Leveraging Digital Mixed Model Value Stream Maps

A leadership guide to deploying Digital Mix VSM to remove waste in mixed model value streams

By: Girish Hidaduggi, Jon Fournier, Herman Ranpuria and Dilesh Patel

Foreword by: Art Thomas
Objectives of this workbook:

To aid leaders in understanding the significance of value stream mapping (VSM) in the context of lean deployment, the transformative potential of Digital Mix VSM, and the systematic means by which they can exploit it to advance the organization's interests.

To furnish the organization with case study-based illustrations that exemplify the development and utilization of digital value stream maps for efficiency gains in mixed model production.
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Acknowledgements

Foreword

Introduction

How to Use This Guide

Guide Sections

PART I: EXECUTIVE SUMMARY

What is Digital Mix VSM?

Digital Mix VSM: Evaluation

PART II: BUILDING A MIXED MODEL MAP

How to Draw Digital Mix VSM’s

Case Study: BQSI Cutters Plant

Sketch the Material Flow

Establish the Paths

Route the Product Variants

Customer Demand

Production Time

Cycle Times

OEE Model

OEE Losses

Inventory Levels and Waste

Inventory Values

Completed Material Flow
Acknowledgements

Our group (The eVSM Group) really began with Rother & Shook's workbook *Learning to See* [1] and a subsequent visit to LEI's (Lean Enterprise Institute) office in Boston around 2002 and later with LEA (Lean Enterprise Academy) in the UK and the Lean Management Instituut in The Netherlands. Meeting with some of the founders of the lean movement was absolutely inspirational. We then developed the eVSM software as a Digital VSM complement to the paper and pencil VSM approach commonly referenced in Lean methodology.

On the literature side, we have learned a great deal from the publications by members of the Lean Global Network. Another book, *Creating Mixed Model Value Streams* by Kevin Duggan [2], became a favorite as we implemented mixed model mapping technology. It explains in detail many practical techniques for applying lean thinking to mixed model production. The publications around *Toyota Kata Culture* [18] have helped connect the design goals of the future state maps to how they might be achieved in practice by building a problem-solving culture in the organization. And finally, online, we love the content at lean.org, at planet-lean.com and the blogs from allaboutlean.com ..great, concise reading that appears frequently in our subscriber mailbox on a wide variety of lean topics and case studies.

Over the past twenty years, eVSM has been deployed in numerous firms, leading to our direct involvement in countless improvement initiatives. This book was inspired by the experiences of working with internal champions to implement Digital VSM effectively in support of lean deployments at both site and enterprise levels.

We thank Art Thomas, Anil Rajadhyaksha, Sagar Chheda, Tara Swarts, Yelena Chuzhoy, Peter Jahn, David Hollinger, Joe Sabo, Mark Milburn, Bjorn Olanders, Anders Meurk, Kevin Faltstrom, Brian Byrne, Cindy Jimmerson, Shirin Andler, Martin Gaugele, Nancy Such, Trent Wall, Brad Campling, Kevin Henn, Peter King, Rajendra Galagali, and many others in the lean community for the wonderful encouragement, support, insights, and conversations over the years.

This is our first publication discussing eVSM's mix technology, and for us, its development traces back to discussions with Canan Oezen. Canan deserves special recognition for instigating a development that is proving beneficial to thousands of lean practitioners.

*Girish, Jon, Herman and Dilesh*
I was honored when Dilesh asked me to write the foreword for “Leveraging Digital Mixed Model Value Stream Maps.” I am confident in eVSM based on my personal experience using the software and knowing the expertise of the eVSM team.

My endorsement for this product comes from practical applications of eVSM in more than fifty companies. Dilesh, Herman and I first met in 2015 during an eVSM training session. Even prior to that training I was a huge fan of eVSM. During my time in operation management (30+ years), I often used multiple products to develop value stream maps (VSM). Whiteboards and sticky notes created a visual representation but were not kind when trying to perform “what-if” scenarios when working on future state. Spreadsheet applications were then used to create methods for calculations. Then the team would try to marry the two methods together. This was very time consuming and did not lend itself to accurate or timely results. Knowing how eVSM combines visual and digital methods into one application, I became an eVSM zealot. To this day I use and train others to get the amazing benefits from eVSM.

"Leveraging Digital Mixed Model Value Stream Maps," is proof that Girish Hidaduggi, Jonathan Fournier, Herman Ranpuria, and Dilesh Patel have not rested on their previous successes. This groundbreaking application addresses the challenges of today's mixed model value streams. Many companies will only map their main, or maybe their troubled value stream, due to the extensive effort in mapping multiple streams. Small and medium size businesses often rely on a low volume and high mix business model. So, the typical value stream map may not be as valuable as with some of the mass production facilities. With the advent of digital technologies, particularly the eVSM Mix software, the authors ushered in a new era of process improvement that transcends traditional limitations.

