PURDUE
UNIVERSITY®

Operations Cohort

Operations Executive Program

April 2026

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Operations Executive Program

April 2026

Program Concept Overview

What is the Operations Executive Program?

The Operations Executive Program is an in-person, immersive experience on the Purdue University campus, where participants will disconnect from the day-to-day work, to learn and interact with some of the best management and engineering professors and intellectuals. To ensure a well-rounded experience, participants will have exposure to a variety of innovative experiences and the opportunity to deepen their network via a cohort environment on and off campus. The customized curriculum provides a contemporary approach to operational leadership, process excellence, tools to increase process rigor across the organization, the client journey, as well as address operational challenges.

Why Purdue?

Purdue University is recognized for its educational expertise in Operations. So much so that Maria called it "The Harvard for Operations." Purdue will deliver a custom experience that builds on core capabilities and contemporary operations leadership for executives. The Purdue Executive Education team has a proven track record of accelerating cross-functional connectivity and collaboration by sourcing faculty from a variety of disciplines to enable thought leadership to address operational challenges. The diverse Purdue Faculty will provide learning around key industry trends and creative concepts with direct applicability to our customers, businesses, and employees. Purdue provides an exciting on-campus experience that is unique to the University and its long-standing heritage of leadership in engineering and business.

The Learning Modules

During a collaborative design workshop, subject matter experts from the Bank and Purdue University created a curriculum focused on four core modules: Sustainable Continuous Improvement, Data-Driven Culture, Financial Acumen, and End-to-End Process Thinking. These four modules are the basis for the week-long Operations Executive Program (OEP) and are tied together via applied exercises and developing an implementation plan.

Continuous improvement, a data-driven culture, financial acumen, and end-to-end process thinking are critical to banking operations. These principles drive efficiency, profitability, and customer satisfaction in the industry. Continuous improvement fosters innovation, enabling the organization to optimize processes, adapt to market changes, and deliver exceptional service. A data-driven culture ensures informed decision-making based on accurate insights, leading to targeted strategies, personalized offerings, and risk mitigation. Financial acumen enables effective resource management, risk assessment, and regulatory compliance. End-to-end process thinking provides a holistic view, identifying inefficiencies, facilitating horizontal business unit collaboration, and improving operational efficiency. Embracing these principles empowers banking operations to achieve operational excellence, stay competitive, and enhance customer experiences.

The Learner Experience

Throughout each day, learners will progress through four primary modules spanning more than a dozen sessions. We use an hourglass image to describe where learners are in the program and the learning they should experience. A key to the program is that daily applied exercises and the curation of an implementation plan act as common thread throughout the week.

Module 1 - Sustainable Continuous Improvement

During Module 1, learners start with broader topics, with a slightly more theoretical view. By the end of day 1 the sessions begin to become more applied as we squeeze down the hourglass.

Module 2 – Data-Drive Culture

By Module 2, Building a Data-Driven Culture, we are starting to squeeze into the middle of the hourglass and the learning becomes more technical and applied. For some the material will become more challenging.

Module 3 – Financial Acumen

In Module 3, Financial Acumen, we remain in the middle of the hourglass. The material may still "squeeze" the participants as it stays more applied and challenging.

Module 4 – End-to-End Process

In Module 4 we remain applied, but the program starts to "open up" a bit. We look at end-to-end process and by the end of the module we focus on the E2E processes by looking at the Client Journey Program

Module 5 – Operations Foundry

In Module 5 we present a business challenge or opportunity identified through the program and develop a plan for post-program implementation considering the daily topics and applied exercises.

** please note, Purdue University recognizes that this is not exactly how hourglasses work.*

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Contents

Welcome to PURDUE!

OEP Program Participants and Guests,

On behalf of Purdue University, it is our great pleasure to extend a warm welcome to you and your esteemed colleagues from the Bank to the Operations Executive Program. We are thrilled to have the opportunity to collaborate with the Bank, a renowned leader in the financial industry, and we are honored that you have chosen Purdue University as your partner in professional development.

As you embark on this program, we want to introduce you to the vibrant and dynamic community that is Purdue University. With a rich history spanning 150 years, Purdue has consistently been a beacon of excellence in education, research, and global impact. Our dedication to preparing the next generation of leaders is matched only by our commitment to innovation and progress.

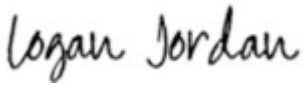
At Purdue, we take immense pride in our "giant leaps" in various fields. Our exceptional faculty members are at the forefront of cutting-edge research, pushing the boundaries of knowledge and discovery. From engineering breakthroughs to advancements in science, technology, and agriculture, Purdue's research initiatives have a significant impact on society and contribute to the betterment of our world.

Moreover, Purdue University strongly believes in the power of engagement and collaboration. We foster a spirit of entrepreneurship and encourage our students and faculty to work closely with industry partners to address real-world challenges. Purdue actively promotes the translation of research into practical applications that drive economic growth and create positive societal change.

As participants in the Operations Executive Program, you will have the unique opportunity to engage with Purdue's distinguished faculty, network with fellow professionals, and delve into the latest industry trends and best practices. We are confident that your time at Purdue will be both enriching and transformative, equipping you with invaluable knowledge and skills to drive operational excellence and lead with confidence.

Once again, we extend a warm welcome to you and your colleagues from the Bank. We look forward to embarking on this exciting journey together and forging a lasting partnership that will contribute to the advancement of operations and the financial industry.

Boiler Up!



Mathew Trampski
OEP Program Lead
Executive Director
Purdue Technical Assistance Program

Logan Jordan
OEP Academic Lead
Associate Dean of Administration
Mitchel E. Daniels, Jr. School of Business

Classroom Wi-Fi Connectivity

A guest Wi-Fi network has been made available for the duration of the program. This network is available when located in the classrooms and common areas of the Convergence Center.

Wi-Fi Details

SSID: Convergence WiFi or WiFi Guest

Password: **<***No Password Needed***>**

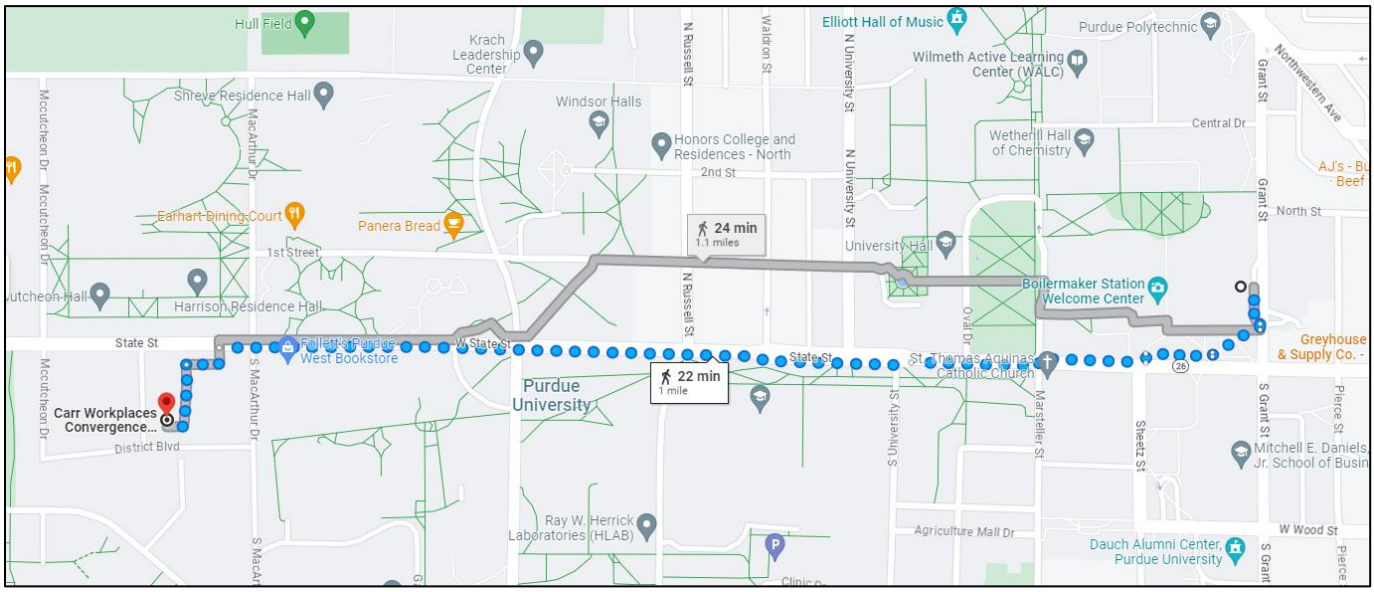
* *If you experience any connectivity issues, please contact any of the Purdue support staff for assistance.*

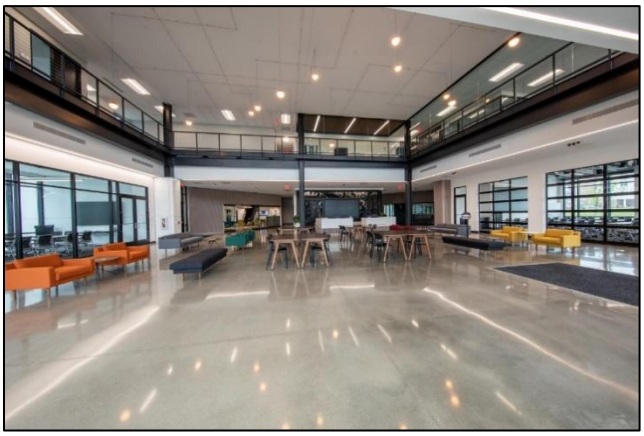
* *Please follow separate Wi-Fi instructions for the hotel*

Program Location – Convergence Center

The main program and daily sessions will be located at the Convergence Center for Innovation & Collaboration. The Convergence Center is one mile from the hotel. Daily transportation will be provided before and during the breakfast period each day. Participants are welcome to walk to Convergence if they prefer. Transportation will also be provided at the end of each day.

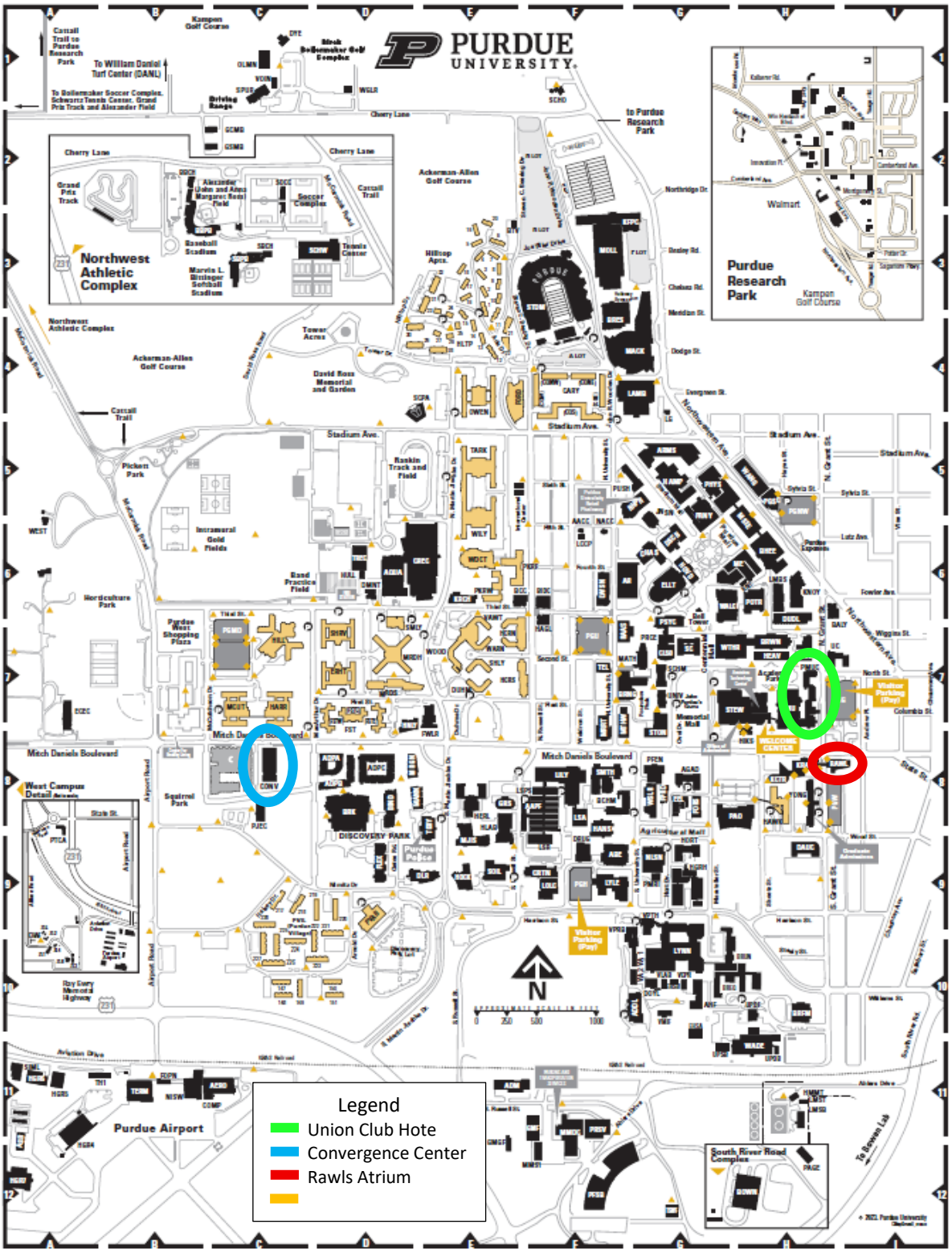
Address:
Convergence Center
101 Foundry Dr.
West Lafayette, IN 47906





Purdue Campus Map

Digital https://www.purdue.edu/campus-map/
Download: https://www.purdue.edu/campus-map/graphics/campusmap.pdf



Free Night Local Suggestions

Eateries:

College-Vibe

- **XXX – Triple X Diner** – Classic Purdue hangout serving legendary burgers and all-day breakfast since 1929.
- **Nine Irish Brothers** – Cozy Irish pub with hearty fare, Guinness on tap, and live music nights.
- **The Tap** – Bustling beer bar featuring dozens of craft brews and elevated pub bites.

Low-Key

- **Sakanaya Izakaya** – Japanese small plates, sushi, and sake in a relaxed, modern setting.
- **BRU Burger** – Gourmet burgers and craft beers in a casual, family-friendly space.
- **Town and Gown Bistro** – Warm, inviting spot for globally inspired comfort food.

Midscale

- **Ripple & Company** – Seasonal, locally sourced dishes with a neighborhood-friendly feel.
- **East End Grill** – Contemporary American grill known for fresh seafood and craft cocktails.
- **The Bryant Food and Drink Co.** – Upscale-casual dining with inventive American cuisine and a vibrant bar.

Upscale

- **Boilerhouse Prime** – Refined steakhouse experience near campus, steeped in Purdue tradition
- **Bistro 501** – French-inspired fine dining with an intimate, elegant atmosphere.
- **8Eleven Bistro** – Chic bistro blending classic flavors with modern culinary flair.

Night Life:

College Vibe

- **Harry's Chocolate Shop** – Purdue's legendary college bar, famous for strong pours and Boilermaker pride.
- **Neon Cactus/The Vault** – Dance the night away with live DJs, neon lights, and high-energy vibes.
- **Union Rack and Roll** – Bowling, billiards, and bar games paired with a full drink menu.

Low-Key

- **648 Bourbon and Cigar Lounge** – Sophisticated lounge for rare bourbons, fine cigars, and conversation.
- **Boiler Up Bar** – Refined cocktail bar located in the Purdue Memorial Union.

For group activities at any of these locations, or others,
please contact Jim or Mat to arrange group transportation.

Purdue Key Personnel Contact Information

Program Lead	Mat Trampski	mtrampsk@purdue.edu	765-414-8462 (m)
Logistics Lead	Angie Hoffine	ahoffine@purdue.edu	765-496-6166 (o)
Program Support	Leigh Ann Griffin	leighann@purdue.edu	765-562-2693 (m)
Program Support	Jim Stratton	stratton@purdue.edu	217-232-2127 (m)
Academic Lead	Logan Jordan	jordan@purdue.edu	765-494-4370 (o)

Airport Logistics

All airport travel is provided for your convenience. Shuttles and car services have been arranged, and schedules will be communicated directly to participants.

Pick-up and drop-off will be at Indianapolis International Airport Drop and the Purdue Union Club Hotel.

For any questions, travel changes, or concerns:
please contact Leigh Ann at (765) 562-2693

Program Agenda

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Program Snapshot

	Sunday April 12	Monday April 13	Tuesday April 14	Wednesday April 15	Thursday April 16	Friday April 17
7:00 AM - 7:30 AM						
7:30 AM - 8:00 AM		Shuttles to Convergence (7:30 - 8:30)	Shuttles (7:15 to 8:15)	Shuttles (7:15 to 8:15) Convergence		Shuttles (7:00 to 7:45) Breakfast (7:15 to 8:00)
8:00 AM - 8:30 AM		Registration & Breakfast (7:45 - 9:00)	Breakfast (7:30 to 8:30)	Breakfast (7:30 to 8:30)	Shuttle to Fair Oaks (7:30-8:30)	**Session 4.3** End 2 End Process (BofA Client Journey) M. Hyzy
8:30 AM - 9:00 AM			**Session 5.2a** Operations Foundry Challenge Review	**Session 5.3a** Operations Foundry	**Session 5.4a** Breakfast & Coffee Bar	
9:00 AM - 9:30 AM		Program Kickoff & **Session 5.1a Foundry**	Break	Break		
9:30 AM - 10:00 AM		Break	**Session 1.3** Foundations of Sustainable Cont. Improvement (PI Tools) P. Brunese	**Session 2.1** Data Driven Culture (Questions & Elements) J. Stratton	**Session 4.1** End 2 End Process (V.S.A. & A Case for PI Tools) S. Encarnacion	Break
10:00 AM - 10:30 AM		**Session 1.1** Foundations of Sustainable Continuous Improvement (Think Differently) B. Alge		Break		**Session 5.5** Operations Foundry (Presentations)
10:30 AM - 11:00 AM				**Session 2.2** Data Driven Culture (Data Tools) J. Stratton	Break	
11:00 AM - 11:30 AM			Break		**Session 5.4b** Foundry Activity Value Stream Activity	Break
11:30 AM - 12:00 PM		Lunch	Travel to JPR	Lunch @ Convergence		Program Close
12:00 PM - 12:30 PM			Lunch John Purdue Room		Lunch Special Guest Presentation Jacqueline McCloskey	Shuttle 1 Departure @ 12:00pm
12:30 PM - 1:00 PM		**Session 3.1** Financial Acumen & Ops (Volume Forecasting) K. Koharki	Travel to Convergence	**Session 2.3** Data Driven Culture (Storytelling w/ Data) D. Pruim		
1:00 PM - 1:30 PM			**Session 1.2** Foundations of Sustainable Continuous Improvement (CI Best Practices) B. Alge			
1:30 PM - 2:00 PM		Break				Shuttle 2 Departure @ 1:30pm
2:00 PM - 2:30 PM		**Session 3.2** Financial Acumen & Ops (Unit Costing) K. Koharki		**Session 4.2** End 2 End Process (Role Play Exercise) D. Pruim	**Session 5.4c** Farm Tour	
2:30 PM - 3:00 PM			Break			
3:00 PM - 3:30 PM		Break	**Session 5.2b** Foundry Activity Control Chart Excel Activity	Break		
3:30 PM - 4:00 PM		**Session 3.3** Financial Acumen & Ops (Building a Business Case) K. Koharki		**Session 5.3b** Foundry		
4:00 PM - 4:30 PM			Break		Break	
4:30 PM - 5:00 PM			**Session 5.2c** Operations Foundry		**Session 5.4d** Tour Debrief	
5:00 PM - 5:30 PM		Break	Break Travel to Hotel	Quick Travel to Hotel	Break	
5:30 PM - 6:00 PM		**Session 5.1b** Operations Foundry		Group Photo	Dinner Cornhole Tournament	
6:00 PM - 6:30 PM		Break Travel to Hotel	Travel to Dinner	Build @ Scale Lab Cocktails and Hors d'oeuvres		
6:30 PM - 7:00 PM	**Optional Social Hour** Purdue Memorial Union (6:30 - 8:30)	Tailgate Fare @ Buchannan Club	Dinner @ Ripple			
7:00 PM - 7:30 PM						
7:30 PM - 8:00 PM						
8:00 PM - 8:30 PM						
8:30 PM - 9:00 PM						
9:00 PM - 9:30 PM						
9:30 PM - 10:00 PM						

Daily Agenda

Day 0 – Sunday, April 12th

Time	Event	Purdue P.O.C.
6:30 PM – Until Concluded	Social Hour (Optional) Rawls Atrium 3rd Floor, RAWLS Hall	Angie Hoffine

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Day 1 – Monday, April 13th

Time	Event	Purdue P.O.C.
7:30 AM – 8:30 AM	Shuttles to Convergence Purdue Memorial Union Club Hotel Lobby	Angie Hoffine
7:45 AM – 9:00 AM	Breakfast and Program Registration Convergence Atrium	
9:00 AM – 9:45 AM	Program Kickoff and Introductions Convergence Center Purdue Opening Remarks Session 5.1(a) – Operations Foundry	Mat Trampski
9:45 AM – 10:00 AM	Break	
10:00 AM – 11:30 AM	Session 1.1 – Think Differently Convergence Center	Brad Alge
11:30 AM – 12:30 PM	Lunch Convergence Center Atrium	Angie Hoffine
12:30 PM – 1:30 PM	Session 3.1 – Volume Forecasting Convergence Center	Kevin Koharki
1:30 PM – 1:45 PM	Break	
1:45 PM – 3:15 PM	Session 3.2 – Unit Costing Convergence Center	Kevin Koharki
3:15 PM – 3:30 PM	Break	
3:30 PM – 5:00 PM	Session 3.3 – Building a Business Case Convergence Center	Kevin Koharki
5:00 PM – 5:15 PM	Break	
5:15 PM – 5:45 PM	Session 5.1(b) --. Operations Foundry Convergence Center	Mat Trampski
5:45 PM – 6:30 PM	Break and Travel to hotel Purdue Memorial Union Hotel	Angie Hoffine
6:30 PM – 7:00 PM	Travel to Buchannan Club	Angie Hoffine
6:30 PM – 7:30 PM	Cocktail Hour & Hors D'oeuvres Buchannan Club	Angie Hoffine
7:30 PM – 8:30 PM	Dinner Buchannan Club	Angie Hoffine
8:30 PM – 9:00 PM	Dessert & Cocktails Buchannan Club	Angie Hoffine

Day 2 – Tuesday, April 14th

Time	Event	Purdue P.O.C.
7:30 AM – 8:30 AM	Breakfast Convergence Center Atrium Shuttles will run from 7:15 AM – 8:15 AM	Angie Hoffine
8:30 AM – 9:15 AM	Session 5.2(a) – Operations Foundry Challenge Review Convergence Center	Mat Trampski
9:15 AM – 9:30 AM	Break	
9:30 AM – 11:00 AM	Session 1.3 – Process Improvement Tools Convergence Center	Pat Brunese
11:00 AM – 11:30 AM	Bookstore Break Follet's Bookstore	
11:30 AM – 1:00 PM	Travel to John Purdue Room Lunch John Purdue Room	Angie Hoffine
1:00 PM – 2:30 PM	Session 1.2 – Continuous Improvement Best Practices Convergence Center	Brad Alge
2:30 PM – 3:00 PM	Break	
3:00 PM – 4:00 PM	Session 5.2(b) – Control Chart Activity Convergence Center	Mat Trampski
4:00 PM – 4:15 PM	Break	
4:15 PM – 4:45 PM	Session 5.2(c) – Operations Foundry Convergence Center	Mat Trampski
4:45 PM – 5:15 PM	Break and Travel to Hotel	
5:45 PM – 6:00 PM	Travel to Dinner	Leigh Ann Griffin
6:00 PM – 9:00 PM	Dinner at Ripple & Co.	Angie Hoffine

Day 3 – Wednesday, April 15th

Time	Event	Points of Contact
7:30 AM – 8:30 AM	Breakfast Burton Morgan Atrium Shuttles will run from 7:15 AM – 8:15 AM	Angie Hoffine
8:30 AM – 9:00 AM	Session 5.3(a) – Operations Foundry Burton Morgan	Mat Trampski
9:00 AM – 9:15 AM	Break	
9:15 AM – 10:15 AM	Session 2.1 – Questions and Elements	Jim Stratton
10:15 AM – 10:30 AM	Break	
10:30 AM – 11:30 AM	Session 2.2 – Data Tools	Jim Stratton
11:30 AM – 12:30 PM	Lunch	Angie Hoffine
12:30 PM – 2:00 PM	Session 2.3- Storytelling with Data	Doug Pruim
2:00 PM – 3:30 PM	Session 4.2- Role Play Exercise	Doug Pruim
3:30 PM – 3:45 PM	Break	
3:45 PM – 4:45 PM	Operations Foundry 5.3(b)	Mat Trampski
4:45 PM – 5:00 PM	Transport to Hotel	Leigh Ann Griffin
5:30 PM – 5:45 PM	Group Photo Union Arch	Jim Stratton
5:45 PM – 7:15 PM	Industrial Engineering Fab Lab Poster Session Dudley Lambertus (Heavy Hors d'oeuvres and Cocktails)	Craig Zehrung

Day 4 – Thursday, April 16th

Time	Event	Purdue P.O.C.
7:30 AM – 8:30 AM	Travel to Fair Oaks Farm	Angie Hoffine
8:30 AM – 9:15 AM	Session 5.4(a) Operations Foundry Breakfast & Coffee Bar	Mat Trampski
9:15 AM – 10:45 AM	Session 4.1 – V.S.A & A Case for Process Improvement Tools Fair Oaks Farm	Stalin Encarnacion
10:45 AM – 11:00 AM	Break	
11:00 AM – 12:00 PM	Session 5.4(b) Operations Foundry – VSA Activity Fair Oaks Farm	Stalin Encarnacion
12:00 PM – 1:30 PM	Lunch & Special Guest Presentation Fair Oaks Farm	Jacqueline McCloskey
1:30 PM – 4:00 PM	Session 5.4(c) Farm Tour Fair Oaks Farm	Jacqueline McCloskey
4:00 PM – 4:15 PM	Break	
4:15 PM – 4:45 PM	Farm Tour Debrief & Ice Cream Fair Oaks Farm	Mat Trampski
4:45 PM – 5:00 PM	Travel to Dinner	
5:00 PM – 8:30 PM	Dinner Fair Oaks Farm Private Clubhouse Cornhole Tournament	Angie Hoffine

Day 5 – Friday, April 17th

Time	Event	Purdue P.O.C.
7:15 AM – 8:00 AM	Breakfast Convergence Center Atrium Shuttles will run from 7:00 AM – 7:45 AM	Angie Hoffine
8:00 AM – 9:30 AM	Session 4.3 – Client Journey Program Convergence Center	Mike Hyzy
9:30 AM – 9:45 AM	Break	
9:45 AM – 11:15 AM	Session 5.5 – Operations Foundry Presentations Convergence Center	Mat Trampski
11:30 AM – 12:00 PM	Program Close Convergence Center	Mat Trampski
12:00 PM – 1:00 PM	Lunch (Grab-n-Go) Convergence Center Atrium	Angie Hoffine

Shuttle to airport from Convergence (GROUP 1)

Shuttle to airport from Hotel (GROUP 2)

Curricular Material

Learning Modules, Outcomes, & Session Descriptions

Module 1 **Foundations of Sustainable Continuous Improvement**

Learning Outcome

Utilize tools and skills to cultivate a culture that challenges the 'status quo' and drives sustainable continuous improvement through critical thinking.

Module 2 **Building a Data-Driven Culture**

Learning Outcome

Leverage intelligent data and effective storytelling to drive business decisions for efficiency and stakeholder value.

Module 3 **Financial Acumen & Operations**

Learning Outcome

Understand the key inputs used by senior leaders to develop capacity levels across business units, how to calculate and monitor unit-level metrics to achieve peak performance and utilize tools to develop successful business cases for key initiatives.

Module 4 **End-to-End Processes**

Learning Outcome

Evaluate end-to-end process(es) inclusive of horizontal impacts to identify opportunities for improvement using statistical tools and process improvement techniques.

Module 5 **Operations Foundry**

Learning Outcome

Present to your SLT a business challenge or opportunity identified through the program and develop a plan for post-program implementation considering the daily topics and applied exercises.

Session Descriptions

Foundations of Sustainable Continuous Improvement

Session 1.1 Think Differently

Description:
This session provides an introduction and overview for the program. In addition, we introduce concepts and exercises that will challenge status quo thinking and encourage the attendees to 'think differently'.

Session Objective(s): (1) Identify the goals of the program. (2) Challenge the status quo and think differently.

