White Paper for DevOps Maturity Implementation Plan

in support of

U.S. Department of Veterans Affairs (VA),

Office of Information and Technology (OIT)

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Submitted by

Company Name and Address	LongView International Technology Solutions, Inc. (d.b.a. LTS) 12930 Worldgate Drive, Suite 300, Herndon, VA 20170	
Dun and Bradstreet Number	626950393	
CAGE Code	4EZ90	
Business Size Standard	Large Business	
Signature and Negotiation Authority	Erik Cecere, *Director of Contracts and Pricing*	(p) 703-657-5511 (e) ececere@LTS.com

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1.1 EXECUTIVE SUMMARY

VA requires an accurate measurement tool to equip Lean, Agile, DevSecOps coaches and teams. Armed with this customizable tool, coaches can lead inexperienced cross-functional teams through a Team Transformation Pipeline (TTP). The same tool can be adapted to measure the TTP value stream resulting in the consistent production of capable, high value delivery teams, and high velocity Agile Release Trains (ARTs).

A DevOps Maturity Model (DOMM), when designed properly, can serve as the needed measurement tool. The DOMM can be used to measure the progress of Coaches and Teams as they pass through the TTP. A separate cross functional DOMM implementation team continues to refine the DOMM, and the tool becomes increasingly accurate in its ability to score value delivery capability and correlate the score with real Customer satisfaction.

Our approach calls for a phased implementation plan to realize the benefits of a customizable, automated DOMM that embodies four core Lean, Agile, DevSecOps themes: 1) Accurate Measurement, 2) Flow, 3) Feedback, and 4) Continuous Improvement.

Delivering Customer Value that translates into higher customer satisfaction is a goal of every government agency. The U.S. Department of Veterans Affairs (VA) Office of Information Technology (OIT) seeks to improve support and enablement of VA Value Delivery to Veterans and those who serve them. With an ever-increasing portion of the value delivered linked to the effectiveness of digital processes and systems, OIT improvement has become proportionally more urgent. However, multiple barriers stand in the way of this improvement: tightly coupled, legacy monolithic applications with various dependent systems make successful and rapid deployment of the changes Customers need very difficult. Stratified change management systems with long lead times, manual testing and deployment processes, and functionally siloed teams with excessive work-in-progress (WIP) slow the flow of value through the delivery pipeline.

VA OIT seeks to transform its value delivery pipeline by using ideas and practices from the Lean, Agile, and DevSecOps frameworks. Lean frameworks started transforming manufacturing processes 70 years ago. Agile started transforming development teams almost 30 years ago, and in the last decade, DevSecOps has transformed software delivery. OIT leaders, looking at data from these transformations, hypothesize that **Lean, Agile, and DevSecOps** (**LAD** for brevity) principles will improve VA value delivery too.

However, ideas can seldom be applied in cookie-cutter fashion to an organization. Leaders of the LAD movements are quick to say their frameworks aren't recipes, but rather guidelines to help organizations forge their own success patterns. Add to this challenge the difficulty of transforming functional workflows and traditional project management processes with deep organizational roots and it becomes clear that an intensive VA-specific effort is required to produce real change.

The premise of the **DevOps Maturity Model (DOMM)** concept presented in the following plan is as follows:

1. For VA to forge its own successful transformation, it needs to **experiment, learn, and validate** the best methods of applying industry success patterns.
2. Experimenting with LAD framework implementation requires measurements, via a **transformation measurement tool**, to identify practices in the VA context that deliver the most value for Veterans and those who serve them.
3. A DevOps Maturity Model **providing multiple customized, accurate measurements** of coaches, teams, and Agile Release Train (ART) progress across the transformation value stream will provide significant business value to VA by:
    a. Concentrating resources and effort on teams that are prepared for the LAD Transformation journey.
    b. Consistently building quality and skills into teams with time-tested, validated methods so they can realize their value delivery potential.
    c. Building ARTs with reliably high-performing teams so together they can rapidly deliver high value software and enterprise solutions (multiple ARTs).

A DOMM can be a powerful transformation measurement tool. Acknowledging that *teams* are the core value delivery units in any organization, the objective of a DOMM is to measure and influence four things:

Table 1 – Four Transformation Objectives and Transformation Questions the DOMM Helps Answer

Four Objectives	Transformation Questions the DOMM Helps to Answer
Team Transformation	*What practices, skills, and capabilities when integrated into team patterns deliver the most value to Customers in the shortest time?*
The Team Transformation Pipeline (TTP)	*When integrated into the Team Transformation Value Stream, what processes, tools, beliefs, and practices result in the most rapid delivery of high value producing teams?*
Coach Transformation	*What LAD skills, knowledge, emotional intelligence, and coaching habits lead to the most rapid team transformation?*
DOMM Transformation	*What measurement methods and criteria, across a broad spectrum of LAD topics, can transform the DOMM into a high value-correlated, well calibrated measurement tool?*

VA requires an accurate measurement tool, like the proposed DOMM, to equip Lean, Agile, DevSecOps (LAD) coaches and teams and build a TTP. Armed with this customizable tool, coaches can lead new cross-functional teams through the TTP resulting in consistent delivery of capable, high value delivery teams, and high velocity Agile Release Trains (ARTs). Producing high performing coaches, teams, ARTs, and a refined measurement tool without a DOMM is equivalent to developing an Olympic runner without a stopwatch; possible, but improbable.

2 THE DOMM IMPLEMENTATION APPROACH – THEMES INFLUENCING THE MODEL AND THE DOMM IMPLEMENTATION PLAN IN THE CONTEXT OF A TEAM TRANSFORMATION PIPELINE

LTS has developed a plan to implement a DOMM that will support the four objectives: 1) LAD Team Transformation, 2) Development of a LAD TTP, 3) LAD Coaching Transformation, and 4) LAD DOMM Transformation (see **Table 1** above) in service to OIT's broader goal of increasing Customer Satisfaction. The plan is challenging because it requires select teams to pause their current work long enough to calculate their current value delivery and measure their current practices. In an organization that often struggles under the tyranny of the urgent because of externally imposed changes, stopping work for a week might be the single biggest transformation challenge. But if OIT can form and/or select a few teams, release them from the demands of crisis management, and develop a DOMM that can effectively measure coaches, teams, and the TTP as they systematically test the LAD hypothesis, OIT will truly be on the verge of lasting change.

In Section 3 below, LTS first describes **four themes** derived from stakeholder inspired Epics impacting DOMM development and implementation: 1) Accurate Measurement, 2) Flow, 3) Feedback, and 4) Continuous Improvement. In each theme, we will discuss related industry experience/ success patterns, recommend DOMM development actions to address the themes' challenges, and provide an example of business value for that theme.

In Section 4, we walk through the DOMM implementation phases, in the context of the TTP for Teams, the TTP, Coaches, and the DOMM itself. We present a plan to use the DOMM to take coaches, teams, the TTP, and the DOMM from low to high value delivery as measured by customized assessments for each entity and confirmed by Customer impact. Lastly, we will present a roadmap to develop a customizable, semi-automated, customer satisfaction correlated DOMM.

Special note: We would be remiss if, at the start, we did not address one potential elephant in the room: Nicole Forsgren, Jez Humble, and Gene Kim, in their influential book *Accelerate: The Science of Lean Software and DevOps: Building and Scaling High Performing Technology Organizations* note the following:

*"While maturity models are very popular in the industry, we cannot stress enough that maturity models **are not** the appropriate tool to use or mindset to have. Instead, shifting to a capabilities model of measurement is essential for organizations wanting to accelerate software delivery."*

They site four factors for their belief which we summarize as: 1) Maturity models emphasize arrival at a mature state vice continuous improvement; 2) Maturity models are lockstep - prescribing similar capabilities regardless of team differences; 3) Capability models *(their preferred term)* rightly emphasize business outcomes vice maturity model emphasis on "vanity metrics"; and, 4) Maturity models define a relatively static view of achievement which has limited value in a rapidly changing digital environment.

LTS believes we have heeded these sage words by building a DOMM that answers these objectives: 1) Our DOMM defines levels in terms of performance capabilities with high performing teams reaching a level 3, but with no upper limit on the achievable levels –

like a video game, great teams are urged to continually reach (and even define for peers) new DOMM levels. 2) We have built a DOMM with a core set of criteria, data points, and capabilities, but which is customizable for different types of teams, working in different environments, at different phases of their transformation. 3) We have emphasized that DOMM levels be correlated with Customer Impact – so reaching a DOMM level is not a vanity metric. A DOMM level represents certain skill levels and capabilities that deliver an increasing Customer value. To amplify the connection with Customer Value delivery, we place the DOMM in the context of a Team Transformation Pipeline whose sole purpose is to systematically transform teams and ARTs into high Customer impact delivery vehicles (albeit with their own unique team personality intact). 4) Lastly, we see a DOMM implementation team that continually improves the DOMM itself by weeding out measurements with insufficient correlation with Customer value or with high risk of misunderstanding/misinterpretation by teams or leaders and adding measures validated through continuous learning.

So, while the straw man maturity model of the past is justly and quickly destroyed by Forsgren et. al., a comprehensive maturity model for today, built and deployed as described below, will be a welcome and powerful tool in the hands of coaches, teams, and leaders. We do not use a new naming convention in this paper, but LTS does recommend consideration of a name change for the model to "**DOMM**". This will help prevent rejection of the model by avid followers of Kim, Humble, and Forsgren while emphasizing a core value of the model as a measurement tool. Believing we have sufficiently deflated the elephant; we continue with the DOMM implementation detail.

3 FOUR THEMES INFLUENCING THE DEVELOPMENT OF THE DOMM

Over the last few weeks of this project, we received excellent advice and thought-provoking questions from our colleagues and peers in OIT and industry which we captured in 16 DOMM Epics (see **Section 6 Appendix A** for full listing of the Epics). We then took the Epics and organized them into four core Themes (**Table 2** below shows both the Themes and the shorthand Epics).

We now review each of the four themes and 1) discuss related industry best practices, 2) explain the impact of the theme on our development and use of the DOMM, and 3) provide an example of the potential business impact of integrating the theme into DOMM. We will incorporate the Themes as we describe the DOMM implementation plan in **Section 4**. The Themes help prioritize and focus efforts to implement and refine the DOMM.

Table 2 – Stakeholder Epics organized under Themes which will inform development and use of the DOMM.

