Lesson Plans for Thinking-in-Time
(Module 4)

1. Overall Terminal Learning Objective.

Thinking-in-Time: A Scenario-based Developmental Method for Army Officers is designed to be conducted through four web-based interactive modules. The Terminal Learning Objective (TLO) for the four modules is:

Action: Demonstrate the Thinking-in-Time cognitive reasoning skill by which the *dimension of time* (past, present, and future) is used to support the decision-making process.
Conditions: Given computer based experiential learning activities, explanation of terms, readings, SME videos, and scenario based feedback.
Standards: The demonstration includes—
1. Define and explain the framework for Thinking-in-Time. (Module 1)
2. Techniques for identifying biases and understanding the past. (Module 2)
3. The Thinking-in-Time process for understanding the present. (Module 3)
4. Techniques for identifying biases and anticipating the future. (Module 4)
Learning Domain/Level: Cognitive/Evaluation

2. Enabling Learning Objective (ELO) for Module 4 – Anticipating the Future

Action: Apply the ARI Thinking-in-Time facets and other techniques to identify biases, anticipate the future, and support the decision-making process
Conditions: Given computer based experiential learning activities, explanation of terms, readings (including current doctrine), and relevant videos
Standards: The application includes—
1. Apply the seven Thinking-in-Time facets to the Army's Recruiting and Retention Challenges
2. Formulate effective ways robotics and artificial intelligence (AI) may offset the shortfalls
3. Examine how Out of the Box/ "Weird Thinking could offset the shortfalls

Learning Domain/Level: Cognitive/Application

3. Background: This module focuses on the ARI Thinking-in-Time definition and its seven facets. In general, this module focuses on the right side of the Framework for Visualizing Thinking-in-Time (the future). The title of this module is Anticipating the Future. When the scenario for this module was originally conceived, the module used the Army's Multi-Domain Transformation as the driver, and how the war involving Russia and Ukraine might alter that transformation. Once the Army announced they were doing that same analysis, those results could have prevented the student from conducting an unbiased forecast. With ARI approval, the scenario was revised to incorporate how a potential shortfall in recruiting may effect that transformation.

Here is an excerpt from the preface to Chief of Staff Paper #1: *Army Multi-Domain Transformation Ready to Win in Competition and Conflict* (Unclassified Version):

The United States Army faces an inflection point that requires innovation, creativity, and entrepreneurship in the application of combat power. Our Nation's adversaries have gained on the Joint Force's qualitative and quantitative advantages. If the Army does not change, it risks losing deterrence and preservation of the Nation's most sacred interests. I set an Army Aimpoint for 2035 as the date at which the Army will be modernized and prepared to dominate our adversaries in sustained Large Scale

Combat Operations (LSCO). 2028 is our Waypoint, a point at which we comprehensively reassess our assumptions about the future and adjust our investments accordingly.

4. Scope (Module 4). The module begins with a late 20th Century, US Army War College scenario involving a confrontation over water rights between Turkey, Syria, and Iraq as a training exercise. The scenario uses a Causal Chain diagram that depicts Turkey holding water back as the first action in the sequence, there are obviously important factors occurring further upstream. This exercise is also intended to help the student "visualize" the metaphorical thinking in "Time Streams" as discussed by Neustadt and May in Module 1. This exercise is also intended to illustrate the ***Framing Causal Chains*** facet and how the facets of time to the left ***(Historical Perspective-Taking, Experiential Reflection,*** *and* ***Historical Reasoning*****)** would be useful to thinking about upstream activities, and how the facets of time to the right (***Trend Analysis, Foreknowledge,*** *and* ***Forecasting*****)** would be useful to thinking about downstream activities.

The second activity is **Thinking-in-Time about the Army Recruiting Challenge**. Within two months of revising the scenario, the CSA and SECARMY published a five-page memorandum, titled, *A Call to Service to Overcome Recruiting and Retention Challenges*, (dated 20 JUL 2022). That memo serves as the basis upon which the student will use the seven facets of Thinking-in-Time to evaluate the challenge. The student is told to forecast our end strength/ability to recruit at various points in the future, specifically 2025, 2028 (Waypoint), 2032, and 2035 (Army Aimpoint).

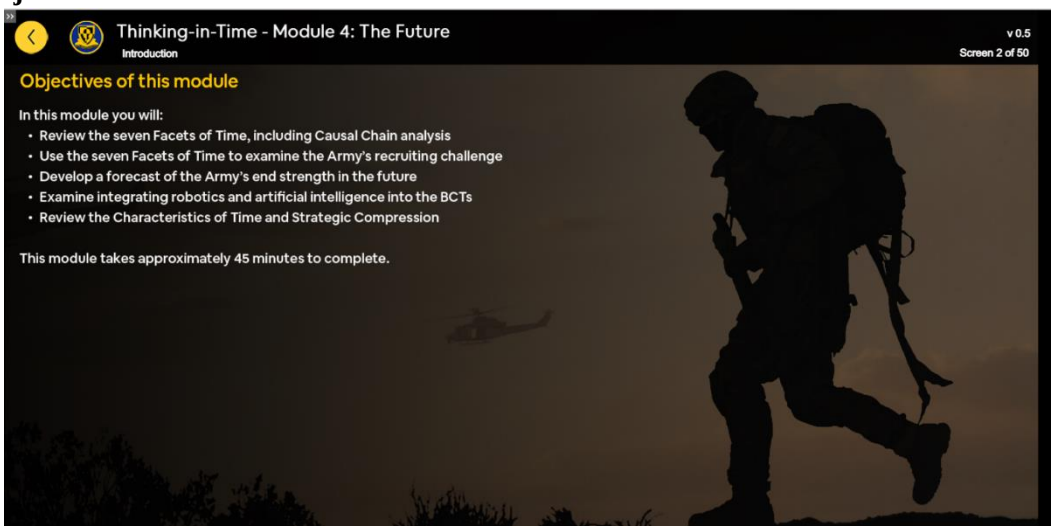
Thinking-in-Time about Robotics & Artificial Intelligence (AI). The student then provides the three most effective ways robotics and artificial intelligence (AI) may be able to reduce the 2022 authorizations (spaces) in the BCTs by 20% by 2028, (26,275). All the data required to formulate this recommendation is provided to them.

Out of the Box/ "Weird Thinking." The student then revisits the idea of disruptive thinking. In contrast to the previous activity of integrating robotics and artificial intelligence into the current BCT force structure in order to reduce personnel, the students are presented with possible alternatives. This includes briefly examining how China and the U S Navy is approaching the problem.

Thinking-in-Time – Summary. This portion emphasizes the key concept and terms by reviewing the Framework for Thinking-in-Time and includes an opportunity for student feedback (Likert scale) on the utility and effectiveness of the intervention.

5. Conduct of the Module.

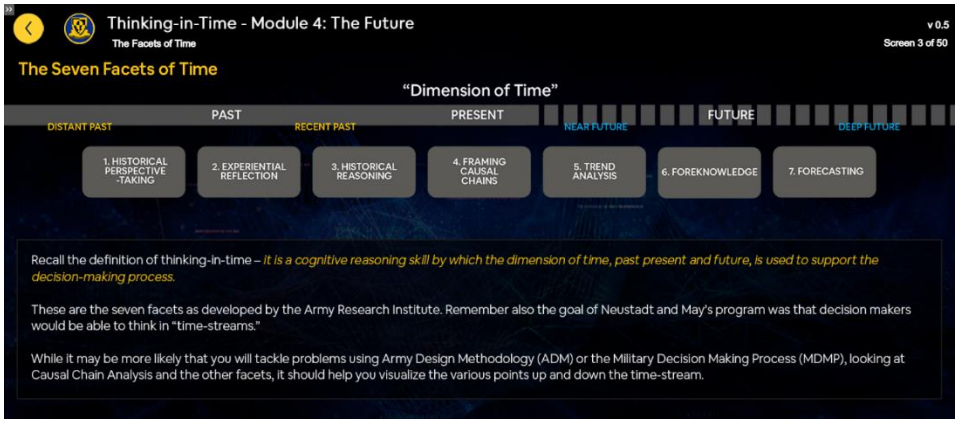
a. Objectives. In this module the student will:



- Review the seven Facets of Time, including Causal Chain analysis.
- Use the seven Facets of Time to examine the Army's recruiting challenge.
- Develop a forecast of the Army's end strength in the future.
- Examine integrating robotics and artificial intelligence into the BCTs.
- Review the Characteristics of Time and Strategic Compression.

b. Concrete Experience. Framing Causal Chains and "visualizing" a Time Stream

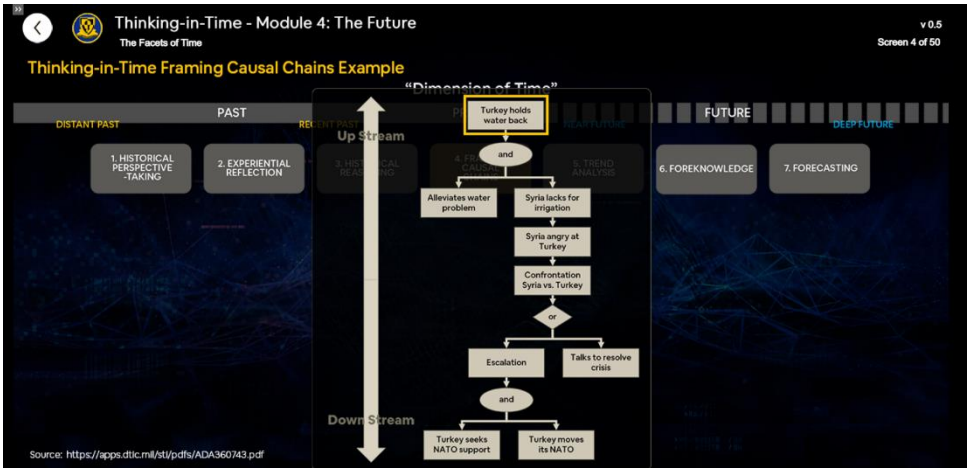
"What is the overall historical context of this problem?" and "How did we arrive at this point in time?"



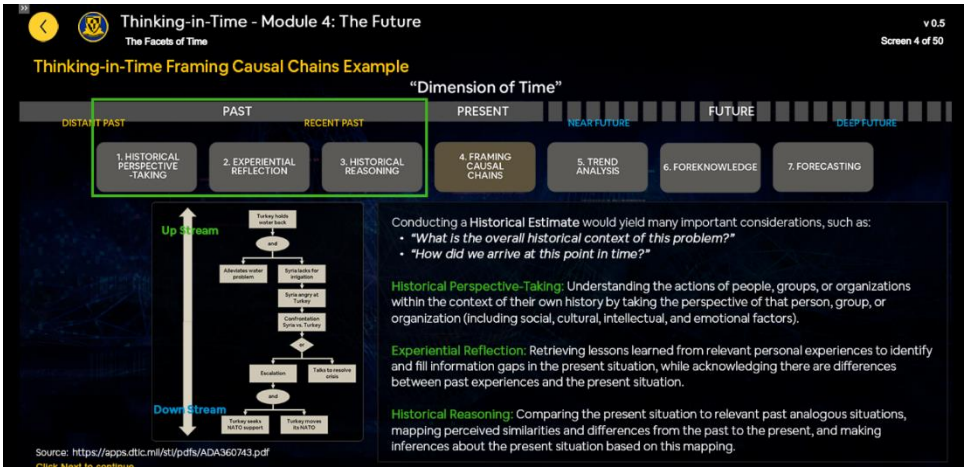
Recall the definition of thinking-in-time: it is a cognitive reasoning skill by which the dimension of time, past present and future, is used to support the decision-making process. These are the seven facets, as developed by the Army Research Institute. Remember, also, the goal of Neustadt and May's program was that decision makers would be able to think in "time-streams."

While it may be more likely that you will tackle problems using ADM or the MDMP, looking at Causal Chain Analysis and the other facets, it should help you visualize the various points up and down the time-stream.

Begin by looking at the facet of: Framing Causal Chains. It is defined as: Identifying and hypothesizing causal sequences of decisions and actions, such as: chains of actions, reactions, counteractions, and outcomes; based on current information.



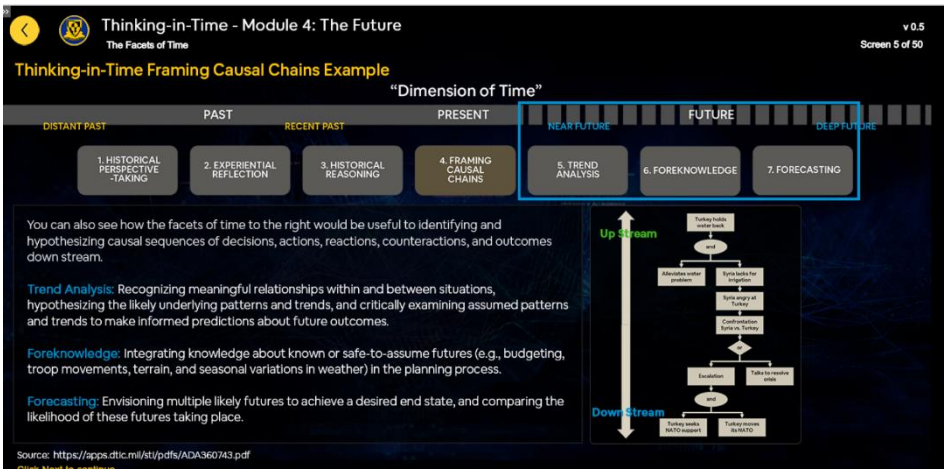
In the late 20th Century, the U.S Army War College used a scenario involving a confrontation over water rights between Turkey, Syria and Iraq as a training exercise.
Looking at the diagram, you can see the first action depicted. Turkey holding water back. The diagram then identifies and hypothesizes causal sequences of decisions, actions, reactions, counteractions, and outcomes.



Although the Causal Chain diagram depicts Turkey holding water back as the first action in the sequence, there are important factors occurring further
up-stream.
As introduced in Module 3, conducting a Historical Estimate would yield many important considerations, such as:
"What is the overall historical context of this problem?" and "How did we arrive at this point in time?"

Also notice how the facets of time to the left would be useful to thinking about up-stream activities.

Again, while it may be more likely that you tackle problems using ADM or MDMP, knowing the facets should help you visualize how they can support thinking in a time-stream.