Faculty Lead: Dr. Brad Alge BofA Video: Tom Scrivener

Foundations of Sustainable Continuous Improvement

Session 1.2 Continuous Improvement Best Practices

Description:
This session provides some best practices that will be instrumental in reinforcing a process mindset and driving continuous improvement resulting from enhanced data-driven decision making. We will focus on understanding the change process and the human aspects of change, paradox and ambidexterity, boundary spanning, and critical thinking using an inquiry approach.

Session Objective(s): Operate your business through a process lens and apply critical thinking to challenge the status quo and drive successful change initiatives.

Faculty Lead: Dr. Brad Alge

Foundations of Sustainable Continuous Improvement

Session 1.3 Process Improvement Tools

Description:
The session will help you gain familiarity with two important process analysis and improvement tools, specifically control charts and statistical process control (SPC). These powerful tools are especially valuable in situations where it is crucial to understand and control process variation.

Session Objective(s): Identify types of process variation and impact, use SPC and control charts to drive operational improvement, recognize how to support deployment and continuous improvement of SPC and control charts.

Faculty Lead: Dr. Pat Brunese

Building a Data-Driven Culture

Session 2.1 Questions & Elements

Description:
Identifying Data - Questions and KPIs: This first session focuses on how to find and use data effectively. We will help you to identify the appropriate questions to ask and KPIs to use to solve business issues. We will review a business case study to discuss different data elements, measurements, and how metrics evolve over time.

Session Objective(s): (1) Defining the questions necessary to manage one's process more effectively and solve business issues. (2) Identifying the data needed to answer key questions and manage one's process more effectively.

Faculty Lead: Dr. Jim Stratton

Building a Data-Driven Culture

Session 2.2 Data Tools

Description:
In this session, we will use data to articulate and influence the improvement process to find and correct issues.

Session Objective(s): Articulating a business case or problem using data to quantify the opportunity.

Faculty Lead: Dr. Jim Stratton

Building a Data-Driven Culture

Session 2.3 Storytelling with Data

Description:
In this session, we will introduce and practice applying the three components of storytelling to convey a message clearly and effectively. You will engage in exercises aligned with each storytelling component followed by a group discussion.

Session Objective(s): Communicate more effectively using the three components of storytelling by: 1) being able to conduct an audience analysis, 2) applying storytelling and narrative arcs, and 3) using data visually to tell a story.

Faculty Lead: Dr. Doug Pruim

Financial Acumen & Operations

Session 3.1 Volume Forecasting

Description:
Understanding the variables that impact volume and capacity planning is essential to maximizing long-term business performance. In this session, we will examine the factors senior leaders use to determine future volumes and how this impacts business unit capacity levels.

Session Objective(s): Examine the data used to determine volume and capacity forecasts so business unit leaders can construct effective operating plans.

Faculty Lead: Dr. Kevin Koharki

Financial Acumen & Operations

Session 3.2 Unit Costing

Description:
Accurately measuring and analyzing unit-level costs are key to understanding business unit-level performance. In this session, we will examine how to accurately calculate, monitor, and interpret unit-costs to make key business decisions.

Session Objective(s): Calculate the most accurate unit-level cost metrics possible, to maximize business unit-level performance.

Faculty Lead: Dr. Kevin Koharki

Financial Acumen & Operations

Session 3.3 Business Case

Description:
To achieve support for business proposals, employees must be able to develop intelligent business cases that will gain approval from senior leaders. In this session, we will focus on common best practices to develop successful business proposals that add value to the organization.

Session Objective(s): Develop a successful business case for key initiatives business leaders with to pursue.

Faculty Lead: Dr. Kevin Koharki

End-to-End Processes

Session 4.1 Value Stream Analysis & The Case for PI Tools

Description:
This session is to help you gain familiarity with a range of process analysis and improvement tools. The session will focus on why these concepts matter, how to leverage their power, understanding lean principles, and will include examples from process owner.

Session Objective(s): Use select/powerful process analysis and improvement tools to gain practical familiarity (e.g. value stream and root cause analysis).

Faculty Lead: Mr. Stalin Encarnacion

End-to-End Processes

Session 4.2 Role Play Exercise

Description:
In this session, we apply content from the last two end-to-end process sessions by engaging in an active experience of the client journey and end-to-end processes through a 3-lens approach (customer experience, efficiency, risk).

Session Objective(s): Continuously inspect or monitor processes to ensure resources and cost efficiency to make impactful, sustainable changes.

Faculty Lead: Dr. Douglas Pruim

End-to-End Processes

Session 4.3 Client Journey Program

Description:
In this last session, we focus on metrics to evaluate risk during the client journey.

Session Objective(s): Evaluate risk through the voice of the customer, process costs/benefits, and horizontal risks.

Faculty Lead: Mr. Mat Trampski Speaker: Mr. Mike Hyzy & Vicky Lentz

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Session 5.0 - Operations Foundry

Description:
This session has two parts: 1) applied daily exercises and 2) implementation plan development to address challenges and opportunities.

Daily Exercises: At the end of each day, there will be a short 30-minute exercise to practice applying learned that day. After the 30-minute exercises, there will be time to work collaboratively and independently to develop an implementation plan to address a challenge or opportunity upon return to the Bank. You will have an opportunity on Thursday evening to share your implementation plan with your assigned group for feedback. The group will choose one individual to present their business case on Friday morning.

Note: Keep in mind that choosing an individual to present an implementation plan does not mean their case will be chosen for funding or guarantee a meeting with Tom Scrivener; the group is choosing a plan they thought was well put together and tells a good 'story' (e.g., the plan is framed with enough information, data, and concepts from the program to share as an example).

Presentations: On the last day of the program, select individuals will share their implementation plans with the entire group. The presentation will take place on Friday morning.

Module Objective(s): (1) Identify an operations-related challenge or opportunity you are facing. (2) Develop an implementation plan to apply new concepts and practices learned during the OEP upon return to the Bank to address your challenge/opportunity. (3) Practice applying the storytelling components to present the challenges and implementation plan to the other OEP participants.

Faculty Lead: Dr. Erica Lott, Mat Trampski, Dr. Jim Stratton

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Session 1.1

Foundations of Sustainable Continuous Improvement

Think Differently

Dr. Brad Alge

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SESSION 1.1 – FOUNDATION OF SUSTAINABLE CONTINUOUS IMPROVEMENT - THINKING DIFFERENTLY

Dr. Brad Alge

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Module 1 – Foundations of Sustainable Continuous Improvement

Session 1.1 –Thinking Differently

Description

This session introduces concepts and exercises that will challenge status quo thinking and encourage the attendees to 'think differently.'

Session Objective

Develop habit of challenging the status quo; Think differently. Develop intellectual humility.

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Think Differently

Brad Alge

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Session 1.1 - Thinking Differently

How Do We Know What We Know? How Can We Be Sure?

Good Science (good data) teaches us humility!

"the fundamental cause of the trouble is that in the modern world the stupid are cocksure while the intelligent are full of doubt."

~Bertrand Russell

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Objective Versus Subjective

Seeing is believing?

Session 1.1 - Thinking Differently

How Do We Know What We Know? How Can We Be Sure?

Kennedy v Nixon Debate

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Consider...You have two options

Assume you lead a bank Financial Center site strategy. Competition is fierce and customer traffic has weakened considerably in some markets for a variety of reasons. These centers are a significant cost to BOA.

A change you are considering: You may have to shut down 120 Financial Centers, which would mean the loss of 1,200 jobs.

You are now considering these options:

- **Plan A** - you definitely save 40 of the 120 Financial Centers and 400 jobs.
- **Plan B** - you have a 1/3 chance to save all 120 Financial Centers and 1,200 jobs, but a 2/3 chance to save none of the Financial Centers

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Which of these options?

- **Plan C -** you will definitely lose 2/3 of the Financial Centers and 800 jobs.
- **Plan D -** you have a 2/3 chance to lose all 120 Financial Centers, but a 1/3 chance to lose no Financial Centers and no jobs.

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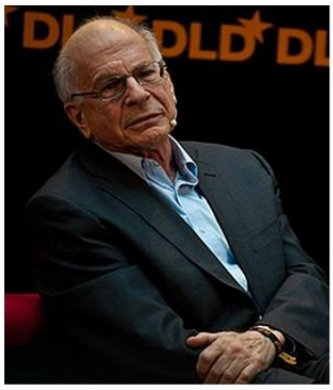
Framing Error

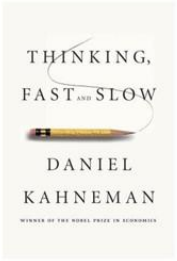


Daniel Kahneman
2002 Nobel Prize Economics

A cognitive bias wherein an individual's choice from a set of options is influenced more by how the information is worded than by the information itself.

Frames: Certainty/Uncertainty
Gains/Losses

Thorough investigation, a critical and analytical approach to information, and the consideration of a diversity of opinions may help avoid the framing effect



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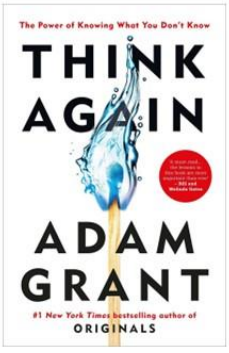
Think Again

Grant challenges conventional wisdom and encourages leaders to embrace a flexible and open mindset, and explores the importance of rethinking, unlearning, and embracing ***intellectual humility*** *to drive innovation and success.*



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We'd like to assume we are rational decision makers...but...

Think of team decisions you have been a part of...

Have you ever made a decision as a team, that neither you, nor any member of the team wanted to do? But, nevertheless, the team decided to do it.

Is that rational?

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Road to Abilene - Rational Decision Making?

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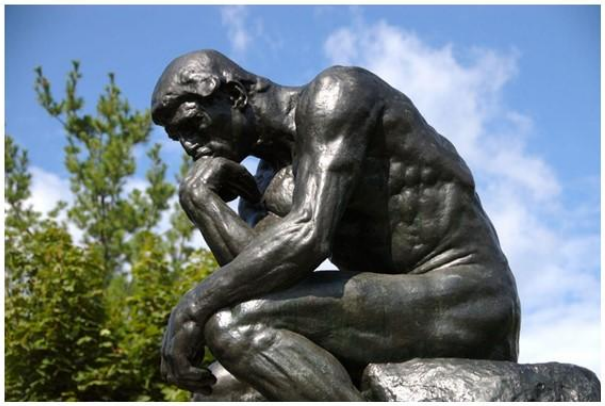
Group Exercise

Hire Regional Banking Executive



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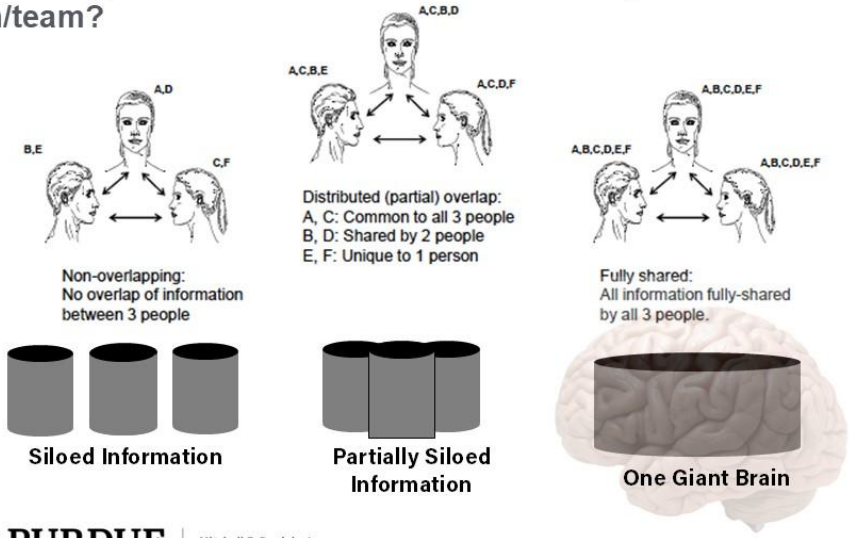
Knowledge Sharing: How information is distributed in your organization/team?



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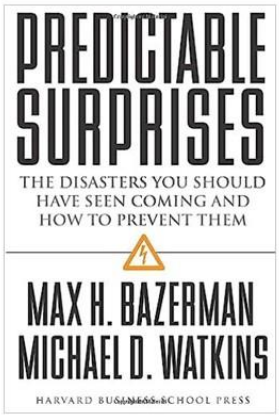
Factors That Explain Predictable Surprise?



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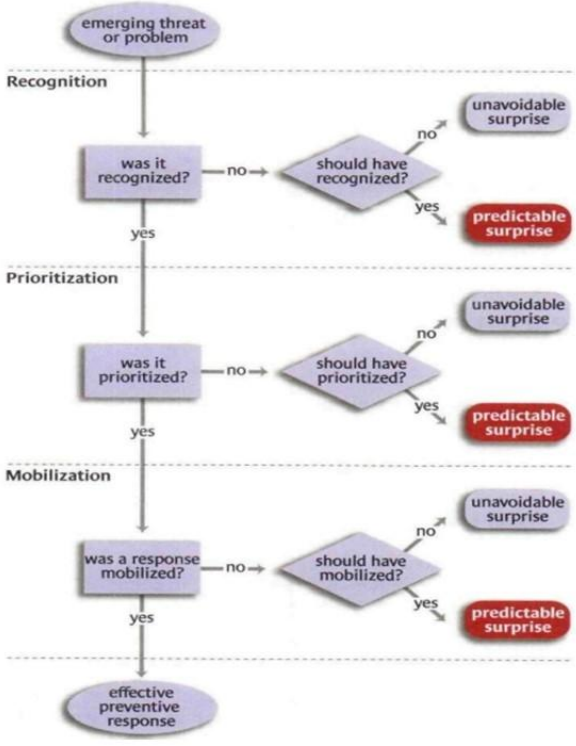
Tool: Avoiding Predictable Surprise



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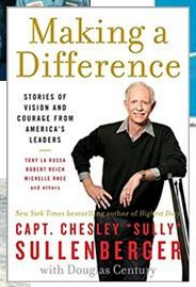
The 3 R's: Routines, Roles, Risk


The Washington Post
FINAL
71 Feared Dead as Plane Hits Bridge, Smashes Cars, Plunges Into Potomac
Metro Train Derails; 3 Die


Boston Sunday Globe
Space shuttle Columbia lost on reentry; 7 astronauts dead



INTERNAL MEMO FROM ROGER BOISJOLY

MORTON THIOKOL, INC. COMPANY PRIVATE
Wasatch Division

Interoffice Memo

31 July 1985
2870:FY86:073

TO: R. K. Lund
Vice President, Engineering

CC: B. C. Brinton, A. J. McDonald, L. H. Sayer, J. R. Kapp

FROM: R. M. Boisjoly
Applied Mechanics - Ext. 3525

SUBJECT: SRM O-Ring Erosion/Potential Failure Criticality

This letter is written to insure that management is fully aware of the seriousness of the current O-Ring erosion problem in the SRM joints from an engineering standpoint.

The mistakenly accepted position on the joint problem was to fly without fear of failure and to run a series of design evaluations which would ultimately lead to a solution or at least a significant reduction of the erosion problem. This position is now drastically changed as a result of the SRM 16A nozzle joint erosion which eroded a secondary O-Ring with the primary O-Ring never sealing.

If the same scenario should occur in a field joint (and it could), then it is a jump ball as to the success or failure of the joint because the secondary O-Ring cannot respond to the clevis opening rate and may not be capable of pressurization. The result would be a catastrophe of the highest order - loss of human life.

An unofficial team (a memo defining the team and its purpose was never published) with leader was formed on 19 July 1985 and was tasked with solving the problem for both the short and long term. This unofficial team is essentially nonexistent at this time. In my opinion, the team must be officially given the responsibility and the authority to execute the work that needs to be done on a non-interference basis (full time assignment until completed).

R. K. Lund 31 July 1985

It is my honest and very real fear that if we do not take immediate action to dedicate a team to solve the problem with the field joint having the number one priority, then we stand in jeopardy of losing a flight along with all the launch pad facilities.

Roger M Boisjoly
R. M. Boisjoly

Concurred by:

Jack R. Kapp
J. R. Kapp, Manager
Applied Mechanics

COMPANY PRIVATE

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Data - Challenger Pre-launch Decision

Data - Challenger Pre-launch Decision

Ambient temperature	Proportion damaged
53	.333
57	.167
58	.167
63	.167
70	.167
70	.167
75	.333

Launch temperature predicted to be 31deg (actual 29 deg)
* Data only included flights where there was damage (range restriction)

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FAXED DATA FROM MORTON THIOKOL

BLOW-BY HISTORY
SRM-15 WORST BLOW-BY
- 2 CASE JOINTS (30°), (110°) ARC
- MUCH WORSE VISUALLY THAN SRM-22

SRM 22 BLOW-BY
- 2 CASE JOINTS (30-40°)

SRM-13A, 15, 16A, 18, 23A 24A
- NOZZLE BLOW-BY

[Ref. 2/14-3 6 of 13]

Joint Primary Concerns — SRM 25

- A Temperature Lower Than Current Data Base Results in Changing Primary O-Ring Sealing Timing Function
- SRM 15A—80° ARC Black Grease Between O-Rings
  SRM 15B—110° ARC Black Grease Between O-Rings
- Lower O-Ring squeeze due to lower temp.
- Higher O-Ring shore hardness
- Thicker grease viscosity
- Higher O-Ring pressure actuation time
- If actuation time increases, threshold of secondary seal pressurization capability is approached
- If threshold is reached then secondary seal may not be capable of being pressurized

CONCLUSIONS:

TEMPERATURE OF O-RING IS NOT ONLY PARAMETER CONTROLLING BLOW-BY

SRM 15 WITH BLOW-BY HAD AN O-RING TEMP AT 53°F
SRM 22 WITH BLOW-BY HAD AN O-RING TEMP AT 75°F
FOUR DEVELOPMENT MOTORS WITH NO BLOW-BY WERE TESTED AT O-RING TEMP OF 47° TO 52°F

DEVELOPMENT MOTORS HAD PUTTY PACKING WHICH RESULTED IN BETTER PERFORMANCE

AT ABOUT 50°F BLOW-BY COULD BE EXPERIENCED IN CASE JOINTS

TEMP FOR SRM 25 ON 1-28-86 LAUNCH WILL BE 29°F 9 AM
38°F 2 PM

HAVE NO DATA THAT WOULD INDICATE SRM 25 IS DIFFERENT THAN SRM 15 OTHER THAN TEMP

[Ref. 2/14-3 12 of 13]

RECOMMENDATIONS:

- O-RING TEMP MUST BE ≥ 53°F AT LAUNCH

  DEVELOPMENT MOTORS AT 47° TO 52°F WITH PUTTY PACKING HAD NO BLOW-BY
  SRM 15 (THE BEST SIMULATION) WORKED AT 53°F

- PROJECT AMBIENT CONDITIONS (TEMP & WIND) TO DETERMINE LAUNCH TIME

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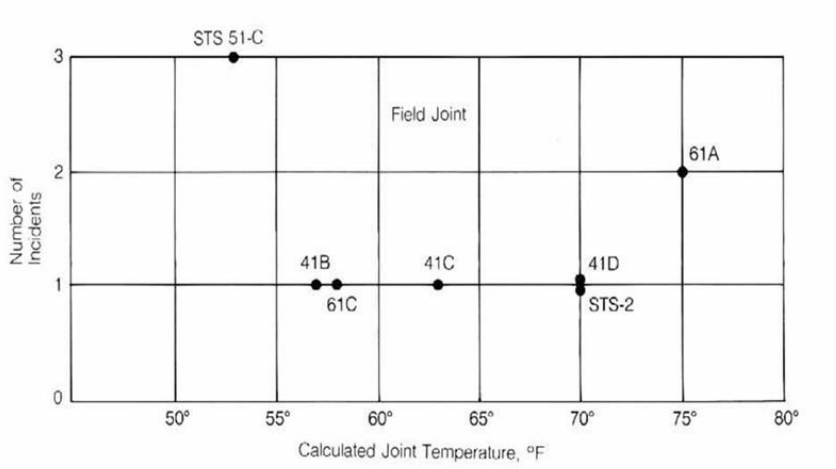
FAX (CONT.)

Plot of Flights with O-Ring Incidents versus Weather-Induced Joint Temperature



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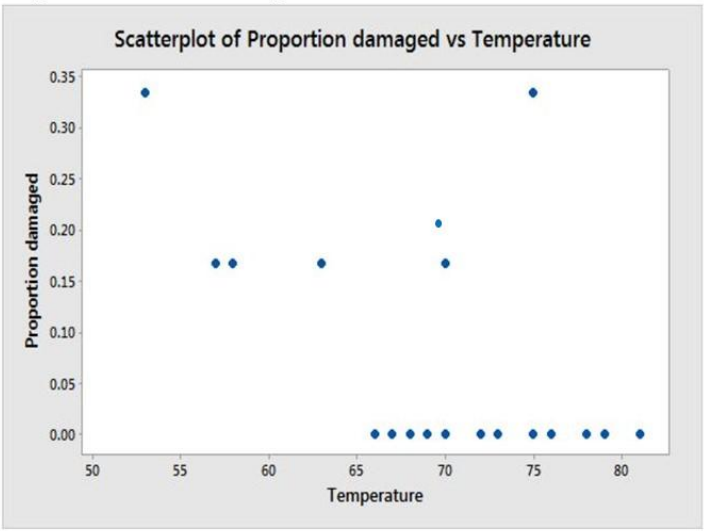
Scatter Plot Including Damaged And Undamaged Launches

Notably, every launch below 65 degrees had damage. 12 of 14 above 65 deg had no damage (14% damaged, 86% no damage)



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Session 1.1 - Thinking Differently

DO OTHERS SEE WHAT I IS SEE? A PARABLE

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Session 1.2

Foundations of Sustainable Continuous Improvement

Continuous Improvement Best Practices

Dr. Brad Alge

PURDUE UNIVERSITY

SESSION 1.2 FOUNDATIONS OF SUSTAINABLE CONTINUOUS IMPROVEMENT – CI BEST PRACTICE

Dr. Brad Alge

PURDUE UNIVERSITY | Mitchell E. Daniels, Jr. School of Business

Module 1 – Foundations of Sustainable Continuous Improvement

Session 1.2 – Continuous Improvement Best Practices

Description

This session provides some best practice that will be instrumental in reinforcing a continuous improvement mindset. We will focus on understanding the change process and the human aspects of change, paradox and ambidexterity, boundary spanning, and critical thinking using an inquiry approach.

Session Objective

- Determining if your team/organization is ready for 'improvement', i.e., change readiness and how to initiate changes; Avoiding a predictable surprise
  - Assess readiness for change
- Recognition of the importance of boundary spanning and apply it to end to end customer business processes and customer journey
  - Types
  - Perspective taking
  - Vignette/exercise
- Understand your role leading a sustained continuous improvement culture
  - Asking the curious questions to develop and establish an inquiry norm
  - Apply critical thinking (model the way)

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Session 1.1 - Thinking Differently

Be Careful of Data Spin

Consider this sobering statistics...

44 %

of

All Marriages End in Divorce

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But....

56 %

of

All Marriages End in **DEATH!!!**

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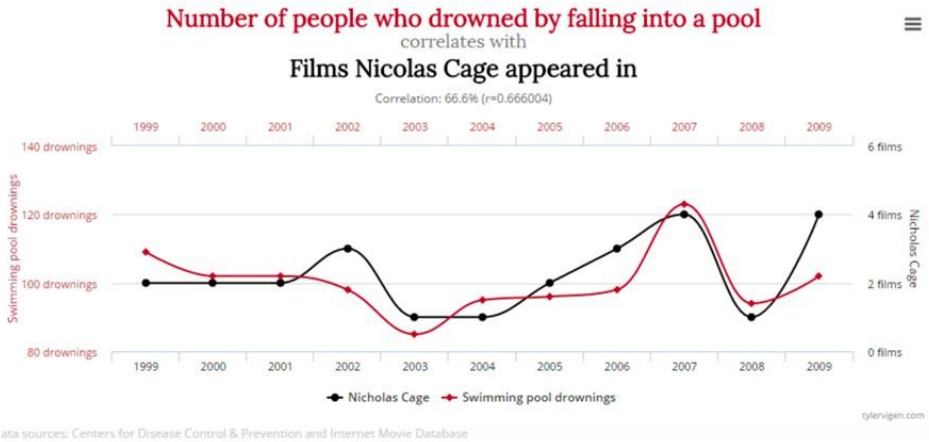
Session 1.2 - CI Best Practices

Real or Spurious?



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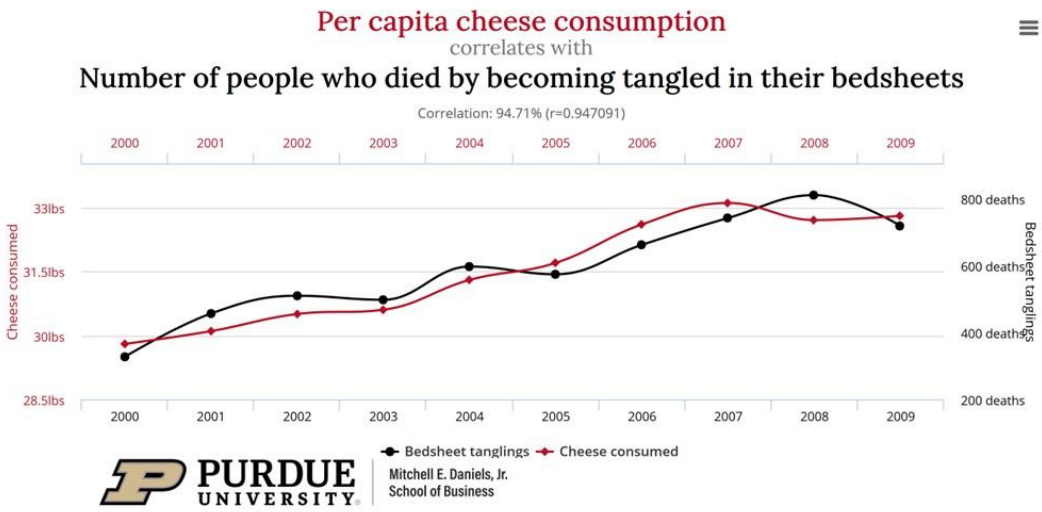
Session 1.2 - CI Best Practices

Real or Spurious?



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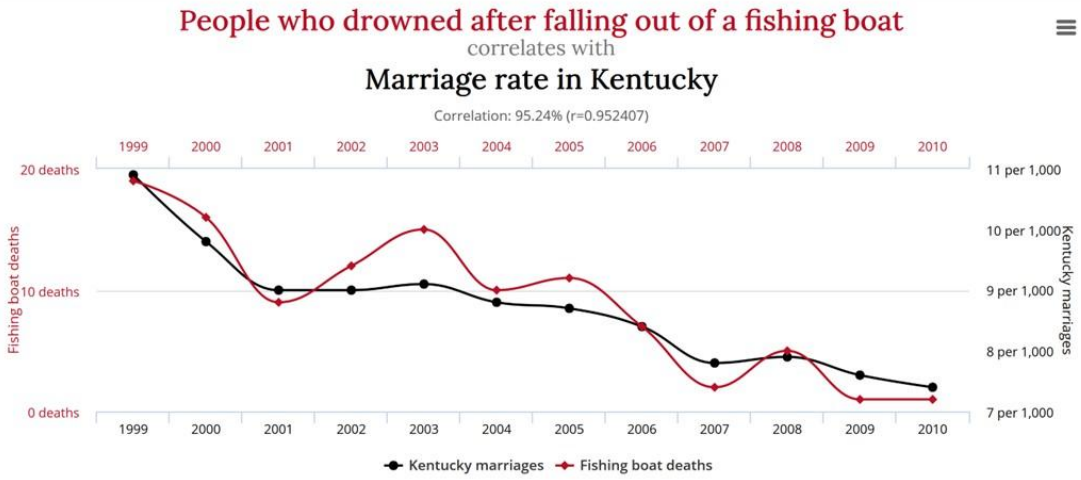
Session 1.2 - Strategic & Engineering Mindsets

Real or Spurious?



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IS IT TIME TO CHANGE?

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Session 1.2 – CI Best Practices

Two Options: Grow or Die

- Let's *MAINTAIN* the good things we have done in the past. Let's EXPLOIT our 'good' (often to the exclusion of EXPLORATION)
- BUT, if what you did yesterday looks so good, what have you done today?
- We are only GROWING or DYING.
- We are never maintaining. If we are maintaining, we are DYING.

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PACE OF CHANGE ...CONSIDER

Fastest diffusion in technology history...