Theme	*Accurate Measurement*	*Flow*	*Feedback*	*Continual Improvement*
Epics	*Validate Measurements*	*Measure Team Transformation*	*Timely Maturity Measurements*	*Correlate Maturity to Customer Impact*
	Customize Assessment by Team Types	*Measure the Team Transformation Pipeline*	*Composite Scores/ Actionable Telemetry*	*Conduct Data-Informed Retrospectives*
	Provide Similar Resources to Each Team	*Measure Risks to Adoption*	*Automated Assessments*	*Validate/Learn Best Practices*
	Measure Beginning Teams	*Measure Coaches*	*Internal and External Customer Focused*	*Encourage Continuous Improvement*

3.1 THEME I: ACCURATE MEASUREMENT

Industry Best Practice

Many experimental findings have been discredited due to improper measurements. We are used to having measurement instruments provided to us – rulers, measured running tracks, and the GPS's in our devices which measure our jiggly-lined movements. But measuring objective performance in the wild can be challenging. In the factory, machines that measure lose calibration through use and must be re-calibrated to an unchanging standard.

When conducting experiments to develop high-value delivery teams, their progress must be measured accurately so we can determine their actual improvement. Some of the measurement tools will have to be created with code, some will have to be refined through testing to see if they are valid and reliable. The Six Sigma process improvement framework highlights the importance of measurement and made measurement system analysis the first step after defining the problem.

The purpose of Measurement System Analysis is to qualify a measurement system for use by quantifying its accuracy, precision, and stability. (https://www.moresteam.com/toolbox/measurement-system-analysis.cfm).

Implications for DOMM Development and Implementation

While we do not plan to initially attain the level of measurement accuracy across all our data found in factory production, yet we will seek the highest levels possible and identify areas for improvement. The goal of accuracy is to determine if the coach, team, TTP and DOMM measurements we take are good enough to tell when and how much teams are improving and when they are not.

We believe there are four important components to accuracy. Measurements should be randomly sampled for accuracy, precision, and stability. Teams with different missions and digital working environments (e.g. Legacy monolith with on-prem hosting vs. Cloud-native application) need customized DOMMs to accurately measure their performance. Teams progressing through the TTP should be equally equipped for success in order to accurately measure the impact of the pipeline on their progress. Lastly, to accurately determine when teams are ready to start the transformation process and enter the TTP, the DOMM must be able to measure very beginning teams who score below level zero.

Example of Potential Business Impact

A team's automated testing has false negatives (no defect identified) and undetected code errors are resulting in average of 15 defects per deployment. But the automated capture of the # of defects is omitting a certain type of defect resulting in a lower defect per deploy rate. The team falsely reaches DOMM Team Level 1 and joins an ART. The team continues poor quality development, but now the Mean Time to Resolve is 3x faster because of the more complex setting.

3.2 THEME II: FLOW

Industry Best Practice

The first principle of DevOps as stated by Kim, et. al. in the DevOps Handbook is flow. Kim and his colleagues admit in a later book (*Beyond the Phoenix Project*, 2018) that they are really just bringing to IT and software development, the concepts that William Shewhart and W. Edwards Deming initiated (including Shewhart's statistical process control to reduce variation and create steady flow throughout the system and Deming's 1950 flow diagram to help leaders see the end-to-end production process as a system).

The Toyota Production System (TPS) has refined these principles and Eliyahu Goldratt amplified the concept of the bottleneck which constrains flow in his Theory of Constraints (TOC). In order to create flow the system must pull elements into production as they are needed, and work processes must be measured and synchronized to deliver the required upstream products/value in cadence across the system.

Process owners repeatedly exploit the primary bottleneck to increase flow (i.e. fully enable the constraint/bottleneck process to reach maximum throughput – e.g. having another Scout carry slowest hiker Herbie's backpack to increase his pace as told in Goldratt's "The Goal").

Implications for DOMM Development and Implementation

As VA transforms teams from functionally isolated development and operational processes to integrated single piece flow, customer-product focused value streams with multiple feedback channels, they will need to measure the increased skill and value delivery capability of teams at each step in the TTP. This is the first purpose of the DOMM – to ensure teams exhibit evidence that they can create flow, reduce bottlenecks, and limit work in progress (WIP).

But it is not enough to use the DOMM to measure team transformation, we also want to use the DOMM to measure the TTP itself. This means measuring the effectiveness of each step in the process flow and measuring the coaches and mentors who are shaping the teams. We want to know if a process step in the TTP has excessive WIP, wait time, and waste with a relatively low percent complete and accurate (translated to DevSecOps teams = teams that complete a TTP phase without achieving the desired performance levels). We want to understand the lead time for the total pipeline and cycle times for each process step and work to decrease both over time. Without measurement, refining the TTP is impossible.

We also want to use the DOMM metrics to measure risks to adoption of LAD practices by monitoring team performance and growth. Coaching is critical to team success and coaching improvement is essential to improvements to the TTP. A customized coaching DOMM helps coaches self-evaluate and helps teams to provide insights back to their coaches: “We noticed we have not reached our goal CI/CD performance levels yet and we think we need more coaching in X area – can you walk us through successful implementations of X?”.

Example of Potential Business Impact

Coaches observe a team DOMM dashboard which shows significant wait time (bottleneck) in their Continuous Integration/Continuous Delivery (CI/CD) pipeline at the change mgmt. process step. The team complains DevSecOps doesn’t work – the same bottlenecks still slow deployment speed. Coaches ask the team questions about the change management process, support their root cause analysis and help escalate the risk to the Release Train Engineer (RTE*) who negotiates a more automated Change Management process and expanded standard changes based on data showing small, minimum defect deployments over the last two Program Increments (PI).

3.3 THEME III: FEEDBACK

Industry Best Practice

Gene Kim, Jez Humble, and David Farley highlight the power of feedback in the **DevOps Handbook** and **Continuous Delivery.** Continuous delivery makes it economic to work in small batches. Small batches allow us to get feedback from users throughout the delivery lifecycle based on working software. Feedback *loops* are sets of relationships between entities where a change in one entity causes a change in another entity and that change eventually leads to a change in the first entity.

We automate feedback wherever possible (e.g. application performance monitoring tools like AppDynamics or data feeds from periodic survey data automatically sent to random users), to allow on-demand visibility of Customer experience. For platform teams this

means feedback from application team Customers. For application team Customers this often means business users – agents, clinicians, administrators as well as their Customers – Veterans. To get a full perspective of user experience at all levels we have to develop multiple feedback channels including social media, surveys, NPS, eNPS, Customer Satisfaction scores, star ratings, etc. As the DOMM itself matures, it includes more and more of these channels, automates their data integration, and develops corresponding telemetry for observability.

Implications for DOMM Development and Implementation

Coaches, Teams, Scrum Masters, and Release Train Engineers closely monitor DOMM data (at first manually and then through automated telemetry) to prioritize their support and impediment relief efforts. Teams will be changing fast. DOMM Data on a team's progress must be recent to be relevant and accurate to the support team – otherwise they could be trying to help with a problem the team already solved.

Automating as many of the DOMM assessments as possible and tying the data feed to frequent team activities (e.g. code commits to trunk in GitHub) can ensure rapid feedback to teams, coaches, and leaders. Leaders don't have time to sift through team performance data to get the big picture of how teams are doing. Composite DOMM scores will synthesize multiple team attributes to allow leaders to quickly see teams who need help.

Feedback must be linked to Customer Satisfaction. But all parties in the TTP process must realize DevSecOps team members are Customers (of coaching services, infrastructure services, pipeline platform team support, etc.) and business software users are Customers along with the obvious end user Veteran Customers. Feedback loops must be established from each producer to the appropriate Customer. The DOMM will have separate assessments to provide insights from both internal and external Customers.

Example of Potential Business Impact

A team in the TTP logs its happiness scores daily in a simple app. The TTP Telemetry has a tile that shows trends in the happiness score. A Scrum Coach notices a severe dip in happiness scores for one of the teams over the last two weeks. The Scrum Coach discovers a team conflict has arisen; they did not have the skills to work it out – other change metrics were starting to nose-dive. The Scrum Coach was able to quickly bring in a Team Dynamics SME to help them resolve the issue and get back to happy before downstream Customers were noticeably impacted.

3.4 THEME IV: CONTINUOUS IMPROVEMENT

Industry Best Practice

W. Edwards Deming's 14 points, number 5, says, *"Improve constantly and forever every process for planning, production and service."* By applying the **Plan, Do, Check, Act (PDCA)** or Deming cycle to the DOMM, we continuously upgrade the DOMM based on the feedback received from systems, customers, and experiments. In Japanese, this continuous improvement process is called "Kaizen" and implies incremental changes over time. The concept is also built into Coaching and Team DOMMs to measure their ability to continuously improve and to develop a culture or habit (Mike Rother's "Toyota Kata") of continuous improvement.

Implications for DOMM Development and Implementation

The DOMM is a measurement tool. But it is not perfectly calibrated. As Customer Impact is correlated with DOMM we adjust the DOMM to better align performance levels to Customer value delivered. The DOMM is formatted for easy use by teams during retrospectives to identify areas of concern for improvement. As teams learn and leaders experiment with the TTP, DOMM scores help to validate the improved practice/skill.

As OIT gains maturity as a learning organization, by focusing on DOMM-generated data, the learning is repeatedly applied across the 4 themes and the 4 DOMM objectives. The DOMM levels are set so that normal teams cannot be satisfied – the highest scoring levels take years to achieve – in the meantime, teams Kaizen On!

Example of Potential Business Impact

Teams and ARTs struggle to identify real areas for improvement during their Retrospectives and Inspect and Adapts (I&A). The DOMM team develops multiple Custom DOMM assessments which teams and ARTs can access online to walk through different questions. The questions are linked to DOMM measures they are tracking in a current TTP Phase. So, teams can compare the goal levels with current levels, prioritize for improvement and create a User Story for the next sprint.

4 A PHASED DOMM IMPLEMENTATION PLAN: DEVELOPING THE DOMM IN THE CONTEXT OF THE TTP PHASES

The TTP design (see **Figure 2**) was not part of the deliverable for this project. But as we researched industry best practices and gathered feedback, we realized that **the DOMM did not have significant relevance outside of the transformation effort:** if transformation of teams into high value delivery DevSecOps teams is the primary objective, then the DOMM's main function is to measure progress and inform all stakeholders regarding the objective. So, we created the TTP to provide a context for the use and iterative development of the Core DOMM and the various types of custom DOMM Assessments during a plausible team transformation journey. The Custom DOMM Assessments largely take their names from the phase/time or purpose of use within the TTP.