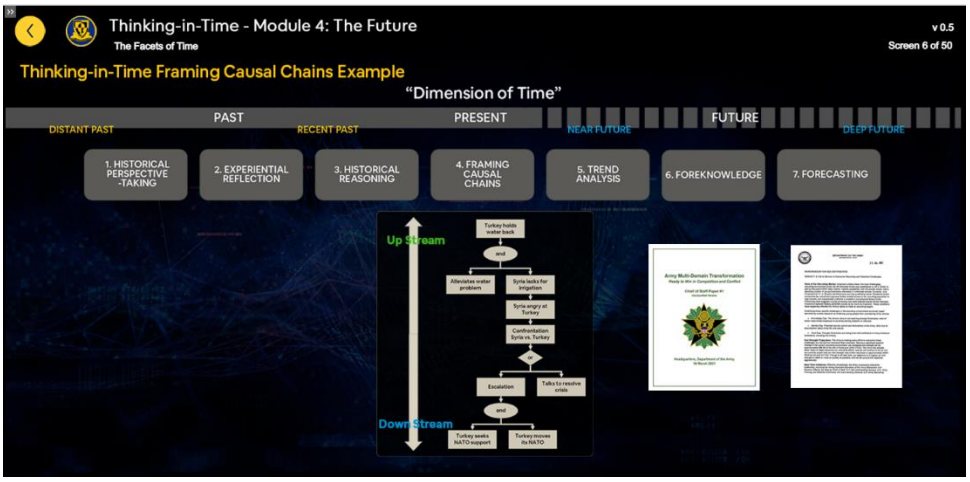
You can also see how the facets of time to the right would be useful to identifying and hypothesizing causal sequences of decisions, actions, reactions, counteractions, and outcomes downstream.

c. Publish & Process. Not used in this Module

d. GNI:

At the end of this first exercise the student will forecast what it will look like downstream. The student is told to ***forecast*** Army end strength/ability to recruit at various points in the future, specifically 2025, 2028 (Waypoint), 2032, and 2035 (Army Aimpoint).

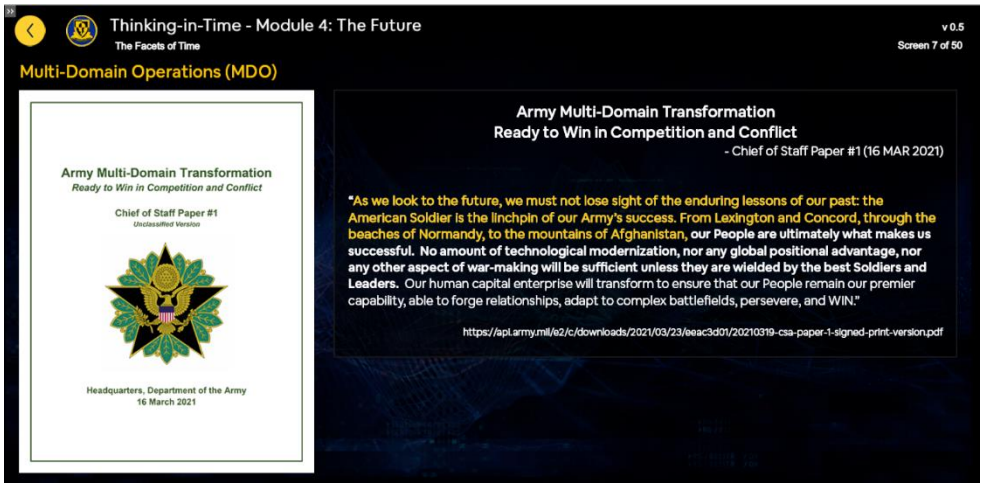
You just saw how the Turkey water scenario helped visualize the problem using Causal Chain analysis, in a time stream.



Now shift to use the facets of Thinking-in-Time, starting with **Framing Causal Chains**, to analyze the Army's recruiting shortfall challenge.

This is an excerpt from the chief of staff paper number one, Army Multi-Domain Transformation. Notice how he links the past with the future.

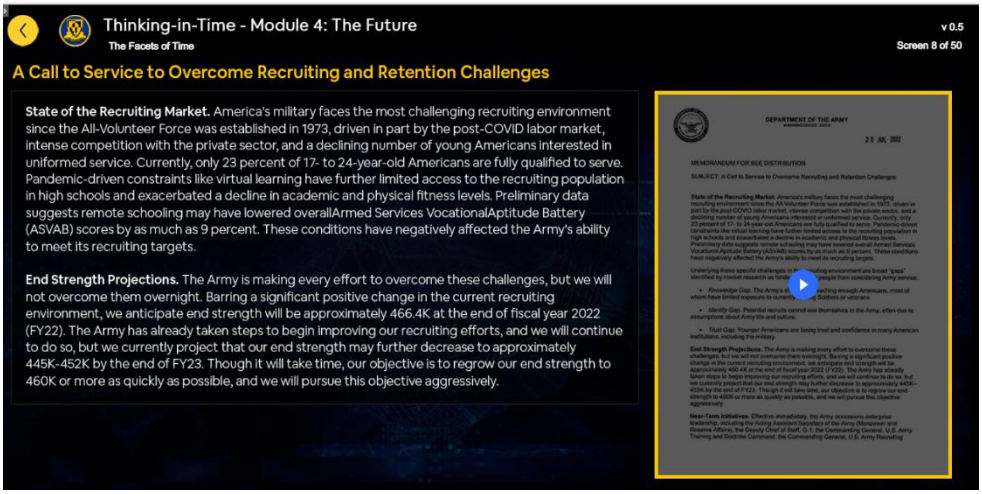
"As we look to the future, we must not lose sight of the enduring lessons of our past: the American Soldier is the linchpin of our Army's success. From Lexington and Concord, through the beaches of Normandy, to the mountains of Afghanistan."



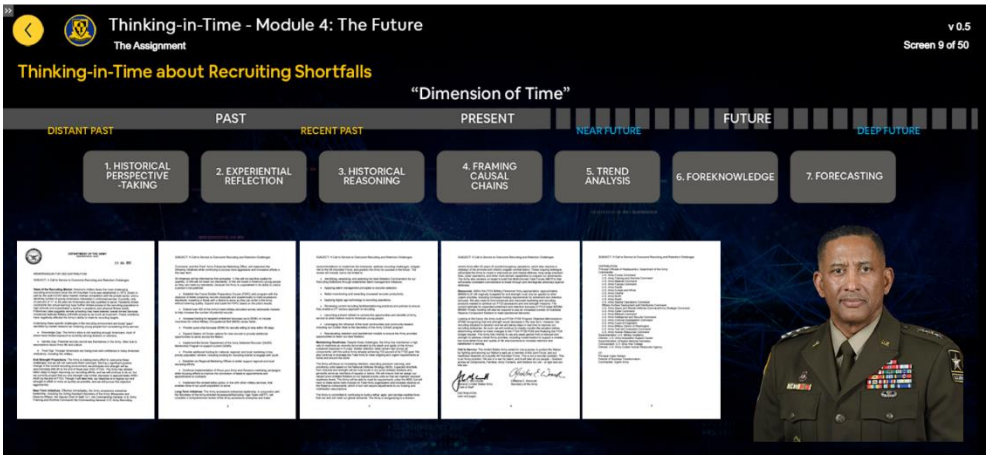
Also, notice he says that "…our People are ultimately what makes us successful."

This raises the question, given that we are in all volunteer force, what do we do if we can't get the people?"

This is the first page of the CSA and SECARMY's five-page memorandum, on the subject: "***A Call to Service to Overcome Recruiting and Retention Challenges***", dated 20 July 2022. Use the memo, and the seven facets of Thinking-in-Time, to evaluate the challenge of recruiting and retention, and forecast the Army's end strength at various points in the future.
The student can click the image to view the complete memorandum. Also, the complete memorandum can be found in the References page. You will need to refer to the memo for the remainder of this exercise.



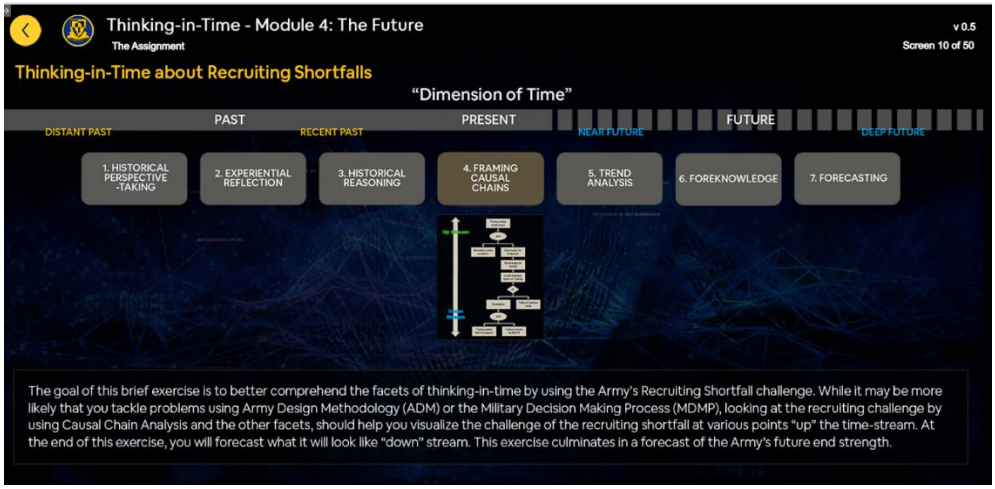
Your boss, the Army G-3/5/7, is concerned that the continued recruiting shortfalls may not allow for the Army to achieve the Aim point for 2035 in our transformation efforts to become a multidomain operations ready Army.



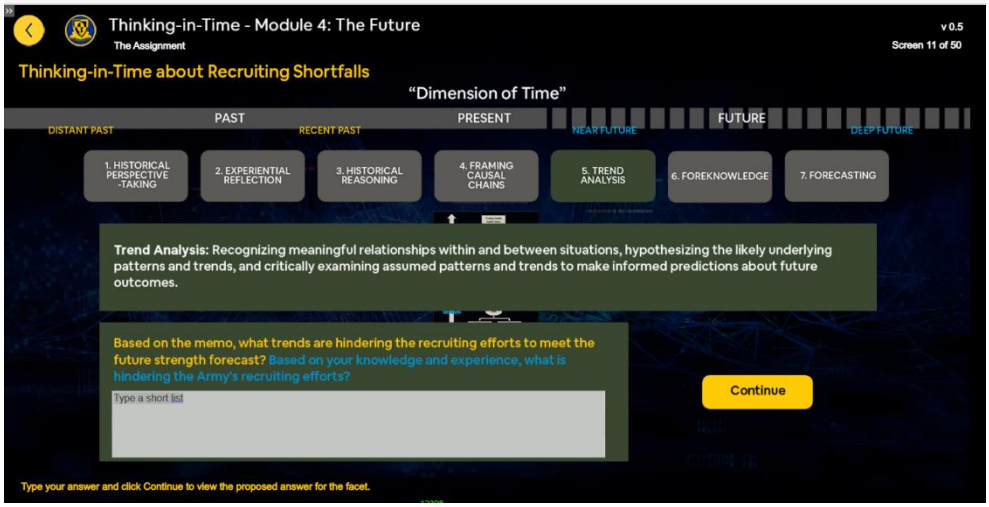
Use the seven facets of time and the CSA/SECARMY memo to complete the following exercise. Remember, the complete memorandum can be found in the References page. You may want to refer to the memo for the remainder of this exercise.

The goal of this brief exercise is to better comprehend the facets of thinking-in-time by using the Army's Recruiting Shortfall challenge.

Again, while it may be more likely that you tackle problems using ADM or MDMP, looking at the recruiting challenge by using Causal Chain Analysis and the other facets, should help you visualize the challenge of the recruiting shortfall at various points "up" the time-stream. At the end of this exercise, you will forecast what it will look like "down" stream. This exercise culminates in a forecast of the Army's future end strength.



Given how **Framing Causal Chain** analysis can be used to look up and down the time stream, the question becomes: "What is the next facet to examine in order to define the recruiting challenge problem and develop a forecast to anticipate the Army's future end strength?"



- Applying the facets of time to this exercise may be a little confusing at first, so do your best. If you get stuck click Continue to see the proposed answer for the facet.

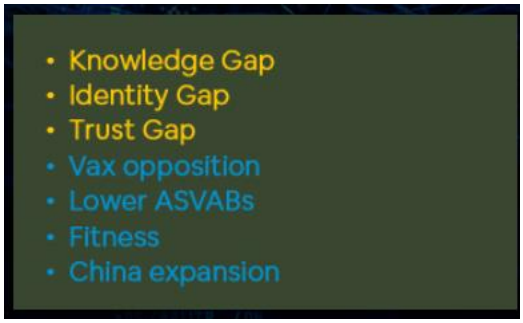
- Knowing what is likely to happen in the near future is important, and the most predictable aspect of the future.

So, begin developing a forecast by starting with trend analysis.

Look at the "**Trend Analysis**" questions for this problem: First, based on the memo, what trends are hindering the recruiting efforts to meet the future strength forecast? Second, based on your knowledge and experience, what is hindering the Army from meeting its recruiting goals now, and what issues are likely to remain as trends into the future?

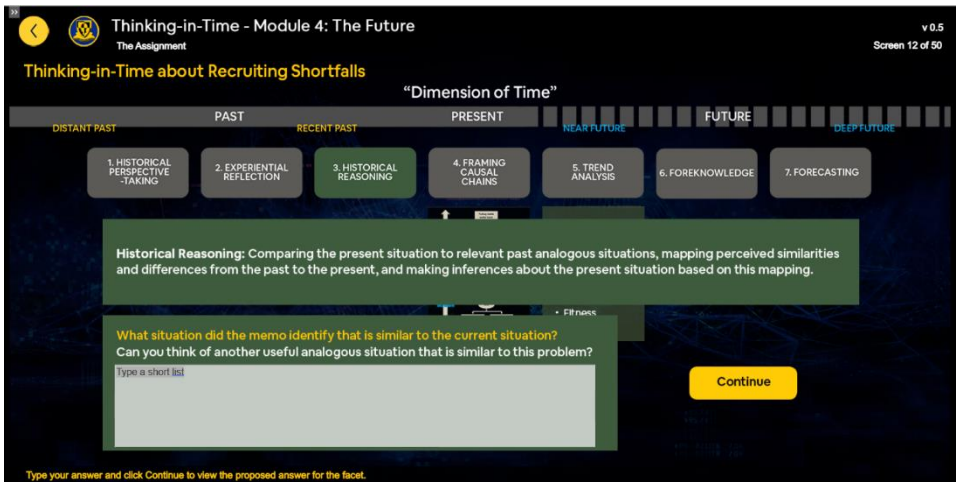
Type two or three very brief responses in the text box and click Continue.