CHATGP penetrated 100 million users in only:

2 Months

World Wide Web took 7 years to penetrate 100 million users

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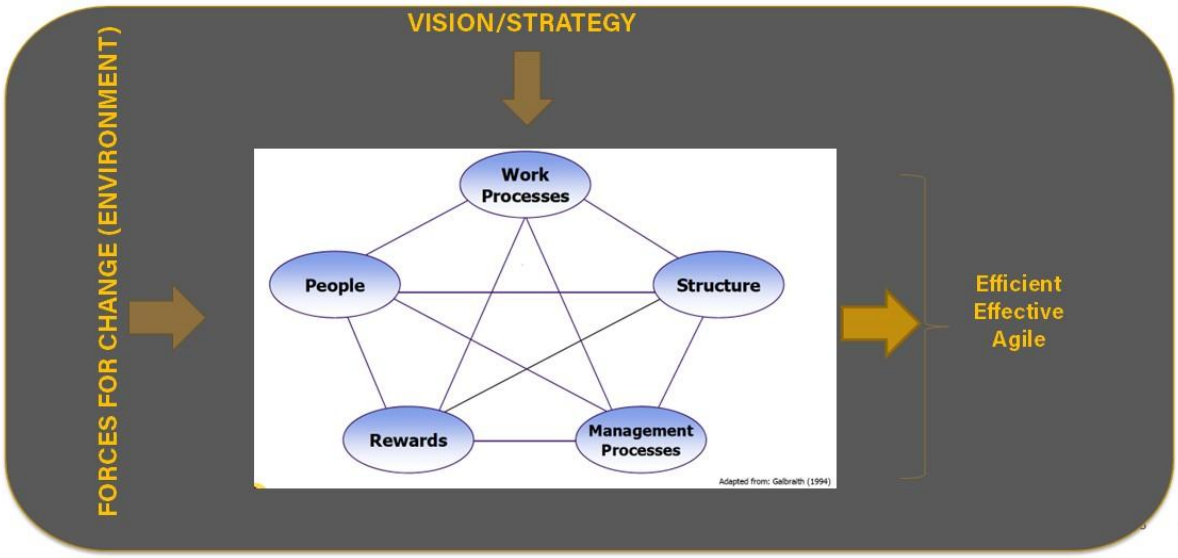
Star Model



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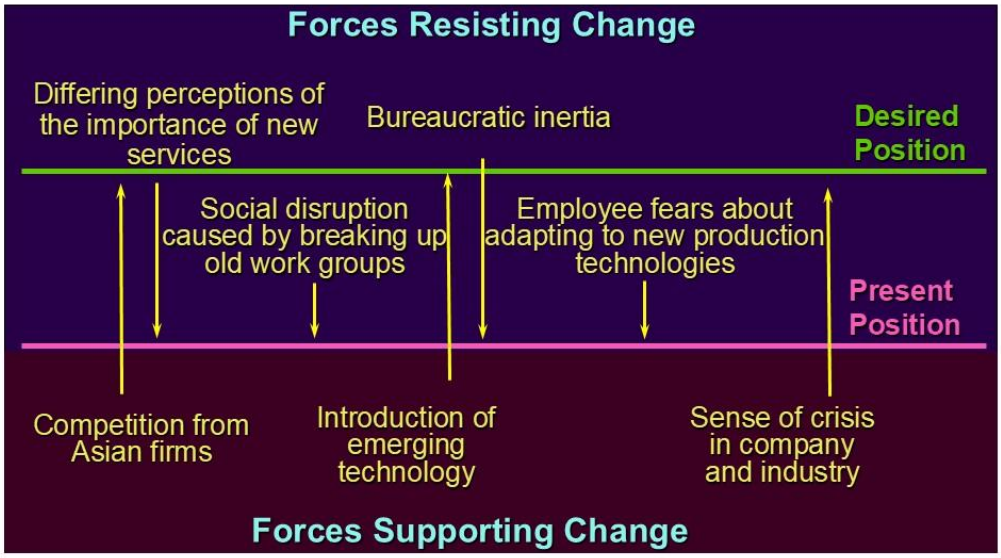
Session 1.2 – CI Best Practices

Forcefield Analysis – Business Case for Change?



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What if we do nothing? The Burning Platform

Year	Budgeted Maint.	Actual Maint.	Surplus
01	$100,000	$40,000	$60,000
02	$110,000	$60,000	$50,000
03	$121,000	$110,000	$11,000
04	$133,000	$210,000	($77,000)
05	$146,000	$335,000	($189,000)
06	$161,000	$485,000	($324,000)
07	$177,000	$660,000	($483,000)
08	$195,000	$1,000,000	($905,000)
	$1,143,000	$3,000,000	($1,857,000)

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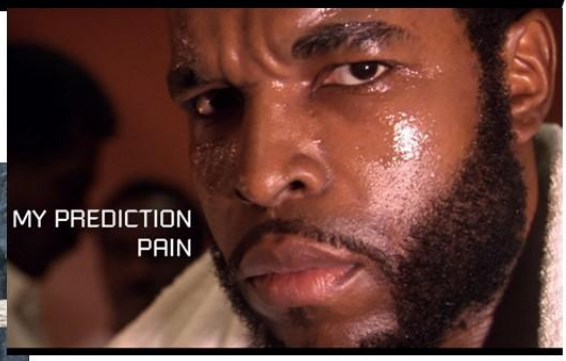
Tell the story: What will our future look like, if we do nothing?



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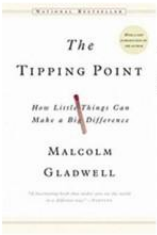
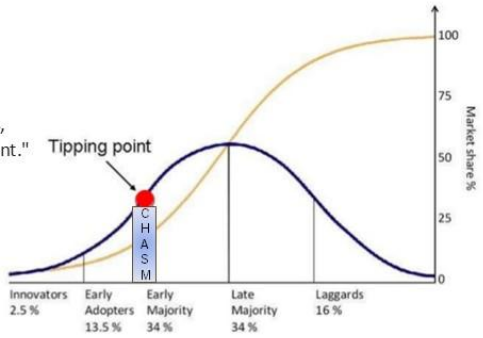
You must drive the change by championing it and finding sustaining sponsors/followers



"the moment of critical mass, the threshold, the boiling point."

Rogers' Diffusion of Innovation Curve



Maloney 16% Rule:
Once you have reached 16% adoption of innovation, you must change your messaging from one based on scarcity, to one based on social proof, to accelerate through the chasm to the reach tipping point

Session 1.2 – CI Best Practices

Paradox – What is it

- Persistent (cannot be resolved)
- Contradictory AND interdependent
- Ongoing tension, dynamic, constantly changing
- Cannot be solved

NOT A Dilemma = YES or NO, THIS or THAT

NOT Contingency = Do A, when B is Present, Else do C

IS a mutuality YES **AND** YES (Explore AND Exploit; Control AND Empower)

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Managerial Ambidexterity

The Roman god Janus had two sets of eyes—one pair focusing on what lay behind, the other on what lay ahead. General managers and corporate executives should be able to relate. They, too, must constantly look backward, attending to the products and processes of the past, while also gazing forward, preparing for the innovations that will define the future

~O'Reilly & Tushman 2004, Harvard Businnes Review

The nimbleness and agility to regulate or balance the persistent, contradictory, interdependent tensions organizations face, and the willingness to persist at solving such tensions, even though they can't be solved.

Examples?

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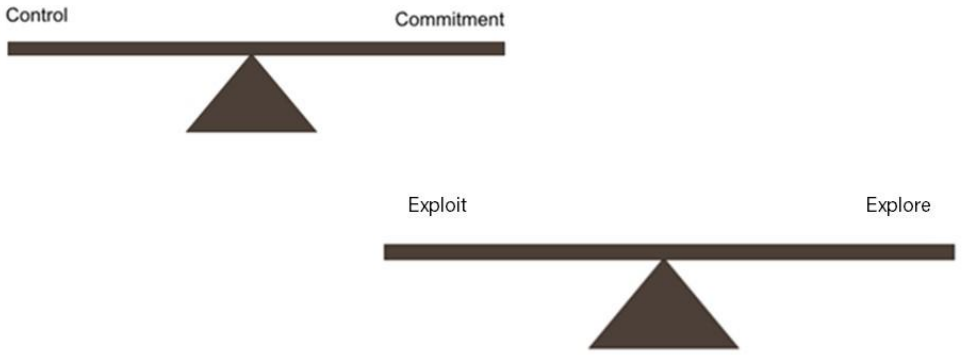
Session 1.3 - CI Best Practices

Paradoxes: Getting to "Yes" and "Yes"



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Paradox Examples

Self (Personal Identity)	Other (Social Identity)
Openness	Closed-ness
Conform	Deviate
Exploit	Explore
Efficiency	Effectiveness
Control	Freedom/Trust
Learning	Performing
Certainty	Uncertainty
Security	Vulnerability
Cooperation	Competition
Individuality	Teamwork
Public (on-stage)	Private (off-stage)

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But, are we really ready for change?

It is critical in the planning for continuous improvement change process to assess the readiness for change. Failure to do so, will increase the likelihood of failure. One way to approach, is by:

- Assessing whether employees (and self) recognize a need for change (urgency)
- Assess their (and self's) willingness to invest effort in the change(s) (commitment)
- Assessing their (and self's) capabilities (KSAs) (ability)

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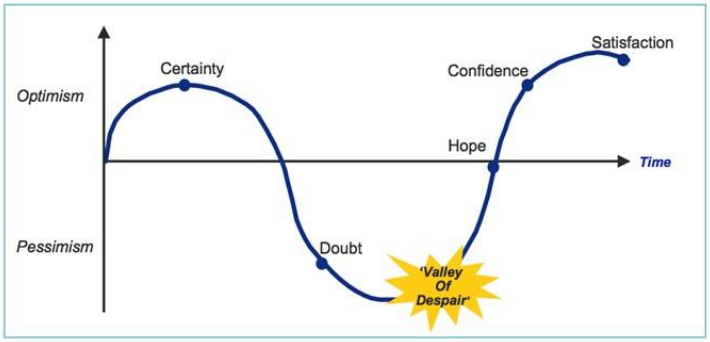
The Change Journey and Dreaded Valley of Despair

The Emotional Cycle of Change



Different people will be in different places at different times – yet the depth of the valley, and the time spent there depend upon the change tactics employed

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A Method for Leading Change

Stage	Actions Needed	Pitfalls
Establish a sense of urgency	• Examine market and competitive realities for potential crises and untapped opportunities. • Convince at least 75% of your managers that the status quo is more dangerous than the unknown.	• Underestimating the difficulty of driving people from their comfort zones • Becoming paralyzed by risks
Form a powerful guiding coalition	• Assemble a group with shared commitment and enough power to lead the change effort. • Encourage them to work as a team outside the normal hierarchy.	• No prior experience in teamwork at the top • Relegating team leadership to an HR, quality, or strategic-planning executive rather than a senior line manager
Create a vision	• Create a vision to direct the change effort. • Develop strategies for realizing that vision.	• Presenting a vision that's too complicated or vague to be communicated in five minutes
Communicate the vision	• Use every vehicle possible to communicate the new vision and strategies for achieving it. • Teach new behaviors by the example of the guiding coalition.	• Undercommunicating the vision • Behaving in ways antithetical to the vision
Empower others to act on the vision	• Remove or alter systems or structures undermining the vision. • Encourage risk taking and nontraditional ideas, activities, and actions.	• Failing to remove powerful individuals who resist the change effort
Plan for and create short-term wins	• Define and engineer visible performance improvements. • Recognize and reward employees contributing to those improvements.	• Leaving short-term successes up to chance • Failing to score successes early enough (12-24 months into the change effort)
Consolidate improvements and produce more change	• Use increased credibility from early wins to change systems, structures, and policies undermining the vision. • Hire, promote, and develop employees who can implement the vision. • Reinvigorate the change process with new projects and change agents.	• Declaring victory too soon—with the first performance improvement • Allowing resistors to convince "troops" that the war has been won
Institutionalize new approaches	• Articulate connections between new behaviors and corporate success. • Create leadership development and succession plans consistent with the new approach.	• Not creating new social norms and shared values consistent with changes • Promoting people into leadership positions who don't personify the new approach

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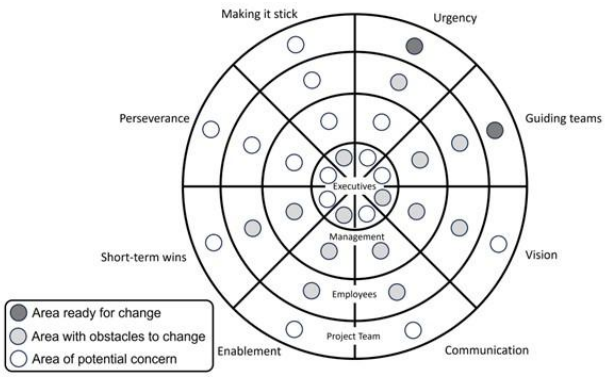
Change Readiness Dimensions



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Tools: Change Readiness Assessment

ORIC measures Change Commitment and Change Efficacy

Additional file 1 Organizational Readiness for Implementing Change (ORIC)

	1 Disagree	2 Somewhat Disagree	3 Neither Agree nor Disagree	4 Somewhat Agree	5 Agree
1. People who work here feel confident that the organization can get people invested in implementing this change.	1	2	3	4	5
2. People who work here are committed to implementing this change.	1	2	3	4	5
3. People who work here feel confident that they can keep track of progress in implementing this change.	1	2	3	4	5
4. People who work here will do whatever it takes to implement this change.	1	2	3	4	5
5. People who work here feel confident that the organization can support people as they adjust to this change.	1	2	3	4	5
6. People who work here want to implement this change.	1	2	3	4	5
7. People who work here feel confident that they can keep the momentum going in implementing this change.	1	2	3	4	5
8. People who work here feel confident that they can handle the challenges that might arise in implementing this change.	1	2	3	4	5
9. People who work here are determined to implement this change.	1	2	3	4	5
10. People who work here feel confident that they can coordinate tasks so that implementation goes smoothly.	1	2	3	4	5
11. People who work here are motivated to implement this change.	1	2	3	4	5
12. People who work here feel confident that they can manage the politics of	1	2	3	4	5

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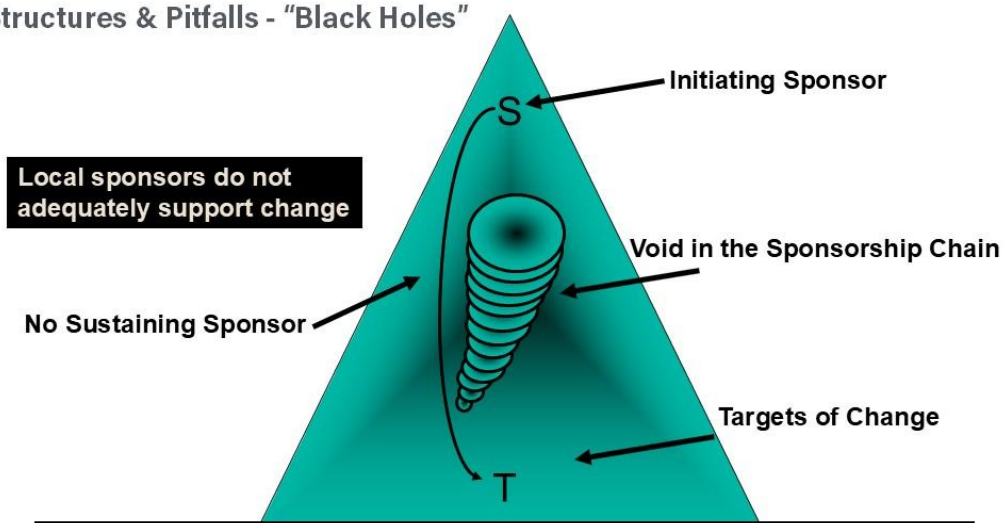
Role Structures & Pitfalls - "Black Holes"



Black Holes develop when targets hear one thing from Senior Management and something different from their supervisors.

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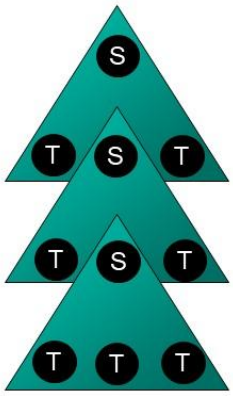
Role Structures & Pitfalls



The remedy to the Black Hole phenomenon is Cascading Sponsorship

The initiating sponsors enlist the commitment of other key managers below them to support the change throughout the organization.

First: The sponsor deals with his/her direct reports as targets to address their concerns

Second: The sponsor then helps them to understand their role as sustaining sponsors

Change cannot succeed without a network of sustaining sponsorship that constantly reinforces the importance of a change as it moves through the organization.

FACILITATING CONTINOUS IMPROVEMENT

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Barrier to Customer Value Creation

The Challenge

Customer innovation initiatives increasingly require people to collaborate across functional and other boundaries. But breaking down silos remains frustratingly difficult.

The Cause

Executives and employees don't know how to identify expertise outside their own work domains and struggle to understand the perspectives of colleagues who think very differently than them.

The Solution

Help your teams connect with and relate to people across organizational divides by doing 3 things:

1. Develop and deploy 'cultural brokers'; Inform teams of networks of expertise within and outside the organization (be a bridge)
2. Perspective taking – getting your team to see things through another's eyes
3. Encourage and train team to ask the right questions

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Cultural Brokers

- Bridging
  - You serve as a "go between" allowing people in different functions to collaborate with minimal disruption to their daily routine
  - Encourage networking across and out
- Binding
  - You serve to bring different networks, functions, communities together to facilitate mutual understanding and lasting relationships

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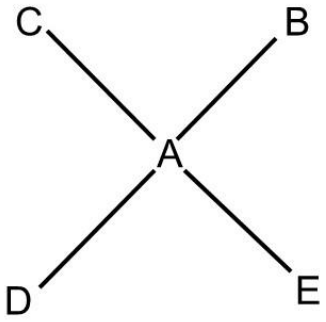
Network (Communication) Structures: Information flow, innovation, and learning

Example 1 E — D — C — B — A

Example 2



Example 3

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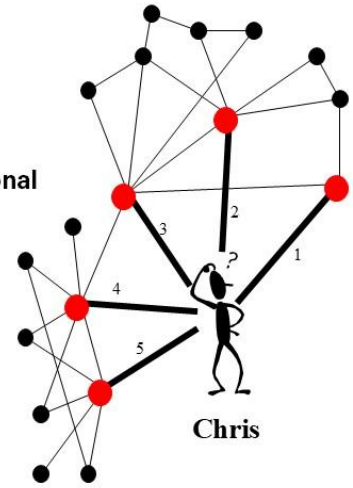
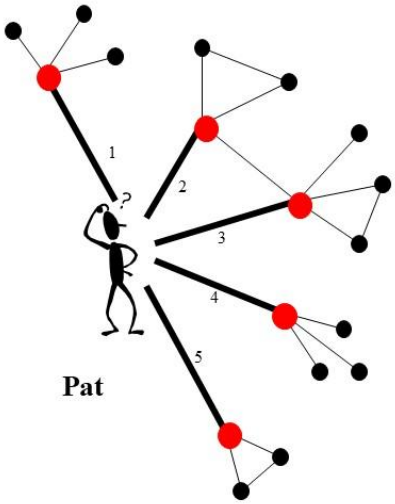
Networks and power: Who has more power?

End-to-End Cross-functional Network





Siloed Network

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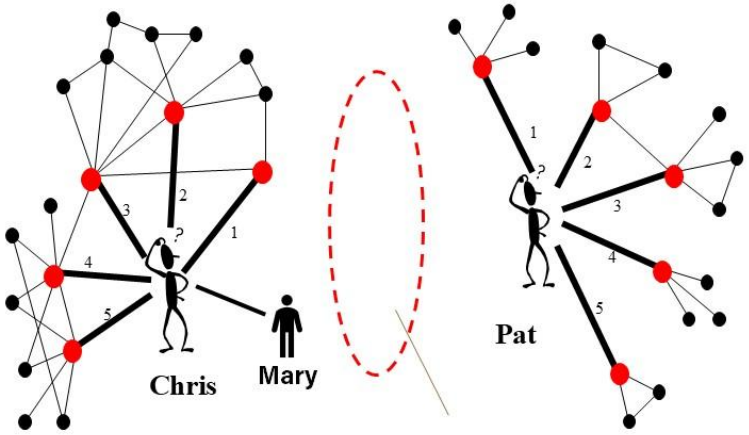
Who has least power? Which network is better positioned to learn, grow, and innovate

End-to-End Cross-functional Network



Siloed Network

Problem: Structural Hole

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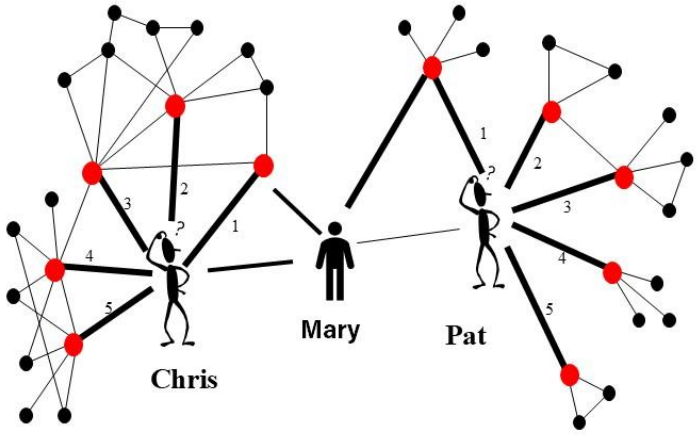
There's Something About Mary: Bridge (fills structural hole)

Beginning to look like a collaborative end-to-end cross-functional network!

What do your social networks look like?



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MANAGING BOUNDARIES & SILOS

Boundaries – Impediments to Operational Excellence, Change?

Q. What types of boundaries are there at work?

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Examples of Hypothetical Customer Journeys

		Retail banking	Wealth management	SME banking	Commercial banking
Build new relationship	Helping the customer open a new account	• Opening a personal account so the customer can perform transactions and pay bills	• Planning for retirement (financial planning)	• Opening a multiproduct business account	• Opening a multiproduct commercial account
Borrow	Helping the customer borrow money	• Home purchase • Other large purchase (e.g., a car or boat) • Fast funding (unsecured)	• Investments (mortgages, commercial real estate)	• For working capital • For capital expenditures • For real estate • For equipment	• For working capital • For capital expenditures • For real estate • For equipment
Deepen relationship	Helping to promote customer's financial well-being	• Saving for college • Assistance with financial difficulties • Assistance with financial education	• Renew/update financial wealth plan • Save and grow wealth (ongoing financial advice)	• Financial decisions • Succession planning • Investments	• Financial decisions • Raise/refinance equity or debt from capital markets • Investments
	Helping the customer with transactions and payments	• Bill payment, checks, personal finance management apps • Debt management	• Wealth portfolio management (rebalancing, trading)	• Debt management • Export/import • Cash and liquidity management	• Debt management • Export/import • Cash and liquidity management
Get service	Helping to solve the customer's problems and issues	• Unrecognized transactions (fraud, disputes) • Problems, service needs • Account closures	• Unrecognized transactions (fraud, disputes) • Problems, service needs • Account closures and asset transfers	• Unrecognized transactions (fraud, disputes) • Problems, service needs • Account closures	• Unrecognized transactions (fraud, disputes) • Problems, service needs • Account closures

Source: BCG analysis.

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Functional Silos

Structural boundaries that are an enemy of collaboration, innovation

Silo mindset

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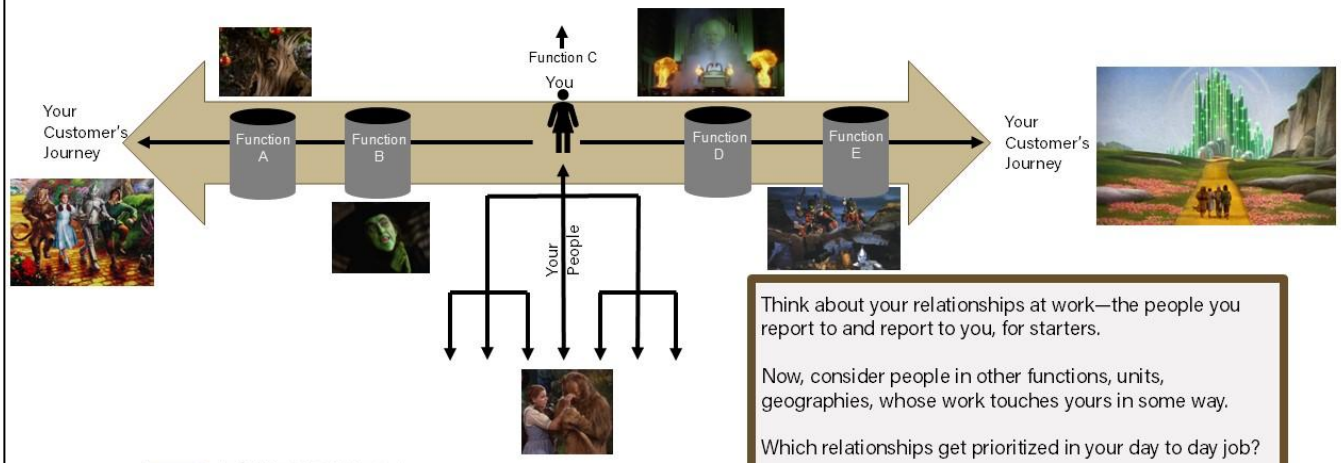
Vertical and Horizontal Boundaries



Think about your relationships at work—the people you report to and report to you, for starters.

Now, consider people in other functions, units, geographies, whose work touches yours in some way.

Which relationships get prioritized in your day to day job?

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Video Case: Vertical Boundary Spanning & Perspective Taking

Do you have Brian Lillies' on Your Team?

Facing tight deadlines and a difficult project, a manager must deal with an overbearing boss who is hampering progress

Role Play

What are your take-aways?

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WATCH SEGMENT 1

How does the personality of the sponsor/boss affect the project and the team? (how does your team see you?)

Have you ever had an experience when your boss undermined the progress of the project? (imagine the effect this has on team members)

How should the VP handle this situation?

What are his options and what are the advantages and disadvantages of each?

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Small Group Discussion

Design a bullet-point strategy how to interact with the executive sponsor. Keep in mind that the project is under time constraint and the confrontation could affect the productivity of the team.

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ROLE PLAY

- Need 2 volunteers!

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WATCH SEGEMENT 2

Would you have done same thing?

What other options did he have?

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WATCH SEGEMENT 3

Have you ever had an experience where your boss became defensive toward your suggestions? How did you manage the situation?

What would you do differently from Lillie's approach to the defensive response from the sponsor?

How should the VP continue to improve communication with the sponsor?

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WATCH SEGMENT 4

How does timing and setting impact the success of a difficult conversation?

Could the VP's decision have backfired and had adverse effects on the project (i.e., was there risk)?

Were there occasions where direct conversation and cordial confrontation were not appropriate? Did you have such experience, when you had to restrain yourself from confronting your boss?

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TWO KEYS TO HORIZONTAL BOUNDARY SPANNING

1. Learning about people on the other side of a boundary (Bridging)
2. Relating to them (and their world) (Binding)

SIMPLE IN CONCEPT, HARD IN PRACTICE

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TAKE HOME TASKS: 3-3-3 PLAN FOR EXPANDING THE NET

- In the **next three days**, talk to three people outside your business unit or company (e.g., customer); learn what they do, how it helps the company, and how it may apply to your work.
- In the **next three weeks**, reconnect with people outside the company who may shed useful light on your work, industry, or career. Have lunch.
- Make a list of five people you need to get to know better to do better at delivering customer value and/or operational excellence. Figure out ways to strengthen your relationship over the **next three months**

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CRITICAL THINKING & INQUIRY MINDSET

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Study: 1,000 Middle Managers at a Large Bank

Study found value of inquisitiveness in boundary-crossing work.

It showed that managers with high levels of curiosity were more likely to build networks that spanned disconnected parts of the company.

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Inquiring Minds Want to Know

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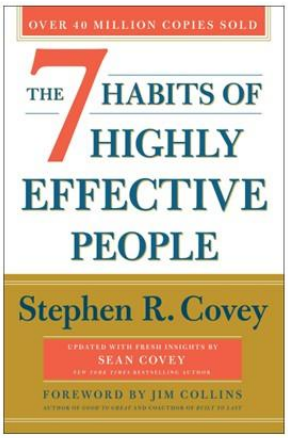
SIMPLE AND POWERFUL

"Seek first to understand, then be understood"



START WITH WHY

"WHY?"

is your friend, one of your most powerful tools to drive continuous improvement

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Why do we fail to ask questions--especially as we move up in the organization?

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Setting the Table: Psychological Safety

A shared belief that the team is safe for interpersonal risk taking; mistakes okay

1. Is risk encouraged and supported? Why or why not?
2. Do people, of their own volition, speak up, voice their opinions or do they withhold?
3. Are mistakes seen as a learning opportunity? Or a control (punishment) opportunity?

See: Edmondson, Amy C.; Mortensen, Mark (2021-04-19). "What Psychological Safety Looks Like in a Hybrid Workplace". Harvard Business Review. ISSN 0017-8012.