We conceive of the DOMM as consisting of a DOMM Core and Custom DOMMs. The DOMM Core is a growing set of categorized assessment questions, data points, or criteria (e.g. "How would you rate your happiness today?" or "The summed total of defects over time period x, derived by an external tool, extracted from the tool's database and loaded into the VA DOMM database"). From the DOMM Core Assessment List, assessment questions/data points can be extracted to create a Custom DOMM. Initially this is just a consolidated Excel list of questions, data points, or criteria cataloged by a variety of characteristics, e.g. a Custom DOMM is derived from the DOMM Core Questions by filtering on Phase VI (ART Walk/Run) for Cloud Native Teams already part of an ART (see **Figure 1** below).

A single question/criteria/data point from the DOMM Core can be applied to multiple Custom DOMMs. As the DOMM and associated dashboards mature, leaders at all levels would be able to select a question or cluster of questions that were of particular interest to them to be visualized graphically as a tile on their DOMM dashboard.

As an example, a Product Line Manager (PLM) with two cohorts of teams going through the TTP may want to see their scores on CI/CD tool use because in the past the teams had failed to build a pipeline that dev teams liked using and were confident in. She can see the skill levels and pipeline build- task accomplishments for each of the 10 teams in her two cohorts in Phase IV. One cohort is proceeding more slowly than the other. She schedules a conference call with the Coaching Teams to see if there are any impediments, she can help break to support the slower cohort.

The Coaching Teams highlight that the slower cohort was struggling to get key approvals from a functional line representative to move forward and they could indeed benefit from her intervention. The cohort Scrum Masters, as a group, convened a call with the PLM to briefly explain their impediment, progress to this point, and additional support needed. The PLM organized a call with the functional approval team, they collaborated on a solution and the slow cohort quickly caught up with their sister cohort.

Accordingly, LTS recommends phased implementation and rapid iteration of the DOMM in parallel with the proposed TTP to ensure that the DOMM properly fits the context and correlates to Customer Impact via an established Customer feedback loop (preferably at least semi-automated). By following the practice of Just-in-Time (JIT) delivery, we deliver the next set of Customized DOMMs after the previous set has been tested in the real-

world workshop of team transformation. Some assessment criteria will not make sense or be answerable by certain product teams. So, the DOMM implementation team must take time to listen to its Customers and, learning from their feedback, revise or update the DOMM Core or one of its customizations.

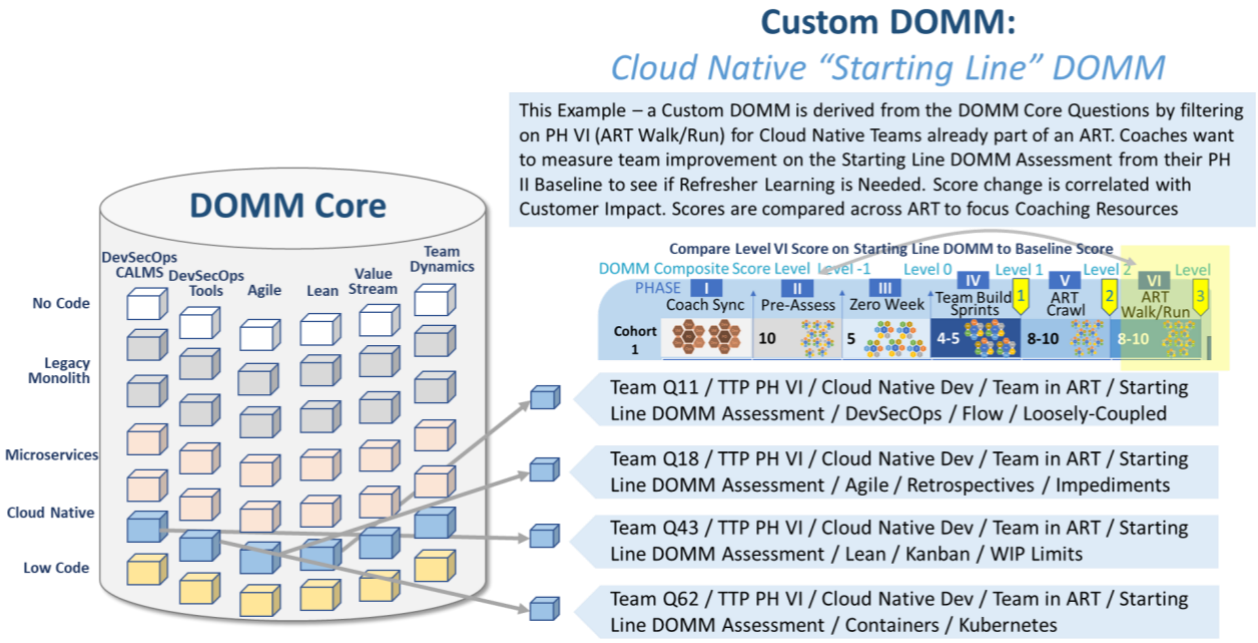

Figure 1 – Custom DOMM Assessments are Derived from the DOMM Core.

4.1 DOMM Alignment to a Team Transformation Pipeline (TTP)

The following DOMM Implementation Plan describes how the DOMM, aligned to the TTP phases, helps transform coaches, teams, the TTP, and the tool itself from low to high value delivery as measured by the customized DOMM for each entity and confirmed by Customer impact. For each phase in the TTP, we discuss the corresponding DOMM implementation plan, and we discuss the various DOMM objectives, activities, and added value. The phases are as follows:

- **Phase I – 3 Week: Coach Sync/Prep with "Team Coaching DOMM"** – Ensuring Coaching Teams are Integrated, Qualified, and Ready to Support Transformation Teams
- **Phase II – 2 Week: Team Pre-Assessment using the "Starting Line DOMM"** – Getting the Right Teams to the Starting Line
- **Phase III – 1 Week: Leveling the Playing Field "Zero Week"** – DOMM Assessment evaluates whether all the teams have access to the agreed upon core tool suite and have initial understanding of the tool functionality to proceed to the Team Build Sprints. This DOMM also evaluates their Value Stream understanding including bottleneck identification and business value delivery baseline.
- **Phase IV – 6 Weeks Level 0 to Level 1: Team Build Sprints** – As coaches and teams start to build out the CI/CD Pipeline and automated testing capability as a "mini-ART" they take the ***Level 1 DOMM*** to see if they have mastered the basics of building

a CI/CD pipeline including automated testing and Customer feedback and are ready to merge cohorts into an ART.

- **Phase V – 12 Week Level 1 to Level 2: Forming the ART** – ***ART Crawl phase***, the *semi-automated* ***Level 2 DOMM*** pulls data from various DevSecOps tools (e.g. Jira, Jenkins, Codacy, Se, Splunk, AppDynamics, etc.) the team has implemented to see how consistently and effectively the teams are using the tools and practices as they "Crawl the ART".
- **Phase VI – 24 Week Level 2 to Level 3: High Performing ARTS** – ***ART Walk/Run phase***, as ART team of teams start to walk and run, they take the increasingly automated ***Level 3 DOMM*** which builds on Levels 1 and 2, but increases the scoring standards and adds measurement of skills they will need when they operate with minimal external coaching or as part of a Solution.

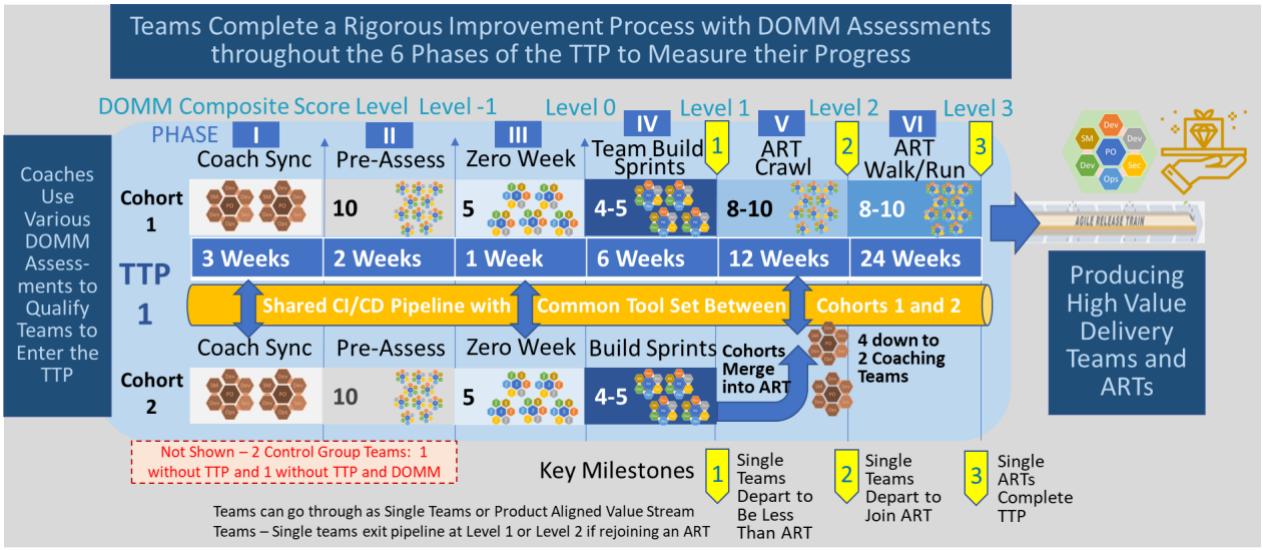

Figure 2 – The illustration above shows a High-Level Value Stream for a Team Transformation Pipeline (TTP) which produces a high-performing (Level 3) ART in 48 weeks. See Solution level TTP in Appendix B.

The illustration above shows a TTP with two cohorts (labeled on the left) consisting of two coaching teams and five transformation teams each. The two cohorts in the TTP will merge and integrate after achieving DOMM Performance Level 1 (Phase V) to form one ART in each TTP. Here we pause briefly to describe some of the basic Custom DOMM Assessment types that we will apply to coaches, teams, the TTP, and the tool through the various phases.

4.2 The Key Custom DOMM Assessment Types

We see the DOMM as a Swiss Army knife type of measurement tool. From a very long list of categorized and tagged DOMM Core assessment questions and criteria pulled from a variety of successful industry patterns, we need to be able to pull out the questions/criteria that fit our measurement needs. The custom DOMM Assessments that would be introduced in different phases of Transformation are shown below and can be repeated or modified throughout the phases (e.g. Zero Week DOMM takes core questions/criteria from the "Starting Line" DOMM and adds an assessment of the team's knowledge of the CI/CD pipeline tool set – among other additions).