The memo identified three things that were hindering that Army's recruiting efforts.
The knowledge gap is the idea that the Army's story is not reaching enough Americans and they have limited exposure to military members.
The identity gap is where potential recruits couldn't see themselves in the Army.
And there is a trust gap where younger Americans are losing trust and confidence in every institution, including the military.



The next step is to use **Historical Reasoning**, to compare the present situation, to relevant past analogous situations to help frame the problem. What situation did the memo identify that is similar to the current situation? Can you think of another useful analogous situation that is similar to this problem?

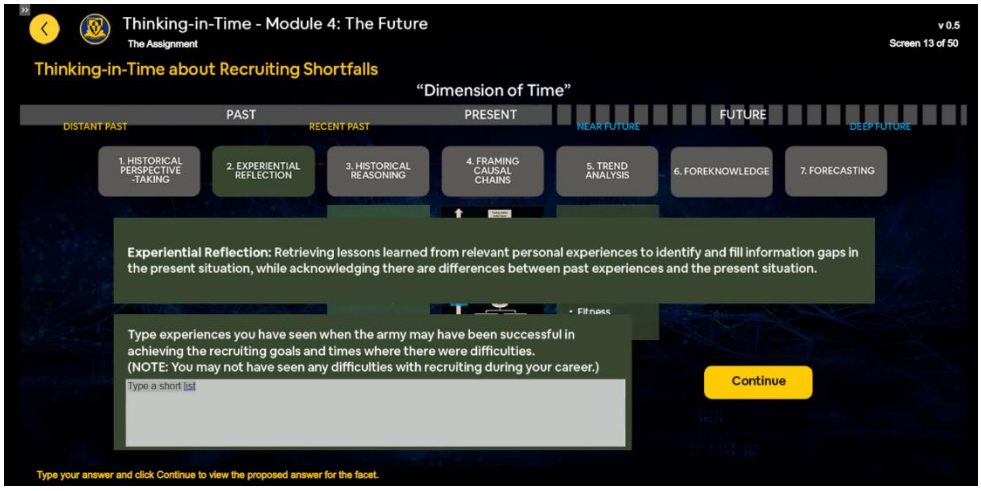
Type two or three responses in the text box and click Continue.



The memo mentioned how our present situation was relevant to past or analogous situations.
The recruiting challenges memo mentioned we were in the most challenging recruiting environment since the advent of the all-volunteer force, (AVF) in 1973. The memo also mentioned COVID-19 and the effects on ASVAB scores. Finally, the all-volunteer force start-up, and the Spanish flu maybe events that help us better relate to our current situation.

The next step is to use the **experiential reflection** facet to retrieve lessons learned from relevant personal experiences to identify and fill information gaps in the present situation.

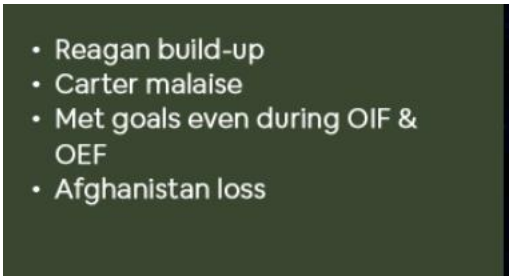
Think back to events in your lifetime, with respect to recruiting challenges. Type experiences you have seen when the Army may have been successful in achieving the recruiting goals and times where there were difficulties. It may be in terms of positive events that generated patriotism, or perhaps periods where people had a sour perspective on the Army.



You may not have seen any difficulties with recruiting during your lifetime, so you may not have this experience to reflect upon. Type two or three responses in the text box and click Continue.

Depending on your age, you may recall the Reagan revolution, this period saw a re-investment in the Army, to include pay raises, peace through strength, and a reinvigoration of pride in the military.

For example, in 1985 the US population was under 240 million, and yet we had an all-volunteer force of 18 divisions with 780,000 Soldiers. Now, in 2023, with a population of 330 million, we are having difficulty manning an Army of only ten divisions and 450,000 Soldiers.



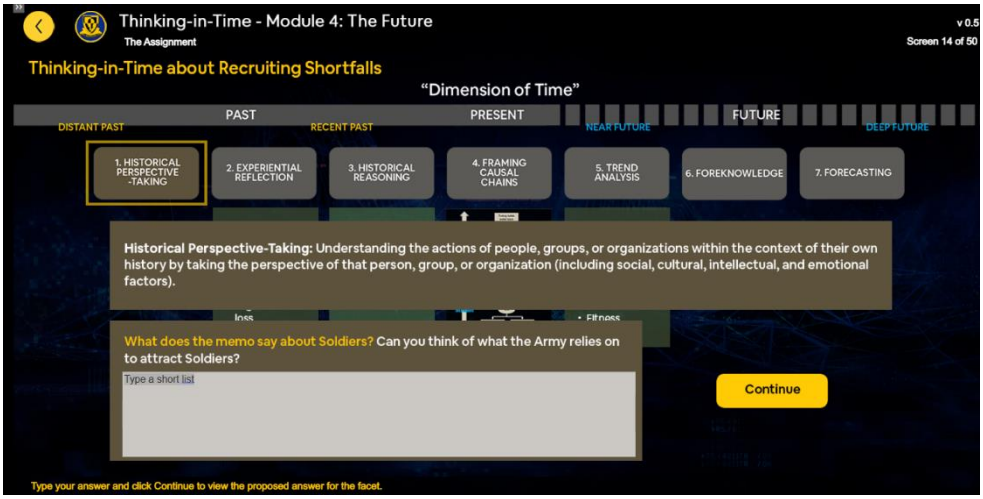
You may think back to the Carter malaise, as it was known. The Carter administration saw the oil embargo, high inflation and what was referred to as the hollow Army during that time frame. Many commentators have equated our current situation in 2023 as similar to that period.

One thing you may reflect on is that during the surge in Iraq the Army expanded to over 540,000 Soldiers. At that time there was a very high OPTEMPO. Despite us being at war in both Iraq and Afghanistan, the Army met its recruiting goals.

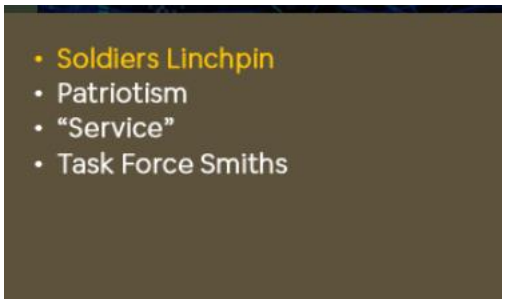
The next facet is **historical perspective-taking**. Notice the definition says, "understanding the actions of people groups or organizations within the context of their own history."

This exercise involves the Army's recruiting challenges. What does the memo say about Soldiers? Can you think of what the Army relies on to attract Soldiers?

Type two or three responses in the text box and click Continue.



The memo referred to Soldiers as the linchpin. We've relied on patriotism and the idea of serving something bigger than oneself as reasons for people to have a propensity to want to serve their nation.

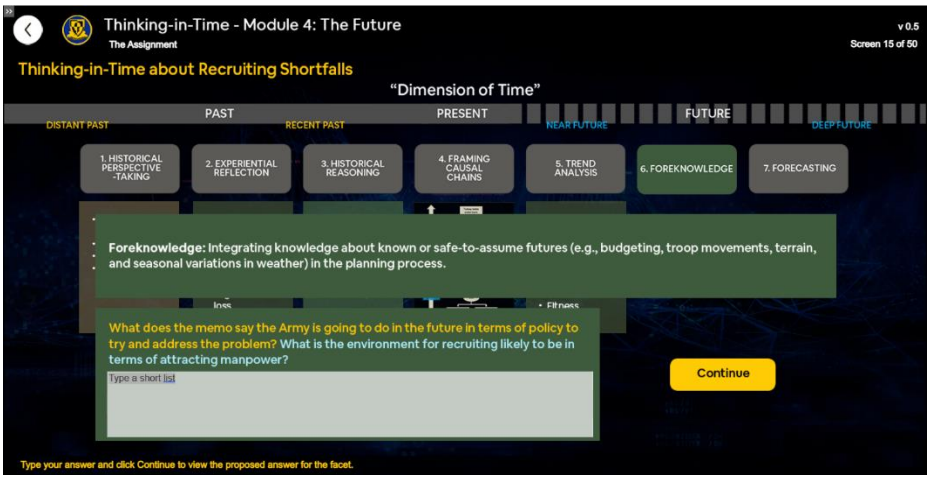


Move to the facet of **foreknowledge**.

What does the memo say the Army is going to do in the future in terms of policy to try and address the problem?

What is the environment for recruiting likely to be in terms of attracting manpower?

Type two or three responses in the text box and click Continue.

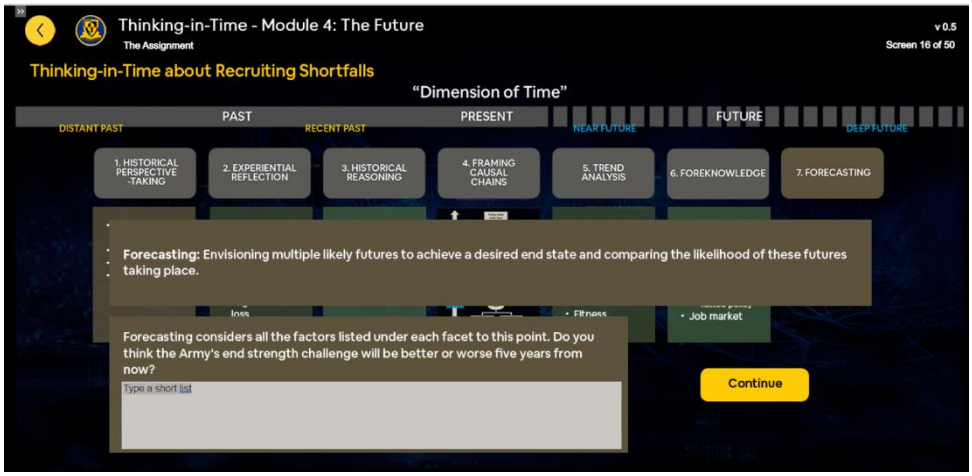


The memo outlined several policy changes that we were taking to try and enhance recruiting efforts. Foreknowledge is those things that are known, or safe to assume in the future.
The memo mentioned $50,000 enlistment bonuses plus $35,000 if you sign up and ship off quickly, the new Future Soldier Preparatory Course (FSPC), helping civilians become enlistment eligible by helping them raise ASVAB, or fitness levels.

The memo mentions the tattoo policy that was amended to allow more civilians to be eligible to join. In January 2023 the U.S Army started offering promotion incentives to Soldiers who refer individuals to their local recruiting station. Privates to privates first class will be eligible for a single rank advancement of one grade if their qualified referral enlists and ships to Basic Combat Training or One Station Unit Training. A Soldier can only be promoted one time in their career from SRP participation.
Specialists and sergeants will be eligible for promotion points by earning the new U.S Army Recruiting Ribbon. The newly created ribbon is part of the Army's effort to recognize Soldiers for contributing to the recruiting effort. Any Soldier, whether officer or enlisted, who has a qualified referral enlist and ship to Basic Combat Training will be eligible for the ribbon.

Don't forget the job market, it seems that it's relatively safe to assume that the job market will remain tight, and the Army will continue to have stiff competition in getting qualified applicants.

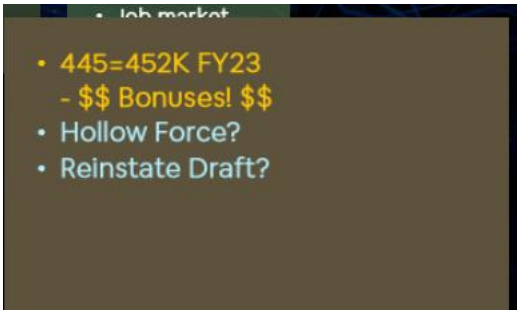
Finally, look at the facet of **forecasting**, or envisioning multiple likely futures to achieve a desired end state and comparing the likelihood of these futures taking place.



Forecasting incorporates all of the facets of thinking-in-time. Starting downstream, with trend analysis or, determining the conditions that are likely to exist in the future, including foreknowledge. Then, look back or upstream, at what situations this is like in the past, or historical reasoning, as well as the experiential reflection items you identified, plus the Army's history and attitude.

Forecasting considers all the factors listed under each facet to this point. Determine what is likely to happen in the future. Do you think the Army's end strength challenge will be better or worse five years from now?

The memo projects the strength to be between 445,000 and 452,000 active component Soldiers.

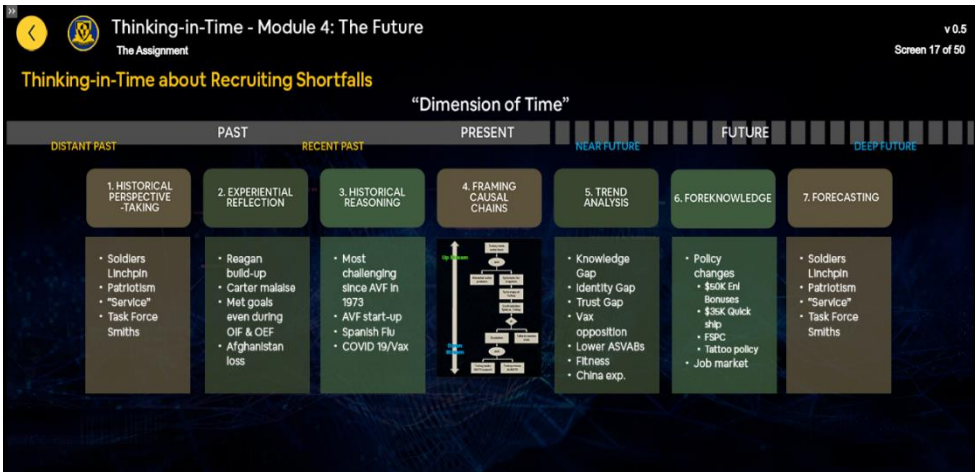


It seems likely that the Army will continue to use money as an incentive to get civilians to join. The memo offers several other initiatives the Army is taking to try and address the shortfall, to include marketing and recruiting changes.