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Advocacy versus Inquiry

Attributes	Advocacy	Inquiry
What is the goal?	To win	To arrive at best possible solution together
How do you play?	Forcefully present your point of view to gain adherents to it	Seek to surface relevant information and perspectives
What are the unstated rules of the game?	The points go to the winner; those with most power often get the last word.	It's a collective learning exercise the purpose of which is to develop understanding and new possibilities
How do you see others?	As competitors	As collaborators
How do you do when there are gaps in your argument?	Hide them	Reveal them, they can trigger places where others can be of most help
How do you treat dissenters?	Suppress them	Welcome them as helping enrich analysis

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The Fix?

- Model the way
- Teach your team the art of inquiry

Common Pitfalls	Effective Inquiry
Start with yes-or-no questions	Start with open ended questions that minimize pre-conceptions. ("How are things going on your end?" "What does your group see as the key opportunity in this space?" "How can we help?"
Continue asking overly general questions ("What's on your mind?") that may invite long off-point responses	As collaborations develop, ask questions that focus on specific issues but allow people plenty of room to elaborate ("What do you know about X?" "Can you explain how that works?")
Assume you have grasped what speaker intended.	Check your understanding by summarizing what you're hearing and asking explicitly for corrections or missing elements. ("Does that sound right? Am I missing anything?" "Can you help me fill in the gap?"
Assume the collaboration process will take care of itself.	Periodically, take time to inquire into others' experiences of the process or relationship. ("How do you think the project is going?" "What can we do to work together more effectively?

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Tool: Intellectual Stimulation by Asking Curious Questions

___ I am curious about

___ Tell me more

___ That's not been my experience

___ I'm wondering

___ Help me understand

___ Walk me through that

___ What are your assumptions?

___ What if your assumptions are wrong?

___ Tell me why this doesn't work/fit for you?

___ Why do you think that?

___ What if?

___ What do you need from me?

___ What are you hearing, how can I clarify?

___ What is my story

___ What data are you basing this on?

___ What data would you need to change your mind?

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QUESTIONS?

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CHANGE READINESS ASSESSMENT
WORKSHEET

Instructions:

- Consider your line of business when responding to questions. Your response should reflect your experience and what you have been able to observe in your line of business.
- For each question, check mark an appropriate box that most closely represents your current situation. Answer each question based on the six-point continuum as a referent point, ranging from "Strongly Disagree" to "Strongly Agree". There is also a box to indicate if you "do not know".
- There are no 'right' or 'wrong' answers. Please answer openly and honestly.
- Your responses will remain confidential.
- The questionnaire below follows the basic steps/framework established by John Kotter in his Harvard article entitled "Leading Change".

In responding, consider a recent (past) or current major change initiative(s) in your organization (i.e. line of business). Could be a change you are considering now. As a whole:

STEP 1: **ESTABLISHING A SENSE OF URGENCY**	Strongly Disagree					Strongly Agree	Do not know
Maintaining 'business as usual' (i.e., status quo) is unacceptable to everyone in this LOB/organization.	☐	☐	☐	☐	☐	☐	☐
Individuals are asking difficult or challenging questions so as to validate the need for this (these) change(s).	☐	☐	☐	☐	☐	☐	☐
There is a sense that people have a greater awareness of customers, the competition, the industry, and the external environment	☐	☐	☐	☐	☐	☐	☐
There is a general feeling that we cannot afford to fall short of our objectives related to this (these) change(s).	☐	☐	☐	☐	☐	☐	☐
= TOTAL	**x1**	**x2**	**x3**	**x4**	**x5**	**x6**	
Add check marks in vertical columns and multiply by column number to get sub-totals, then add sub-totals to get an overall total. Minimum Score = 4 = Very High Risk; Maximum Score = 24 = Very Low Risk; Any score below a 16 is considered a risk and should be an area of concern going forward.							

Total for STEP 1 _____

STEP 2: **BUILDING GUIDING COALITION/TEAM**	Strongly Disagree					Strongly Agree	Do not know
There is a shared commitment in this LOB/organization to driving forward with current change initiative(s).	☐	☐	☐	☐	☐	☐	☐
People are encouraged to work as a cross-functional team, even if it means working outside of the current hierarchy, so as to achieve change objective(s).	☐	☐	☐	☐	☐	☐	☐
There are people who support this change at all levels within the LOB/organization	☐	☐	☐	☐	☐	☐	☐
The leadership here, at all levels, provides strong support for the change initiative(s).	☐	☐	☐	☐	☐	☐	☐
= TOTAL	**x1**	**x2**	**x3**	**x4**	**x5**	**x6**	
Add check marks in vertical columns and multiply by column number to get sub-totals, then add sub-totals to get an overall total. Minimum Score = 4 = Very High Risk; Maximum Score = 24 = Very Low Risk; Any score below a 16 is considered a risk and should be an area of concern going forward.							

Total for Step 2_____

STEP 3: **CLARITY OF PURPOSE/VISION**	Strongly Disagree					Strongly Agree	Do not know
There is a strong, shared sense of purpose going forward.	☐	☐	☐	☐	☐	☐	☐
I believe our vision for change is compelling and attractive.	☐	☐	☐	☐	☐	☐	☐
Most of us affected by change initiative(s) can communicate the vision for change in three minutes or less.	☐	☐	☐	☐	☐	☐	☐
The vision of this change takes into account the long-term interests of everyone in this organization.	☐	☐	☐	☐	☐	☐	☐
= TOTAL	**x1**	**x2**	**x3**	**x4**	**x5**	**x6**	
Add check marks in vertical columns and multiply by column number to get sub-totals, then add sub-totals to get an overall total. Minimum Score = 4 = Very High Risk; Maximum Score = 24 = Very Low Risk; Any score below a 16 is considered a risk and should be an area of concern going forward.							

Total for STEP 3_____

STEP 4: **COMMUNICATING VISION**	Strongly Disagree					Strongly Agree	Do not know
The vision for change is clear to all.	☐	☐	☐	☐	☐	☐	☐
Leadership continually reinforces the vision through communication and action.	☐	☐	☐	☐	☐	☐	☐
Vision, goals, and strategies for change are continually discussed in management meetings and in formal and informal gatherings.	☐	☐	☐	☐	☐	☐	☐
This LOB/organization does a good job of timely communication about change efforts and progress being made toward meeting change goals.	☐	☐	☐	☐	☐	☐	☐
= TOTAL	**x1**	**x2**	**x3**	**x4**	**x5**	**x6**	
Add check marks in vertical columns and multiply by column number to get sub-totals, then add sub-totals to get an overall total. Minimum Score = 4 = Very High Risk; Maximum Score = 24 = Very Low Risk; Any score below a 16 is considered a risk and should be an area of concern going forward.							

Total for STEP 4_____

STEP 5: **EMPOWERING OTHERS TO ACT**	Strongly Disagree					Strongly Agree	Do not know
People are free to take the necessary risks to achieve change objectives.	☐	☐	☐	☐	☐	☐	☐
People are given the necessary tools and support to achieve change objectives.	☐	☐	☐	☐	☐	☐	☐
Managers/supervisors who are unwilling to support change or have the power to inhibit others from doing so are dealt with in an appropriate manner.	☐	☐	☐	☐	☐	☐	☐
Leaders at all levels do a good job of removing obstacles that keep LOB/Organization from achieving our change goals.	☐	☐	☐	☐	☐	☐	☐
= TOTAL	**x1**	**x2**	**x3**	**x4**	**x5**	**x6**	
Add check marks in vertical columns and multiply by column number to get sub-totals, then add sub-totals to get an overall total. Minimum Score = 4 = Very High Risk; Maximum Score = 24 = Very Low Risk; Any score below a 16 is considered a risk and should be an area of concern going forward.							

Total for STEP 5_____

STEP 6: **PLANNING FOR and** **CREATING SHORT-TERM WINS**	Strongly Disagree					Strongly Agree	Do not know
When achievements or progress is made, we regularly celebrate it.	☐	☐	☐	☐	☐	☐	☐
Short-term wins are clearly communicated to all.	☐	☐	☐	☐	☐	☐	☐
People who are involved in successful change outcomes, are rewarded and recognized	☐	☐	☐	☐	☐	☐	☐
Change objectives are set in ways that enable us to achieve some short-term wins.	☐	☐	☐	☐	☐	☐	☐
= TOTAL	**x1**	**x2**	**x3**	**x4**	**x5**	**x6**	
Add check marks in vertical columns and multiply by column number to get sub-totals, then add sub-totals to get an overall total. Minimum Score = 4 = Very High Risk; Maximum Score = 24 = Very Low Risk; Any score below a 16 is considered a risk and should be an area of concern going forward.							

Total for STEP 6_____

STEP 7: **CONSOLIDATING IMPROVEMENT,** **PRODUCING MORE CHANGE**	Strongly Disagree					Strongly Agree	Do not know
When selecting, promoting, and developing employees, the vision for change is used as a barometer for decision-making.	☐	☐	☐	☐	☐	☐	☐
New and additional resources are brought on board to sustain change efforts.	☐	☐	☐	☐	☐	☐	☐
Leadership welcomes new ideas for continual improvement and furthering change.	☐	☐	☐	☐	☐	☐	☐
Leadership clearly monitors and measures progress of change efforts.	☐	☐	☐	☐	☐	☐	☐
= TOTAL	**x1**	**x2**	**x3**	**x4**	**x5**	**x6**	
Add check marks in vertical columns and multiply by column number to get sub-totals, then add sub-totals to get an overall total. Minimum Score = 4 = Very High Risk; Maximum Score = 24 = Very Low Risk; Any score below a 16 is considered a risk and should be an area of concern going forward.							

Total for STEP 7_____

STEP 8: **INSTITUTIONALIZE NEW APPROACHES**	Strongly Disagree					Strongly Agree	Do not know
Leadership does a good job of preparing future leaders to carry out the change vision.	☐	☐	☐	☐	☐	☐	☐
When employees engage in behaviors that support the change vision, they are rewarded.	☐	☐	☐	☐	☐	☐	☐
When individuals fail to support the changes, leadership has the courage to let them go.	☐	☐	☐	☐	☐	☐	☐
Employees receive constant feedback to let them know that they are doing the 'right things' to ensure success of change.	☐	☐	☐	☐	☐	☐	☐
= TOTAL	**x1**	**x2**	**x3**	**x4**	**x5**	**x6**	
Add check marks in vertical columns and multiply by column number to get sub-totals, then add sub-totals to get an overall total. Minimum Score = 4 = Very High Risk; Maximum Score = 24 = Very Low Risk; Any score below a 16 is considered a risk and should be an area of concern going forward.							

Total for STEP 8_____

Thank you for completing this Readiness Assessment. Please summarize your total for each of the 8 sections above:

SUMMARY

STEP	**SCORE (TOTAL)**
1. Establishing a Sense of Urgency	
2. Building a Guiding Coalition/Team	
3. Clarity of Purpose/Vision	
4. Communicating Vision	
5. Empowering Others to Act on Vision	
6. Creating Short-Term Wins	
7. Consolidating Change/Producing More Changes	
8. Institutionalizing New Approach	

Grand Total: _____

Maximum possible is 192. As an aggregate, a score of less than 128 is considered a risk going forward. A Score of below 64 is a very high risk.

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Session 1.3

Foundations of Sustainable Continuous Improvement

Process Improvement Tools

Dr. Patrick Brunese

PURDUE UNIVERSITY

SESSION 1.3 SUSTAINABLE CONTINUOUS IMPROVEMENT – PROCESS ANALYSIS TOOLS

Dr. Patrick A. Brunese
Edwardson School of Industrial Engineering

Previous contributions and development by:
Cindy Farrer, Purdue Manufacturing Extension – Quality and Supply Chain
Dr. Ben Fong, Edwardson School of Industrial Engineering

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Module 1 – Foundations of Sustainable Continuous Improvement (CI)

Overview

I. Setting the Stage

II. Process Variation

III. Statistical Process Control (SPC), Variability & Control Charts

IV. Process Stability & Capability

V. Sustainable Improvement Perspectives

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Module 1 - Foundations of Sustainable CI

A provocation…

(Doc B's Key Assumption) ***You are a process owner.***

- Step 1: Draw one of your processes.
  - *What do you see?*

Module 1 - Foundations of Sustainable CI

A provocation…

(Doc B's Key Assumption) ***You are a process owner.***

- Step 1: Draw one of your processes.
  - *What do you see?*
- Step 2: What do you measure?
  - *What data do you collect on your process?*
  - *Why do you collect it that way, and what does it mean to you?*

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Module 1 - Foundations of Sustainable CI

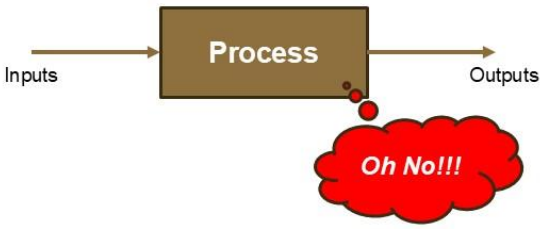
A provocation…

(Doc B's Key Assumption) ***You are a process owner.***

- Step 1: Draw one of your processes.
  - *What do you see*
- Step 2: What do you measure?
  - *What data do you collect on your process?*
  - *Why do you collect it that way, and what does it mean to you?*
- Step 3: How do you make decisions based related to process operations?
  - ***Do you ever wish you could get a do-over on a past decision? Why?***

Module 1 - Foundations of Sustainable CI

Another view…



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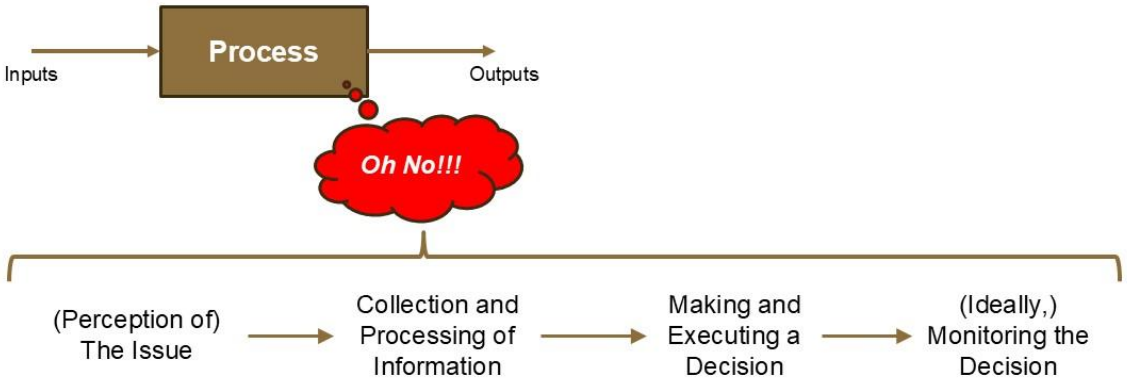
Another view…



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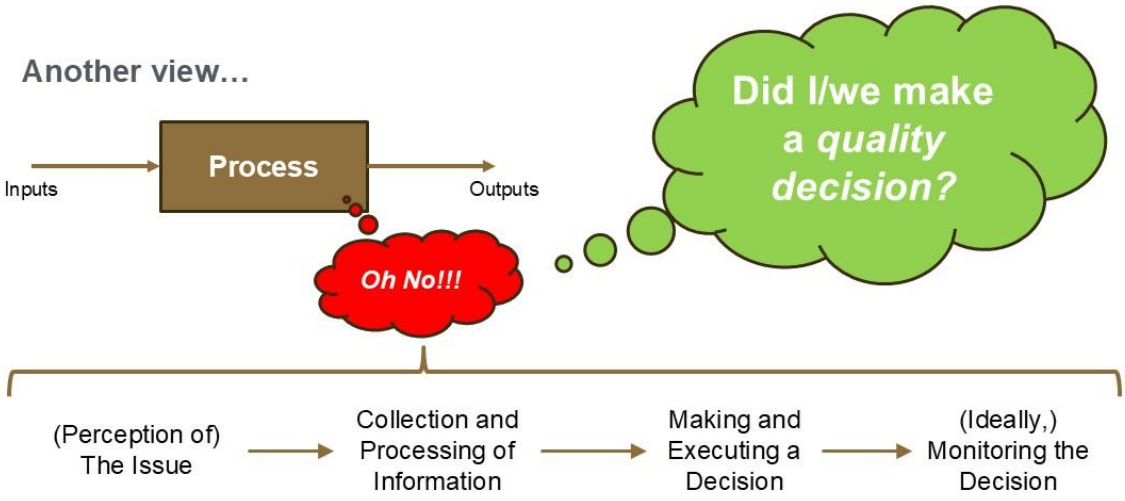
Another view…



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Module 1 - Foundations of Sustainable CI

Control Charts and Statistical Process Control

Description

This session is to help you gain familiarity of two important process analysis and improvement tools, specifically Control Charts and Statistical Process Control (SPC). These powerful tools are especially valuable in situations where it is crucial to understand and control variation.

Session Objectives

- Understand types of process variation and impact
- Gain knowledge of Statistical Process Control and Control Charts and the value of these in driving operational improvement
- Recognize how to support the use of SPC and Control Charts to improve operational excellence.

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What is SPC?

- SPC stands for Statistical Process Control.
- The purpose of SPC is to ensure that a process is “under control”, help produce products or services that meets customer specifications and identify when process variation exceeds the statistical upper or lower limits of “common cause” variation.
- SPC is used widely across industries to improve product and service quality, reduce costs and increase customer satisfaction.

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Is SPC relevant to the banking industry?

- Do clients or downstream customers experience issues with service quality or transaction errors?
- Are error rates or variation in transaction processing affecting operational efficiency?
- Do loan approval times vary across different branches or teams?
- Are the costs associated with correcting errors or honoring service guarantees exceeding budgets?
- Are there issues in employee turnover or workforce allocation that affect branch operations?
- Do patterns of security breaches or fraud exist that could be systematically prevented?
- Is the success rate of first contact issue resolution inconsistent among customer service representatives?
- Do any processes, like loan origination or account closure, take longer than benchmarks?
- Is your division/branch meeting all financial/profitability goals?

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Bank ATM Servicing Example: Process What You Carry (PWYC)

Servicing ATM vendors will process ATM cash themselves rather than delivering to a centralized vault creating a single chain of custody

- Removed hand-offs and processing cash closer to ATMs
- Targeted four large centralized processing markets
- Streamlined exceptions research
- De-risk vendor network by reducing concentration
- Strengthen resiliency plan
- PWYC is a criteria of ATM recyclers

Dramatic improvement in cycle time SLA performance since transition to PWYC

Deposit Pulls Reporting Summary	% Auto Matched within 3 Business Days													
	YTD	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24
	2024														
Vault A	96.10%	82.69%	97.74%	81.87%	47.82%	91.11%	94.97%	82.50%	75.96%	90.21%	98.78%	98.43%	99.36%	95.57%	99.73%
Vault B	98.25%	91.79%	97.58%	99.36%	99.15%	99.24%	99.63%	99.40%	99.62%	99.56%	99.39%	98.37%	98.73%	98.08%	96.51%
Vault C	98.78%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	99.35%	97.91%

Note: N/A predates PWYC

❶ Vault B started PWYC for serviced ATMs May 2023
❷ Vault A incorporates remaining serviced ATMs into PWYC January 2024
❸ Vault C started PWYC May 2024

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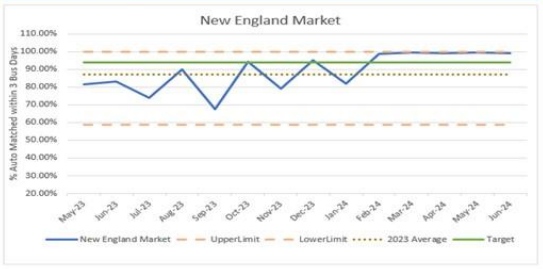
Bank ATM Servicing Example: Process What You Carry (PWYC)

Cycle Time SLA Performance Control Charts



Straight Through Processing Improvement Trending (SLA 3 days)

Dramatic improvement in cycle time SLA performance and aging since transition to PWYC

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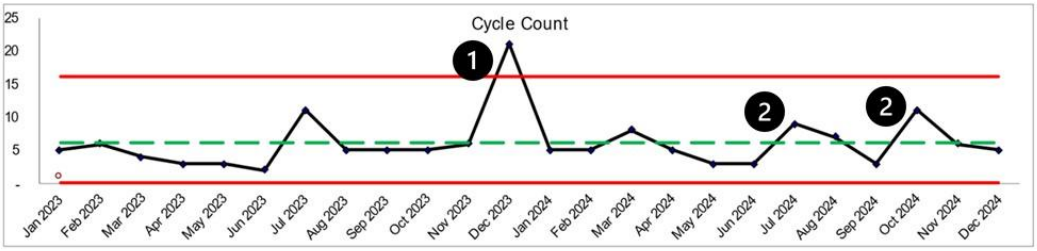
Bank Example: Trade Compression – Reduction of Year-end Spikes

- Trade Compression is a process where market participants **reduce the number of derivatives trades on the books by netting the offsetting positions**, reducing operational complexity.
  - Each trade has operational overhead such as settlement and reconcilement, trade compression reduces that overhead and makes trade processing more efficient.



Observations / Opportunities
1 Predictable spikes at year end
2 Due to complexity of the Compression Process and to avoid over staffing, Pre Planning of Cycles in Q3/4 helped minimize spikes at year end.

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Overview

I. Setting the Stage

II. **Process Variation**

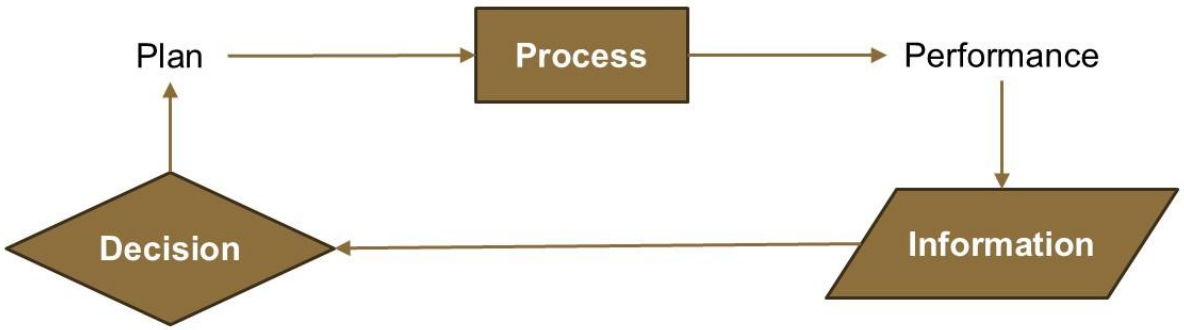
III. Statistical Process Control (SPC), Variability & Control Charts

IV. Process Stability & Capability

V. Sustainable Improvement Perspectives

Understanding Variation

The (Feedback) Control Principle



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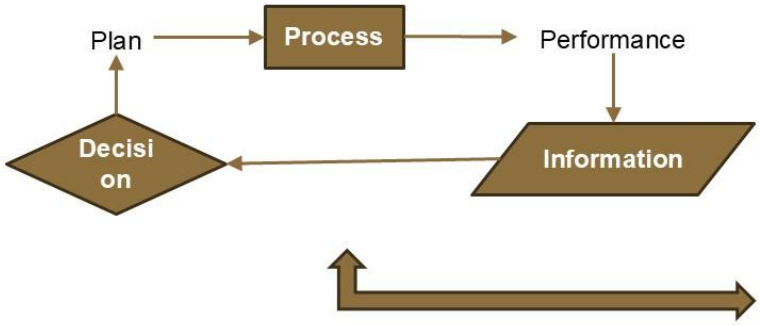
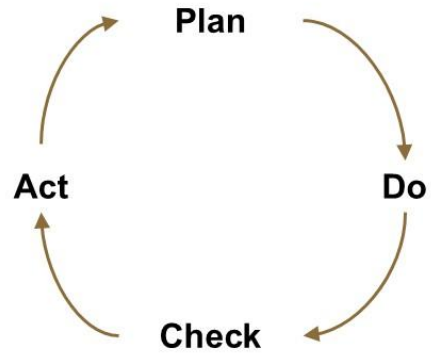
Understanding Variation

The (Feedback) Control Principle





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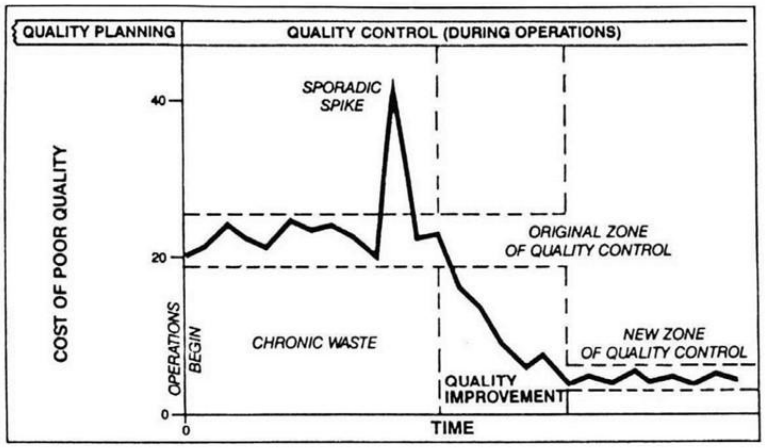
Understanding Variation

Juran's Quality Trilogy



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Source: Juran, J.M. (1986).

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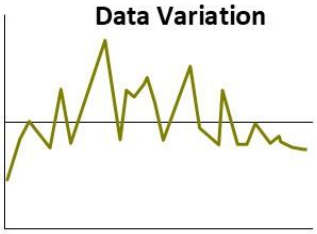
Understanding Variation

Process Variation

- Variation causes a process to not produce the same result every time
- Variation exists in all processes
- Measuring and understanding variation in our business processes helps us to identify
  - What the current level of performance is
  - What needs to change in order to reduce the variability
- Causes of variation within a process include

Materials	Environment
Methods	Measurement
Machines	People



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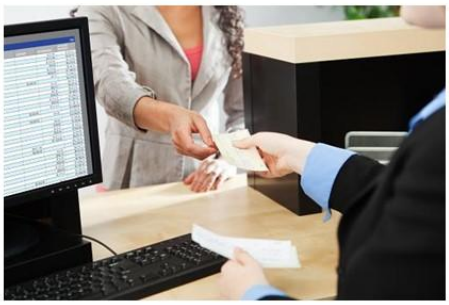
Understanding Variation

Variation in Your World

- What are some examples of variation you've encountered in your own work processes and how did you address them?
- How might reducing process variation impact customer satisfaction or operational efficiency in your organization?



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Understanding Variation

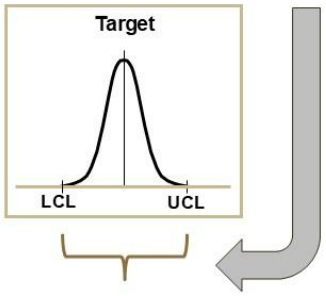
Variation Measures

Central Tendency

Central or typical value of a dataset

Variability

How spread out the data are



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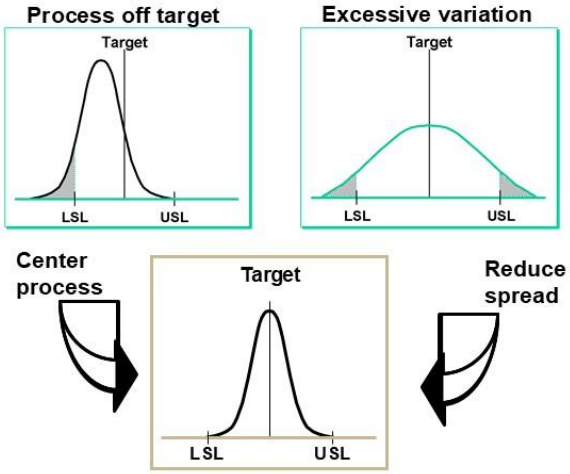
Understanding Variation

Process Variation



- Which is more important:
  - Hitting the target?
  - Reducing variation?
- Why?

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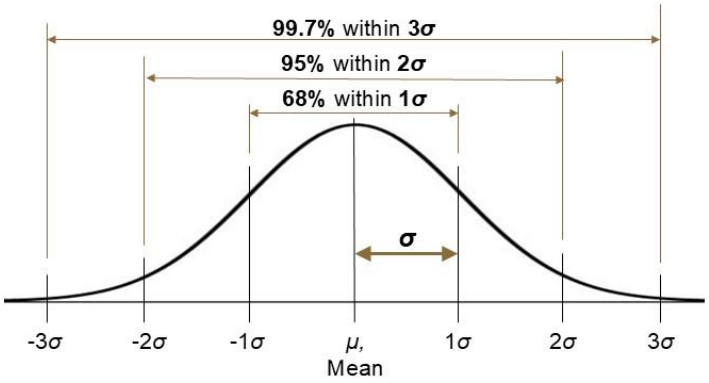
Process Analysis Tools

Sigma and Distributions

- Standard deviation, also known as sigma (σ), is a measure of **how spread out** the data are.
- We often describe the distribution of data by labeling the curve at **plus and minus one, two, and three standard deviations from the mean**.
- In a normal distribution:



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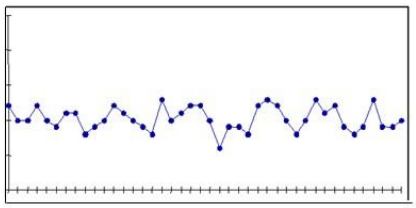
Understanding Variation

Two Types of Variation

Common Cause

- Variation that is normal in a process
- Common cause variation exhibits a stable pattern – random noise
- Can not be eliminated; goal is to REDUCE
- Reducing common cause variation usually requires action by management on the system.