Coaching DOMMs are focused on measuring the knowledge and skills of the coaches and their ability to influence team value delivery improvement. The Team Coaching DOMM starts with core coaching assessment and then branches into two tests with specific questions for each team based on their focus area (i.e. Lean and Agile or DevSecOps).

Team Transformation DOMMs measure a team's increase in LAD knowledge (tools, processes, culture, etc.) and skills and their associated impact on value delivery and Customer Experience. They include the Starting Line DOMM, Zero Week DOMM and various Level DOMMs.

TTP DOMMs measure the value adding capability of the TTP processes via key value stream metrics (cycle time, % complete and accurate, wait time, work in progress (WIP), bottlenecks, etc.) with the Teams as the "product" flowing through the pipeline. The various scores for the first cohorts to complete the TTP become the baseline scores against which the TTP is measured for successive cohorts.

Assessment Transformation DOMMs are created to help the DOMM team improve the DOMM itself. So just as coaches, teams and TTP managers are trying to improve their performance, the DOMM team is trying to improve the ability of the DOMM Tool to accurately assess performance and progress, i.e. What can be done to ensure that DOMM criteria/questions are understood without need for clarity by those administering the assessment (see Phase IV UX DOMM below)? What can be done to increase the accuracy of automated cycle time measurements for the CI/CD pipeline being posted to the DOMM dashboard and reduce variation between cycle times recorded by the two tools being used for CI (Phase II AVR DOMM)? The DOMM team will lead the tool through an intensive continuous improvement process.

The DOMM Implementation team also strives to improve the accuracy, validity, and reliability of the various Custom DOMMs – i.e. do the various DOMMs measure what we intend them to measure (e.g., number of deployments captures all deployments by a team according to the organization's definition of a deployment)? Do the DOMMs measure their topic accurately (e.g. TTP cycle time for a team's development of its first validated automated test starts and ends at definitive points in time that can be measured) and are the measurements obtained the same way over time (e.g. scripts to pull performance data from a database continue to pull the same data fields after a script revision is required). Lastly, User Experience DOMMs measure the UX acceptability of the various DOMMs (i.e., Were the DOMMs easy to use, understandable, efficient, produce visual results for frequent monitoring?)

Special Use Custom DOMMs are created by coaches, teams, TTP leaders, or the DOMM Implementation team when they see an area or areas not covered by a standard DOMM (above) that still needs to be measured. Returning to the Swiss Army knife analogy, these DOMMs would be similar to the separate set of driver heads (Philips, Flat Tip, Pozidriv, Torx, Hex, etc.) used for a specific screw.

Table 3 – Key Custom DOMM Assessments taken during each phase of the Transformation Pipeline for each of the Four Objectives.

Phase	Phase I	Phase II	Phase III	Phase IV	Phase V	Phase VI
Team	*Teams Forming - No Team DOMMs*	*Starting Line DOMM*	*Zero Week DOMM*	*Level 1 DOMM*	*Level 2 DOMM*	*Level 3 DOMM Level -Value Delivery Correlation*
TTP	*ROC* for TTP and Refine KPIs/Measures*	*Test TTP DOMM*	*Level 0 TTP DOMM*	*Level 1 TTP DOMM*	*Level 2 TTP DOMM*	*Level 3 TTP DOMM*
Coach	*Team Coaching DOMM*	*Team Coaching Focus Area DOMM*	*VSM Coaching DOMM*	*Team Coaching DOMM*	*ART Merge and Crawl Coaching DOMM*	*ART Walk and Run Coaching DOMM*
Assess	*Automation DOMM*	*Accuracy, Validity, Reliability AVR DOMMs*	*Business Value Audit DOMM*	*User Experience DOMM*	*Automation DOMM*	*Multi-DOMM data review and analysis*

*ROC = Rehearsal of Concept

Final Note: The question will likely arise: What if one or more of the teams in a cohort achieves a DOMM performance level in advance of the other teams as identified during intra-phase testing by coaches? The answer is simple – the Coaching Teams work with the faster teams to support the learning of the slower teams. Starting with the primary bottleneck team (most stuck), coaches and high-performing team members practice their coaching habit skills (part of the Starting Line (SL) DOMM in Phase II below – See **Team Interaction Intelligence** section of the SL DOMM below) to help the slower teams achieve mastery without losing their sense of autonomy (not easy). The cohort thus develops the inter-team loyalty they will need when they merge into an ART while increasing their coaching capabilities and cross-fertilizing learned successful patterns across teams. **Potential coaching resources may be identified during these situations as some of the "fast" team members will likely excel in mentoring.**

4.3 PHASE I – 3 WEEK COACH SYNC/PREP: ENSURING COACHING TEAMS ARE INTEGRATED

Phase Objectives:

Help Coaching Teams get to know each other, understand their capabilities and synthesize their ideas on how best to support the Transformation Teams in their journeys through the TTP. The DOMM Team tests its first DOMM assessments – Team Coaching DOMM, Starting Line DOMM, and Zero Week DOMM while starting to automate DOMM metric collection.

DOMM Activities:

Phase I	Team Transformation	Team Transformation Pipeline	Coach Transformation	DOMM Transformation
Week 1	*Test Starting Line DOMM and recommend changes*	*Refine TTP Value Stream Map (VSM)*	*Take the Team Coaching DOMM*	*Administer the Coaching DOMM and evaluate results*
Week 2	*Practice with the VA LAD tool set*	*Identify Measurement Points on the VSM*	*Work on strengths and weaknesses from Coaching DOMM*	*Revise Coaching DOMM Revise Starting Line DOMM*
Week 3	*Build Prototype CI/CD Pipeline and Revise Zero Week DOMM as needed*	*Develop the TTP DOMM I*	*Retake Team Coaching DOMM and determine coaching performance baseline score*	*Take the Automation DOMM*

DOMM Implementation Across Transformation Objective Workstreams:

Members of coaching teams each have special skills and each of the teams have a focus – one focuses on Lean and Agile coaching while the other has a DevSecOps focus (see **Table 4** below). Because the Coaching teams consist of contractors and VA FTE and multiple skill sets that have not worked together as teams previous to the first iteration of the TTP, these two teams will work intensively together for three weeks to practice with the VA LAD tool set, build out a prototype CI/CD pipeline and deploy a sample feature that they will use as a demo tool for the transforming teams.

Table 4 – The chart shows an example of 2 coaching teams that will together provide an intensive Dojo-type experience for up to five DevSecOps Teams

LAD Coaching Team with Lean Agile Focus	LAD Coaching Team with DevSecOps Focus
Scrum Coach and team Scrum Master	*1. Test Automation Coach and Team Scrum Master*
Product Owner Coach	*2. Continuous Delivery Coach*
UX Coach	*3. Telemetry/Visibility Coach*
Bus. Process/Lean Six Sigma Coach	*4. Data Analyst Coach*
Development Quality Coach	*5. Theory of Constraints (TOC)/Value Stream Coach*
VA SAFe Program Consultant Coach	*6. VA Value Stream Coach and Team PO*
VA Product Mgr. Coach and Team PO	*7. VA Cloud/Container Coach*

At the same time, they will work with the DOMM team to refine the early DOMM Assessments:

- Coaching teams test the Team Transformation "Starting Line" DOMM and help the DOMM Design team to revise it as needed
- Team Transformation Pipeline – Phase I TTP DOMM
- Coaching teams review the **Phase I TTP DOMM Assessment** and provide feedback for the DOMM team
- Coach Transformation – Coaching DOMM, Zero Week DOMM
- Take the Coaching DOMM in Weeks 1 and 3 and capture their baseline performance score in week 3

Coaching teams go through the standard battery of Team Transformation Assessments (Zero Week DOMM) that will be administered during "Zero Week" – The Coaching Teams

will have to reach a Level 0 score before hosting their learning teams to ensure they are modeling the team skills and behaviors they want their Transformation Teams to display.

The Coaching teams using their diverse and deep skills to start to automate some of the DOMM measurements using their prototype CI/CD pipeline and automated testing tools. The Coaching teams review the VA Application Performance Monitoring tools to identify critical feeds for Transformation Teams to understand and review as one of their Customer feedback channels. The Coaching teams build several MVP DOMM Dashboards/Telemetry to act as a working prototype for the Transformation Teams to learn from, monitor their data, and eventually reproduce.

Sample Coaching DOMM Questions/Criteria/Data Points:

Developing a Coaching Habit (questions adapted from Michael Bungay Stanier's eponymous book)*:*

- What measures has the Coaching Team put in place to avoid Overdependence on their coaching services?
- How will the Coaching Team monitor and limit their workload (to normal 40-hour work weeks) using LAD principles?
- How will the Coaching Team use the DOMM to help teams stay focused on the highest impact activities – and the ones with the most meaning/fulfillment?
- Provide an example of how you successfully used the 7 Questions to help someone grow and solve a problem?

4.4 Phase II – Two Week Team Pre-Assessment: Getting the Right Teams to the Starting Line

Phase Objectives:

The Coaching Teams continue to help the DOMM team automate DOMM data collection, build telemetry, and revise future phase DOMM assessments. The Coaching Teams work ~2 hours a day with the 10 potential Transformation Teams to assess their readiness to enter the TTP using the Starting Line DOMM tool.

The Starting Line DOMM is a multi-day virtual, but live assessment given over two weeks which helps the Coaching teams determine who will be the five Transformation Teams to move on to "Zero Week". The value of Phase II arises from its competitive stimulus and the opportunity, regardless of the outcome, for teams to take time to see and measure themselves through a variety of DOMM tools with feedback from LAD SMEs. Most teams will improve just from the value of understanding themselves and identifying weaknesses and strengths even if they aren't accepted for a current cohort. New cohorts will begin every 12 weeks.

The Coaching Teams personally administer the Starting Line DOMM which serves another valuable purpose – the Coaches and potential Transformation Teams get to know each other (at least remotely) and understand each other. Five of the Transformation Teams and the two Coaching Teams will be spending a lot of time together over the next 24-48 months and we hypothesize this initial investment will pay big dividends for them to talk, listen, and learn.

DOMM Activities:

Phase II	Team Transformation	Team Transformation Pipeline	Coach Transformation	DOMM Transformation
Week 1	*10 Teams take the Starting Line DOM and provide feedback on its effectiveness*	*Test the TTP DOMM I*	*Facilitate Starting Line DOMM* *Take the Teach Coaching Focus Area DOMM*	*Continue DOMM Data Automation and Telemetry/Dashboards*
Week 2	*10 Teams finish the Starting Line DOM and provide feedback on its effectiveness*	*Coach Teams recommend revisions to TTP DOMM I*	*Facilitate Starting Line DOMM* *Take final Coaching DOMM baseline*	*Administer the Revised Coaching DOMM and evaluate results*

DOMM Implementation Across Transformation Objective Workstreams:

Team Transformation Workstream

LAD is not easy. Yes, the goal is to make work easier and releases less frustrating and Customers happier. But getting there involves hard, focused experimental work. Forging new team habits and neural pathways can be painful. And measurement, which is a cornerstone of experimentation and learning is always challenging because of the attention to detail required and the fact that when you are measuring it feels like you are not "doing" and not "doing" can seem wasteful. We underscore the challenges of entering and passing through the TTP to emphasize the need for our first step in the DOMM process.