Considering the previous mentioned actions, and with what we know through foreknowledge, what is a likely forecast? Will history repeat itself; will the Army end up with a hollow force?

Will things get so bad that the draft needs to be reinstated?

What if there is a war involving large scale combat operations with a great power competitor, would Americans be running to the recruiting office like they did after Pearl Harbor?



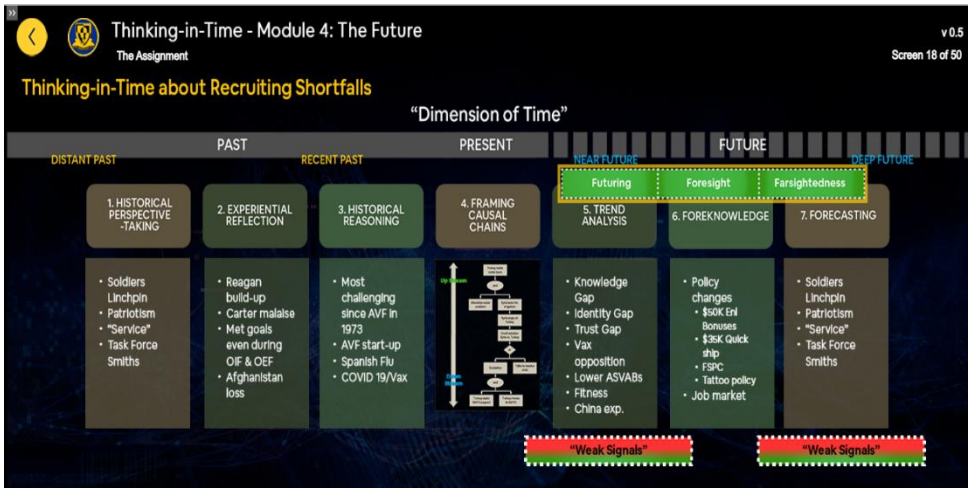
This is not just an academic question, think back to the Chief of Staff's, paper number one, *Army Multi-Domain Transformation,* without people we don't have an Army.

In module one you learned about the terms **futuring; foresight; and farsightedness**.

Cultivating that mindset or developing those skills can help you minimize surprises or better **detect weak signals.**

Think about the idea of weak signals, like that from an FM or AM radio station. Signals in the distance that are only detectable if you are looking or listening for them.

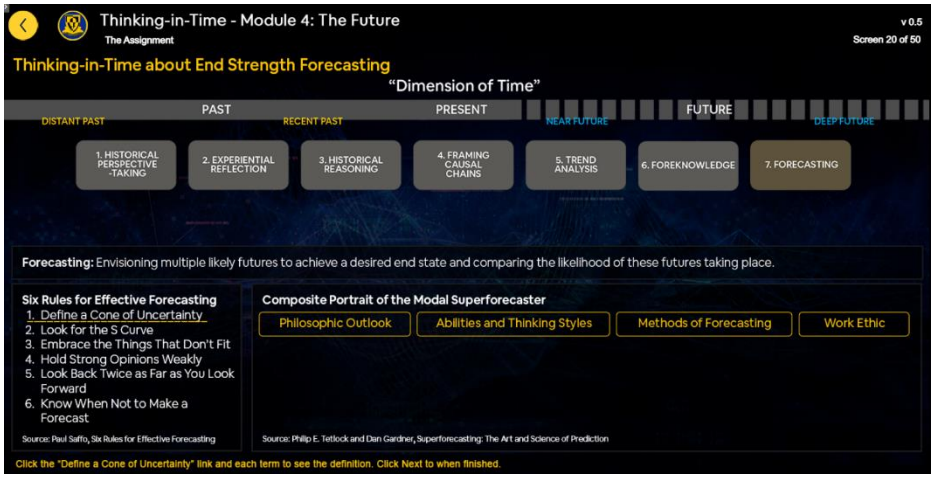
What weak signals were missed that could have prevented this recruiting challenge?



Take a minute and watch the video by Lieutenant General HR McMaster.

Look more closely at the facet or activity of forecasting. The six rules for effective forecasting, by Paul Saffo, are listed, along with a link to see more information about the cone of uncertainty, or rule number 1. The cone is an example of the efforts to develop intelligent robots.

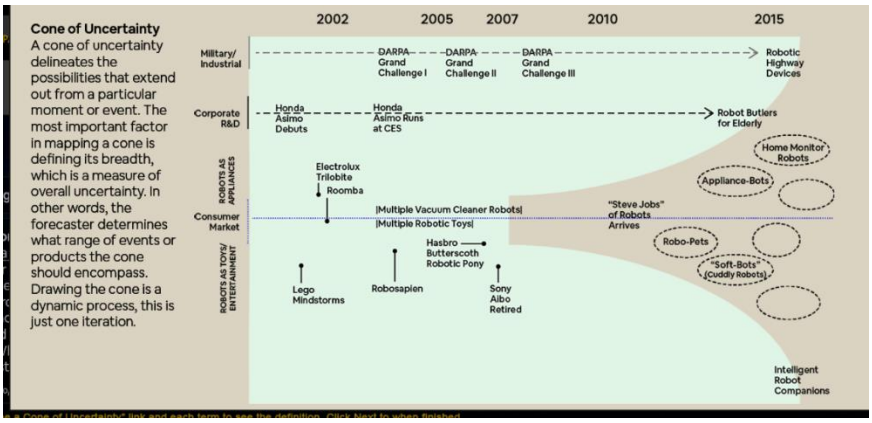
The composite portrait of the modal super forecaster if from the book "The art of science of prediction", by Phillip Tetlock and Dan Gardner. Some of the key aspects of a



super forecaster's philosophical outlook is that nothing is certain and being humble and nondeterministic.

With respect to abilities and thinking styles, a super forecaster remains actively open minded, beliefs are only hypothesis to be tested while being intellectually curious and comfortable with numbers. Pay close attention to the Methods of Forecasting. Other attributes include having a work ethic, a growth mindset, believing it's possible to get better and having dogged determination. Click each item for more information.

The cone of uncertainty is a visual tool used to delineate possibilities that extend out from a particular moment or event.



Many factors go into delineating the cone of uncertainty, but the most important is defining its breadth, which is a measure of overall uncertainty.

Other factors -relationships among elements, for example, and the ranking of possible outcomes-must also be considered in developing a forecast but determining the cone's breadth is the crucial first step.

Imagine it is 1997, the Toyota Prius has just gone on sale in Japan, and you are forecasting the future of the market for hybrid cars in the United States.

External factors to consider would be oil price trends and consumer attitudes regarding the environment, as well as more general factors such as economic trends. Inside the cone would be factors such as the possible emergence of competing technologies (for instance, fuel cells) and an increased consumer preference for small cars (such as the Mini).

At the edge of the cone would be wild cards like a terrorist attack or a war in the Middle East. These are just a very few representative examples.

Drawing it too narrow is worse than drawing it too broad. The art of defining the cone's edge lies in carefully distinguishing between the highly improbable and the wildly impossible, such as a black swan event. A good boundary is one made up of elements lying on the ragged edge of plausibility. Don't focus on the edge at the exclusion of the center or you will be surprised by an overlooked certainty. See the article in the references section.

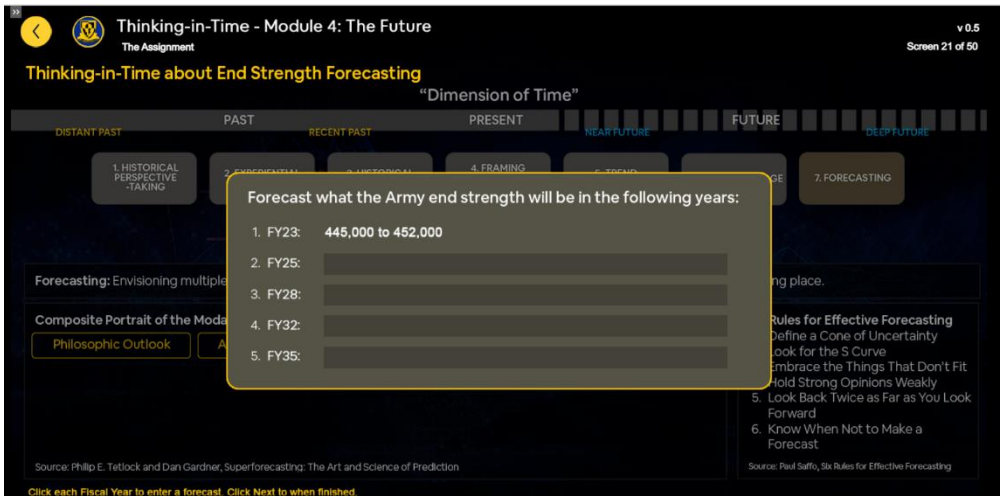
Foreknowledge, or the reasonably safe to assume number from the memo, estimates the Army to be between 445,000 and 452,000, in Fiscal year 2023. Take the time to **Forecast** what the Army end strength will be in the following years. Type your end strength forecast for each fiscal year in each field.

What is your forecast for fiscal year 2025?

What is your forecast for fiscal year 2028?

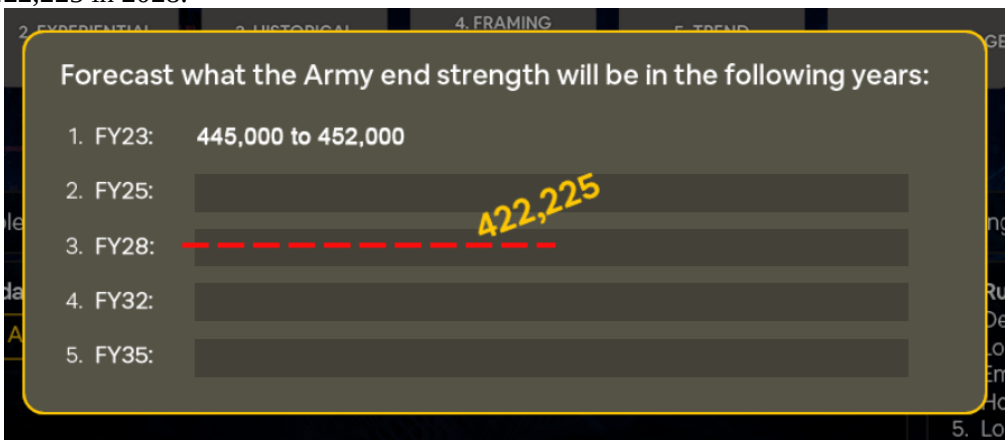
What is your forecast for fiscal year 2032?

What is your forecast for fiscal year 2035?



Your boss remains concerned that continued recruiting shortfalls and other factors that may not allow for the Army to achieve the Aim point for 2035. The G-3/5/7 is forecasting the active component end strength will be down to 422,225 in 2028.

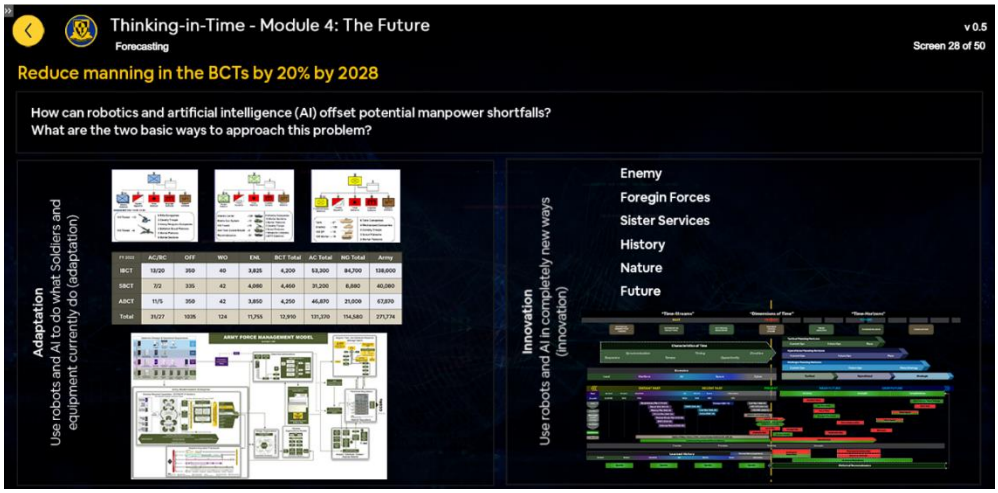
Based on that projection, he wants you to provide the three most effective ways robotics and artificial intelligence, or AI, may be able to reduce the fiscal year 2023 authorizations, or spaces, in the BCT's by 20%, or 26,275 spaces, by 2028.



Click next to view a video that shows some of the Army's modernization efforts currently taking place to the anticipate the future.

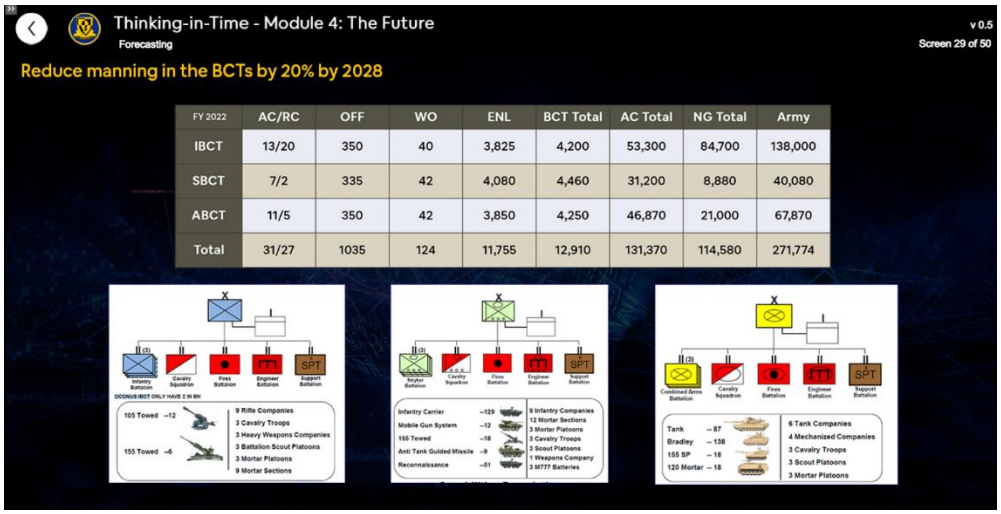
This is the rough order of magnitude of the problem, *how can robotics and artificial intelligence offset potential manpower shortfalls*?
There are two basic approaches to the problem. One is adaptation, that is to use robots and artificial intelligence do what Soldiers and equipment currently do inside the BCT's. The other option is innovation, to come up with completely new formations.