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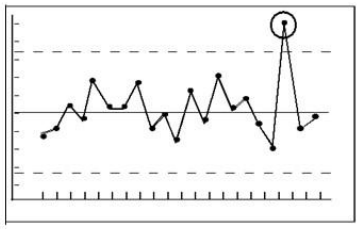
Special Cause

- Variation from something "**different**" or unusual happening
- Exhibits an unstable pattern – but has an assignable cause
- Goal is to eliminate special causes to achieve a stable, predictable process



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Module 1 - Foundations of Sustainable Continuous Improvement

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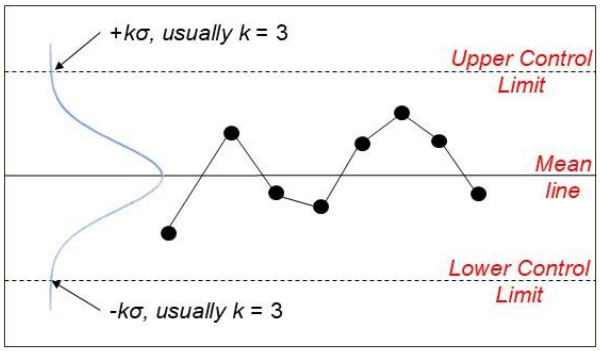
Process Analysis Tools

Visualizing Variation: The Control Chart

A control chart helps to monitor whether a process is *Stable/In Control* meaning

- **No special cause** sources of variation – all of its sources of variation are common cause
- **Output** that **is stable and predictable**

The components of a control chart are determined from statistical analysis of the process data – so the center line and control limits are calculated directly from the data.



Dr. Walter A. Shewhart, "Father of Statistical Quality Control (SQC)", had invented the Control Charts while he was working at Bell Labs in 1924.

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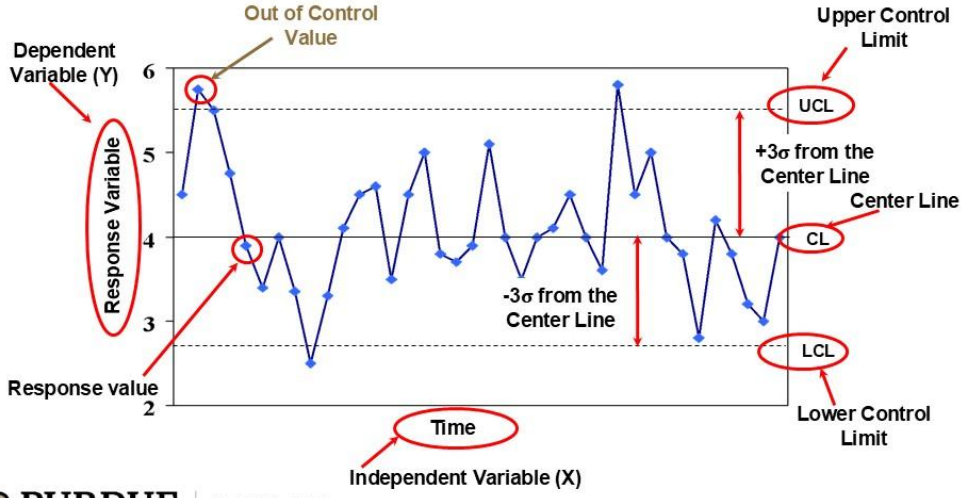
Process Analysis Tools

Components of a Control Chart



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Process Analysis Tools

Why Control Charts Matter

- **Process Variability Analysis**: They help distinguish between natural process variability and special cause variation. Understanding these differences guides implementation of corrective actions.

- **Early Detection of Process Issues**: Control charts enable the early detection of process variations before they result in non-conformance or defects.

- **Improvement of Process Capability**: By identifying and eliminating sources of special cause variation, control charts can lead to a more stable and predictable process.

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Process Analysis Tools

Control Charts

- Display the values for each specific data set collected, along with the respective control limits
- Illustrate variation between individual measurements
- Data needs to be time-based and numerical/non-categorical; examples include:

Potential data sets	Bank-related examples
% Defective	% of returned documents each day
Processing times per item	Seconds/minutes per trade processed
Monthly % SLA met	% manual checks processed accurately the first time
Volume per unit time	Number of loans processed per week
Process costs	Overtime costs per month

What are examples of control chart applications in your work area?

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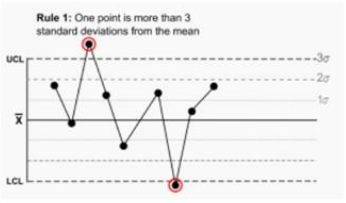
Process Analysis Tools

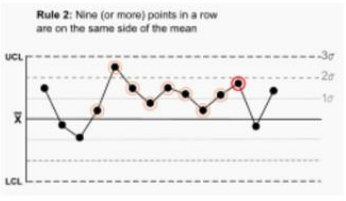
Tests for Non-Random Patterns (Special Causes)

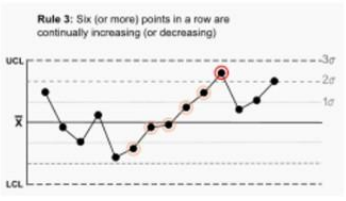
1. **One point beyond control limit (more than 3 standard deviations from centerline).**
   - Detects a shift in the mean, an increase in the standard deviation, out of control

2. **Nine (or more) points in a row are on the same side of the mean.**
   - Detects a shift in the process mean, bias exists

3. **Six (or more) points in a row are steadily increasing or decreasing**
   - Detects a trend or drift in the process mean







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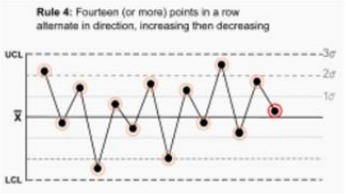
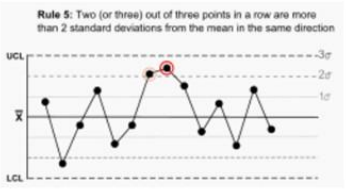
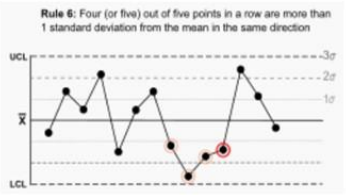
Process Analysis Tools

Tests for Non-Random Patterns (Special Causes)

4. **Fourteen (or more) points in a row are alternating up and down**
   - Detects systematic effects, this oscillation is beyond noise; the rule is considered with directionality only
5. **Two (or three) out of three points in a row are more than 2 σ from the mean in the same direction**
   - Detects a shift in the process average or increase in the standard deviation; there is a medium tendency for samples to be out of control
6. **Four (or five) out of five points in a row are more than 1 σ from the mean in the same direction**
   - Detects a shift in the process mean; a strong tendency for samples to be slightly out of control







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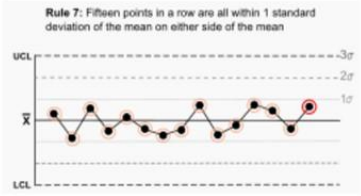
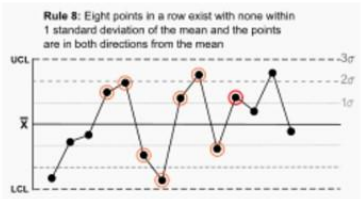
Process Analysis Tools

Tests for Non-Random Patterns (Special Causes)

7. **Fifteen points in a row within 1 σ, above and below the center line**
   - Detects stratification of subgroups when the observations in a single subgroup come from various sources with different means
8. **Eight points in a row on both sides of the center line with none in within 1 σ**
   - Jumping from above to below while missing the 1 σ band is rarely random





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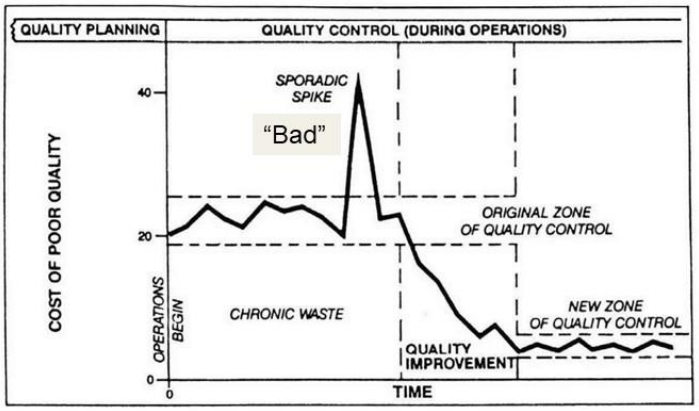
Process Analysis Tools

Special causes are not always what they seem



Note that special causes can be considered as "bad" (unwanted shift in process performance) or "good" (implemented process improvements resulting in process performance shift)

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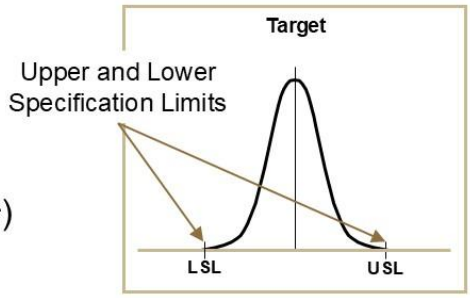
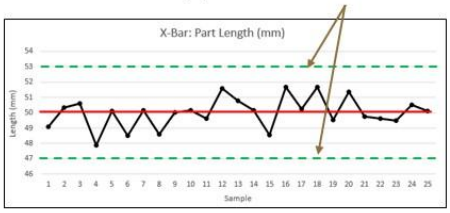
Process Analysis Tools

Statistical Control vs. Capability

- **Specification limits** are the product or process targets (ideally, defined by the customer of our process – *design parameters*) therefore the **voice of the customer**
  - "Triggers" and "Limits" for BofA KRIs & KPIs.
- **Control limits** are calculated from the process data, so they are the **voice of the process**.



Upper and Lower Control Limits



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Process Analysis Tools

Specification Limit or Control Limit?

- A customer specifies that loan approvals must be processed within 3 to 5 days.
- The average daily transaction time at a bank should not deviate by more than 2 standard deviations from the process mean.
- A bank's policy requires that customer wait times at the teller should be under 10 minutes.
- A quality control chart shows upper and lower thresholds that represent the normal variation in the loan approval process.
- A legal mandate states that banks must process mortgage applications within 30 days.

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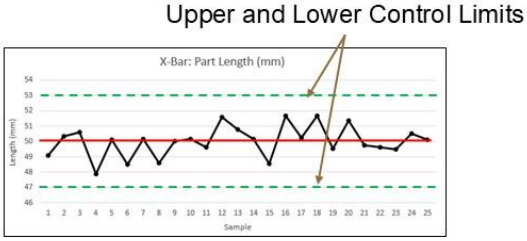
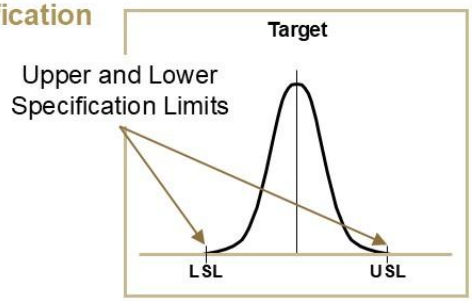
Process Analysis Tools

Statistical Control vs. Capability

- A process is **in statistical control** when:
  - Only **common cause** variation is present.
  - All the measurements fall inside the **control limits**.
- A process is **capable** when:
  - All the measurements fall inside the **specification limits**.



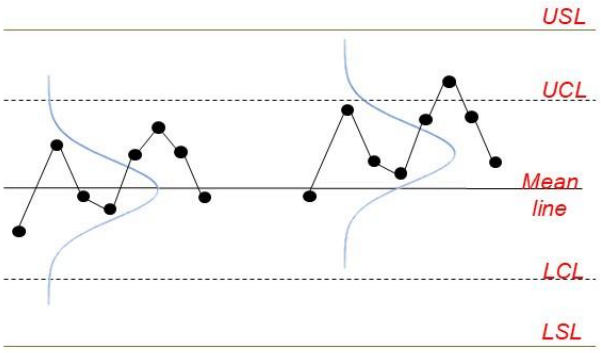


Process Analysis Tools

Specification Limits vs. Control Limits

- Specification limits are design parameters
  - No special connection to control charts
  - Direct connection to ***waste***
- Combining the two perspectives indicates scope of corrective actions

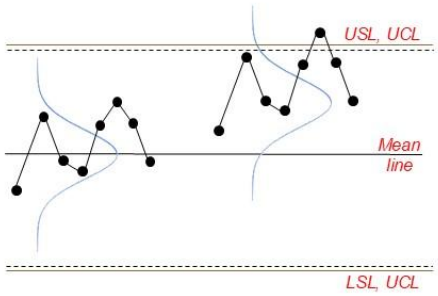
- Case 1: Control Limits within Specification Limits



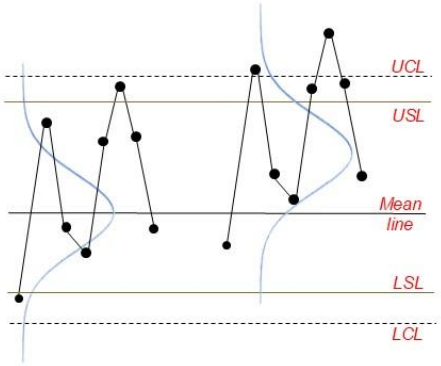
Process Analysis Tools

Specification Limits vs. Control Limits

- Case 2: Control Limits equal to Specification Limits

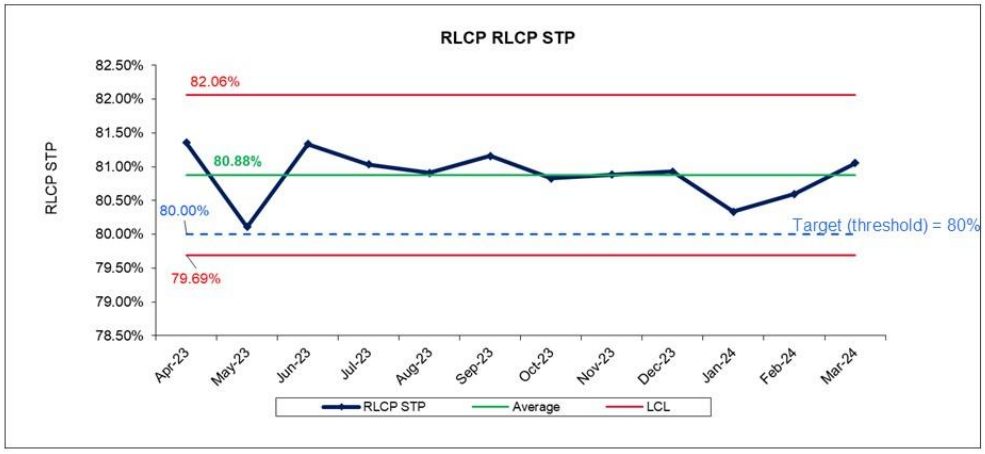


- Case 3: Control Limits outside of Specification Limits



Process Analysis Tools

Example: RLCP STP



ETS leverages Control Charts to evaluate process controls metrics to understand metric performance, whether within tolerance – and if not, why, and to determine any adjustments

Questions:

- Is the process capable?
- Is the process stable?
- Should any action be taken on the process to ensure consistent & reliable ability to meet target?

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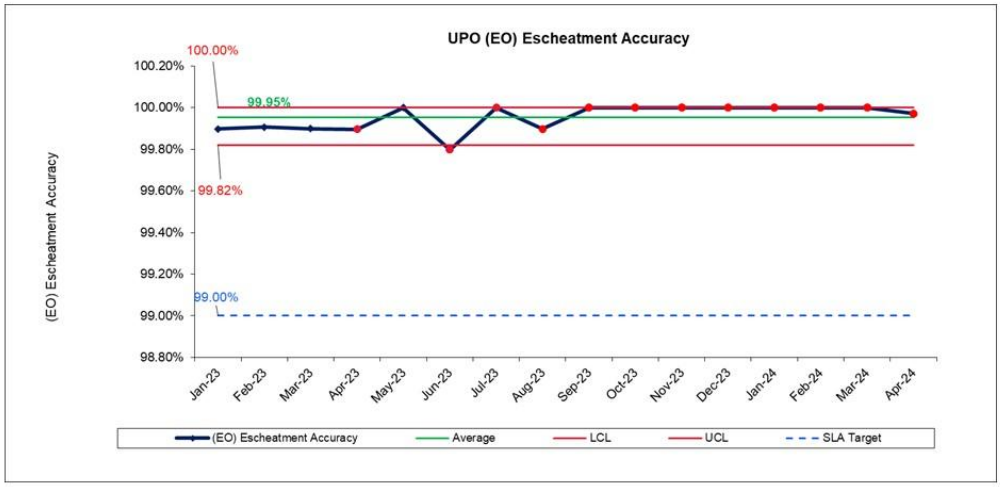
Process Analysis Tools

Example: Escheatment Accuracy



ETS leverages Control Charts to evaluate process controls metrics to understand metric performance, whether within tolerance – and if not, why, and to determine any adjustments

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Module 1 - Foundations of Sustainable Continuous Improvement

Overview

I. Setting the Stage

II. Process Variation

III. Statistical Process Control (SPC), Variability & Control Charts

IV. Process Stability & Capability

V. Sustainable Improvement Perspectives

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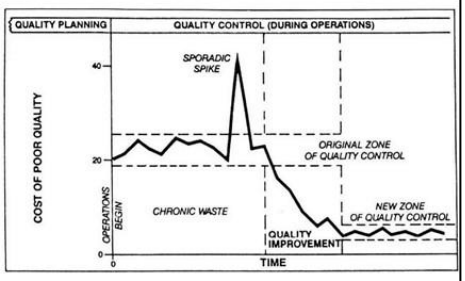
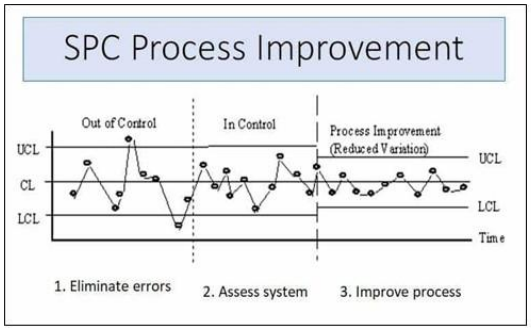
Process Improvement Tools

Adjusting Control Limits for Process Improvements

- Improvements necessitate control limit adjustments to obtain operational excellence.
- Too often companies operate within set a specifications, assuming all is fine if the metrics are *green*.
  - "If it's not broke don't fix it" mindset prevents further improvements and maintains the status quo.





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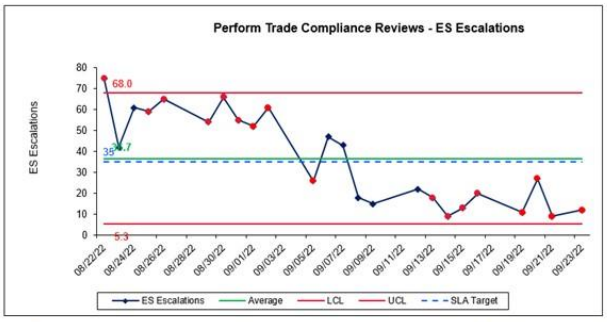
Process Analysis Tools

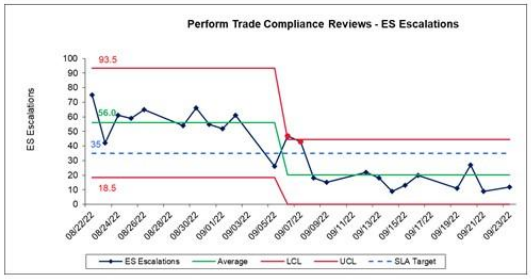
Example: Economic Sanctions Control Chart – GBS Transactions



Special causes detected – appears the process shifted downward

Most recent value
12.0
Process Stable?
No
Alarm(s) met:
Stability Rule # 2 3 4

Recalculate Control Limits



Process is stable after downward shift

- Trade Compliance team sent a global communication to Trade Operations on 9/6/22 to remind Operations of guidelines for Economic Sanctions escalations
- After global communication sent, noticeable drop in volume of escalations demonstrated
- Average received daily now is 20 compared to 59 received prior to global communication sent

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Process Improvement Tools

Intervention is not isolated to correcting process failures

Embrace the red… but the greatest gains can come from working on the green

Just because something is running correctly does not mean it's the best way to do it. Often, the greatest gains come from taking a perfectly stable system and improving it, so it operates with less effort and at a lower cost.

Source: https://www.forbes.com/sites/davidmichels/2019/03/29/why-companies-that-embrace-red-is-good-get-the-best-results/?sh=6479038116ea

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Process Improvement Tools

Examples – Working on the Green

Loan Application Processing

Current State: Loan applications are within an acceptable timeframe, with various departments handling different segments of the process.

Improvement: Implementing an integrated software solution that automatically pulls in relevant customer data, assesses risk, and makes preliminary decisions can reduce processing time, decrease the likelihood of errors, and lower the cost per application processed.

ATM Network Optimization

Current State: ATMs are deployed across multiple locations with a standard set of services available, operating efficiently with routine maintenance.

Improvement: Using data analytics to assess usage patterns and customer needs, the bank can optimize the locations and features of ATMs, potentially reducing the number of machines while offering targeted services where they are needed most. This can lead to savings in maintenance costs and better allocation of capital to high-demand areas.

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Can you think of examples like this from your department or function?

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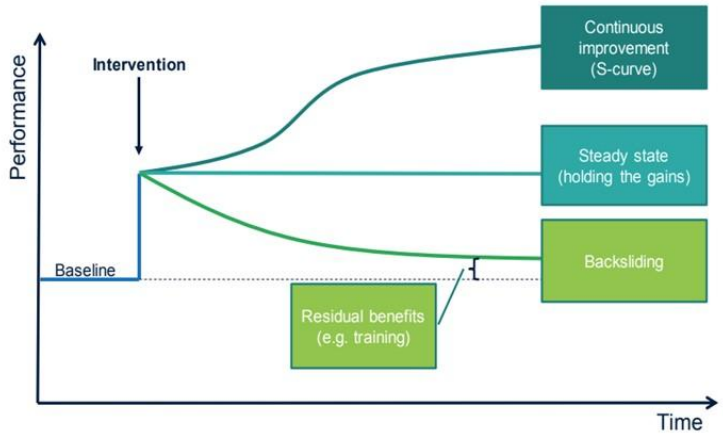
Process Improvement Tools

Management Impact on Effectiveness

- Seek to understand process variation and impact.
- Focus the organization on variation reduction.
- Recognize that just because a process is stable, doesn't mean it can't be improved.
- Show support and interest in the application and results of properly applied SPC. Make regular visits and ask questions in those areas.
- Promote a culture of quality and continuous improvement.

Process Improvement Tools

Improvements require maintenance – grow or die, revisited



- Process improvement requires a long view
  - Org. change is always large-scale
  - Top-Down→ ← Bottom-Up
- Impediments
  - Initiative fatigue
  - Tools, tools, tools
  - (Short-term) Metrics
  - Dogmas

Source: Holweg, M. et al. (2018).

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Process Analysis and Improvement Tools

Share examples of where these tools can apply in your organization?

THANK YOU

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References

In case you are interested

- Juran, J.M. (1986). The Quality Trilogy. Paper presented at ASQC 40th Annual Quality Congress in Anaheim, California, May 20.
- Holweg, M., Davies, J., De Meyer, A., Lawson, B., and Schmenner, R.W. (2018). Process Theory: The Principles of Operations Management. Oxford University Press. Oxford, UK.
- Holweg, Matthias and Staats, Bradley R. and Upton, David M., Making Process Improvements Stick (2018). Kenan Institute of Private Enterprise Research Paper No. 18-22, Available at SSRN: https://ssrn.com/abstract=3240097 or http://dx.doi.org/10.2139/ssrn.3240097

Module 1 - Foundations of Sustainable CI

Process Analysis and Improvement Tools

- Value Stream Mapping
- Flow Charts
- Cause and Effect Diagrams
- SIPOC Diagrams
- Pareto Chart
- Histogram
- Scatter Diagram
- Benchmarking
- Root Cause Analysis
- *Plan-Do-Check-Act*
- ***Statistical Process Control***
- ***Control Charts***

- Failure Mode and Effects Analysis (FMEA)
- SWOT Analysis
- Theory of Constraints (TOC)
- Lean Tools
- Six Sigma Tools
- Gantt Charts
- Process Simulation
- Gemba Walks
- *Quality Management Systems*
- Business Process Re-engineering

Understanding Variation

Everyday Variation Example

- You are driving to work.

What are possible sources of **common cause** variation?	What are possible sources of **special cause** variation?
• Traffic • Speed traveled • Number of red lights encountered	• Flat tire • Traffic jam due to accident • Heavy thunderstorm forces you to drive slowly

"Normal" variation

Variation from something "different" or unusual happening

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Process Analysis Perspective

Appendix

I. **Red Bead Game**

I. Red Bead Exercise

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Understanding Variation

Red Bead Game

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Understanding Variation

Red Bead Game - Learning

- *People need to understand variation. A control chart provides an easy way to see what is the natural variation of the system and highlight when there is a special cause.*
- *The Red Bead Experiment demonstrates that even though "willing workers" want to do a good job, their success is directly tied to and limited by the nature of the system they are working within.*
- *Dr. W. Edwards Deming said: "The system is the responsibility of management. People work within the system, management is responsible for the system."*

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Understanding Variation

Red Bead Game – Some Other Learnings

- Knowing how things work matters. Managers need to understand and improve processes rather than blaming workers.
- Setting unrealistic goals can backfire. Goals that don't consider how the system works can lead to frustration and unwanted shortcuts.
- Motivating speeches, banners and quality slogans don't help if the system doesn't change
- Judging someone's work without considering the system's limitations can be unfair and misleading.
- Real improvements come from changes to the system; not individual adjustments.

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Process Analysis Perspective

Appendix

I. Red Bead Game

I. **Red Bead Exercise**

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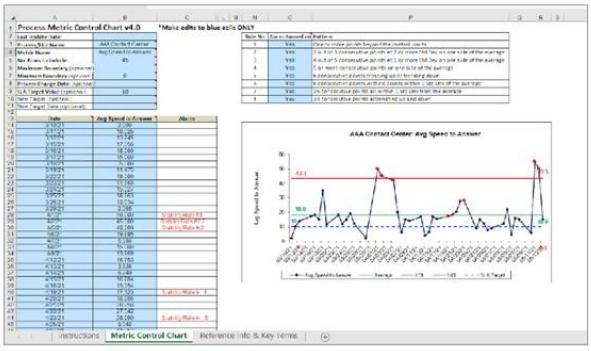
Red Bead Exercise: Individual Chart

- Create an Individuals Chart from the Red Bead data earlier.
- Use BofA Excel Process Metric Control Chart file

BAC GO Control Chart Template



Data Sets for Control Chart Experimentation

Date	Data
5/1/24	0.240
5/2/24	0.250
5/3/24	0.290
5/4/24	0.320
5/5/24	0.340
5/6/24	0.350
5/7/24	0.360
5/8/24	0.240
5/9/24	0.240
5/10/24	0.250
5/11/24	0.280
5/12/24	0.270

Date	Data
5/1/24	40.000
5/2/24	34.000
5/3/24	34.000
5/4/24	35.000
5/5/24	38.000
5/6/24	33.000
5/7/24	33.000
5/8/24	50.000
5/9/24	44.000
5/10/24	38.000
5/11/24	38.000
5/12/24	38.000

Date	Data
5/1/24	90.700
5/2/24	95.400
5/3/24	88.800
5/4/24	89.200
5/5/24	97.200
5/6/24	84.200
5/7/24	89.900
5/8/24	84.300
5/9/24	97.400
5/10/24	98.400
5/11/24	96.300
5/12/24	99.000
5/13/24	98.100
5/14/24	96.700

Change cell B14 to B21
Type in data set 1. What are your observations?
Repeat with data sets 2 and 3.

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Session 2.1

Building a Data-Driven Culture

Questions & Elements

Dr. Jim Stratton

PURDUE UNIVERSITY

SESSION 2.1 DATA DRIVEN CULTURE – QUESTIONS AND ELEMENTS

Jim Stratton, Technical Assistance Program

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Module 2 – Data Driven Culture

Session 2.1 – Questions and Elements

Description

Identifying Data – Questions and KPI's: This first session focuses on how to find and use data effectively. We will help you identify the appropriate questions to ask and KPI's to use to solve business issues. We will review a business case study to discuss different data elements, measurements, and how metrics evolve over time.