We want teams that have a foundational level of preparedness for LAD transformation and a high probability of completing the journey through the TTP. As an analogy, the military recruit's people with a broad spectrum of physical, mental, and emotional readiness, but they must meet minimum standards before entering bootcamp. Even with the initial screening criteria, many cannot start the real bootcamp until they have shed weight and/or increased stamina in an adjacent fitness program. In the same way, manufacturers measure and test the parts delivered by suppliers prior to delivering them to the production assembly line. Parts that don't meet the production floor standards must be returned to the supplier for rework. The initial DOMM helps determine team readiness.

The **Starting Line DOMM** is intended to measure the readiness of a cohort of teams to enter the TTP. In other words, we are trying to measure the negative portion of the team value delivery continuum (i.e., below zero to zero). The Starting Line DOMM, like a dentist's panoramic x-ray, will try to get a 360-degree view of the team. This Starting Line DOMM is largely manual because we can't assume the common use of a set of tools with common measurements that can deliver a common standard. But tools will be used to capture simple data where available (e.g., if a cohort of teams all use a single agile project tool, we can extract data from that tool using an API or connector to feed our data integration and dashboard tool).

Below are the proposed **Starting Line DOMM** categories:

- DevSecOps
  - Understanding of DevSecOps – Kim et. al.
  - Belief in a Safety Culture – Sydney Dekker
  - Understanding of Team Topologies – Manuel Pais and Matthew Skelton
  - Understanding Theory of Constraints (TOC) – Eliyahu Goldratt
  - Systems Thinking – Learning Organization – Peter Senge
- Agile
  - Business Agility Assessment – SAFe 5.0
  - Understanding Agile Principles, Framework, Ceremonies, and Roles – Scrum Guide
  - "Scrum but" Test – Sutherland et. al.
- Lean
  - Understanding and use of Lean Principles – James Womack
  - Understanding and use of the Improvement Kata – Mark Rother
  - Understanding Value Stream Mapping – Karen Martin, Mike Rother, John Shook
- Team Interaction Intelligence
  - Evaluation of the Team's Coaching Habits - Michael Bungay Stanier
  - Practice of Daring Leadership – Brene Brown
  - Reflection on the Team's Dysfunctions – Patrick Lencioni

Table 5 – Example of 10 team category and composite scores for qualifying team assessment. Top 5 teams meeting minimum standards accepted into TTP with one waiver.

Starting Line DOMM Category	DevSecOps	Agile	Lean	Team Interaction Intelligence	Composite Score	
Team 1 Score	79	93	85	79	84	Selected
Team 2 Score	69	69	69	69	69	Wait List
Team 3 Score	48	90	90	48	69	Wait List
Team 4 Score	89	89	90	89	89.25	Selected
Team 5 Score	84	84	84	84	84	Selected
Team 6 Score	49	70	90	49	64.5	Wait List
Team 7 Score	58	77	58	58	62.75	Wait List
Team 8 Score	85	85	85	42	74.25	Selected w/Waiver
Team 9 Score	74	74	81	80	77.25	Selected
Team 10 Score	63	90	63	63	69.75	Wait List
	69.8	82.1	79.5	66.1		
Min. Required	70	75	75	75	75	

Note: Notional Data in the chart reveals overall team weaknesses in DevSecOps and Team Interaction Intelligence which informs learning recommendations for teams trying out for the next cohort in 12 weeks.

This is a five day, two hours per day (over two normal working weeks during standard work hours) coach-facilitated assessment with individual and team inputs leading to scores in four areas. The assessment results in a single composite team readiness score with four category scores. Teams must score above a certain composite level without scoring lower than the agreed standard on any one of the category scores. For every 10 teams who go through the Starting Line DOMM assessment, we recommend only 50% should make it to **Phase II** (or less depending on how many passes the minimum

standards established). The rest will be given materials and resources to improve their knowledge and skills for at least **two sprints** (or 30 days) and request through their leadership to return for a retest. The DOMM team will hypothesize that teams scoring at a certain level in each category and/or a composite readiness score will have a strong probability of completing the TTP (i.e., dramatically improving their Customer value delivery capability).

If resources are available, 10 other teams take the Starting Line DOMM assessment and the top five scoring teams from each enter **Cohorts 2 through 4 filling up TTPs 1 and 2** (see **Section 7 Appendix B for the Extended TTP**). We have created a 20 team LAD laboratory and test environment for the DOMM and TTP. Lastly, any good experiment has a control group. We propose two teams that were not selected for a TTP be used as the Control Group Teams. Neither team will be part of the TTP, but one of these teams will have access to the various DOMM assessments and the other team will not. Both teams will use the current local LAD implementation process vice the newly developed TTP.

At the end of Phase VI (see **Section 4.8** below), the Control Group Teams will be given the Level 3 DOMM assessment and have their business value delivery determined. The Control Group Team Level 3 DOMM scores and Business Value Delivered will be compared with Transformation Teams achieving Level 3. Coaching teams review the results and responses of the Starting Line DOMM Assessment and provide feedback to the DOMM team to improve for the next cohort or before. They also review the upcoming Zero Week DOMM and Level 1 DOMM.

Team Transformation Pipeline (TTP)

The DOMM team determines the ability of the Starting Line DOMM to sufficiently differentiate between 10 Teams and deliver 5 qualified Teams with a sufficient average score to the Zero Week.

Coach Transformation

The Coaches test themselves on the Team Coaching Focus Area DOMM to see if they have reached the foundational level of LAD teamwork value delivery.

DOMM Transformation

The DOMM Team creates an MVP web portal for the Coaches and Teams to go to see their data. The Coaching Team continues to refine its MVP Dashboards for DOMM data including more detailed data from the Starting Line DOMM for review. Additionally, the DOMM team takes and Accuracy, Validity, Reliability (AVR) DOMM to score the DOMM measurement capability.

Sample DOMM Questions/Criteria/Data Points from the Starting Line DOMM:

Team Culture

- Teams conduct blameless hot washes/After Action Reviews
- Teams discuss mistakes/issues openly to learn
- Teams seek to minimize dependencies, maximize velocity
- Teams create safe places to make mistakes, learn and improve

4.5 PHASE III – ONE WEEK "LEVELING THE PLAYING FIELD" – ZERO WEEK

Phase Objectives:

Zero Week phase is a one-week, intensive (early morning to early evening), face-to-face LAD bootcamp with five key objectives:

- Working with coaches and SME Customers, the five qualifying teams identify Customer Persona clusters and **map the User Experience journey**.
- Then they **complete an end-to-end Value Stream map** (aligned to the UX Journey Map) for their portion of the product line – from idea to funding to DevSecOps to internal customer and finally to end users.
- Continuing in collaboration, they **compute the business value** (in hours) for the functionality/features/services they create along the Value Stream. This will be a team's baseline business value measurement.
- The teams view demos of the prototype CI/CD pipeline created by the Coaching Team and work closely with coaches to begin replicating the pipeline, learning the DevSecOps tooling basics first-hand.
- Over the course of the week, the teams complete an enhanced Starting Line DOMM (increasing standards-difficulty for previous criteria/questions and adding a five-part assessment of the team's understanding of DevSecOps tool basic functionality from design to measure and iterate phases) called **Zero DOMM**. This will be a team's baseline DOMM measurement.

DOMM Activities:

Phase III	Team Transformation	Team Transformation Pipeline	Coach Transformation	DOMM Transformation
Week 1	*Teams take Zero Week DOMM Assessments (more advanced versions of Starting Line DOMM) each day of the week. Compare Zero Week results to related Starting Line DOMM*	*Coach Teams test the Level 0 TTP DOMM*	*Take VSM DOMM after Value Stream Exercise with Teams*	*Consider revising Zero Week DOMM based on feedback/scores* *Automate DOMM data from initial team CI/CD construction efforts*

Implementation Across Transformation Objective Workstreams:

Team Transformation

One VA stakeholder asked a simple, but profound question which has shaped our proposed methodology. Essentially, he asked if it was fair to give teams a DOMM assessment if they did not have the same tools, training, or resources. The answer is obviously no. Because we want to develop a culture of equality and fairness (so all will feel respected enough to share their fears and their innovative thoughts), we want the DOMM to be fair too. Therefore, we propose a "Zero" Week before moving through the TTP. The Starting Line DOMM gets the right teams in the cohorts and the Zero Week with Associated "Zero" DOMM ensures they are equipped with additional knowledge, tools, and understanding. Zero Week is also where teams get a baseline reading of the value they are currently contributing to their internal and external customers.

Zero Week is recommended to be an intensive, challenging, LAD-focused preparation week conducted face-to-face whenever possible. Equally important to the task of level-setting the teams in the pipeline, coaches work with teams to map their value streams and estimate the team's current business value delivery. Once they have computed this value delivery amount (in hours saved, benefits facilitated, illnesses resolved, etc.), a small neutral team of data and business analysts review the value computations checking the math and logic of the calculations. The teams all take the series of Zero DOMM assessments with portions each day of the week. At the end of Zero Week, the top three scoring teams advance to Level 0 while the other two teams either return to redo the Starting Line DOMM assessment or repeat Zero Week depending on the coaches' review of their performance areas.

At the end of Zero Week, at least 3 teams have the full 360 Starting Line Assessment, Zero Week Assessments, Business Value Delivery Estimations. Coaches and teams reflect on things that could have been done better from both a coach and a student perspective. Most importantly we can peg their current Zero Week DOMM score to their Current Customer Value delivery numbers. We will now measure the DOMM areas and the Team's value delivery for the rest of the TTP phases.

Team Transformation Pipeline

The TTP DOMM now adds measurements to evaluate the team's success in Mapping their Value Stream with the Coaching team, taking the Zero Week DOMM (an advanced Starting Line DOMM that adds initial CI/CD development questions) at the end of the week to see growth after intensive week.

Coach Transformation

The Coaching Team UX, Business Value, and Value Stream SMEs lead an assessment of the effectiveness of the Persona Selection, UX Journey Mapping, and Value Stream mapping exercises and identify areas for improvement which will be prioritized for inclusion in their next sprint.