For this training, first look at integrating new capabilities into the existing formations in order to reduce the requirements for Soldiers.
Three BCT's with their organizational hierarchies are displayed, along with key pieces of equipment. The table the shows number of BCT's by type. Also included is the Army Force Management model, the systems and processes the Army uses to develop and integrate new capabilities.



This table shows the active component as of Fiscal Year 2022, where there were 31 BCT's, 7 Stryker brigade combat teams, and 11 armored brigade combat teams, for a total of 31 brigade combat teams in the active component. Looking across each BCT, you can see the number of officers, warrant officers, enlisted and the total for the entire BCT. Each BCT has roughly 4,200 personnel.

In the active component, there are roughly 53,000 Soldiers in IBCTs, another 31,000 in Stryker brigade combat teams, and 46,000 in Armored brigade combat teams, for a total of 131,370 authorized Soldiers in all the active component BCTs. The three formations organizational hierarchies are also displayed, including the key pieces of equipment in each formation, as well as the number of companies, troops, separate platoons, and sections.



The requirement is to reduce active component Soldiers in BCT's from 131,370 to, 105,000, for the fiscal year 2028 forecast. This is a 20% reduction. At this point just know that these 26,275 spaces must come out of all three brigade combat teams. Note that the reduction does not have to be proportional.

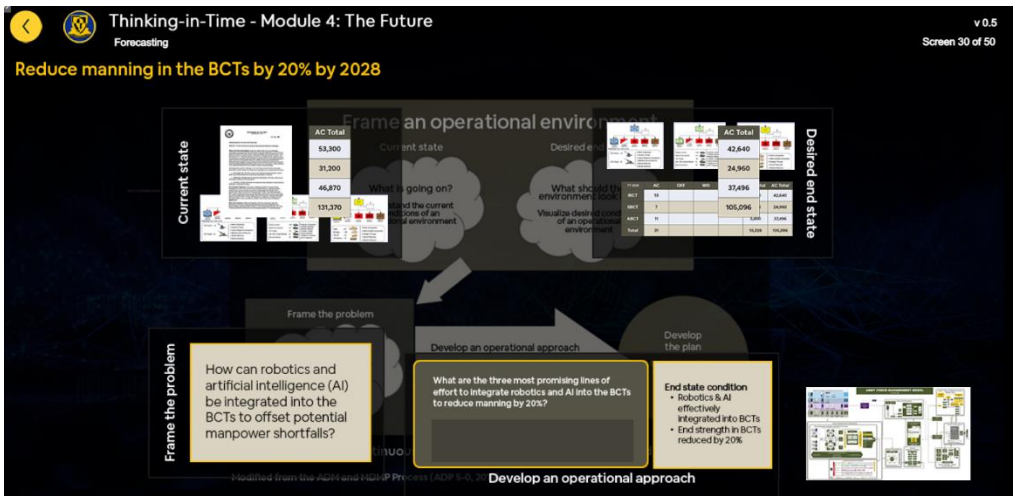
FY 2022	AC/RC	OFF	WO	ENL	BCT Total	AC Total	NG Total	Army
IBCT	13/20	350	40	3,825	4,200	53,300	84,700	138,000
SBCT	7/2	335	42	4,080	4,460	31,200	8,880	40,080
ABCT	11/5	350	42	3,850	4,250	46,870	21,000	67,870
Total	31/27	1035	124	11,755	12,910	131,370	114,580	271,774

FY 2028	AC	OFF	WO	ENL	BCT Total	AC Total
IBCT	13				3,360	42,640
SBCT	7				3,568	24,960
ABCT	11				3,400	37,496
Total	31				10,328	105,096

In module 3 you learned to think in time, as a process. You also learned how that process aligned with Army Design Methodology, and the Military Decision-Making Process. Use that process with the current requirements.
The current state includes the memo from the Chief of Staff and Secretary of the Army, along with the total number of Soldiers in BCT's and the three formations.

The desired end state is to reduce the active component to 105,096 total spaces in the 31 BCT's.

The problem is framed as: How can robotics and artificial intelligence (AI) be integrated into the BCT's to offset potential manpower shortfalls?



For the develop an operational approach step, share your thoughts on the three most promising lines of effort to integrate robotics and AI into the BCTs to reduce manning by 20%.

One line of effort might be to look at MOS's that could be reduced, for example: if you were trying to integrate robots and artificial intelligence into a fast food restaurant to offset manning requirements, you could propose using kiosks to replace the clerks. This replaces 50% of the clerks with kiosks. Another example could be to replace one out of three cooks with robotic deep-fry machines, and so on. This would allow for a reduction of cook and clerk MOS personnel.

The number of MOS's in an Army BCT can vary depending on the type and mission of the unit. However, on average, a BCT can have between 30 to 40 different MOS's represented. Some of the common MOS's found in a BCT include Infantry, Armor, Field Artillery, Combat Engineers, Military Police, Signal

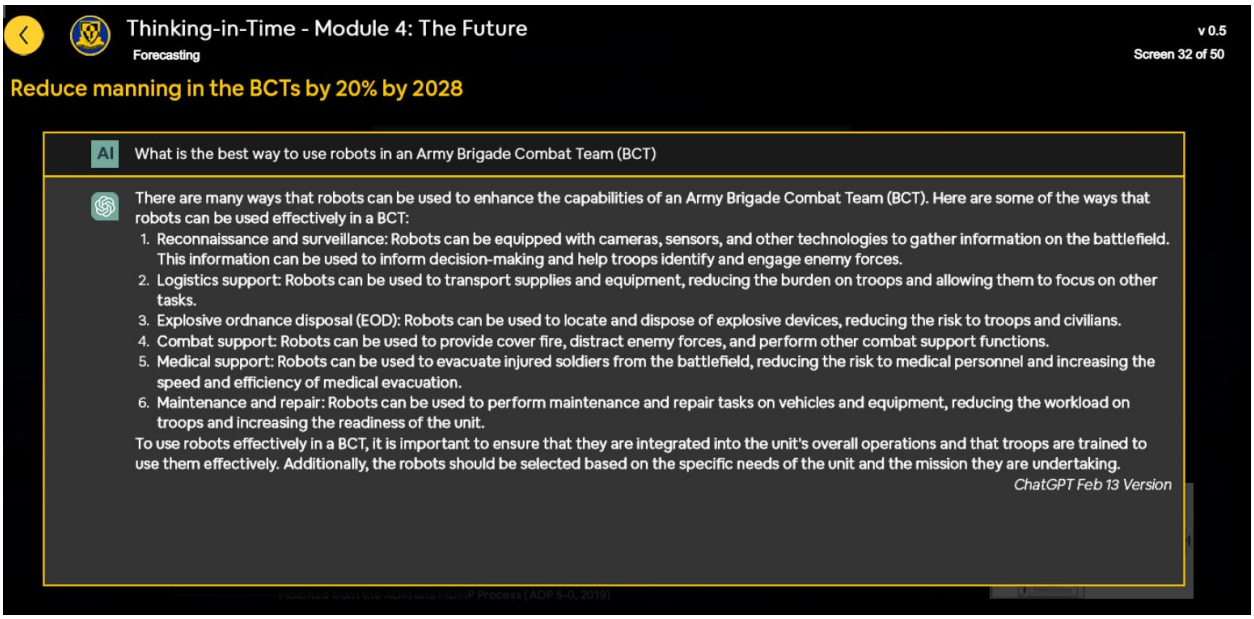
Corps, Medical Corps, Intelligence, and Logistics. Each MOS represents a different skill set and is responsible for specific duties within the BCT.

Another line of effort might be to look at war fighting functions.

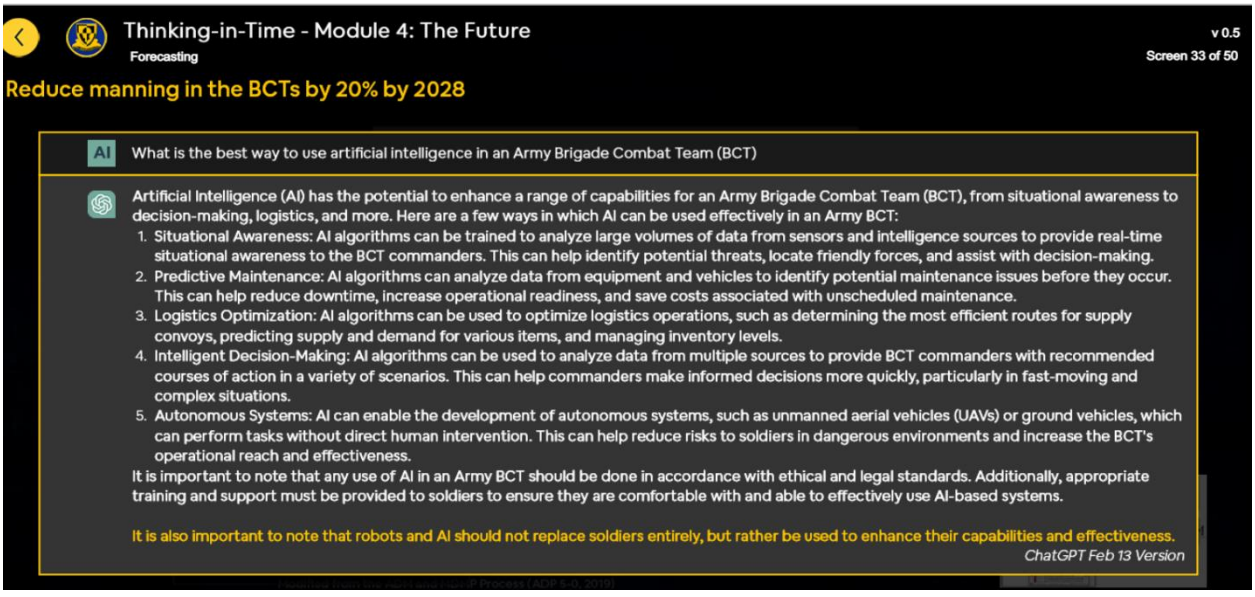
Recognizing that the end state is a 20% reduction, what would be the three most promising areas replacing Soldiers with robotics and AI.

What are the three most promising lines of effort to reduce manning in the BCTs? Type your response and click next to continue.

Two questions were posed to the Artificial Intelligence program Chat GPT. The first question asked: what is the best way to use robots in an Army Brigade Combat Team.

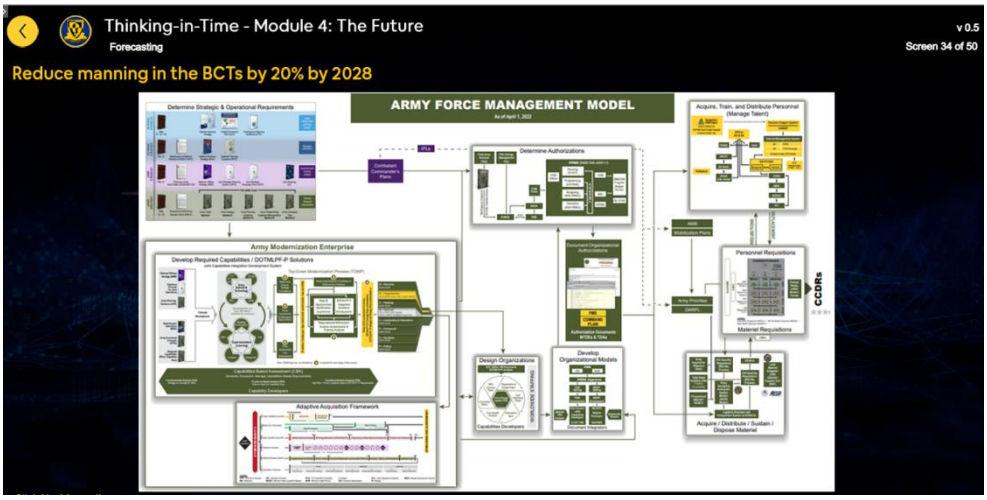


The second question asked: What is the best way to use artificial intelligence in an Army Brigade Combat Team? Notice the final entry. ***It is also important to note that robots and AI should not replace Soldiers entirely, but rather be used to enhance their capabilities and effectiveness.***



Do you agree the conclusions that Chat GPT generated? How might a human have answered these questions?

You probably found it difficult to name three lines of effort to replace Soldiers with robotics and AI, that's OK. You also saw the Chat GPT AI responses.



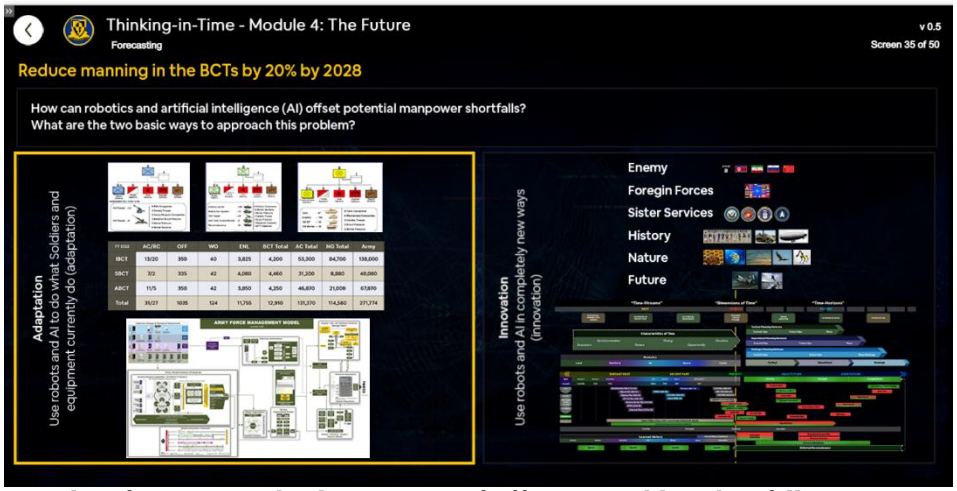
The highest density personnel in the BCTs are the 11 series in the Stryker and Infantry brigade combat teams, and the 19 series in the Armored brigade combat teams, but it is still a very difficult proposition. As you may recall from Force Management instruction, the Army has a very deliberate process to generate ready, lethal, and modern forces for the combatant commanders to meet the requirements of the National Defense Strategy and their Combatant command campaign plans.