Session Objective

(1) Define the questions necessary to manage one's process more effectively and solve business issues. (2) Identify the data needed to answer key questions and manage one's processes more effectively.

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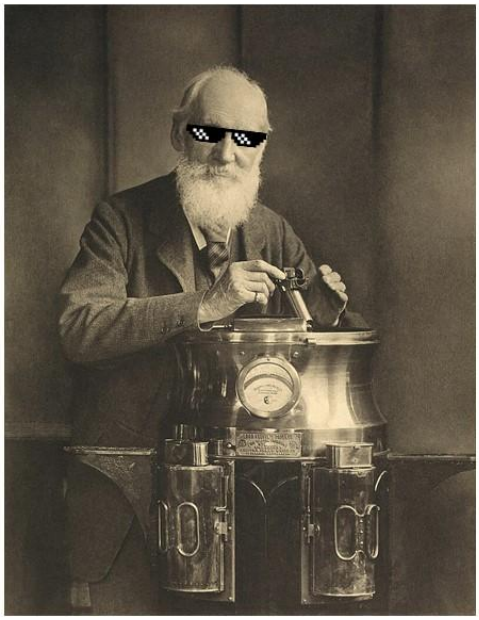
Building Data-Driven Culture

"When you can measure what you are speaking about, and express it in numbers, you know something about it, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind, it may be the beginning of knowledge, but you have scarcely, in your thoughts advanced to the stage of science.

– Lord Kelvin (1824-1907)

"You got receipts?"
– today's youth (2024)



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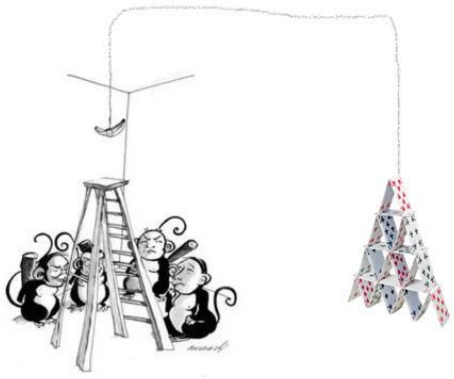
Differing Perspective

The banana is a lie...

- What if the banana shouldn't be touched?
- Do you know why the banana shouldn't be touched?
- Do we need to gather more data to see why the banana shouldn't be touched?
- Before we remove the banana, maybe we should ensure that removing it won't cause another system to collapse.
- THIS IS WHY WE MEASURE!



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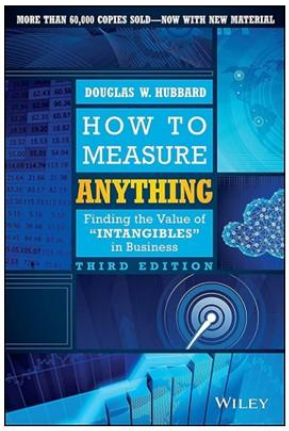
Building Data-Driven Culture

The REAL learning objectives...

- "Only measure things that support a decision"
- The ultimate goal of measurement is uncertainty reduction
- If you don't know where to start, start measuring anything, and refine/adjust later
- Introduce the Universal Approach to Measurement
- Introduce Estimation and Calibration



How to Measure Anything
Douglas Hubbard

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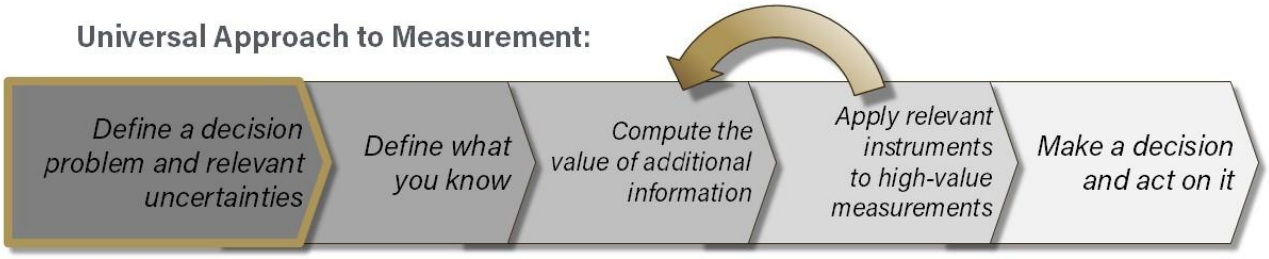
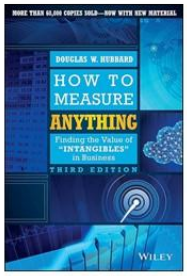
Questions and Elements - Gathering Information

Universal Approach to Measurement:



- What is the decision this measurement is supposed to support?
- How much do we know about it now? (baseline uncertainty)
- What is the definition of the thing being measured in terms of observable consequences and how, exactly, does this thing matter to the decision being asked?
- What is the value of additional information?
- How does uncertainty about this variable create risk for the decision?



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Estimation and Calibration

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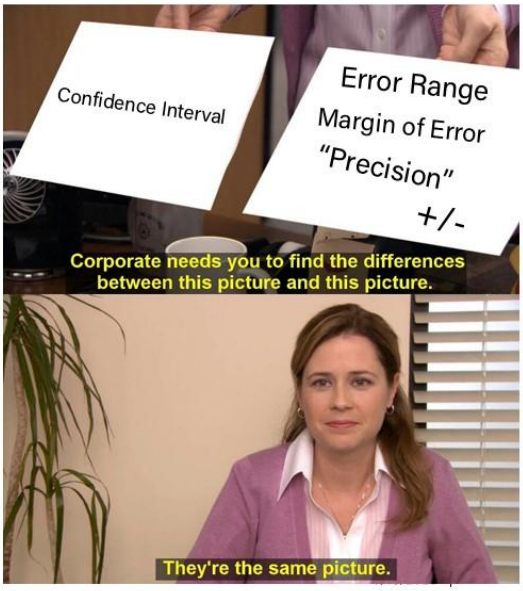
Estimation and Calibration - Confidence Intervals

This introduces the concept of "confidence"

- How confident are we in our data/sample/process?

$$= estimate \pm margin\ of\ error$$



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Estimation and Calibration - Confidence Intervals

We will go deeper in Session 2.2 – hang tight

- Academic Standard – Rigorous Research
  - 95% confidence refers to the confidence in the measurement tool
  - Sample size dependent – the more samples the better
  - Variation (standard deviation)

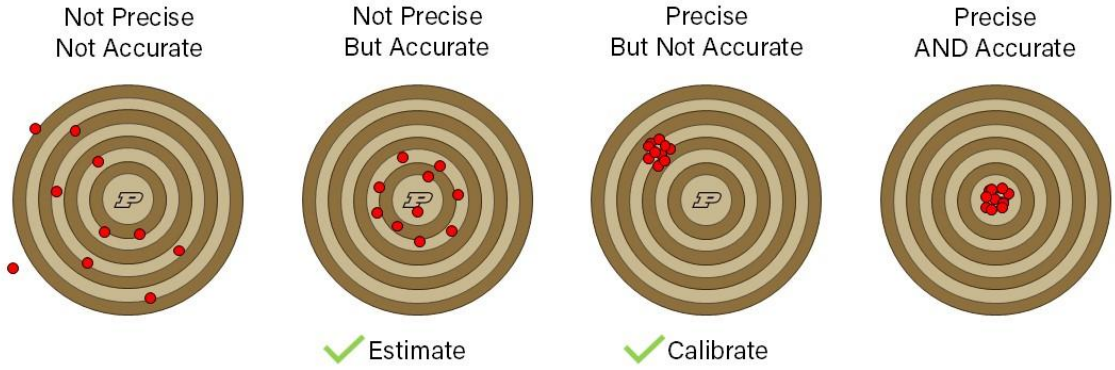
$$Confidence\ Interval = \bar{X} \pm t\frac{s}{\sqrt{n}}$$

- Non-Academic Standard – Gut Feeling
  - What is your confidence is your estimation?

Accuracy vs. Precision

Precision – ability to consistently hit a target

Accurate – ability to hit the correct target



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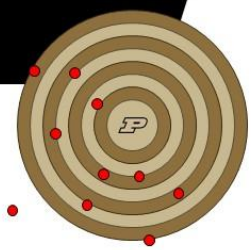
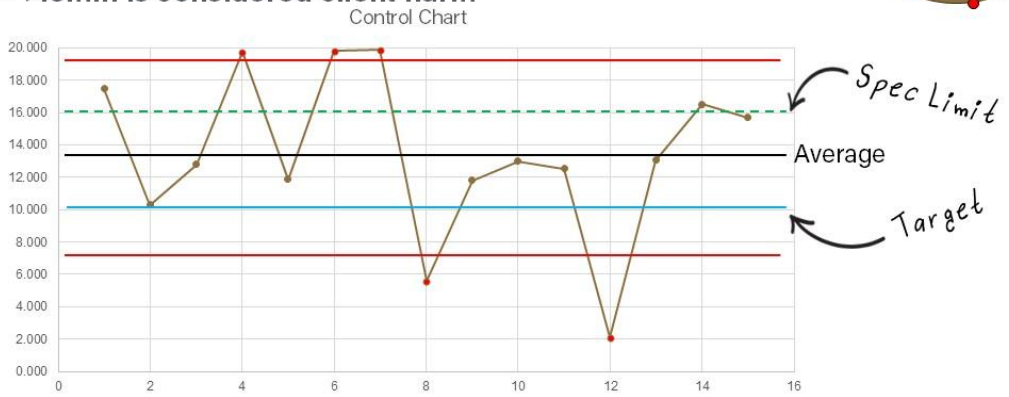
Accuracy vs. Precision



Target = 10min average call length
Average = 13.4 minutes
Spec Limit = >16min is considered client harm



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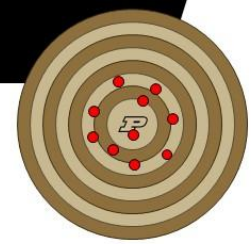
Accuracy vs. Precision



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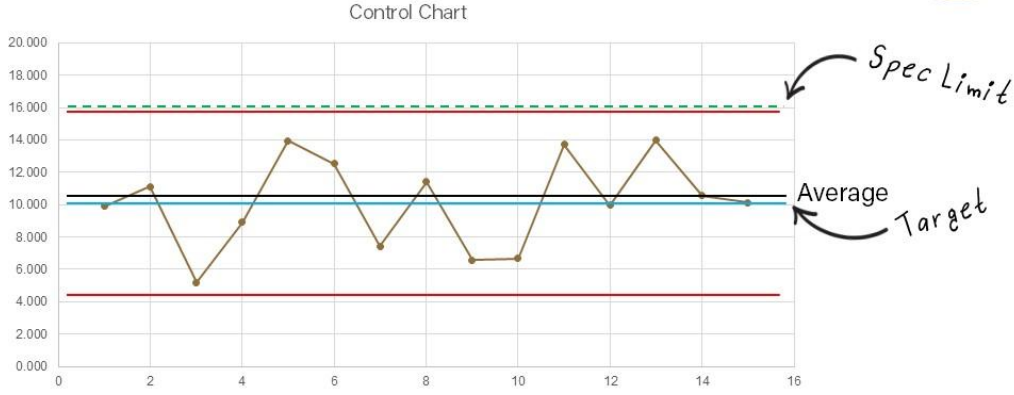
Average = 10.1 minutes
Spec Limit = >16min is considered client harm



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Accuracy vs. Precision

Target = 10min average call length
Average = 16.09 minutes
Spec Limit = >16min is considered client harm

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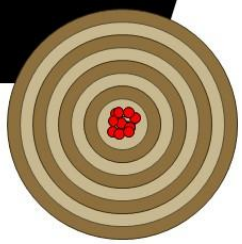
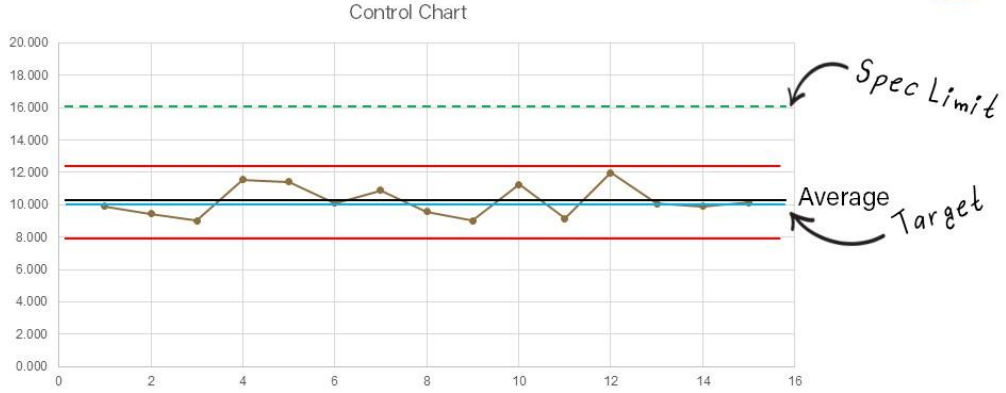
Accuracy vs. Precision



Target = 10min average call length
Average = 10.2 minutes
Spec Limit = >16min is considered client harm



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Accuracy vs. Precision

Is an uncalibrated scale still useful?

- Known: Scale is not reading correctly
- Do we care?
- Depends on what we are measuring!
  - If we are measuring rate of weight loss, then the discrepancy is allowable
  - If we are aiming for a target weight, then the discrepancy is NOT allowable
- We must understand BOTH the intention of the measurement, as well as the capability of the tool with which we are using to measure.
- Are we confident with the measurement?

Precise
But Not Accurate

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Estimation and Calibration - Rule of 5

Pick 5 data points at random

- The max and minimum of 5 random samples will contain the TRUE MEDIAN of the dataset 93% of the time.
- Does this resolution work for your business line?
- Sniff test? vs final decision

```
=INDEX(SORTBY($A$2:$A$95557, RANDARRAY(ROWS($A$2:$A$95557))), SEQUENCE(1))
```

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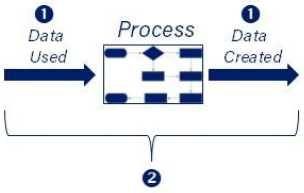
Estimation and Calibration - Confidence Intervals

Data types

- Proportional data - % of successes or failures $= \hat{p} \pm z\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$
- Discrete data – counts, or integers $= \bar{X} \pm z\frac{s}{\sqrt{n}}$
- Continuous data – measurements and decimals $= \bar{X} \pm t\frac{s}{\sqrt{n}}$

Intelligent use of Data

- Data used by a process or created by a process
  - Vital transactional data, client data, used within a process
- Data about a process
  - Information that helps us understand process performance



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Sampling

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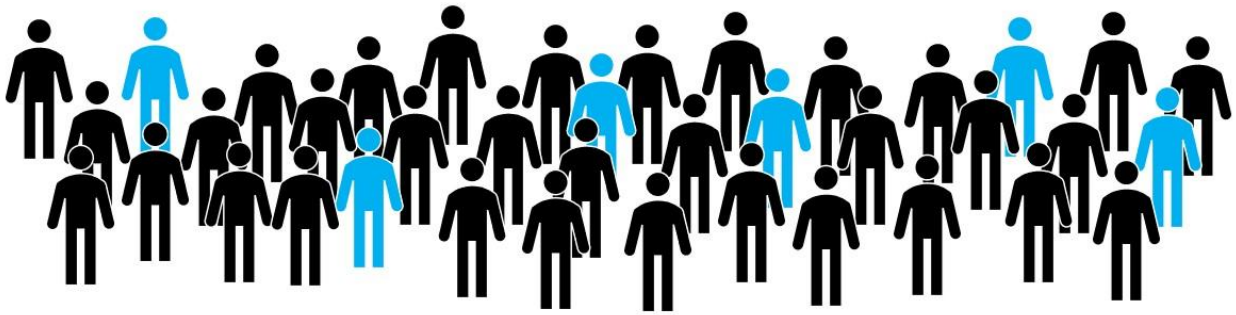
Sampling

Defining your population



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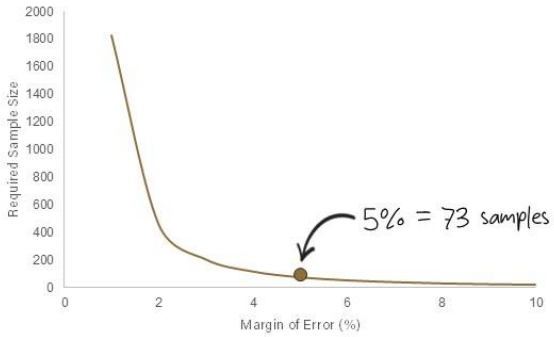
Estimation and Calibration

Why 95-5-5? Let's define the standard.

- What does it *actually mean* to be 95% "confident"?
  - Probability that the true population metric falls within the Margin of Error
- Is 5% margin of error acceptable?
  - Margin of error is defined as the +/- deviation from the population metric of interest
- Is 5% population proportion appropriate?
  - Fraction of the population that conform to the population metric of interest, in the context of the bank, this is the error rate or defect rate



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How many samples do I need?

How to determine what sample size for a desired confidence

- Proportional/Discrete Data:

$$n = \left(\frac{1.96}{m}\right)^2 p(1-p)$$

- n is sample size
- 1.96 is factor for 95% confidence (2.575 for 99% confidence) [z-scores]
- m is desired precision or margin of error
- p is expected % error rate or defect rate

- Continuous Data:

$$n = \left(\frac{1.96 * \sigma}{m}\right)^2$$

- n is sample size
- 1.96 is factor for 95% confidence (2.575 for 99% confidence) [z-scores]
- σ is known population standard deviation
- m is the desired margin of error

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What If We Can Sample the Entire Population?

Bank Example: Automated Population Testing Approach & Results

- Operations reduced risk by **moving from sample testing to population testing** of correspondence using automation and complex logic
- SQL based data queries/logic perform rules comparison between System of Record data and final customer fulfillment.

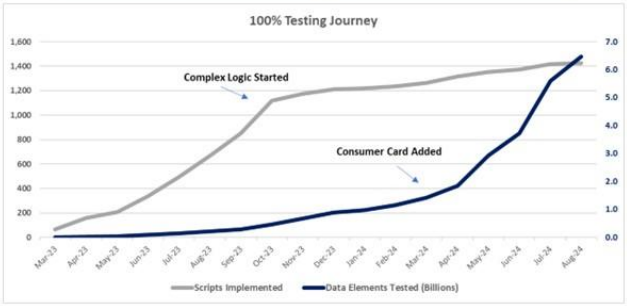
Initial Focus / Approach

- Test 100% of correspondence
- Focus on high-risk, high-volume processes
- Move from simple to complex code/logic
- Start with a few; build to many

- **Over 1,400 test scripts** now running daily
- **~200MM Customer statements** tested since inception
- **6.5B Data elements** tested

Noted Outcomes & Observations

- Identified issues testing 100% of populations that would not be seen via sampling
- Reduced reliance on manual reviews
- Daily test scripts resulted in identifying and remediating issues more timely
- Feedback loop needed to remediate issues identified
- Using data to help identify operational issues that may have customer impacts
- Automated reporting of results alerts stakeholders



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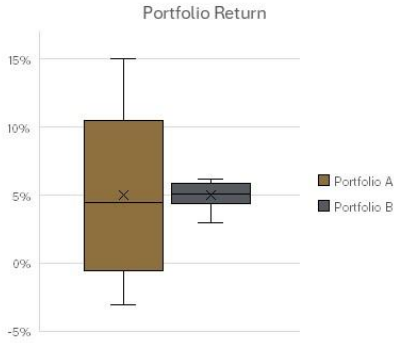
Sampling Variance

Be careful of averages!

- Always remember that the average is just a snapshot, it does not do not account for variation!

	Portfolio A	Portfolio B
Average Return	5%	5%
Individual Investment Returns	15%	6.2%
	12%	6.0%
	10%	5.8%
	8%	5.5%
	7%	5.2%
	2%	5.0%
	1%	4.8%
	0%	4.5%
	-2%	4.0%
	-3%	3.0%



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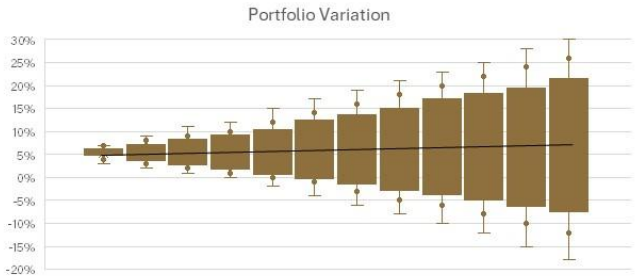
Sampling Variance

Managing by Averages

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.3%	5.5%	5.7%	5.7%	5.8%	6.2%	6.2%	6.2%	6.5%	6.5%	6.6%	6.7%



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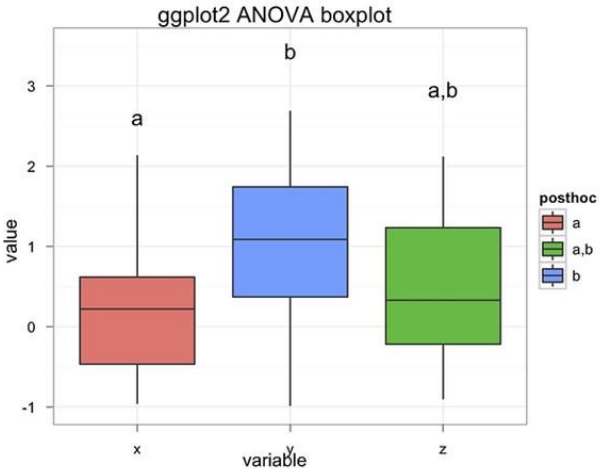
Sampling Variance

ANOVA and Means Comparison

- ANOVA – ANalysis Of Variance – This test will identify whether there is a significant difference between two or more groups

↓

- Tukey's Method – Used to identify if sample means are significantly different, and will identify where the differences exist between the groups



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Special Considerations

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Intelligent Use of Data

Data SWAT Team Examples:

Check Ops Manual Reporting (RLCP)

Then	A daily report is exported manually from i3 so that it can be reloaded to a metrics gathering platform. 16 different filters are selected and extracted individually.
Now	Saved an hour a day through web-page scrape automation. I3 system also prioritized for AIT import in 2Q24, to expand on capability and replace scraping with direct feed.

94% Reduction in processing time. 200+ hours/yr saved

Add Depositor Name to On Us Check Fraud Alerts

Then	Lack of data integration to identify and detect check fraud depositor name and alert clients
Now	Enhanced alerts with depositor name to improve detection of fraudulent name changes allowing for proactive client alerts on risk

$4.6MM losses saved over 5 years

Check Operations Due Diligence Letters

Then	Due diligence letters sent to clients for abandoned checks. Team manually reviewed returned letters (in PDF format) to re-key data
Now	Data team 'scrapes' and stores data from letters. Removes significant manual processing and review time, reduces re-key errors and reduces time for clients to receive new checks.

Elimination of manual work; Simplified process

Automating Returned Mail Review

Then	Manually comparing address information for returned mail/undeliverable items
Now	Automating the read of the data returned to compare for changes

35K monthly volume reduction, 7 FTE saves

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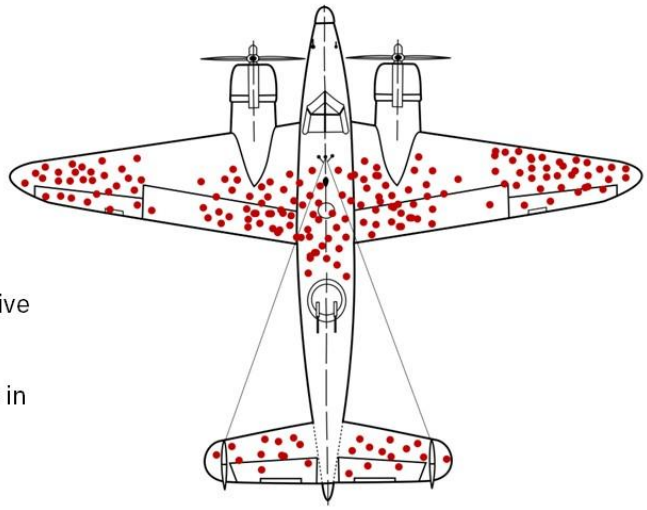
How do we handle missing data?

Missing data

- Determine what data is missing, and WHY?
- Can you live with incomplete data?
- Is the incomplete data still representative of your target population?
- How does this impact your confidence in the data?



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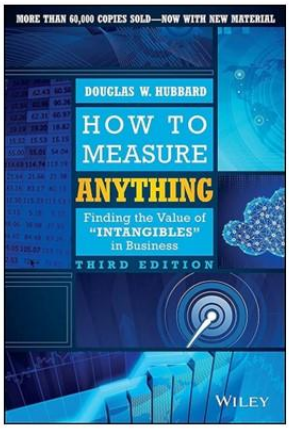
Building Data-Driven Culture

"It is better to be approximately right than precisely wrong"

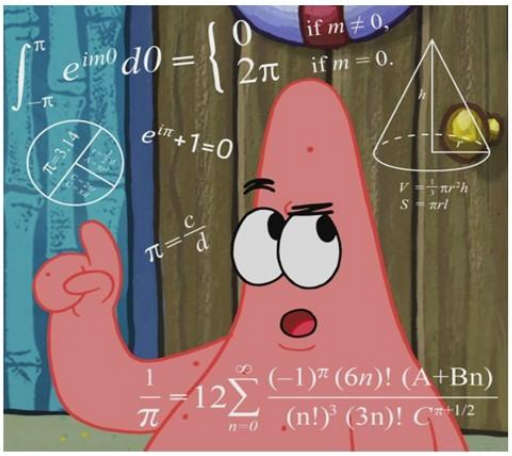
-Douglas Hubbard



What the heck are we even measuring?

Thought exercise

- What is the value of the incorrect data measured precisely?
  - × Resources being allocated to the wrong effort
  - ✓ Finding unexpected trends or issues
  - ✓ Far more data than you think. Where else can you use the data?
- What is the value of correct data measured imprecisely?
  - × Increased risk of making the incorrect decision
  - ✓ Do we know how precise we need to be? Perhaps we are already at a comfortable limit.
  - ✓ Iterate on our measurement process to determine an an allowable/comfortable limit



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Missing Data

What if my confidence interval isn't precise enough?

- Can you live with a lower confidence?
  - Must factor risk or client harm
- Increase sample size! The more samples you have, the more precision you can obtain.
  - However, in some cases obtaining more samples can be costly.
- Reduce the standard deviation
  - This assumes you have control over the data, however sometimes you do!

Objections to Measurement

When ~~not~~ to measure!

- ✗ Cost – The cost of obtaining data outweighs the ROI of the decision the measurement supports. How much is the business decision worth?
  - ✓ If possible, reduce the amount of confidence required in your data. There may be flexibility in the amount or quality of data that would reduce price, while still providing the certainty required for the decision.
- ✗ Difficult Measurement – Sometimes abstract ideas can be difficult to quantify.
  - ✓ There may be available data on which you can infer for your decision. Useful NEW observations are more accessible than you think
- ✗ Availability of Data – What if the data simply doesn't exist? What would be the cost of gathering data?
  - ✓ You have far more data than you think. You need far less than you think.
- ✗ Ethical Boundaries of Data – Monetary value of a human life?
  - ✓ Remaining ignorant about data is often worse than answering difficult questions. "The preference for ignorance over even marginal reductions in ignorance is never a moral high ground" – Hubbard

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Thought Exercise

Work with your table!

- Identify data for your opportunity/challenge that you feel may be the wrong data, and/or being measured too precisely for the use-case.
- Identify data for your opportunity/challenge that you feel may be the right data, but is being measured imprecisely.

1. What data already exists, and what may we be missing?
2. Is there a potential for client harm if we make an incorrect decision?
3. How would you correct either scenario?
4. Is more/less data/precision needed?
5. What resources might you need for proper measurement?
6. Are there misleading conclusions that can be drawn from you data?

Thought Exercise

This is important!

- During your discussion did you learn of data that may be useful to a business decision in your line of business?
- Keep this information to use for the Operations Foundry. This is a larger piece of the puzzle and should be an integral piece of your business case proposal.

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Why is this important?

The whole point of understanding your data, and being confident in your data, is to REDUCE the potential for client harm and the risk of making a bad decision!

THANK YOU

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Session 2.2

Building a Data-Driven Culture

Data Tools

Dr. Jim Stratton

PURDUE UNIVERSITY

SESSION 2.2 DATA DRIVEN CULTURE – DATA TOOLS

Jim Stratton, Technical Assistance Program

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Module 2 – Data Driven Culture

Session 2.2 – Data Tools

Description

In this session we will use data to articulate the improvement process to find and correct issues.

Session Objective

Articulate a business case or problem using data to quantify the opportunity.

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Building Data-Driven Culture

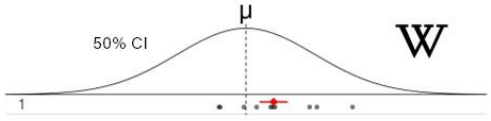
The REAL learning objectives...