DOMM Transformation

The DOMM team considers revisions to the Zero Week DOMM after garnering feedback from Coaching and Transformation Teams. They start to automate the DOMM data to be collected via APIs and scripts from the initial constructed CI/CD pipeline and associated tools.

Sample DOMM Questions/Criteria/Data Points:

Lean Principles

- Reduce Average Work in Progress
- Eliminate waste using the 5 S's and 8 Wastes
- Practice Just in Time Delivery
- Produce until marginal returns are negative - no gold plating
- Teams Refine backlogs and measure business value to do the most important work first

4.6 Phase IV – Six Weeks: Level 0 to Level 1 "Running the Course" – Team Build Sprints

Phase Objectives:

Transformation Teams rapidly build and configure their shared CI/CD pipeline, (a separate pipeline is shared between each of the two TTPs so that variations can be tested and the most effective tool/practice/method can be selected at Level 1 – End of Phase IV – when the two cohorts merge into a single ART), in a series of six one-week sprints.

The teams start to implement some ART practices in this "mini-Program Increment" so they are ready to transition to full ART ceremonies in Phase V.

The Zero Week DOMM is one total assessment with six sections – one for each area of the pipeline (e.g. continuous integration, automated testing, continuous delivery, and deploy-on-demand/change management capabilities). All teams (Coaches, Transformation, and DOMM) assess the effectiveness of the TTP to help the Transformation Teams to rapidly assimilate the LAD concepts and practices to build their own CI/CD pipeline with a VA approved tool set.

DOMM Activities:

Phase IV	Coach Transformation	Team Transformation	Team Transformation Pipeline	DOMM Transformation
Weeks 1 - 6	*Coach Teams administer weekly Level 1 DOMM Assessment sections to ensure Transformation Teams have the skills needed to join an ART in Phase V*	*Transformation Teams take the Level 1 DOMM assessments each week and remediate weaknesses each week with Coaches and other teams*	*TBD*	*TBD*
Week 6	*TBD*	*The Level 1 DOMM composite scores are computed and teams achieving the minimum required performance move on to Phase V.*	*Level 1 TTP DOMM assessment measures the effectiveness of the TTP – again with the transformation teams as the "Product" – how much variation was there among teams, how many "defects", did teams have long wait times between activities?*	*UX DOMM to measure the Coach and Transformation Teams' experience using the DOMM assessments*

DOMM Implementation Across Transformation Objective Workstreams:

<u>Team Transformation Workstream</u>

Teams take the Level I DOMM one section per week (at the end of each 1-week Sprint and as part of the team retrospective. Failure is mitigated by iterative testing and remediation throughout the 6 weeks so essentially only teams who don't want to continue

will be removed from the process. Teams may make limited individual substitutions based on governance guidelines.

Team Transformation Pipeline: The effectiveness of the TTP in delivering 5 each Level 1 Transformation Teams at the end of a total of 9 weeks (including Phases II-IV) is evaluated with the Level 1 TTP DOMM. The TTP DOMM compares performances among teams to identify excessive variation among teams and common problems encountered by teams (e.g. tool access approval, etc.)

Coach Transformation

The 4 Coaching Teams with the highest performing Transformation Teams and the highest scores on the Team Coaching DOMM and VSM DOMM are selected to coach the newly formed ART and the other 4 Coaching Teams either split to join a new Transformation Team (and thus seeding his or her team with a potentially high performing team member – having been through an intensive 24 week coaching/doing TTP) or stay together to coach a new cohort.

DOMM Transformation

The DOMM team administers the User Experience DOMM to measure the Coach and Transformation Teams' experience using the DOMM assessments. They may engage external UX SMEs and UX Coaches from the Coaching Teams to provide brief support in correcting weaknesses after the assessment.

Sample DOMM Questions/Criteria/Data Points:

Automation and Integration

- Automated build?
- Automated unit tests?
- Automated acceptance tests?
- Automated performance tests?
- Automated security tests?
- Automated provisioning & Deploy to Test Environ.?
- Automated deployment to production?
- Integration with chatbots / Slack?
- Integration with production monitoring and observability tools?

4.7 PHASE V – 12 WEEK - LEVEL 1 TO LEVEL 2 - FORMING THE ART – ART CRAWL PHASE

Phase Objectives:

The Lean/Agile focused Coaching Team works intensively (with help from the Release Train Engineer and Product Manager) to merge two cohorts of 5 teams each into a single ART which executes a low velocity (Crawl) Program Increment (PI) with all SAFe ceremonies.

The DevSecOps focused Coaching Team works intensively (with help from the System Team and System Architect) to integrate the best performing components of each TTP's CI/CD pipeline into a single pipeline to be used by the ART.

DOMM Activities:

Phase V	Team Transformation	Team Transformation Pipeline	Coach Transformation	DOMM Transformation
Weeks 2,4,6,8,10	*Level 2 DOMM in 5 parts*		*Team Coaching DOMM Final*	
Week 12 I&A		*Level 2 TTP DOMM*	*ART Merge and Crawl DOMM*	*Automation DOMM*

DOMM Implementation Across Transformation Objective Workstreams:

Team Transformation Workstream

Teams continue to assess their team-focused capabilities but the Level 2 DOMM also critiques their ability to quickly merge with their sister cohort team into a single ART. The Level 2 DOMM also seeks a balanced measurement of the various LAD frameworks (Scrum, SAFe, Lean TPS, DevSecOps, etc.).

As an example of testing the balanced approach, the Level 2 DOMM will use criteria from Team Topologies which emphasize that teams limit their communication overhead to those stakeholders they need to communicate with to deliver value and DevSecOps principles which call for loosely coupled applications and systems built modularly so that independent and frequent deployments can occur. At the same time, when teams join an ART, they may be influenced to relinquish their independence.

Level 2 DOMM measures both a team's ability to integrate with the ART practices, but also its ability to maintain its DevSecOps independence and continuous delivery. The fact that Coach Teams share ideas and information across cohorts and, less frequently, across TTPs and that all teams are achieving standardized performance levels prior to advancing mitigates the risk of a collision instead of a merger. The Level 2 DOMM also measures to ensure that the ARTs new pipeline velocity hasn't significantly diminished since merging Team Cohorts.

The Scrum Master and Product Owner from the Team with the highest scoring Level 1 DOMM (across both Cohorts) become the ART RTE and Product Manager respectively and the System Team contributes the System Architect role to complete the ART staff.

Team Transformation Pipeline

The Level 2 TTP DOMM evaluates the overall TTP ability to merge two cohorts into a single ART with minimal reduction in team flow. This TTP DOMM builds on previous TTP DOMMs but focuses on the blending of two branches of the production line (to use manufacturing concepts). Are the teams able to quickly transition to the ART level ceremonies with all ten teams participating in PI Planning (which can be challenging), etc. The Level 2 TTP DOMM continues to depend on data from both the Coaching DOMM and Team Level DOMMs to determine the TTP effectiveness.

Coach Transformation

The Team Coaching DOMM is a final iteration of this DOMM for the six-phase process. The DOMM Team administers this and the Coaching Teams, Transformation Teams, and automated data sources provide the inputs to the assessment so that the Coaching Team

can see its growth and engage in continuous learning. Just as the Team DOMMs are correlated with Customer Value/Impact so also the Coaching DOMM and level achieved by coaching teams are correlated with the improvement in value delivery by the teams they coached, i.e. Coaches are ultimately scored on their ability to help teams improve their value delivery and Customer impact.

DOMM Transformation

The DOMM team takes the Automation DOMM again to compare against their baseline taken in Phase I.

Sample DOMM Questions/Criteria/Data Points:

ART Deployment Capability

- Deployment Frequency
- Lead Time for Changes – code commit to code running in production
- Change Failure Rate – changes released to production that result in degraded service
- Time to Restore – Unplanned outage or service disruption

4.8 Phase VI – 24 Week - Level 2 to Level 3 - High Performing ARTS – ART Walk/Run Phase

Phase Objectives:

The newly formed ART completes one Walk and one Run PI as its teams are individually high performing value delivering units and the ART as a whole avoids the pitfalls of scaling (i.e. potential for tight software/system coupling, team loss of autonomy, loss of direct contact with users, etc.). The Level 3 DOMM assesses their ability to achieve what we will generalize as integration without assimilation or achieving balanced LAD performance increases.

Most importantly, the team growth from Level 0 to Level 3 DOMM is compared with the growth in each team's ability to deliver value by evaluating the team's current value delivery with the baseline value delivery measured in Zero Week/Level 0 (e.g. the increase in capabilities and skills from Level 0 to Level 3 DOMM is evaluated to be 50% and if the team's business value delivered per sprint increased 100% from 200 to 400 hours then the TTP overall had a 2x multiplier effect).

The Various DOMMs are refined and reviewed across teams, cohorts, and TTPs to improve all aspects of the transformation from coaches to the DOMM itself.

DOMM Activities:

Phase VI	Team Transformation	Team Transformation Pipeline	Coach Transformation	DOMM Transformation
Even Weeks	*Level 3 DOMM*	*TBD*	*TBD*	*TBD*
Weeks 12, 24 I&A	*TBD*	*Level 3 TTP DOMM*	*ART Walk and Run Coaching DOMM*	*DOMM refinements*

Phase VI	Team Transformation	Team Transformation Pipeline	Coach Transformation	DOMM Transformation
End of Phase	*Team DOMM Level Correlation with Value Delivery*	*TBD*	*Final Team Coaching DOMM*	*Multi-DOMM data review and analysis*

DOMM Implementation Across Transformation Objective Workstreams:

Team Transformation

Teams take the Level 3 DOMM assessment which includes team and ART criteria. They work with the DOMM and Coaching Teams to conduct a final correlation of gains in DOMM Level/Scores with gains in value delivery and/or Customer Satisfaction. The Control Group Teams (one that was provided access to the DOMM Assessment tools and one that had neither access to the TTP process nor the DOMM) are given the Level 3 DOMM and performance is compared with the Transformation Teams' and to their own Starting Line Assessment. A neutral team of coaches in a blind situation determine the Control Group Teams' business value delivered for comparison with teams who went through the TTP. (see Phase II above)

Team Transformation Pipeline

The Coaches, ART leaders and Transformation Teams participate in the Level 3 TTP DOMM to assess whether the TTP was able to deliver 10 Level 3 qualified teams with quality built in, high value-add capability, and the ability to integrate in the ART without assimilating. The total value delivery capability of the teams is tallied for comparison with the total TTP values at the Zero Week business value delivery baseline measurement. Did all the teams survive intact except for intentional team cross-fertilization and skill/resource balancing? Did teams show continuous improvement as they flowed through the TTP pipeline? How long did it take to swarm and resolve TTP bottlenecks/impediments (e.g. tool availability, unforeseen external dependencies, unknown architectural challenges, etc.) during phase VI versus phase IV?