The Army uses the Joint Capabilities Integration Development System (JCIDS), for developing required capabilities, and the Army Force Development Process for designing organizations, developing organizational models, determining authorizations through Total Army Analysis, and then documenting that force structure in modification tables of organization and equipment, or MTOE's.

The system for acquiring materiel solutions and then fielding that equipment is also a very deliberate process. The model also depicts the process to acquire, train, and distribute personnel.

Go back to the problem for this exercise, ***why is the Army failing to acquire the required personnel***?

On the left side is the process you just used to look at adaptation of existing units in order to reduce personnel requirements by integrating robotics and artificial intelligence into the BCT's.



As Chat GPT noted, and you probably realize from this exercise, it is difficult for robots and AI to replace Soldiers entirely, but rather they can be used to enhance the capabilities and effectiveness of the BCT's. But this may not result in the 20% manpower offset that the G-3/5/7 wants to achieve by 2028.

This suggests it may be necessary to look at innovating or identifying a completely new way of offsetting Soldier shortfalls.

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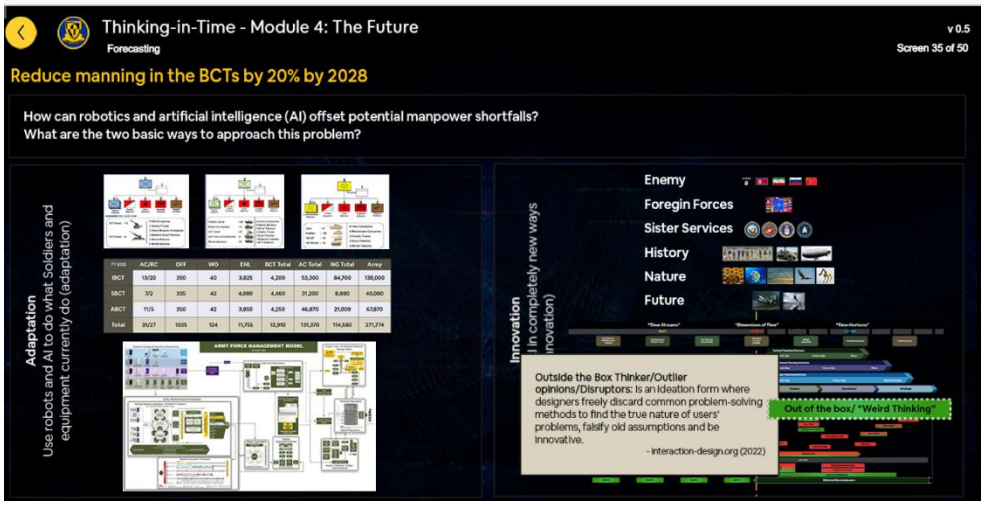
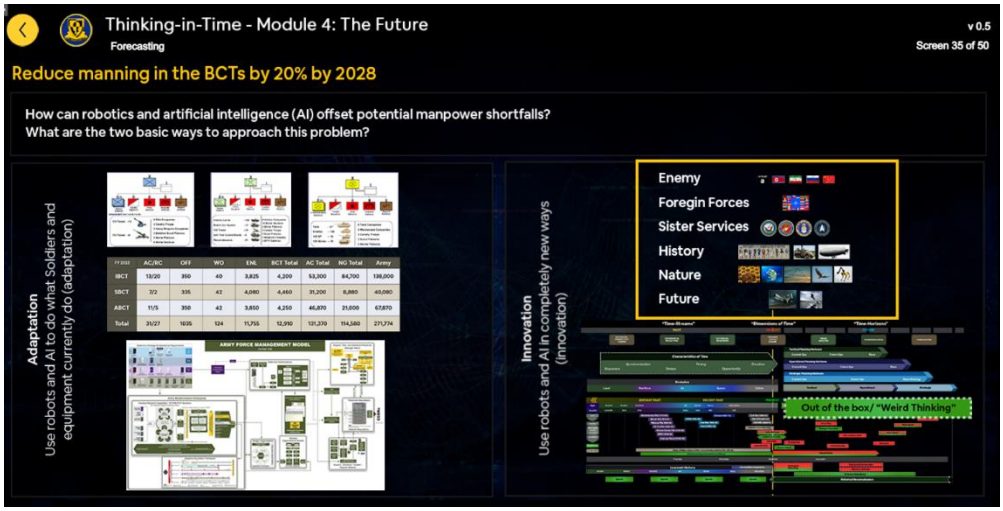
This suggests it may be necessary to look at innovating or identifying a completely new way of offsetting Soldier shortfalls.

Notice the Thinking-in-Time terms: out-of-the-box thinker, outlier opinions and disruptors, can also be described as weird thinking.

One futurist suggested, as a general rule that you would want no more than 20% of a team to be disruptive or weird thinkers. But that you do need them to facilitate ideas, solutions, or approaches that might not otherwise be found. Cultivate this trait into your own thinking through intellectual curiosity and study.



Also displayed is a model that depicts a possible way to find inspiration to innovate.

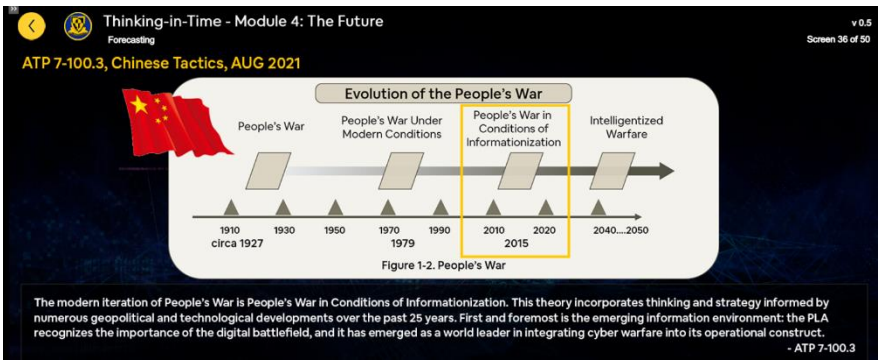


When faced with something new you could ask,

- How does the enemy do it?"
- How do foreign forces do it?
- How do sister services do it?
- How does history say it was it done in the past?
- You can also look to nature and the future for inspiration. When Dick Tracy first wore his two-way watch, it was a long way before the apple wristwatch.

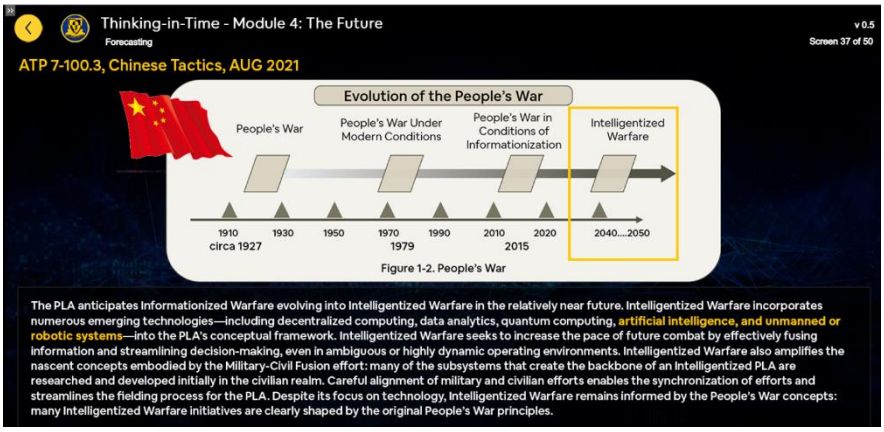
Consider again a potential solution of integrating robotics and AI.

This diagram is from the Army Techniques Publication 7-100.3, *Chinese Tactics*. This ATP was used in module 3. The diagram shows the current state of China's approach to warfare. Their theory has been informed by numerous geopolitical and technological developments over the past 25 years.



In this theory they recognize the importance of the information environment and the digital battlefield, and are a world leader in integrating cyber warfare into their operational construct.

The diagram shows that the Chinese intend to move to intelligentized warfare. According to the excerpt this should occur in the very near future.

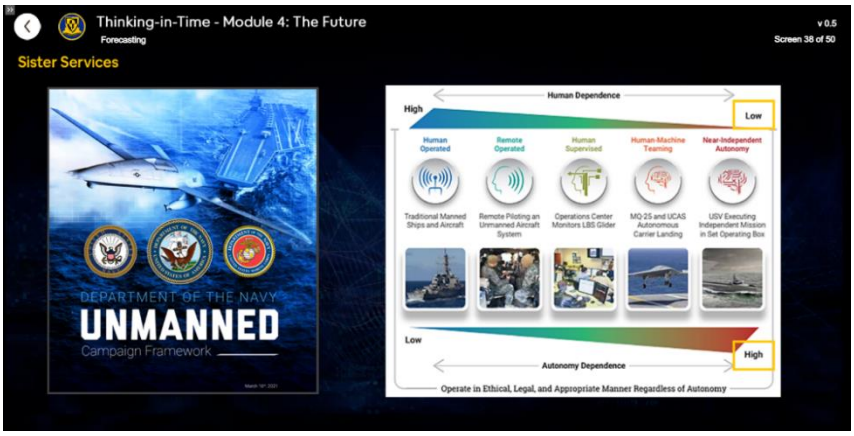


Intelligentized warfare incorporates numerous emerging technologies, including decentralized computing, data analytics, quantum computing, artificial intelligence, and unmanned or robotic systems into their conceptual framework.

By doing this they intend to increase the pace of future combat.

Another potential source of inspiration for "outside the box," or "weird thinking", is to look at sister services.

In this case, you see the U.S. Navy's approach to unmanned naval warfare.

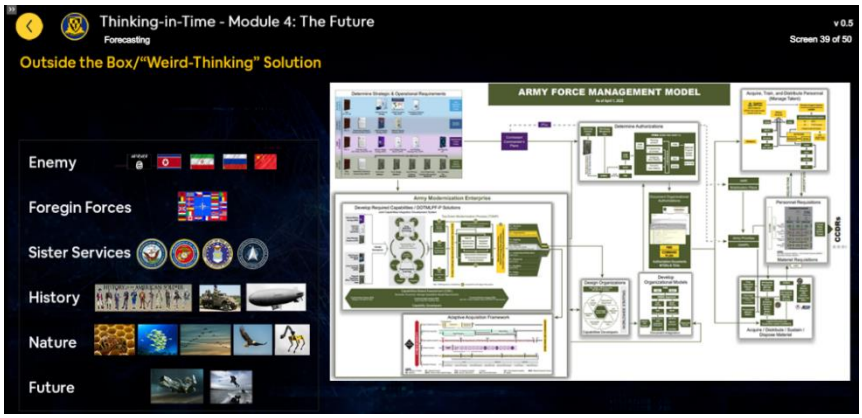


The left side of the diagram shows systems with a high degree of human dependence and a low degree of autonomy. As it moves towards the right side, the diagram shows systems with a low dependence on humans and high dependence on autonomy.

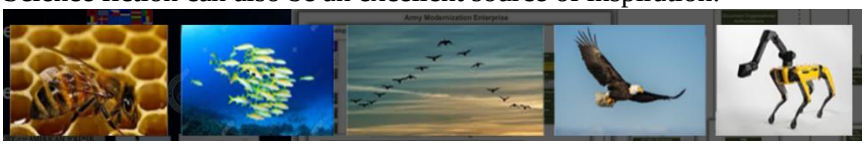
This can be a useful way of thinking about the employment of autonomous systems and artificial intelligence for the problem you are trying to solve for the Army.

Recall the model for various sources of inspiration for innovative thinking.

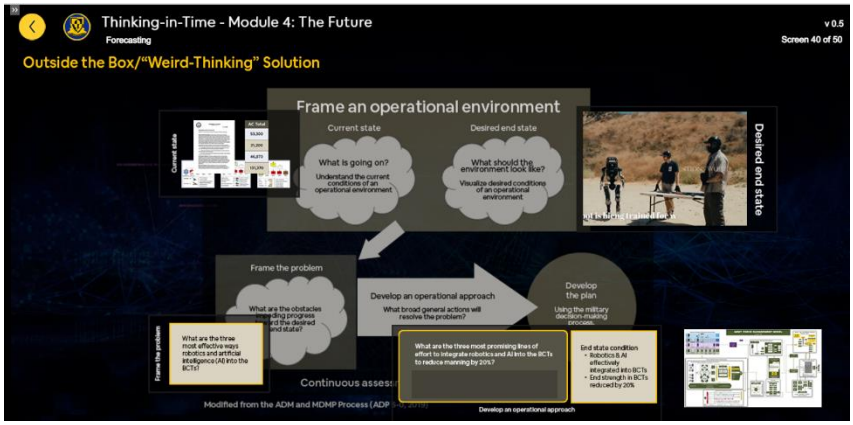
Consider, briefly, what nature offers.



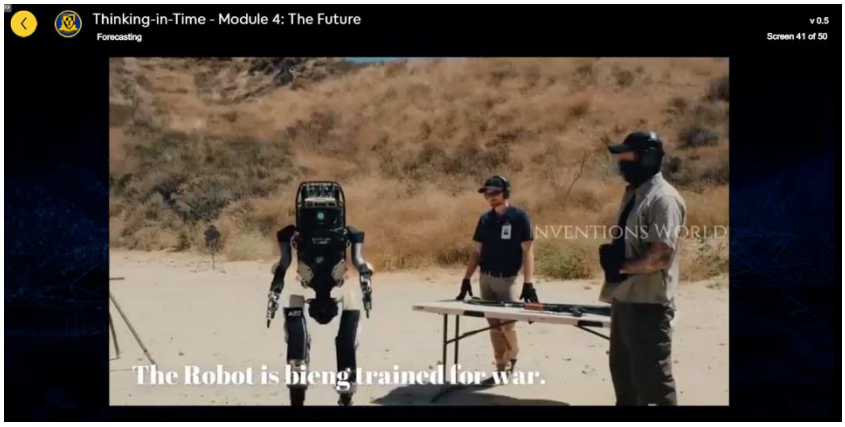
Whether it is drones swarming like bees or underwater drones moving like a school of fish, or airplanes flying in-formation like geese, or robots designed like dogs. There is a lot to be gained by considering designs in nature as sources for out-of-the-box thinking.
Science fiction can also be an excellent source of inspiration.



Recall using the Army Design Methodology for framing the problem of "integrating robotics and artificial intelligence into the existing BCT formations."
Recall the difficulty of trying to figure out how to offset people and equipment, or capabilities, resident in those formations. That's where an entirely new approach might be required that will only come from outside the box or weird thinking. What would a BCT-like formation consist of if it were entirely robotic and autonomous?