- Reduction of uncertainty. We will never be able to fully eliminate uncertainty, but we can take calculated measures to reduce that uncertainty.
- If we can better understand our uncertainty, we can better understand the risk.
- Risk is the ultimate driver of the decisions we make.
- Practice estimation and calibration

Confidence Intervals - Cont.

Understanding the concept

- In this case, the true population mean (μ) is unknown. We are using the Confidence Interval to estimate its true value.
- A 95% confidence interval means that we are 95% confident that the range calculated contains the true population mean.
- The confidence is on the tool, not the sample.



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Confidence Intervals - Cont.

Confidence Chronicles: Cultivating Courage and Conviction

- Academic Standard – Rigorous Research
  - 95% confidence that the range contains the true population mean
  - Sample size
  - Variation (standard deviation)

$$Confidence\ Interval = \hat{p} \pm z\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

- Non-Academic Standard – Gut Feeling
  - What is your confidence is your estimation?

Estimation and Calibration - Confidence Intervals - ACTIVITY

Enough that for now, what is your gut telling you?

- Work in groups as tables
- Keep your discussions private as this is a competition
- Management has asked you to determine, with 95% confidence, the birthdates of two historical figures. However, there are consequences for guessing. Failure to identify capture the actual dates in your confidence interval will result in budget cuts for your business group.
- NO DEVICES!

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Estimation

What about things that are more difficult to estimate?

- How many golf balls would fit inside a Boeing 747?
- How many windows are in New York City?
- The bank wants to host a bi-annual customer appreciation day. How many hot dogs do we need to order?
- How to quantify the ROI of executive training programs?

► How much do you already know?

► If you don't know where to start, start measuring anything, and refine/adjust later

What story are we trying to tell?

Proportional Data vs. Continuous Data

Samples { 97, 113, 90, 103, ..., n }

Proportional data shows a percentage.
- How many data points meet a certain condition
- How many are above/below a certain value
- How many yes vs. no, present vs. missing

Continuous data is something that is measured, but not necessarily discrete.
- ATM transaction or loan origination amounts
- Salary data
- Commute times

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Confidence Intervals – Proportional Data

How do we *quickly* calculate confidence intervals?

90%	95%	98%	99%
1.645	1.960	2.326	2.575

$$Confidence\ Interval = \hat{p} \pm z\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

Samples: 97, 113, 90, 103, ..., n

How many OEP participants received more than a $100k raise?

Descriptive Statistics:
- $Sample\ proportion = \hat{p} = \frac{x}{n} = 0.63$
- $Sample\ size = n = 100$
- $Critical\ value = z_{\alpha/2} = 1.96$
- $Confidence = 0.95$
- $alpha = 0.05$

$$Confidence\ Interval = 0.63 \pm 1.96\sqrt{\frac{0.63\ (1-0.63)}{100}}$$

$$Confidence\ Interval = (0.53, 0.72)$$

This means that we are 95% confident that the true proportion of people who get MORE THAN a $100k raise is between 53% and 72%

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Confidence Intervals – Proportional Data

How does our confidence change the math?

90%	95%	98%	99%
1.645	1.960	2.326	2.575

$$Confidence\ Interval_{90} = 0.63 \pm 1.645\sqrt{\frac{0.63\ (1-0.63)}{100}}$$

$Confidence\ Interval_{90} = (0.55, 0.71)$ Margin of Error is ±8%

$Confidence\ Interval_{95} = (0.53, 0.72)\ (0.60, 0.65)_{n=1000}\ (0.62, 0.63)_{n=95557}$

$Confidence\ Interval_{98} = (0.52, 0.74)$

$Confidence\ Interval_{99} = (0.50, 0.75)$ Margin of Error is ±12.5%

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Sample size matters!

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Confidence Intervals - Continuous Data

How do we *quickly* calculate a confidence interval?

$$Confidence\ Interval = \bar{X} \pm t\frac{s}{\sqrt{n}}$$

Samples: 97, 113, 90, 103, ..., n → Descriptive Statistics:

$Mean = \bar{X} = 110.85$

$StdDev = s = 21.71$

$Sample\ size = n = 100$

$test\ statistic = t = 1.984^*$

$alpha = 0.05$

$$CI = 110.85 \pm 1.984\frac{21.71}{\sqrt{100}}$$

$$CI = 110.85 \pm 4.342$$

$$CI = (106.54, 115.15)$$

This means that we are 95% confident that the true average raise is between \$106k and \$115k

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One-sided	90%	95%	97.50%	99%	99.50%	99.95%
Two-sided	80%	90%	95%	98%	99%	99.90%
1	3.078	6.314	12.706	31.821	63.657	636.619
2	1.886	2.920	4.303	6.965	9.925	31.599
3	1.638	2.353	3.182	4.541	5.841	12.924
4	1.533	2.132	2.776	3.747	4.604	8.610
5	1.476	2.015	2.571	3.365	4.032	6.869
6	1.440	1.943	2.447	3.143	3.707	5.959
7	1.415	1.895	2.365	2.998	3.499	5.408
8	1.397	1.860	2.306	2.896	3.355	5.041
9	1.383	1.833	2.262	2.821	3.250	4.781
10	1.372	1.812	2.228	2.764	3.169	4.587
11	1.363	1.796	2.201	2.718	3.106	4.437
12	1.356	1.782	2.179	2.681	3.055	4.318
13	1.350	1.771	2.160	2.650	3.012	4.221
14	1.345	1.761	2.145	2.624	2.977	4.140
15	1.341	1.753	2.131	2.602	2.947	4.073
16	1.337	1.746	2.120	2.583	2.921	4.015
17	1.333	1.740	2.110	2.567	2.898	3.965
18	1.330	1.734	2.101	2.552	2.878	3.922
19	1.328	1.729	2.093	2.539	2.861	3.883
20	1.325	1.725	2.086	2.528	2.845	3.850
30	1.310	1.697	2.042	2.457	2.750	3.646
40	1.303	1.684	2.021	2.423	2.704	3.551
50	1.299	1.676	2.009	2.403	2.678	3.496
60	1.296	1.671	2.000	2.390	2.660	3.460
80	1.292	1.664	1.990	2.374	2.639	3.416
100	1.290	1.660	1.984	2.364	2.626	3.390
120	1.289	1.658	1.980	2.358	2.617	3.373
∞	1.282	1.645	1.960	2.326	2.576	3.291
Two-sided	80%	90%	95%	98%	99%	99.90%

Confidence Intervals - Continuous Data

Don't fret, we can simplify things.

$$Confidence\ Interval = \bar{X} \pm t\frac{s}{\sqrt{n}}$$

$$Confidence\ Interval = \bar{X} \pm 2\frac{s}{\sqrt{n}}$$

$$Confidence\ Interval = \bar{X} \pm 3\frac{s}{\sqrt{n}}$$

=confidence.t(alpha, standard_dev, size)

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One-sided	90%	95%	97.50%	99%	99.50%	99.95%
Two-sided	80%	90%	95%	98%	99%	99.90%
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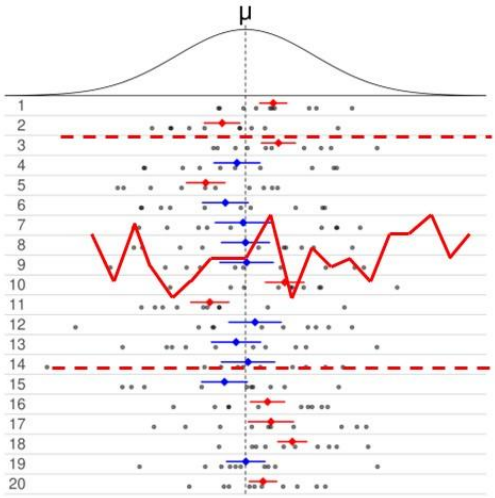
4	1.533	2.132	2.776	3.747	4.604	8.610
5	1.476	2.015	2.571	3.365	4.032	6.869
6	1.440	1.943	2.447	3.143	3.707	5.959
7	1.415	1.895	2.365	2.998	3.499	5.408
8	1.397	1.860	2.306	2.896	3.355	5.041
9	1.383	1.833	2.262	2.821	3.250	4.781
10	1.372	1.812	2.228	2.764	3.169	4.587
11	1.363	1.796	2.201	2.718	3.106	4.437
12	1.356	1.782	2.179	2.681	3.055	4.318
13	1.350	1.771	2.160	2.650	3.012	4.221
14	1.345	1.761	2.145	2.624	2.977	4.140
15	1.341	1.753	2.131	2.602	2.947	4.073
16	1.337	1.746	2.120	2.583	2.921	4.015
17	1.333	1.740	2.110	2.567	2.898	3.965
18	1.330	1.734	2.101	2.552	2.878	3.922
19	1.328	1.729	2.093	2.539	2.861	3.883
20	1.325	1.725	2.086	2.528	2.845	3.850
30	1.310	1.697	2.042	2.457	2.750	3.646
40	1.303	1.684	2.021	2.423	2.704	3.551
50	1.299	1.676	2.009	2.403	2.678	3.496
60	1.296	1.671	2.000	2.390	2.660	3.460
80	1.292	1.664	1.990	2.374	2.639	3.416
100	1.290	1.660	1.984	2.364	2.626	3.390
120	1.289	1.658	1.980	2.358	2.617	3.373
∞	1.282	1.645	1.960	2.326	2.576	3.291
Two-sided	80%	90%	95%	98%	99%	99.90%

Why does all of this matter?

But wait, there's more...MATH

$$CI = \bar{X} \pm \mathcal{B}\frac{\mathcal{S}}{\sqrt{m}}$$



$$\mathrm{U}/LCL = \mu \pm 3\frac{\sigma}{\sqrt{n}}$$

Why does all of this matter?

Recap - What does it really mean to be confident in our decisions?

- Have you weighed the risk of making a wrong decision?
- How much do you really trust your gut?
- Sure, 95-5-5 is the standard, but is it too much? Or is it not enough?

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Building Data-Driven Culture

The REAL learning objectives...

- We don't care if you can remember how to calculate confidence intervals.
- The take-away is that you should understand that in a data-driven culture, there are tools to help increase your confidence (and decrease the risk) of making the correct decision.
- These methods help apply a little bit of statistical fortitude to gut decisions, and can be leveraged for even larger decisions

THANK YOU

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Session 2.3

Building a Data-Driven Culture

Storytelling with Data

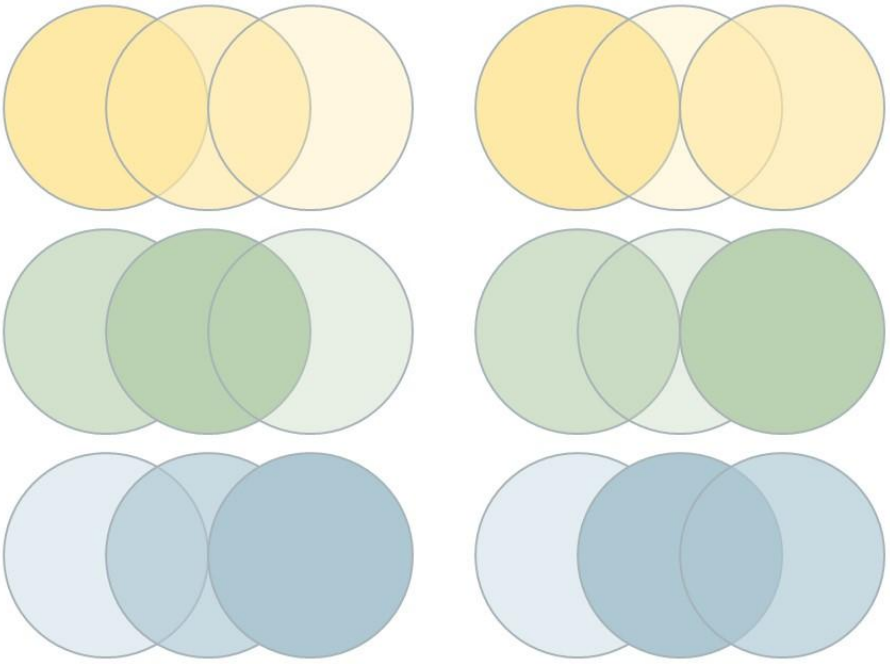
Dr. Doug Pruim

PURDUE UNIVERSITY

Story Order Options

Choosing the right path based on your audience

Stories can be ordered in a variety of ways **based on your audience** and **the situation**.



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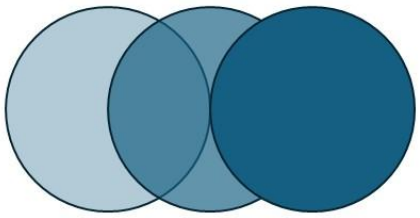
Downstream

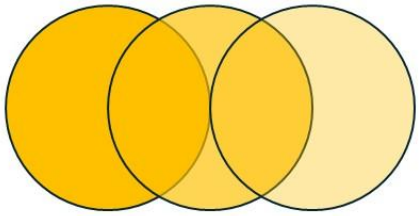


Standard story:
Once upon a time…
Unfortunately …
Here's what we did…
Finally, we won.

Audience:
People who don't know the context

Interested clients, workers, investors

Upstream



The BLUF
(bottom line up front)
Here's the deal…
Here's our rationale…
Here's the problem it solves.

Audience:
People who already know the context, limited time

CEOs, bosses, higher ups, people who don't have time for "stories"

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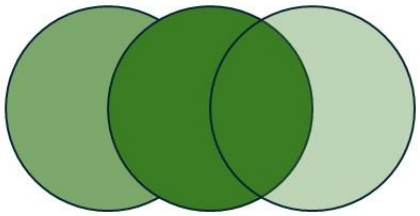
Cross-stream



The Record Scratch
As you're aware, we've been…
Which is why we need…
Remember why we started.

Audience:
People who already know the journey

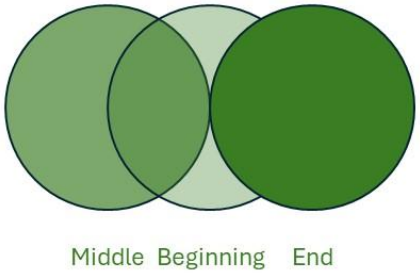
Team members, partners, co-workers, fellow travelers

Cross-stream

Half-time Speech
It was a tough first half…
Remember why we started…
Which is why we need…

Audience:
People who already know the journey

Team members, partners, co-workers, fellow travelers ***who might need some motivation***



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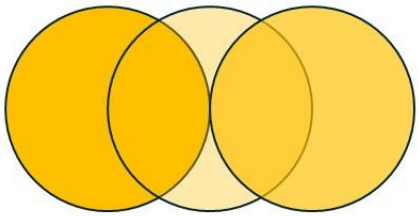
Upstream

The "Calling in a Favor"
Here's what we need…
Remember, you said…
Here's our rationale.



Audience:
People who already know the context, limited time

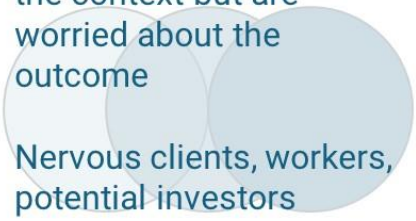
Important people who need a gentle reminder or perhaps a little bit of a guilt trip; parents

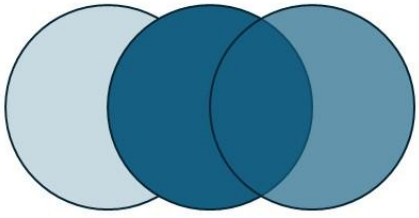
Downstream

"Don't be anxious" story:
Once upon a time…
Unfortunately…
Don't worry; we won.
Here's how it happened…

Audience:
People who don't know the context but are worried about the outcome

Nervous clients, workers, potential investors





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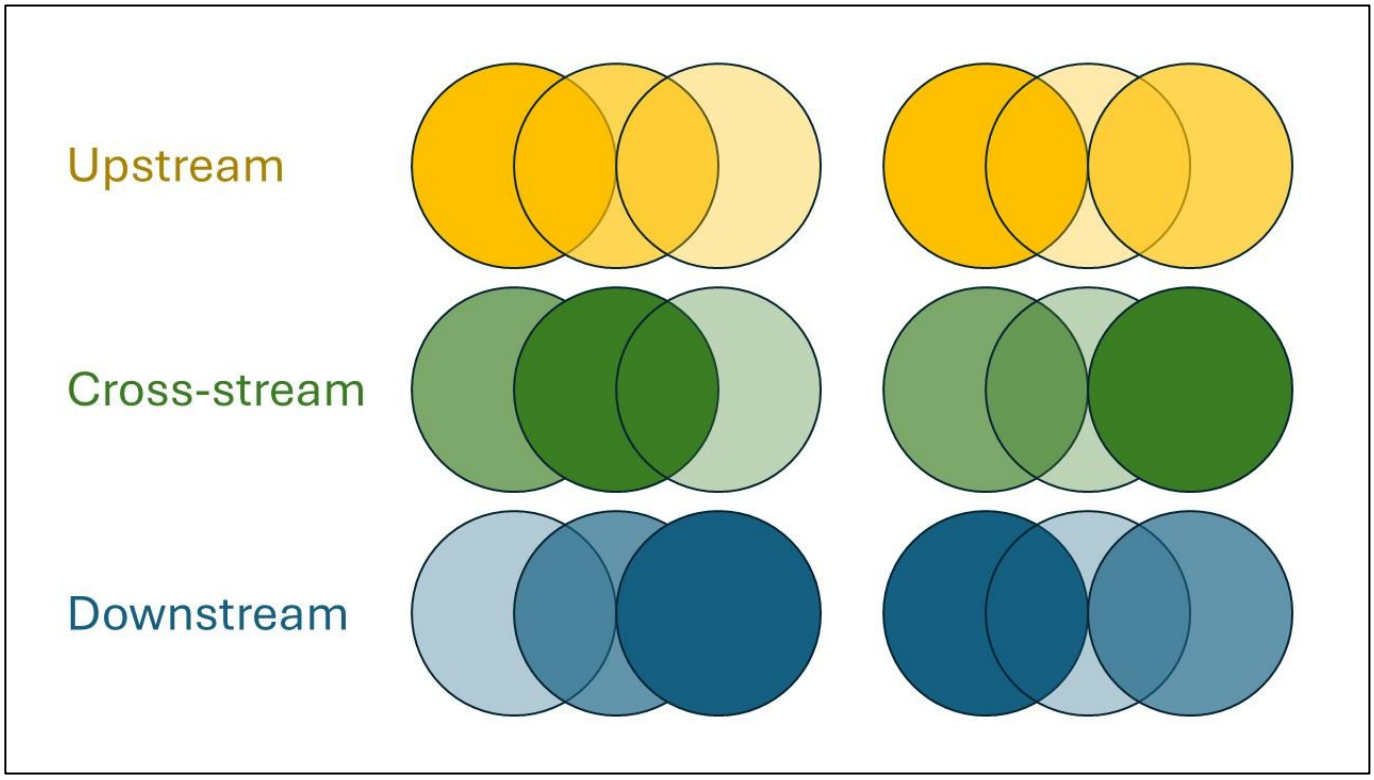

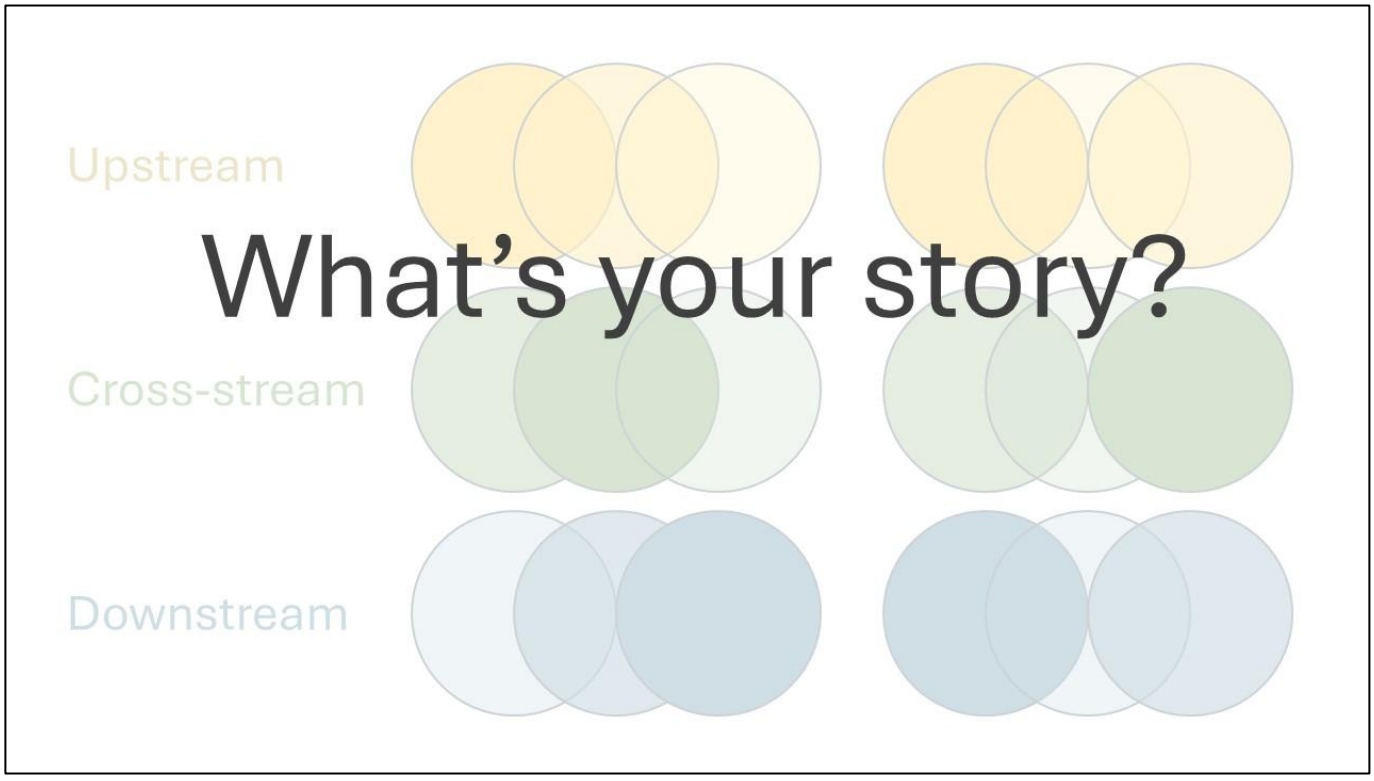

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Storytelling with Data

Price of 40 lb. cheddar cheese blocks

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	
2014	2.22	2.19	2.36	2.24	2.02	2.02	1.99	2.18	2.35	2.19	1.95	1.59
2015	1.52	1.54	1.55	1.59	1.63	1.71	1.67	1.71	1.66	1.67	1.62	1.46
2016	1.48	1.47	1.49	1.42	1.32	1.50	1.66	1.78	1.62	1.60	1.88	1.73
2017	1.69	1.62	1.43	1.50	1.63	1.60	1.66	1.69	1.64	1.73	1.66	1.49
2018	1.49	1.52	1.56	1.61	1.64	1.56	1.54	1.63	1.64	1.59	1.40	1.38
2019	1.41	1.56	1.59	1.66	1.68	1.79	1.82	1.88	2.04	2.07	1.97	1.88
2020	1.91	1.83	1.76	1.10	1.67	2.56	2.65	1.77	2.33	2.71	2.05	1.62
2021	1.75	1.58	1.74	1.79	1.68	1.50	1.64	1.72	1.76	1.78	1.74	1.89
2022	1.91	1.94	2.17	2.34	2.33	2.19	2.01	1.81	1.95	2.03	2.12	2.09
2023	2.00	1.89	1.94	1.76	1.57	1.40	1.62	1.98	1.85	1.72	1.63	1.51
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SOURCE: Cheese Reporter

PURDUE UNIVERSITY

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PURDUE UNIVERSITY

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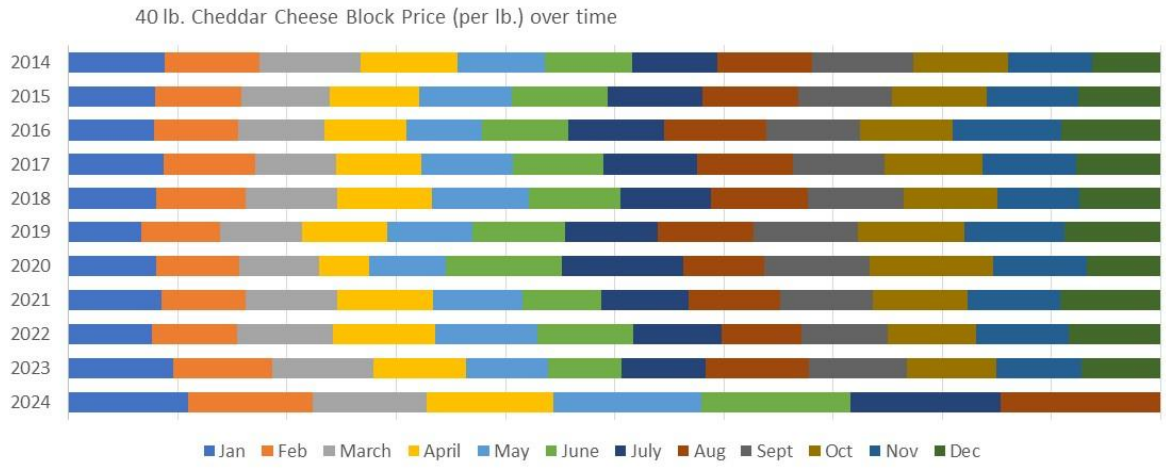

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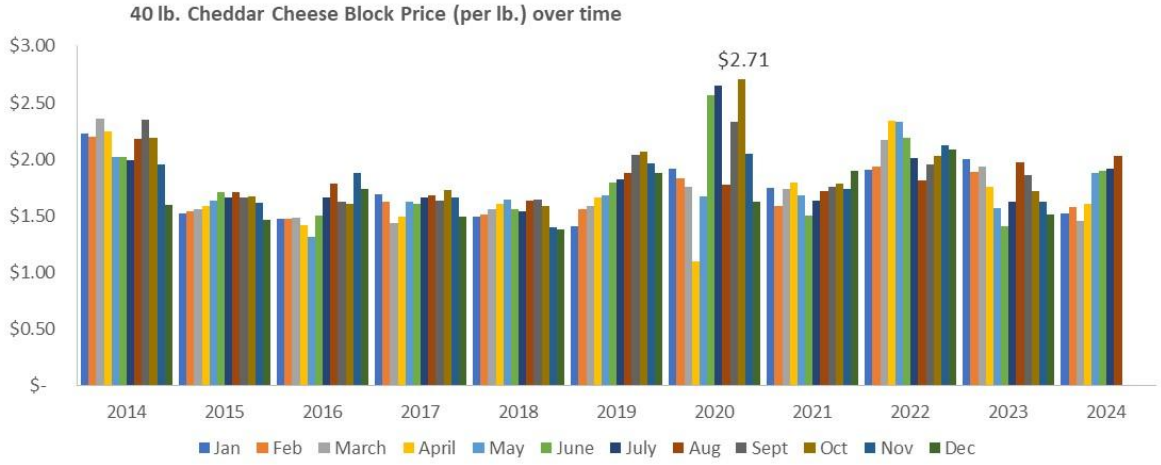

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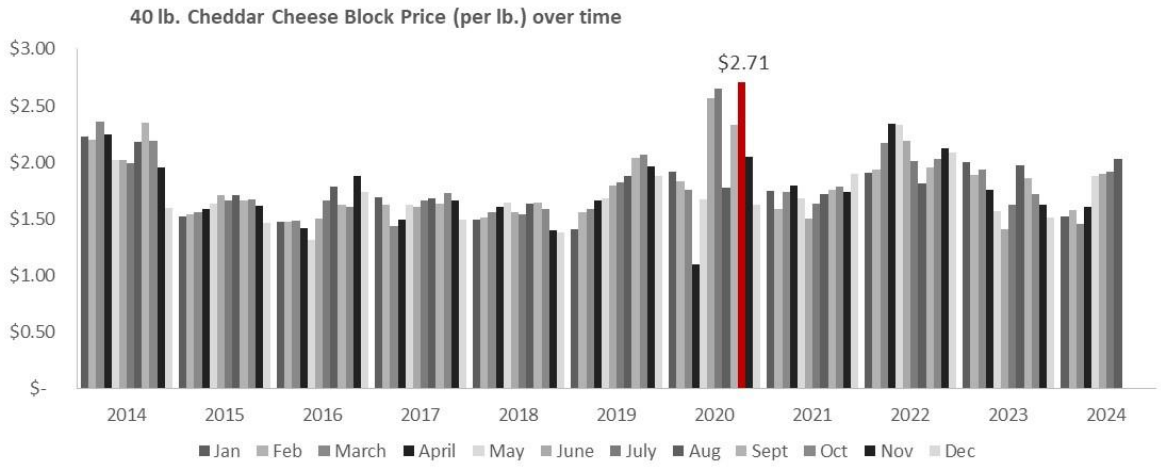