Coach Transformation

Coaches take the ART Walk/Run Coaching DOMM to see if they reached a Level 3 Coaching performance and they take a Final Team Coaching DOMM to determine overall progress since the first Team Coaching DOMM in Phase I (48 weeks earlier)

DOMM Transformation

The DOMM team reviews all DOMM assessments along with team and coach feedback to determine the most effective assessments in order to prioritize improvements. They also review and analyze DOMM data across Teams, Cohorts and TTPs to identify areas for improvement. The DOMM team develops a comprehensive review and analysis report which is essentially a **"State of Lean/Agile/DevSecOps" for the 10 teams** that took part in the TTP. Teams, Coaches, TTP leaders, PLMs, and LAD leaders can see data represented from over the course of the year and can create their own reports, graphs from the DOMM Core using unique IDs of criteria/question/data points or criteria clusters.

Sample DOMM Questions/Criteria/Data Points:

Overall DevSecOps Metrics for ART Crawl/Walk DOMM – this list taken from the Google State of DevOps 2019 report:

- **Loosely coupled architecture?** As measured by dependencies in the service mapping and impediments documented in deployment cycles.
- **Clear and "lightweight" change process?** As measured by decision levels in the change management process, process steps for standard deployments, % of deployments classified as standard, cycle time of the change mgmt. process as experienced by teams in the ART.
- **Code maintainability?** Teams have systems and tools that make it easy for developers to change code maintained by other teams, find examples in the codebase, reuse other people's code, as well as add, upgrade, and migrate to new versions of dependencies without breaking their code.
- **Continuous integration?** Each code commit should result in a successful build of the software and a set of test suites being run. Automated builds and tests for a project should be run successfully every day.
- **Automated testing?** Teams have confidence that a failure in a test suite denotes an actual failure just as much as a test suite passing successfully means it can be successfully deployed. Teams have the ability to reproduce and fix failures, gather feedback from tests, improve test quality and iterate test runs quickly
- **Deployment automation?** Teams can deploy on-demand to production or to end users throughout the software delivery lifecycle.
- **Monitoring?** Full stack application performance monitoring tool deployed to users, time to recover, # of incidents addressed before SLAs breached, effectiveness of automated alerts (true positive alerts vs. false), critical transaction baselines validated by users as sufficient and accurate (process X measured the same by tool as by users), dashboard created and approved by event management team, time for major incident management team to discover the root cause in a high priority incident, ability of the problem management team to use monitoring to assist in root cause analysis and validation. Monitoring of network and server metrics.
- **Trunk-based development?** Team trunk-based development is characterized by fewer than three active branches and branches and forks having lifetimes of less than a day before being merged to master.
- **Use of cloud services?** Teams have on-demand self-service provisioning of computing resources, network access through heterogenous platforms, resource pooling in a multi-tenant model, rapid elasticity of resources, and measured use.
- **Disaster recovery testing?** ARTs and teams work with Major Incident Management, various service Tiers, and the help desk to conduct Table-top exercises that are not carried out on real systems, infrastructure (including datacenter) failover, application failover, simulations that disrupt production-like test systems (including failure injection such as degrading network links, turning off routers, etc.), simulations that disrupt production systems (including failure injection such as degrading network links, turning off routers, etc.), and creating automation and systems that disrupt production systems on a regular, ongoing basis.

- Do teams have a framework for conducting **blameless post-mortems** emphasizing the what instead of the who and incorporating use of multiple feedback channels to identify remedies?

Does the ART define an improvement goal and Teams **define improvement stories based on findings** from post-mortems that are included in the next PI and/or sprint?

4.9 IMPLEMENTING THE DOMM – THE ROADMAP

The below steps summarize the key actions needed to fully implement the DOMM (described also in the various phases above):

- Form a nine-person cross-functional DOMM Implementation Team with SMEs from the LAD frameworks (one each from Lean/Value Stream, Agile, and DevSecOps), one Data Analyst, one Data Scientist, one Sr. Business Process Analyst, one lead TTP Coach, one Scrum Master and one Product Owner.
- Fill the DOMM Core with the best industry maturity criteria, questions, and data points.
- Assign a unique identifier and categorize the Core criteria/questions across key types: Application Type, LAD topic, TTP Phase, and Transformation Objective (Coach, Team, TTP, or DOMM), etc.
- Filter the DOMM Core to produce Custom DOMM assessments (e.g. Starting Line DOMM, Level 1 DOMM).
- Test the Custom DOMMs to be used in the first two phases of the TTP on a random sample of teams with similar team characteristics (e.g., team time together, application type and environment, specific ART, Product Line).
- Review the test results with the Coaching Teams and Other SMEs and thoroughly analyze the data.
- Refine the key Custom DOMMs for initial phases and draft Custom DOMMs for later phases of TTP.
- Coaching Teams use the Custom DOMMs to establish baseline metrics for Teams going through TTP.
- The DOMM Implementation Team continues to build and refine the Custom DOMMs and maintain the response Database
- Starting in Phase III – “Zero Week” – The DOMM team works with the Coaching teams and Transformation teams to increase automation of critical data points and incorporate into the Custom DOMM scoring (e.g. Pull Deployment Frequency and Lead Time for Changes metrics from CI/CD tool as the Teams build out their CI/CD pipeline and integrate with the Team Transformation Level 1 Custom DOMM).
- The DOMM team integrates and displays DOMM data in various dashboards at different org. levels using a tool like Prometheus/Grafana or Splunk/Splunk IT Service Intelligence (ITSI).
- Use the Coaching Team’s Value Stream Mapping data, baseline business value delivery determination, and Phase VI value delivery update to compare changes in value delivery/Customer Satisfaction with improvements in Team Custom DOMM Scores.

- The DOMM team continues to apply LAD principles to DOMM Core, Custom DOMMs, and DOMM delivery and data analysis.

As teams progress through Phases 0-IV of the TTP, the DOMM measurements plot the team's progress through the first two quadrants of the QA Symphony Maturity Model. They rapidly improve their Agile knowledge and execution and extend their agility during the build sprints as they build out their CI/CD pipeline. As the two cohorts merge to form an ART in Phase V, the DOMM team starts to consolidate data from all the teams in the ART to see how the overall ART is performing – the first step toward an enterprise implementation of LAD.

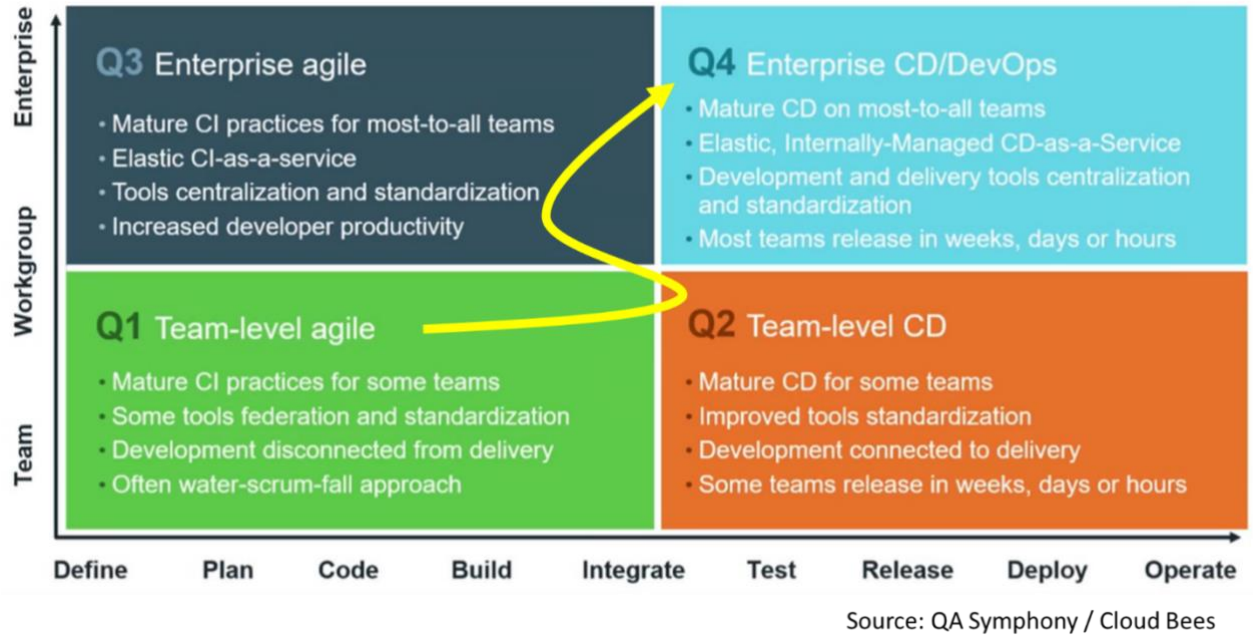

Figure 3 – The QA Symphony/Cloud Bees four quadrant maturity model can be used to plot the progression of teams through the TTP – starting with team agility practices and CI/CD capabilities in Zero Week (Phase III) and Team Build Sprints (Phase IV), the teams pass through Q1 and Q2 and then begin the journey to enterprise capabilities and performance as the cohorts merge into an ART and practice agile and eventually enterprise CD/DevOps (and other LAD principles).

5 SUMMARY

We have laid out four DOMM Themes which we then applied to multiple types of DOMM Assessments intended to measure Coaches, Transformation Teams, the Transformation Team Pipeline and the effectiveness of the DOMM itself. We created a proposed roadmap to produce two high performing ARTs after 48 weeks with a stable process to enable further scaling to a multi-ART Solution or to additional parallel running TTPs. At the end of the planned year, the DevSecOps Leadership, Lean Agile Center of Excellence and Product Line Managers will have two validated ARTs, eight validated coaching teams, and thousands of data points captured for analysis and a 2021 State of Lean/Agile/DevSecOps in OIT report to share as a lessons learned document.

VA requires an accurate measurement tool to equip Lean, Agile, DevSecOps coaches and teams. Armed with this customizable tool, coaches can lead inexperienced cross-functional teams through a TTP. The same tool can be adapted to measure the TTP value stream resulting in the consistent delivery of capable, high value delivery teams, and high velocity ARTs.