In the pursuit of continuous improvement and excellence, leaders seek tools and methodologies that not only highlight opportunities, but also foster a culture of continuous improvement. When performing the traditional VSM, much of the demonstrated waste was in inventory. “My” opinion is that at times too much effort from the VSM was focused on inventory reduction and not really process improvement. We have all seen that map where the lead time ladder shows 120 days lead time with two hours of value-added activity. 90% or more of that lead time is often in inventory (most of that in raw material). A company called me a few years ago that had succeeded in driving down their inventory by 50% based on a VSM. However, their additional expenses from gaining that cash and space was double the savings. The eVSM application certainly allows you to visualize inventory, but also provides empirical visualization for many other types of data.
VSM has been a cornerstone of lean methodology and has provided a structured approach to analyzing and optimizing processes. However, as manufacturing landscapes evolve, so must our tools.

What sets this guide apart is its comprehensive approach. This book is not just an application manual; it allows leaders to establish a vision for their continuous improvement journey. It's a practical testament to how the power of innovation can drive operational excellence. Through research, practical insights, and real-world case studies, the authors equip leaders and practitioners with the knowledge and tools needed to deploy VSM effectively in a mixed model environment.

As the Director of Business Development at Purdue University Manufacturing Extension Partnership, I've seen firsthand the transformative impact of lean methodologies. However, I also recognize the need for adaptation in an ever-changing landscape. "Leveraging Digital Mixed Model Value Stream Maps" represents a pivotal opportunity in this journey.

By embracing digital technologies and leveraging the power of eVSM Mix, organizations can unlock new opportunities for improvement, streamline operations, and ultimately deliver greater value to their customers.

I commend the authors for their dedication to advancing the field of lean manufacturing and for sharing their expertise with the broader community. May this book serve as a catalyst for change, inspiring leaders to embrace digital innovation and chart a course towards a more efficient and sustainable future.

**Art Thomas**  
Director of Business Development  
Manufacturing Extension Partnership  
Purdue University  
Feb 2024
"A value stream is all the actions (both value-creating and non-value-creating) currently required to bring a product through the main flows essential to every product..." (Rother and Shook, Learning to See) [1]

Lean, with its mapping component, value stream mapping (VSM), has endured as a process improvement methodology for over twenty-five years. VSM is a metrics-based analytical mapping method with simple calculations for lean metrics like Takt Time, VA, NVA, Capacity, OEE, and so forth; however:

- The calculations and charting associated with value stream maps can be tedious;
- It's hard to keep updating the calculations for "what-if" studies;
- Manual calculations can be prone to error.

This is where Digital VSM came in, as a complement to the initial paper-and-pencil map. The eVSM software has been used to create Digital VSMs for the last twenty years, but it has also encountered a couple of hurdles:

- Lean application has expanded and is applied to increasingly complex value streams;
- Product variants (mixed model) have proliferated so that many variants are now made with shared resources.

Mixed model value stream mapping is used in this situation. The book, Mixed Model Value Stream Mapping [2] illustrates how the mapping technique can aid with lean deployments inside mixed model environments. Creating and analyzing mixed model value stream maps with only paper and pencil, however, is practically unfeasible. The eVSM program has been revamped for the mixed model production setting and is now accessible as eVSM Mix for creating and analyzing Digital Mix VSMs. The eVSM Mix software reintroduces VSM as a fundamental tool for lean practitioners working in mixed model situations.

Leaders at site and enterprise levels interested in effectively applying lean to the organization's mixed model production have a great opportunity with Digital Mix VSM. This guide will illustrate Digital Mix VSMs created with the eVSM Mix software, show how to use them analytically for "what-if" studies and highlight best practices for deployment.
Value Stream Mapping is often shown on the incoming stairway to the lean methods house. It’s the birds-eye view to help decide what methods to apply, in what order, and where. Digital Mix VSM makes the value stream map feasible again for usage with lean in mixed model production.
Welcome to the leadership guide to Digital Mix Model Value Stream Mapping. This guide is designed to be a roadmap for integrating digital value stream mapping into your lean deployment to improve your production processes.

Who Should Read This Guide:

Leadership: Find quick insights in the Executive Summary to understand the strategic value of Digital Mix VSM. Look at the Deployment Best Practices to review leaderships role in the transformation.

Lean Practitioners: Delve into the case study with sections on Building a Mixed Model Map, Analysis & Improvement.

Deployment Champions: Obtain key learnings from previous deployments from the guide section Deployment Best Practices and get the most from Digital Mix VSM for your organization.
Guide Sections

PART I: EXECUTIVE SUMMARY
A brief overview for executives to grasp the benefits and strategic importance of adopting Digital Mix VSM to enhance a lean deployment.