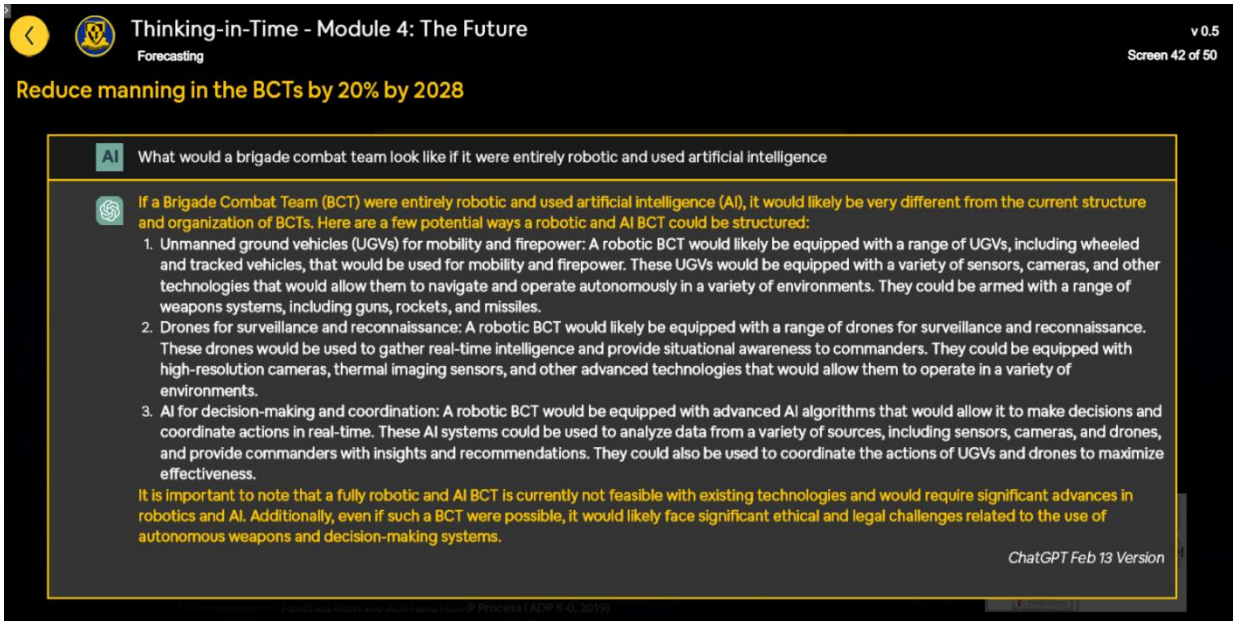


The video shared, on the next screen, shows a possible desired end state of this problem.



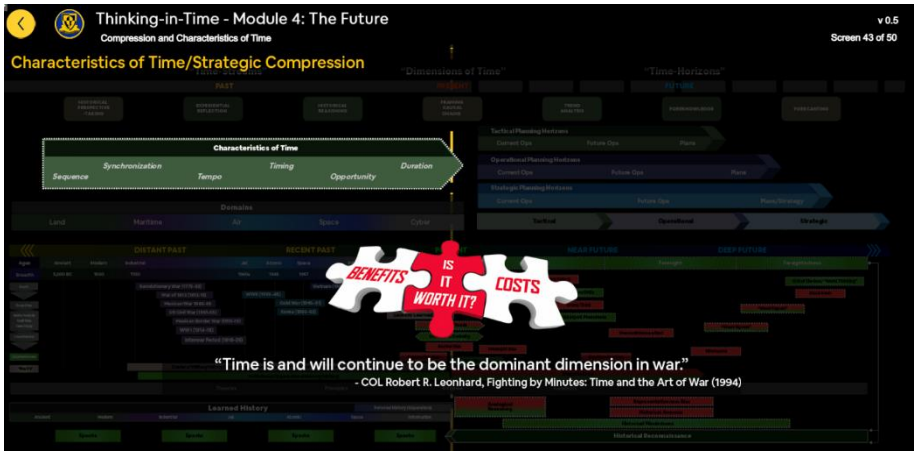
Although AI and robotics offer great promise, it may be worth considering how the artificial intelligence of Chat GPT responded to the question:

What would a brigade combat team look like if it were entirely robotic and used artificial intelligence?



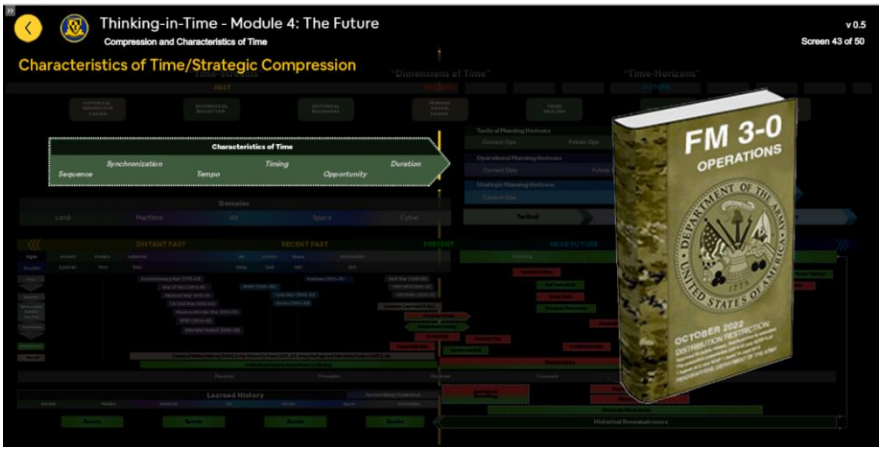
As you noticed through these two exercises, Soldiers will remain the linchpin of the Army at least through 2028.

Before completing the Thinking-in-time course, it is worth thinking about the characteristics of time and the nature of time.



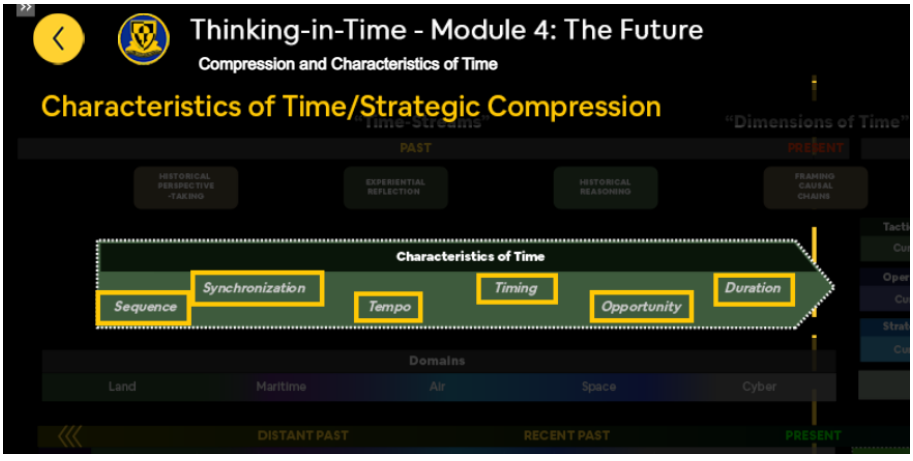
As you prepare to return to your real-world obligations think about the quote in module one, from military theorist Robert Leonhard, in his 1994 book titled: *"Fighting by Minutes: Time and the Art of War"*: "Time is and will continue to be the dominant dimension in war." Leonhard went on to say that: "the most effective way to perceive, interpret, and plan military operations is in terms of time, rather than space."

Much has changed since 1994. The Army, in its October 2022 version of Field Manual 3-0, establishes multidomain operations as the Army's operational concept. Conceptually, multidomain operations reflect an evolutionary inflection point, building on the incremental changes in doctrine as the operational environment has changed over the last forty years. In practice, however, these conceptual changes will have revolutionary impacts on how the Army conducts operations in the coming decades.



This Field Manual provides useful examples of these characteristics of time, and their significance to operations. The characteristics of time will be addressed with their linkage to the Army's operational concept.

The Characteristics of Time include: Sequence, Synchronization, Tempo, Timing, Opportunity, and Duration. Click each characteristic for more information.



Sequence: Relates to the order of events and can refer to serial or parallel relationships. At the operational level, an example is force tailoring, which is "The process of determining the right mix of forces and the sequence of their deployment in support of a joint force commander." At the tactical level,

Commanders must assume risk to create opportunity and sequence their operations because they cannot defeat enemy forces in a single decisive battle.

Synchronization: Once leaders have integrated the right capabilities, they must synchronize their employment and effects. Synchronization is the arrangement of military actions in time, space, and purpose to produce maximum relative combat power at a decisive place and time. The following factors enable leaders to determine when to initiate employment of a capability and how to adapt to changes in the operational environment during execution:

- The desired overall effect over time.
- How the individual effects complement each other over time.
- The time it takes each capability or formation to generate its individual effects from the start of employment.
- Whether each individual effect is enduring, simultaneous, or sequenced with the other effects.
- The consequences of an individual effect not occurring at the planned time.

Tempo: Is the relative speed and rhythm of military operations over time with respect to the enemy, as defined in ADP 3-0. It implies the ability to understand, decide, act, assess, and adapt. During competition, commanders act quickly to control events and deny enemy forces relative advantages. By acting faster than the situation deteriorates, commanders can change the dynamics of a crisis and restore favorable conditions. During armed conflict, commanders normally seek to maintain a higher tempo than enemy forces do. A rapid tempo can overwhelm an enemy force's ability to counter friendly actions, and it can enable friendly forces to exploit a short window of opportunity.

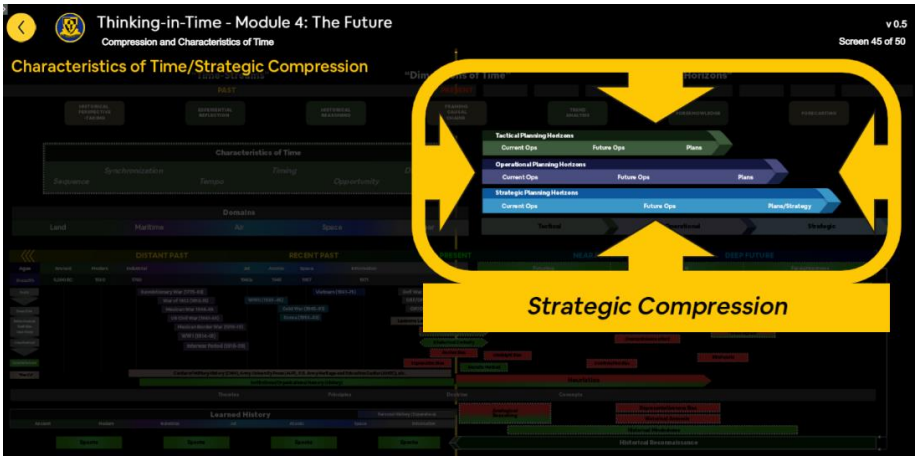
Timing: Implies a gain or loss from the standpoint of action or inaction. FM 3-0 says: To facilitate this integration and synchronization, commanders designate targeting priorities, effects, and timing within their assigned areas.

Opportunity: FM 3-0 shares that: A relative advantage is a location or condition, in any domain, relative to an adversary or enemy that provides an opportunity to progress towards or achieve an objective. Commanders seek and create relative advantages to exploit through action, and they continually assess the situation to identify ways to expand opportunities. The time available to create and exploit opportunities against adaptive threats is usually limited. Agile units rapidly recognize an opportunity and take action to exploit it.

Duration: In warfare, as coined by Clausewitz, refers to the length of a conflict.
FM 3-0 notes duration in operations in the following ways:

- Operational reach is the distance and duration across which a force can successfully employ military capabilities
- Crisis response operations are characterized by high degrees of volatility and uncertainty. A crisis may erupt with no warning, or it may be well anticipated. Its duration is unpredictable.

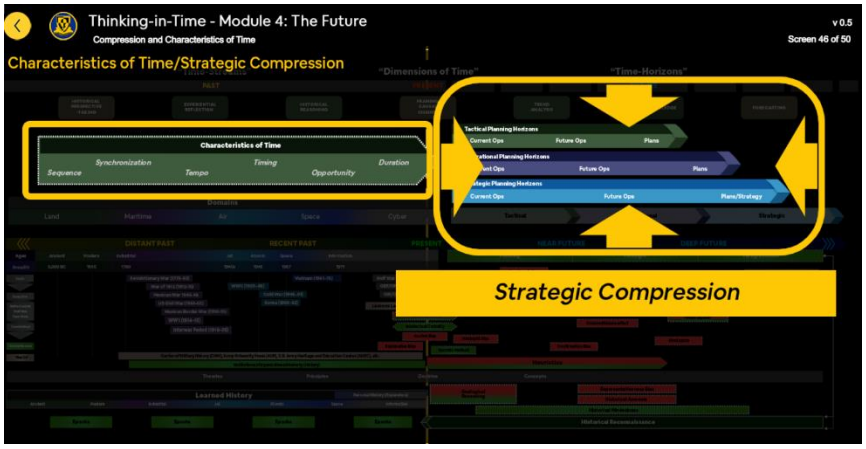
Regarding the nature of time, in an article entitled: "*Strategic Compression and the Military's Pursuit of Cognitive Readiness*", the authors define Strategic compression as a phenomenon "where the tactical, operational, and strategic levels of war contract, enmeshing the characteristics of those levels (such as, the actions, goals, time scales, physical spans of influence, and available resources).



It also involves changes to traditionally expected causal relationships, incorporating new causal chains across the levels (for example, low-level tactical actions directly impact broad-scale strategic responses) and eliminating expected causal connections (for example, successfully meeting all tactical outcomes without attaining the expected positive strategic end states)."

Strategic compression blurs the conceptual boundaries of our formalized organizational structures, blurring lines not only within the vertical hierarchy but also laterally and between what is "inside" versus "outside" the system. Correspondingly, it muddies the expected causal chains, creating unexpected emergent outcomes of lower-level actions or wholly ambiguous cause-and-effect sequences.
Both the characteristics of time, and strategic compression, recognize the various effects of time can be different at the various levels of war and within those levels.

Here the latest version of FM 3-0 is also instructive as it examines convergence:



Convergence is an outcome created by the concerted employment of capabilities from multiple domains and echelons against combinations of decisive points in any domain to create effects against a system, formation, decision maker, or in a specific geographic area.