A DOMM, when designed properly, can be this measurement tool. The DOMM can be used to measure the progress of Coaches and Teams as they pass through the TTP. A separate cross functional DOMM implementation team continues to refine the DOMM, and the tool becomes increasingly accurate in its ability to score value delivery capability and correlate the score with real Customer satisfaction.

6 APPENDIX A: KEY EPICS FOR DEVOPS MATURITY MODEL CREATION AND IMPLEMENTATION

Theme	Accurate Measurement	Flow	Feedback	Continual Improvement
Epics	*Validate measurements*	*Measure Team Transformation*	*Timely Maturity Measurements*	*Correlate Maturity to Customer Impact*
	Customize Assessment by Team Types	*Measure the Team Transformation Pipeline*	*Composite Scores/ Actionable Telemetry*	*Conduct Data-Informed Retrospectives*
	Provide Similar Resources to Each Team	*Measure Risks to Adoption*	*Automated Assessments*	*Validate/Learn Best Practices*
	Measure Beginning Teams	*Measure Coaches*	*Internal and External Customer Focused*	*Encourage Continuous Improvement*

In the section that follows, we break down epic-level stories that form the need described in the Project Performance Work Statement (emphasis added):

*As the Department of Veterans Affairs (VA) OIT **transitions** into Development Operations (DevOps), we would benefit from being able to **quickly identify maturity levels** of all product and project teams. This ability would help **determine best practices** for each team to **move forward** with their processes.*

*The Product Line Manager (PLM) is seeking the ability to be able to **automatically assess** the DevOps maturity of each of the product and project teams, along with **methods to measure risk** to drive DevOps **adoption** and **continuous improvement** process.*

Because this need statement contains value-dense, compressed requirements, we felt the need to unpack them into the following core Epics:

- **"Transition"/ Transformation**: **As** a DevSecOps transformation leader, **I want** to be able to measure team, ART, and Solution qualities that show transformation progress from functionally isolated development and operational processes to integrated single piece flow, customer-product focused value streams with multiple feedback channels to feed the continuous improvement process **so that** we can optimize value delivery and increase user satisfaction.
- **Reporting Speed ("Quickly")**: **As** a DevSecOps transformation leader, **I want** to be able to see the current transformation progress of teams, ARTs, and Solutions within hours or days instead of weeks and months to collect data, **so that** I can make informed decisions within sprint and program increment (PI) timeframes.
- **Composite/Actionable Telemetry ("Quickly Identify Maturity Levels")**: **As** a DevSecOps transformation leader, **I want** to be able to see a dashboard or similar interface that is simple to understand and clearly highlights the overall state of transformation along several key performance indicators (KPIs), **so that** I don't have to conduct a separate analysis of multiple disparate and disjointed data points.
- **Validate/Learn/"Determine Best Practices": As** a DevSecOps transformation leader, **I want** to be able to measure the impact of various DevSecOps tools and practices on Customer Satisfaction and value delivery, **so that** I can apply

proportionate resources to validated tools and practices thus increasing the pace of transformation while developing a culture of learning.

- **"Move Forward" / Data Informed Retrospectives: As** a DevSecOps transformation leader, **I want** teams, ARTs, and Solutions to be able to see an accurate picture of themselves painted with relevant data **so that** they can hold informed retrospectives and Inspect and Adapt (I&A) events and prioritize their own iterative improvement efforts.
- **"Automatically Assess"**: **As** a PLM **I want** to automate as much of the maturity measurement process as possible **so that** I can observe progress at the team, ART, and Solution levels with several clicks on a dashboard in near real time (defined in this situation as being data less than 24 hours old).
- **"Methods to Measure Risk…Adoption"**. **As** a PLM **I want** to be alerted when a team, ART, or Solution are at risk of not reaching the desired maturity state or performance level for a certain time period **so that** I can rapidly deploy resources to proactively prevent delays in team transformation and adoption of DevSecOps practices.
- **"Continuous Improvement"**. **As** a PLM **I want** maturity metrics/KPIs to be extended to encourage further improvement of teams, ARTs, and Solutions **so that** no one in the Product Line feels that they have *arrived* at a final maturity level.

Through multiple meetings with project stakeholders and colleagues and continued industry research, we identified eight additional key requirements for a DevOps Maturity Model (DOMM) which we have stated here as Epics:

1. **"Customize Measurement by Team Type". As** a PLM, **I want** the maturity model to be customizable to allow for fair assessments of teams with varying types of work (from legacy monolith applications to low-code microservices) **so that** the assessments will accurately measure the maturity of each type of team.
2. **"Provide the Same/Similar Resources to Each Team". As a** DevSecOps team member **I want** to have all the tools, training, coaching and resources needed to achieve high performance **so that** my team and I can consistently delivery high value to our customers.
3. **"Measure Beginning Teams". As** a DevSecOps transformation leader, **I want** to be able to measure capabilities of teams who only have minimal knowledge of DevSecOps **so that** we can determine their readiness to enter into our team transformation pipeline instead of assigning them to a non-descript "negative" level.
4. **"Correlate Maturity to Customer Impact"**. **As** a PLM, **I want** to correlate changes in maturity measurements to changes in business value delivered **so that** we can judge the effectiveness of gaining skills in various DevSecOps tools and practices and add priority to those delivering more business value.
5. **"Measure the Team Transformation Pipeline". (closely related to Epic 1 above) As a** DevSecOps transformation leader, **I want** to be able to measure the team transformation value stream as part of the maturity model **so that** I can quickly identify bottlenecks, non-value added time, excess work-in-progress (WIP), team execution quality (% complete and accurate), and process cycle and lead times (time from team entry into the transformation pipeline to the point when it reaches a certain

performance level and associated correlational value delivery) and seek to improve the pipeline flow.

6. **“Measure the Maturity of DevSecOps Coaches/Trainers”. As** a DevSecOps transformational leader, **I want** to be able to measure the growing maturity/capability of government and contract coaches and trainers **so that** we can support underperforming coaches, learn from high performing coaches and ultimately build a VA DevSecOps core coaching capability from data-validated experience.
7. **“Validate Measurements and Calibrate Measurement Tools”. As a** DevSecOps Transformational leader **I want** to ensure that when I measure team, Art, and Solution performance, my measurements are reliable and valid (the measurement is accurate and I am truly measuring what I think I am measuring) **so that** we can trust the data in our decision making and be trusted in our reporting.
8. **“Customers can be in IT, an internal business user, or an end user”. As** a PLM, **I want** to be able to see feedback from multiple Customers **so that** I can gauge the effectiveness of the total value delivery pipeline including DevSecOps teams, business users, and end users and permit upstream fixes before end user impacts.

7 APPENDIX B: EXTENDED TTP TO PRODUCE HIGH PERFORMING SOLUTION TRAINS – MERGING 2 HIGH-PERFORMING ARTS

The Extended TTP merges two TTPs (which allows for experimentation – effectively A/B testing - between the two TTPs with different CI/CD tool sets, intentionally different Custom DOMMs (within guidelines), and other variables. The extended TTP ends with two high performing Solutions and two of the highest performing teams with the highest scores on the Coaching DOMM are assigned for 24 Weeks to coach through Phase IV (where the number of coaching teams are reduced by 50% after cohort merging).

In this way, the highest performing, best qualified coaching teams have a chance to put their skills to use with new teams, without becoming professional coaches that never do the work. Coaching teams also rotate back into the ART or Solution. The DOMM Core is extended with questions/criteria/data points specific to Large Solution SAFe and scaled DevSecOps solutions, e.g. skillful deployment of container clusters and cluster management.

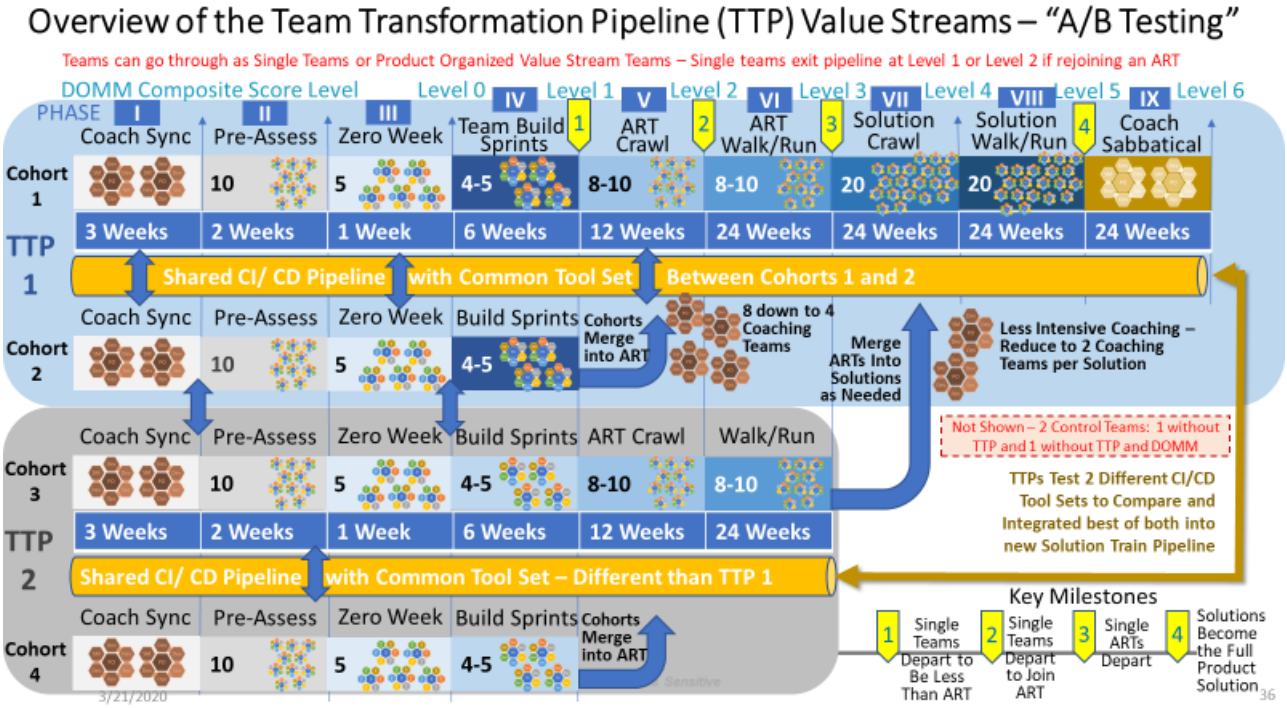

Figure 4 – Overview of the TTP Value Streams: "A/B Testing".