Strategic level is dealing with more variables. At each level there is equivalence in effective complexity. Second, we pointed out the throughlining occurring throughout using colors and functional naming. Elevationing plays itself out constantly as we use DSRP (especially the P) to see things from a strategic, operational, and tactical lens. Finally, lowlighting content, highlighting structure and mixing and matching the DSRP structures in order to see new possibilities, question one's bias, and organize raw information into meaningful mental models is occurring at every level.

Sea Level. Today in the VUCA world we live in, business leaders are looking for ways to empower their workers at the same time that they structure their work. We want our organizations and our people to be hyper-focused and directed toward our goals at the same time we want them to be fluid and adaptive to real-world constraints and barriers on the ground. As is often said, *hiring the best people and then micromanaging them is not ideal.* Aligning SOT (utilizing DSRP and VMCL to understand and build the SOT leapfrogging skills) in the way we've described in the case above, allows workers to see the tactical, operational and strategic goals but also to manage their own daily and weekly to do lists *in service of* those SOT parameters (See Figure 14).

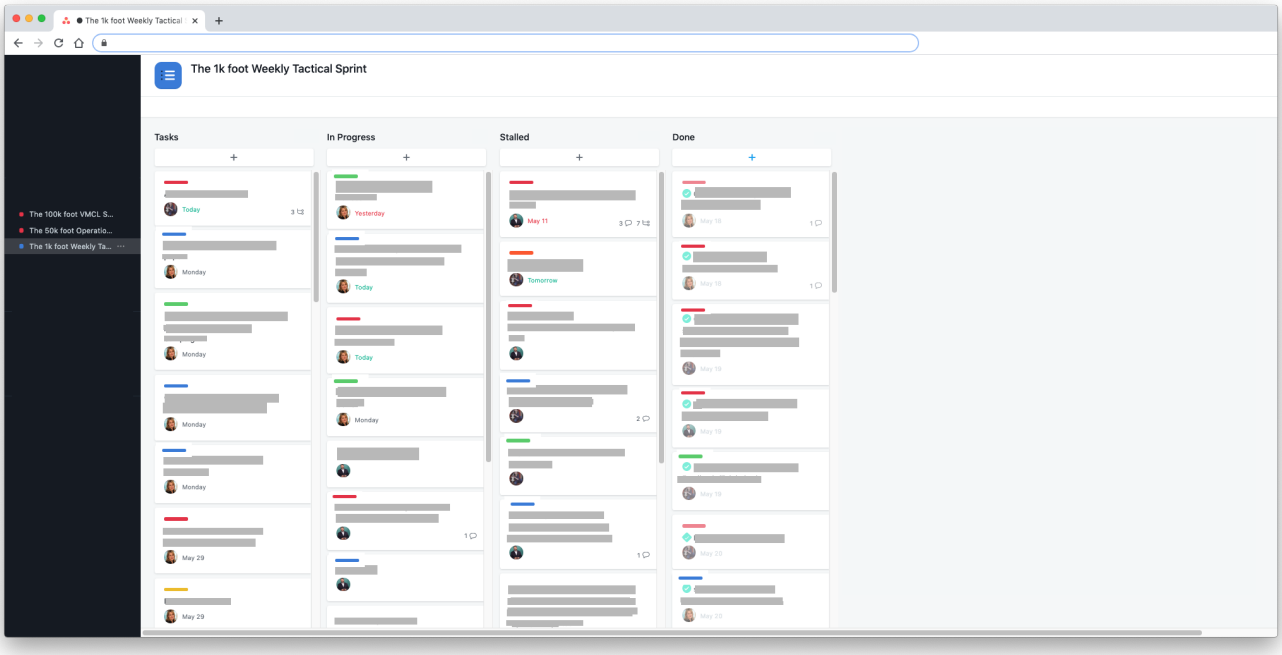

Fig. 12. The 1k foot level Tactical [weekly] sprint/kanban board with colored linkages to nested Operational and Strategic Level structures

Fig. 13. An individual-level task or Sprint-level story can be “throughlined” to the Strategic-level using nested coloring

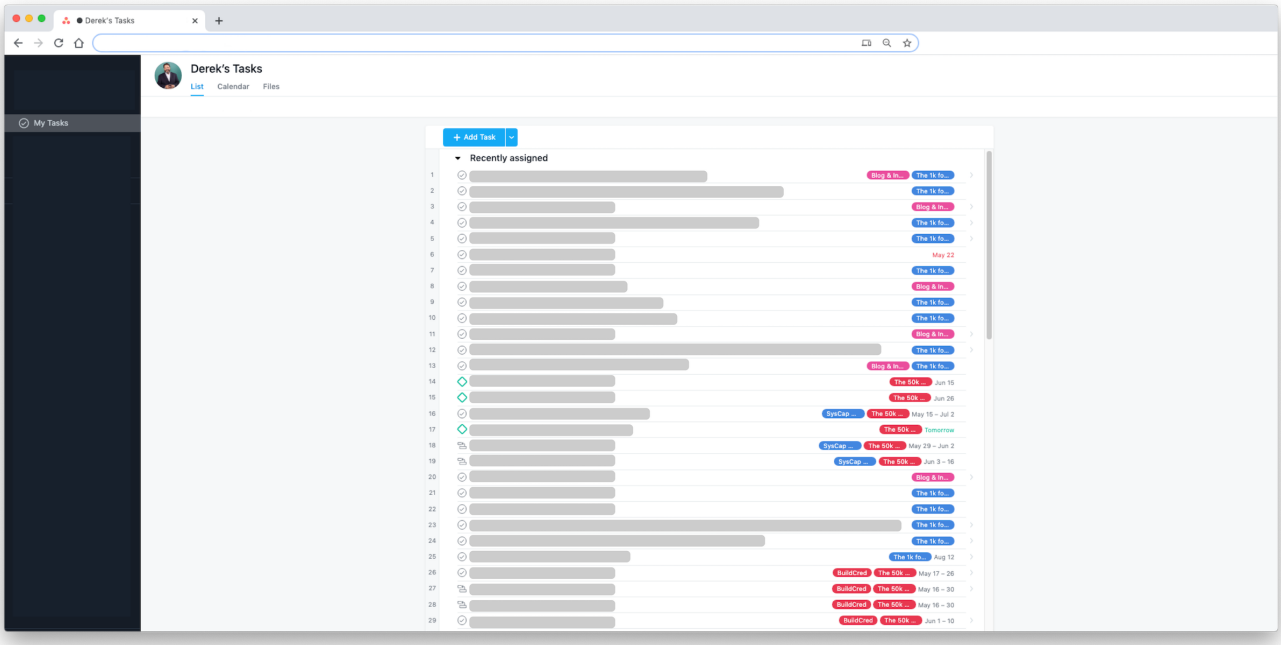

Fig. 14. Sea-Level Individual Adaptive To Do List showing user-created tasks linked (colors) to nested Tactical, Operational, and Strategic levels

6. Conclusions

Developing a deep understanding of DSRP and VMCL and utilizing this understanding to understand and build the skills of Lowlighting (content), Highlighting (structure), Mixing (structures), Fractaling (structure), Throughlining, Elevationing (from SOT perspectives), Grounding, and Functional Naming can allow leaders to Leapfrog the SOT learning curve.

Learning and practicing these skills isn't "free." This skill development takes time. But the time-to-task to learn these skills explicitly will have a significant ROI as compared to relying on the "hope" that such skills will develop from real-world expertise. By making these skills explicit, metacognitive, and purposefully pursued, the net-time to SOT'ing can be substantially decreased.

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