PART II: BUILDING A MIXED MODEL MAP
Step-by-step example using a case study on creating your digital mixed model map.

PART III: ANALYZING THE CURRENT STATE
Learn how to identify bottlenecks, waste, and opportunities for improvement.

PART IV: PLANNING FOR IMPROVEMENTS
Practical steps that leverage your analysis and lean thinking to make impactful changes.

PART V: LIVING VSM LEVERAGE
Examples using the digital map as a model in a “living” way to help analyze production challenges and change requests.

PART VI: DEPLOYMENT BEST PRACTICE
Insights into making the most out of your Digital Mix VSM efforts to support your lean deployment and avoiding common mistakes.

APPENDIX A: VSM CASE STUDIES
Current state maps in Digital Mix format corresponding to the two most well-known case studies in the literature.

APPENDIX B: eVSM MIX LEAN KIT
An integrated lean kit for value stream mapping and value stream design.
Part I is a concise guide for leadership on:

- What Digital Mix VSM is and the benefits.
- The requirements for the digital software platform.
- How eVSM Mix software meets the requirements.
What is Digital Mix VSM?

The purpose of Value Stream Mapping (VSM) has always been to provide a high-level, metrics-based view of a production process, analyze it from a lean perspective, redesign it to improve flow, and then help select, prioritize and sequence improvements.

Let's demonstrate alignment and show how leaders' desire for world-class processes are supported by Digital VSM with the eVSM Mix software.

What do leaders want?

Leaders want world-class production processes to meet business goals, and a built-in improvement culture that solves problems by making them visible and applies corrective actions in a systematic way.

What part does lean play?

Lean is a widely respected methodology for continuous process improvement.

What is the value stream map in lean?

Central to the lean method is a way to see the overall process that delivers value to the customer and identify the waste within, that could be removed for business benefit. Value stream mapping can provide a metrics-based, birds-eye view of the current state, and an ability to then redesign it, using lean principles, to a desired future state.

When is VSM hard to use?

When producing a variety of product versions, manually calculating critical metrics is tedious and difficult, making it difficult for a VSM to fulfill its role in a lean deployment. Decisions that were intended to be made on a metrics basis fall back to relying on intuition.

What is difficult about mapping mixed model production?

Managing different demands, routings, and operational values can make mapping mixed model production challenging. If attempted manually or in a simple flowcharting tool, it's tedious, time-consuming, and prone to error.

How does eVSM Mix help?

eVSM is beneficial because it makes VSM with analytics easy and automated for mixed model production. It extends the applicability of VSM from traditional high-volume/low-mix lines to low-volume/high-mix lines (Fig 1.1). Digital maps are “living” and can be used on an ongoing basis to help with "what-if" changes around production (Fig 1.2).
Fig 1.1: eVSM Mix extends applicability of VSM

Fig 1.2: eVSM Mix Maps can be continually leveraged
Below are the typical leadership questions about Digital Mix VSM and its deployment using the eVSM Mix software. Answering these in a clear way is an important goal of this guide.

<table>
<thead>
<tr>
<th>Evaluation Question</th>
<th>Response</th>
</tr>
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<tbody>
<tr>
<td>Does the organization need it?</td>
<td>Yes, if lean is the operational excellence methodology. Yes, if we make product variants with shared resources.</td>
</tr>
<tr>
<td>Why is it better than traditional paper or spreadsheet approach alone?</td>
<td>It allows us to do “what-if” studies. It allows us to standardize enterprise wide. We can draw and analyze mixed model maps.</td>
</tr>
<tr>
<td>What are requirements for Digital Mix VSM software</td>
<td>It should allow for different demands, cycle times by variant. It should permit different paths (routings) by variant. It should have automatic analytics and charting.</td>
</tr>
<tr>
<td>How doe eVSM Mix fit the requirements?</td>
<td>It meets the three Digital Mix Software requirements (above) It has comprehensive eLearning to support deployment. It has had widespread usage and validation worldwide. It supports both mapping (VSM) and design (VSD).</td>
</tr>
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| Is eVSM Mix affordable for our use?                                                 | Annual site fee starts at similar cost to a one day consultation
enterprise deployments have volume discounts. eLearning is built in as part of the license fee.                                                                                              |
| What data does the map need and do we have it?                                       | See Part II: Building the mixed model map. It shows the addition of data, step by step. Data import tools also available for bulk data.                                                                 |
| What kind of analysis and “what-if” studies can we do?                               | See Part III and IV: Analyzing and Improving. See Part V: Living VSM Leverage. See Appendix B: eVSM Mix Lean Kit                                                                                           |
| Can we verify the analytics?                                                        | See Appendix A for eVSM Mix maps corresponding to classic VSM case studies.                                                                                                                                 |
| How do we learn and deploy this?                                                    | See Part VI: Deployment Best Practice.                                                                                                                                                                   |