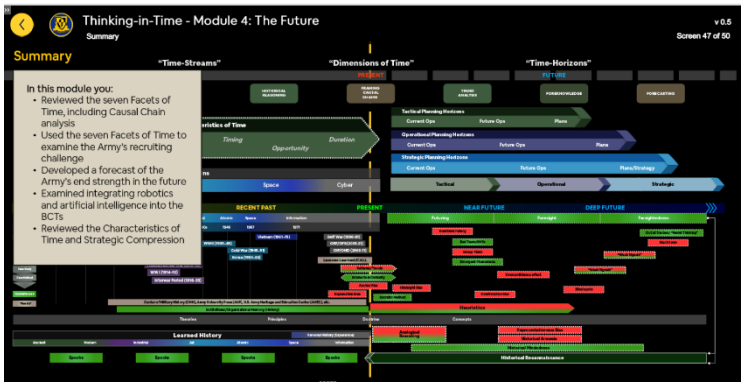
Convergence occurs when a higher echelon and its subordinate echelons create effects from and in multiple domains in ways that defeat or disrupt enemy forces long enough for friendly forces to effectively exploit the opportunity. Convergence broadens the scope of mass, synchronization, and combined arms, by applying combat power to combinations of decisive points, instead of just one, across time, space, and domains.

Convergence is a way to balance the principles of mass, objective, and economy of force, massing combat power on some parts of the enemy force while employing different techniques against other decisive points to create cumulative effects the enemy cannot overcome.

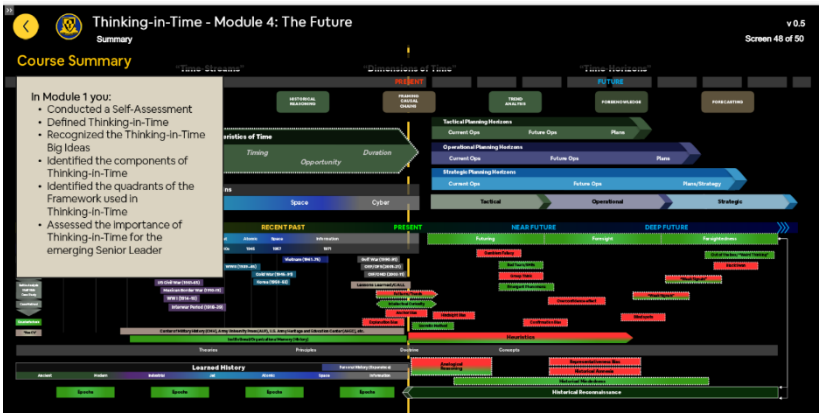
Convergence is most effective when its effects accrue and create a cycle of expanding opportunity.

e. Module Summary. In this module you:

- Reviewed the seven Facets of Time, including Causal Chain analysis.
- Used the seven Facets of Time to examine the Army's recruiting challenge.
- Developed a forecast of the Army's end strength in the future.
- Examined integrating robotics and artificial intelligence into the BCTs.
- Reviewed the Characteristics of Time and Strategic Compression.



Remember, in module one, you conducted a self-assessment, defined Thinking-in-Time, Recognized the Thinking-in-Time Big Ideas, Identified the components of Thinking-in-Time, Identified the quadrants of the Framework used in Thinking-in-Time, and Assessed the importance of Thinking-in-Time for the emerging Senior Leader.



Recall the Thinking-in-time framework, depicted at the top is the dimension of time. Past, Present, and future.
Recall that Thinking-in-Time is defined as a cognitive reasoning skill by which the dimension of time, past, present, and future, is used to support the decision-making process. The present is depicted by the dotted line down the middle.

The lower left quadrant of the framework depicts the past. It shows various ages, for example the space age or information age. Below that are some of the major wars the U.S Army has been involved in, and how they correspond to the respective ages. To the left of the wars is, the breadth of history, as well as techniques to dig deeper to plumb the depths of historical events.

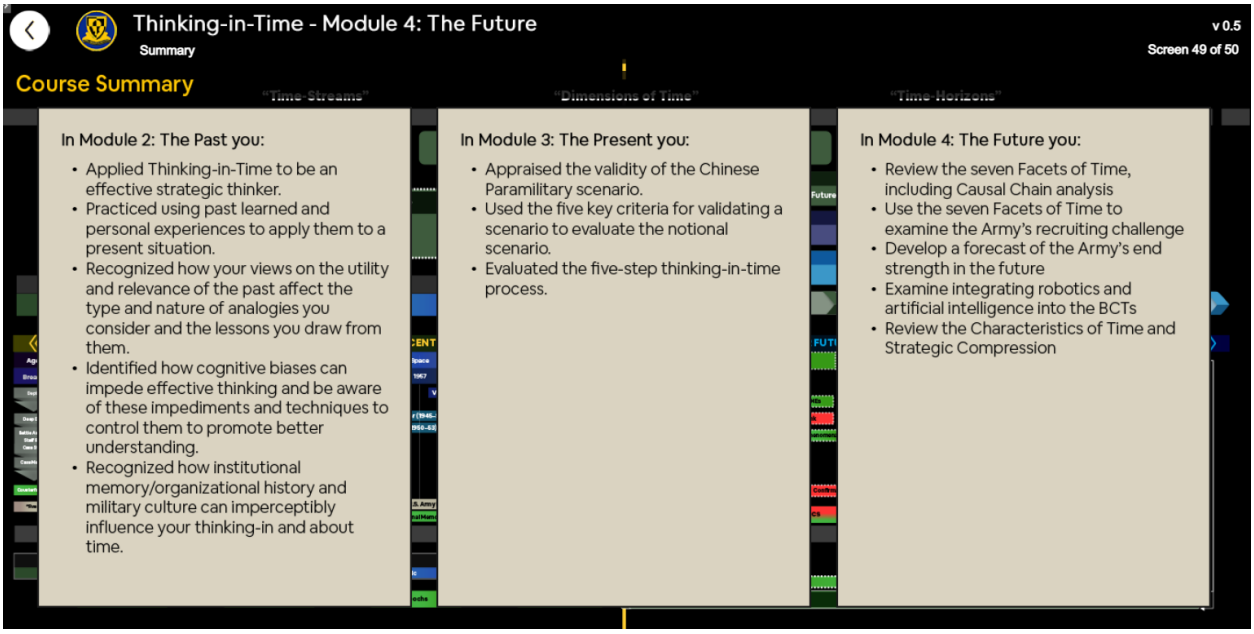
The top right quadrant, or the future dimension, shows the three levels of war and the various planning horizons at each level.

The lower right quadrant, including those terms that cross the present dotted line, are numerous techniques, biases, fallacies, and other factors that influence using the past to anticipate the future. As a general rule, if they are green, they have a positive effect, if they are in red, they have a negative effect, and if they are mixed, they can have a positive or negative effect on effective thinking in time.

Remember, In Module 2, your boss gave you six topics to create a class where you used various techniques to examine the past to explain why our efforts failed in Afghanistan.

In Module 3, you used the five-step process for Thinking-in-time to evaluate the plausibility of the present-day notional scenario, where the Chinese provide paramilitary forces advise and assist the Mexican drug cartels.

In Module 4 you used the seven facets of Thinking-in-time to forecast the Army's end strength, up to 12 years in the future.



Now that you completed this course, how are you going to use, Thinking-in-time?

Visit the References section on the Main Menu for a list of documents that were used in this course.

Appendix A: Possible Discussion Questions

1. In module 3 you learned that the validity of a scenario depends on five key criteria (Plausibility, Consistency, Relevance, Challenge, and Differentiation).
- How would you assess the validity of the Recruiting challenges and integration of Robotics and AI scenario?

2. The definition is that - ***Thinking-in-Time is a cognitive reasoning skill by which the dimension of time, past present and future, is used to support the decision-making process***.

3. Army Research Institute (ARI) developed the seven facets of Thinking-in-Time (***a cognitive reasoning skill by which the dimension of time, past present and future, is used to support the decision-making process)*** to help isolate the discreet activities involved in understanding the *past, present, and future.* Let's briefly review and discuss each of the seven.

(1) **Historical Perspective-Taking** is *Understanding the actions of people, groups, or organizations within the context of their own history by taking the perspective of that person, group, or organization - including social, cultural, intellectual, and emotional factors.*
- Why might this activity be important for your branch/functional area (FA) to analyze and understand the OE?

(2) **Experiential Reflection** is *Retrieving lessons learned from relevant personal experiences to identify and fill information gaps in the present situation, while acknowledging there are differences between past experiences and the present situation.*
- How can you prevent misapplying your personal experience(s) to a present situation?

(3) **Historical Reasoning** is *Comparing the present situation to relevant past analogous situations, mapping perceived similarities and differences from the past to the present, and making inferences about the present situation based on this mapping.*
- Why might this activity be important to your branch/FA understanding the OE?

(4) **Framing Causal Chains** is *Identifying and hypothesizing causal sequences of decisions and actions for example, chains of actions, reactions, counteractions, and outcomes, based on current information.*
- What are the potential downsides implicit in this activity?

(5) **Trend Analysis** is *Recognizing meaningful relationships within and between situations, hypothesizing the likely underlying patterns and trends, and critically examining assumed patterns and trends to make informed predictions about future outcomes.*
- What are the top three trends most likely to impact your branch's/FA's ability to contribute to multidomain operations?

(6) **Foreknowledge** is defined as *Integrating knowledge about known or safe-to-assume futures, for example, budgeting, troop movements, terrain, and seasonal variations in weather) in the planning process.*
- The Army's new Recruiting Ribbon is part of the Army's effort to recognize Soldiers for contributing to the recruiting effort. Any Soldier (officer or enlisted), who has a qualified referral enlist and ship to Basic Combat Training will be eligible for the ribbon. Will this new ribbon help our recruiting efforts?
- How many additional recruits per year (if any) can be expected because of the new ribbon?

(7) **Forecasting** is *Envisioning multiple likely futures to achieve a desired end state and comparing the likelihood of these futures taking place.*

- What can you do to cultivate this skill?

4. The CSA/SECARMY memo, *A Call to Service to Overcome Recruiting and Retention Challenges,* (dated 20 JUL 2022) stated one of the three primary reasons for the recruiting challenge is a ***trust gap*** where younger Americans are losing trust and confidence in every institution, including the military.

- How do you think our exit from Afghanistan affected the ***trust gap***?
- How do you think mandatory military Covid vaccines affected the ***trust gap***?

5. **Group Think** is defined as *a pattern of thought characterized by self-deception, forced manufacture of consent, and conformity to group values and ethics*.

- Can someone provide an example?

6. The CSA's memo stated another one of the three primary reasons for the recruiting challenge is a ***knowledge gap*** *- the idea that the Army's story is not reaching enough Americans and they have limited exposure to military members.* **Confirmation Bias** is *a trap that humans often fall into —we tend to look for evidence that supports the conclusion we've made prematurely, not realizing that evidence can often support several hypotheses.*

- How might **confirmation bias** have affected the conclusion there is a knowledge gap?

7. A **Red Team** member, playing devil's advocate, tells the CSA that it may actually be that because ***the Army's story is reaching Americans*** that recruiting is down.

- The CSA asks if you agree or disagree with the Red Team member's hypothesis, and why?

8. Your boss, the Army's G-3/5/7 is **forecasting** the active component end strength will be down to 422,225 in 2028. He asks you if that is forecast is too low, too high, and why you think that?

9. **Black Swan**- is *something that cannot be predicted - The seemingly improbable but highly consequential surprises that turn our familiar ways of thinking upside down.*

- What is most likely Black Swan event the Army will face in the next three years?
- What is most likely Black Swan event our Nation will face in the next five years?

10. **Blind spots-** are *a lack of insight or awareness—often persistent—about a specific area of one's behavior or personality*.

- What is a blind spot common in officers in your branch/FA?
- How can you become more self-aware of your personal blind spot(s)?

11. **Outside the Box Thinker/Outlier opinions/Disruptors** – Outside the box thinking is an ideation form where designers freely discard common problem-solving methods to find the true nature of users' problems, falsify old assumptions and be innovative.

- How do leaders cultivate this trait in subordinates?
- What are the pros and cons of this type of thinking?

12. You were introduced to a model that depicts a possible way to find inspiration to innovate. When faced with something new you could ask,

a. How does the enemy do it?"
b. How do foreign forces do it?
c. How do sister services do it?
d. How does history say it was it done in the past?
e. How does nature do it?
f. What does the future/science fiction suggest?

- What are the pros and cons of this type of thinking?
- What could be added to the list?

13. Given that we are in all volunteer force, what are some possible **Outside the Box Thinker/Outlier opinions/Disruptors ideas or approaches to** get the recruits the Army needs?

14. Weak Signals- is the first indicator of change or an arising issue that may become significant in the future.
- What weak signals were missed that could have anticipated this recruiting challenge?

15. China's Intelligentized warfare incorporates numerous emerging technologies, including decentralized computing, data analytics, quantum computing, artificial intelligence, and unmanned or robotic systems into their conceptual framework. By doing this in the very near future they intend to increase the pace of future combat.
  - What are the implications of China's moving to intelligentized warfare for your branch/FA?
  - What are the implications of China's moving to intelligentized warfare for the tactical level?
  - What are the implications of China's moving to intelligentized warfare for the strategic level?

16. Intellectual curiosity - *to seek out, engage in, enjoy, and continuously pursue opportunities for effortful cognitive activity" and "understand the environment"*
- On a scale of 1 to 10 (10 being very curious), what would you rate your **Intellectual curiosity**?
- How can you cultivate this trait in your subordinates?

17. What **dimension of time (past, present, and future)** is the most important?

18. How do the **Characteristics of Time** (***Sequence, Synchronization, Tempo, Timing, Opportunity, and Duration***) pertain to adaptation of BCTs versus innovation to a completely new, potentially autonomous combat formation?

19. FM 3-0 explains that **Convergence** *occurs when a higher echelon and its subordinate echelons create effects from and in multiple domains in ways that defeat or disrupt enemy forces long enough for friendly forces to effectively exploit the* ***opportunity****. Convergence broadens the scope of mass,* ***synchronization****, and combined arms, by applying combat power to combinations of decisive points, instead of just one, across time, space, and domains.*
- How does your branch/FA *create effects…in multiple domains in ways that defeat or disrupt enemy forces long enough for friendly forces to effectively exploit the* ***opportunity***.?

20. What is the most important concept to take away from this module?

21. What is the most important concept to take away from this course?

22. How can you apply what you've learned when you get to your next unit?

Appendix B: Thinking-in-Time Framework