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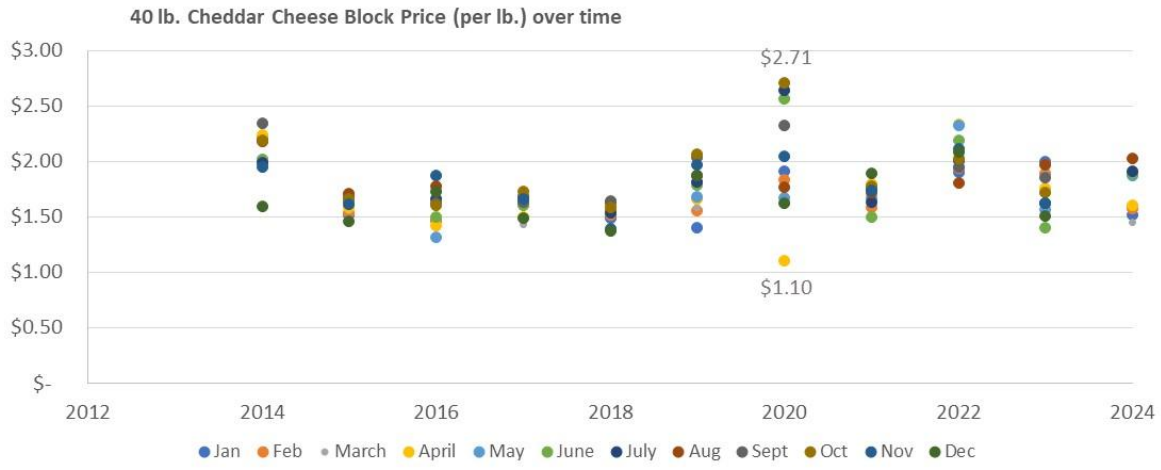

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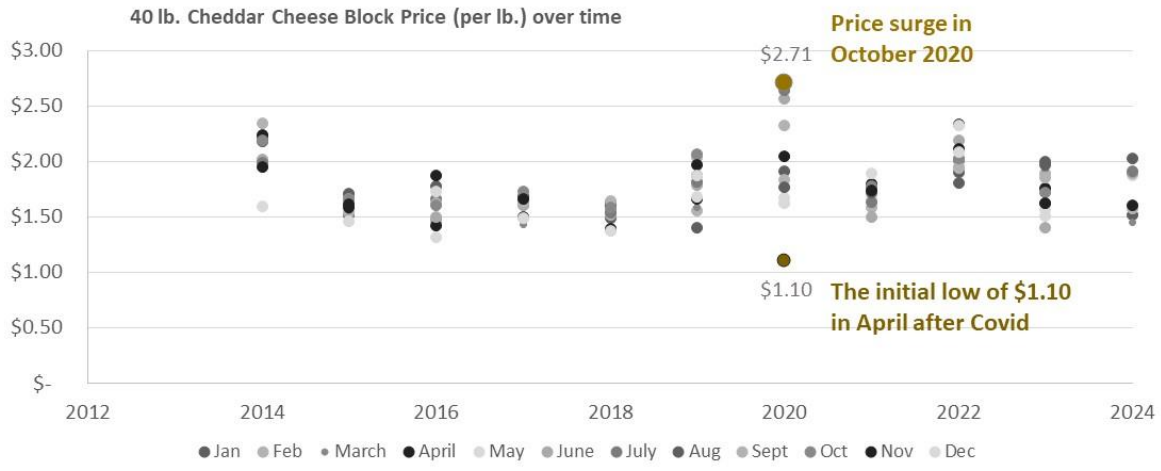

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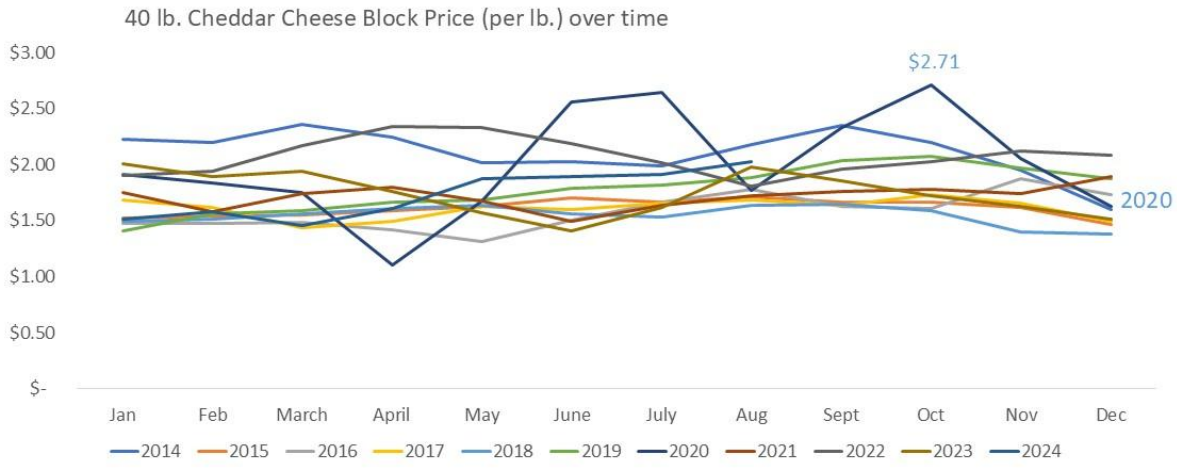

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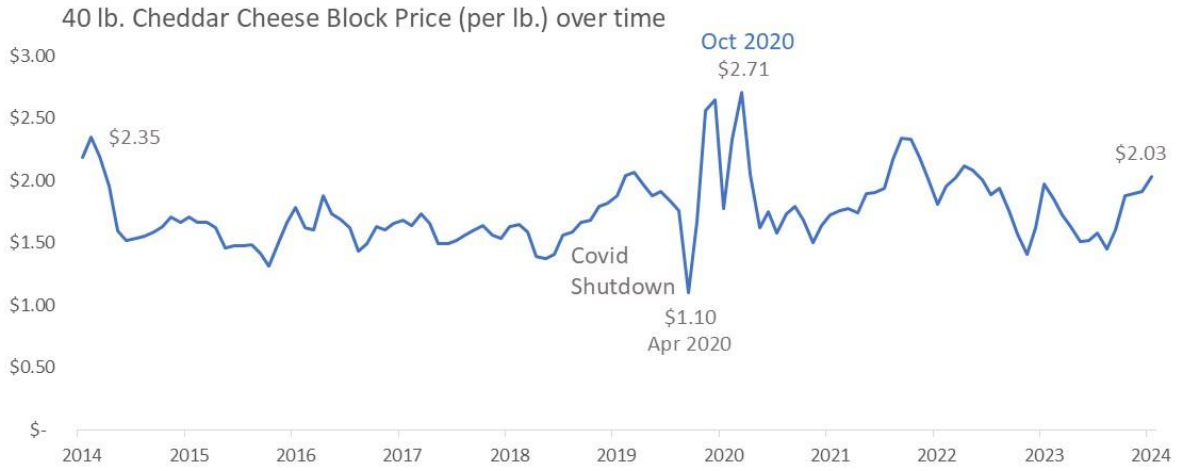

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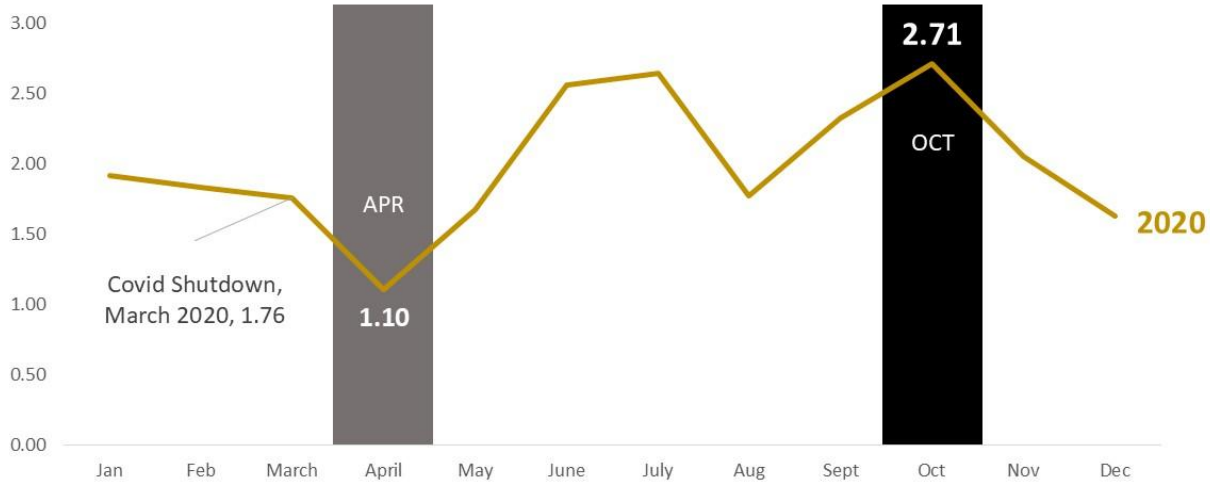

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SOURCE: Cheese Reporter

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Appendix

Color scales versus saturation

Country Level Sales Rank Top 5 Drugs

Rainbow distribution in color indicates sales rank in given country from #1 (red) to #10 or higher (dark purple)

Country	A	B	C	D	E
AUS	1	2	3	6	7
BRA	1	3	4	5	6
CAN	2	3	6	12	8
CHI	1	2	8	4	7
FRA	3	2	4	8	10
GER	3	1	6	5	4
IND	4	1	8	10	5
ITA	2	4	10	9	8
MEX	1	5	4	6	3
RUS	4	3	7	9	12
SPA	2	3	4	5	11
TUR	7	2	3	4	8
UK	1	2	3	6	7
US	1	2	4	3	5

Top 5 drugs: country-level sales rank

RANK	1	2	3	4	5+
COUNTRY | DRUG	A	B	C	D	E
Australia	1	2	3	6	7
Brazil	1	3	4	5	6
Canada	2	3	6	12	8
China	1	2	8	4	7
France	3	2	4	8	10
Germany	3	1	6	5	4
India	4	1	8	10	5
Italy	2	4	10	9	8
Mexico	1	5	4	6	3
Russia	4	3	7	9	12
Spain	2	3	4	5	11
Turkey	7	2	3	4	8
United Kingdom	1	2	3	6	7
United States	1	2	4	3	5

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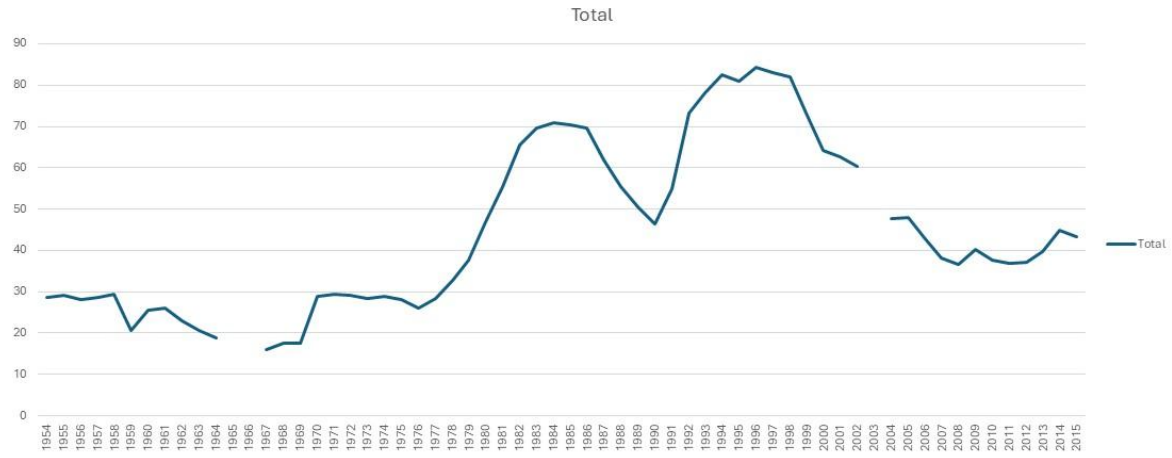
Sweden: Debt to GDP Ratio from 1954 to 2015



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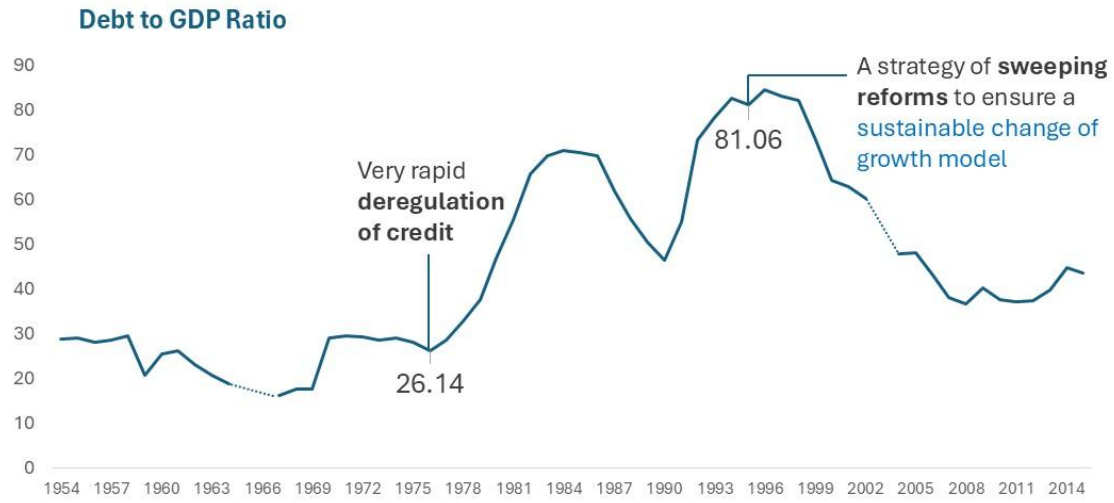

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Session 3.1

Financial Acumen & Operations

Volume Forecasting & Capacity Planning

Dr. Kevin Koharki

PURDUE UNIVERSITY

SESSION 3.1 FINANCIAL ACUMEN – VOLUME FORECASTING

Kevin Koharki, MBA, PhD
Associate Professor of Accounting
Mitch Daniels School of Business

Session 3.1 - Introduction

What do these Q1 '25 earnings call quotes suggest management's primary responsibility is?

"So in summary for Bank of America for the first quarter of 2025, I want to thank the team for another strong quarter. We saw good organic client activity. We saw enjoyed good growth in revenue and earnings. We continue to invest into the future growth of our company. We manage the risk well that drove healthy returns for our shareholders, and we increased the capital back to our shareholders." – Brian Moynihan

"You can see in the waterfall, we deployed capital in a number of ways this quarter. In addition to the increased amount of share repurchases, we allocated more capital to our global markets business and grew both consumer and commercial loans. Within the ending loan growth, it's worth noting we bought an $8 billion portfolio of residential mortgage loans that's both high in quality and allows good potential to expand relationship with customers beyond those mortgage loans, and we expect these loans to add just over $100 million in NII annually" – Alastair Borthwick

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Session 3.1 - Introduction

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Session 3.1 - Introduction

Balance Sheet, Liquidity, and Capital

(EOP basis unless noted)

Balance Sheet Metrics	4Q25	3Q25	4Q24
Assets ($B)			
Total assets	$3,410	$3,403	$3,261
Total loans and leases	1,186	1,166	1,096
Cash and cash equivalents	232	247	290
Total debt securities	926	936	917
Carried at fair value	403	405	359
Held-to-maturity, at cost	523	531	559
Funding & Liquidity ($B)			
Total deposits	$2,019	$2,002	$1,965
Long-term debt	318	311	283
Global Liquidity Sources (average)[1]	975	961	953
Equity ($B)			
Common shareholders' equity	$277	$276	$271
Common equity ratio	8.1 %	8.1 %	8.3 %
Tangible common shareholders' equity[2]	$207	$206	$201
Tangible common equity ratio[2]	6.2 %	6.2 %	6.3 %
Per Share Data			
Book value per common share	$38.44	$37.72	$35.58
Tangible book value per common share[2]	28.73	28.16	26.37
Common shares outstanding (in billions)	7.21	7.33	7.61

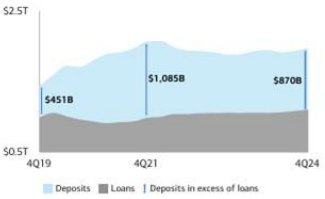
Basel 3 Capital ($B)[3,4]	4Q25	3Q25	4Q24
Common equity tier 1 capital	$201	$203	$201
Standardized approach			
Risk-weighted assets (RWA)	$1,773	$1,751	$1,696
CET1 ratio	11.4 %	11.6 %	11.9 %
Advanced approaches			
Risk-weighted assets	$1,568	$1,546	$1,490
CET1 ratio	12.8 %	13.1 %	13.5 %
Supplementary leverage			
Supplementary Leverage Ratio	5.7 %	5.8 %	5.9 %

- CET1 ratio of 11.4% decreased 23 bps vs. 3Q25[3] (-12 bp impact from change in accounting method)[4]
  - CET1 capital of $201B decreased $1B
  - Standardized RWA of $1.8T increased $22B
- Book value per share of $38.44 improved 8% from 4Q24; tangible book value per share of $28.73 improved 9% from 4Q24[2]
- Average Global Liquidity Sources of $975B increased $14B from 3Q25[1]

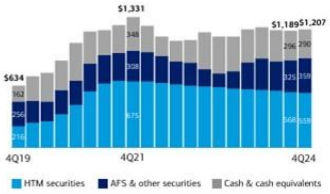
Session 3.1 - Introduction

Managing Excess Deposits

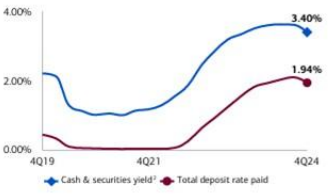
Deposits in Excess of Loans (EOP)



Cash and Securities Portfolios ($B)[1]



Cash & Securities Yield vs. Deposit Rate Paid



- Deposits in excess of loans were $870B in 4Q24
- Excess deposits stored in cash and investment securities
  - 54% cash and AFS and 46% HTM in 4Q24
  - Cash levels of $290B remained well above pre-pandemic ($162B in 4Q19)
- AFS securities mostly hedged with floating rate swaps, which substantially eliminates regulatory capital impacts; duration less than 0.5 years
- HTM securities book has declined $125B since peaking at $683B in 3Q21; down $36B vs. 4Q23 and $9B vs. 3Q24
  - MBS[1] of $430B down $9B, and U.S. Treasuries and other securities of $129B flat vs. 3Q24
- Blended cash and securities yield is 146 bps above deposit rate paid

Note: Amounts may not total due to rounding.
[1] HTM stands for held-to-maturity. AFS stands for available-for-sale. MBS stands for mortgage-backed securities.
[2] Yields based on average balances. Yield on cash represents yield on interest-bearing deposits with the Federal Reserve, non-U.S. central banks, and other banks.

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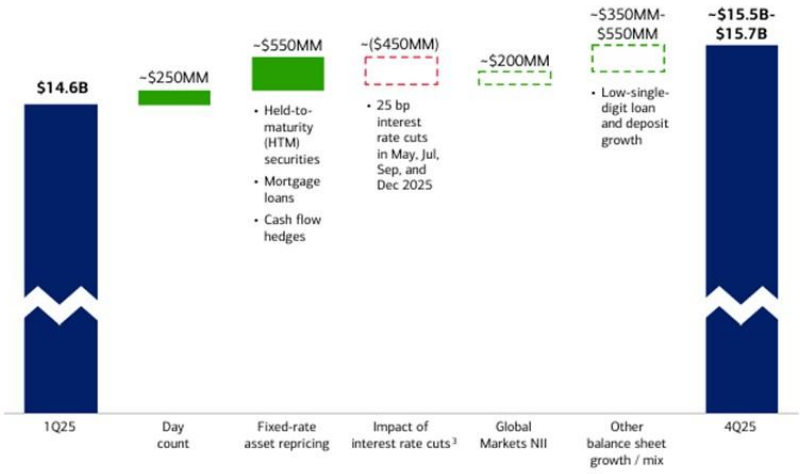
Session 3.1 - Introduction

Net Interest Income Outlook[1,2]



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Session 3.1 - Introduction

What do these Q4 '24 earnings call quotes suggest about expense control?

"But now, we're sort of settling into that 213,000 level people with a takeout on stuff through operating excellence and putting in on stuff into client coverage, expanding our pipes to draw more marketing, more client coverage, more technology investment. **So, we always are shifting expenses, and that's how we make that operating leverage happen.**" – Brian Moynihan

"To give you an example, out of the two, if you normalized last year's expense and think about, you know, our expectations from '23 to '24 and you look at the growth rate, **a big part of the growth rate expense, about 45 to 50% of it is the incentives to wealth management teammates, which is a good thing…**

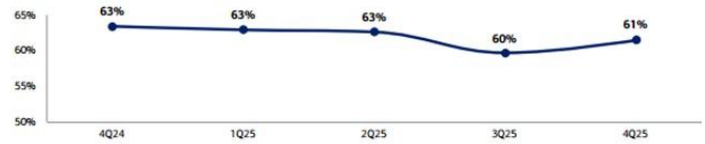
…in the consumer business, which is more incrementally profitable…and you see the expense base their flattening out. **You'll see that we'll get back to the operating leverage that we expected…unless the market's going to go up, you know, 25%, 30% every year and drive the wealth management.**" – Brian Moynihan

Session 3.1 - Introduction

Expense and Efficiency

Total Noninterest Expense ($B)

Efficiency Ratio



- Efficiency ratio improved YoY to 61%; 3.3% operating leverage in 4Q25
- 4Q25 noninterest expense of $17.4B
  - Increased $0.7B, or 3.9%, vs. 4Q24, driven by higher revenue-related incentive and transaction expenses, as well as investments in people, brand, and technology
  - Increased $0.1B, or 0.6%, vs. 3Q25, driven primarily by investments in technology, higher revenue-related expenses, and higher litigation costs, partially offset by a reduction of the FDIC special assessment accrual

Notes: Amounts may not total due to rounding.

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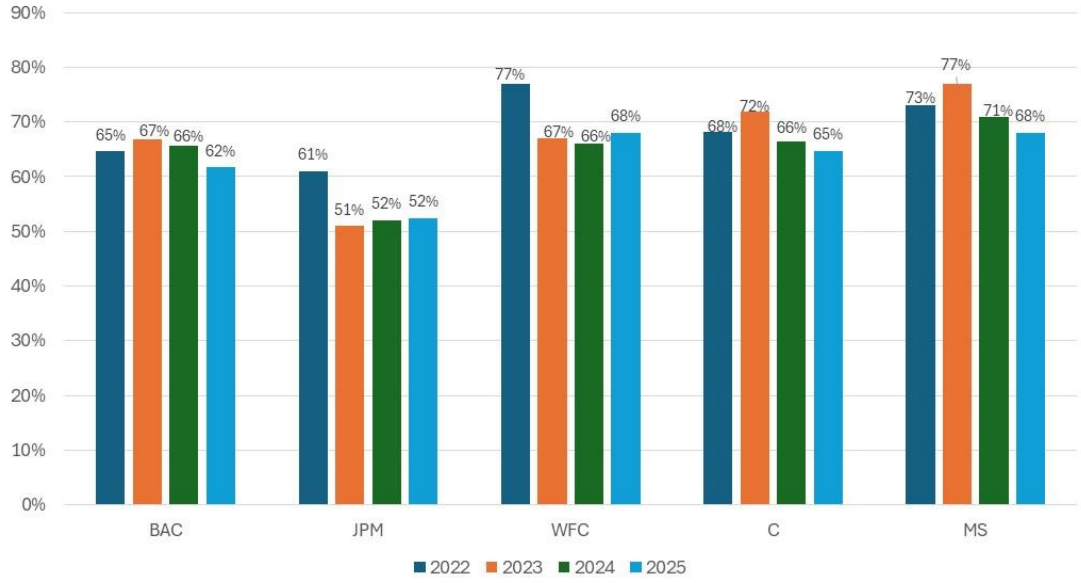
Session 3.1 - Introduction

Bank of America Corporation and Subsidiaries
Consolidated Statement of Income
(In millions, except per share information)

	Year Ended December 31		Fourth Quarter 2025	Third Quarter 2025	Second Quarter 2025	First Quarter 2025	Fourth Quarter 2024
	2025	2024					
Net interest income							
Interest income	$ 138,566	$ 146,607	$ 34,261	$ 35,366	$ 34,873	$ 34,066	$ 35,977
Interest expense	78,470	90,547	18,511	20,133	20,203	19,623	21,618
Net interest income	60,096	56,060	15,750	15,233	14,670	14,443	14,359
Noninterest income							
Fees and commissions	39,402	36,291	10,181	10,337	9,469	9,415	9,543
Market making and similar activities	12,014	12,967	2,074	3,203	3,153	3,584	2,503
Other income	1,585	538	362	267	151	805	70
Total noninterest income	53,001	49,796	12,617	13,807	12,773	13,804	12,116
Total revenue, net of interest expense	113,097	105,856	28,367	29,040	27,443	28,247	26,475
Provision for credit losses	5,675	5,821	1,308	1,295	1,592	1,480	1,452
Noninterest expense							
Compensation and benefits	42,346	40,182	10,602	10,523	10,332	10,889	10,245
Information processing and communications	7,453	7,231	1,913	1,827	1,819	1,894	1,884
Occupancy and equipment	7,448	7,289	1,884	1,872	1,836	1,856	1,824
Product delivery and transaction related	3,924	3,494	1,011	1,025	974	914	903
Professional fees	2,580	2,669	682	606	640	652	744
Marketing	2,204	1,956	563	572	563	506	510
Other general operating	3,772	3,991	782	912	1,019	1,059	677
Total noninterest expense	69,727	66,812	17,437	17,337	17,183	17,770	16,787
Income before income taxes	37,695	33,223	9,622	10,408	8,668	8,997	8,236
Income tax expense	7,186	6,250	1,975	2,076	1,498	1,637	1,430
Net income	$ 30,509	$ 26,973	$ 7,647	$ 8,332	$ 7,170	$ 7,360	$ 6,806
Preferred stock dividends	1,454	1,629	328	429	291	406	266
Net income applicable to common shareholders	$ 29,055	$ 25,344	$ 7,319	$ 7,903	$ 6,879	$ 6,954	$ 6,540
Per common share information							
Earnings	$ 3.86	$ 3.23	$ 0.99	$ 1.06	$ 0.91	$ 0.91	$ 0.85
Diluted earnings	3.81	3.19	0.98	1.04	0.90	0.89	0.83
Average common shares issued and outstanding	7,521.9	7,855.5	7,364.9	7,466.0	7,581.2	7,677.9	7,738.4
Average diluted common shares issued and outstanding	7,680.9	7,935.8	7,546.9	7,627.1	7,651.6	7,770.8	7,843.7

Session 3.1 – Introduction – Efficiency Ratio Comparison



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Module 3 – Financial Acumen & Operations

Session 3.1 - Volume Forecasting & Capacity Planning

Description

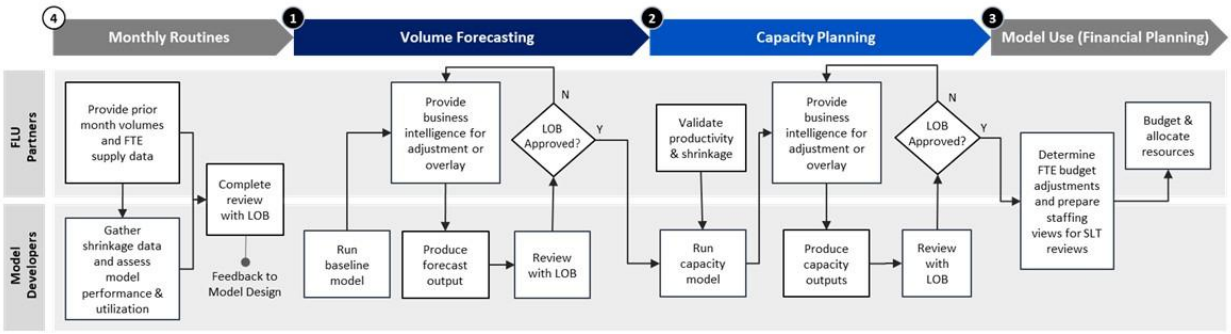
Understanding the variables that impact volume and capacity planning is essential to maximizing long-term business performance. In this session, we will examine the factors senior leaders use to determine future volumes and how this impacts business unit capacity levels.

Session Objective

Examine the data used to determine volume and capacity forecasts so business unit leaders can construct effective operating plans.

Session 3.1 – Volume Forecasting & Capacity Planning

Process Overview



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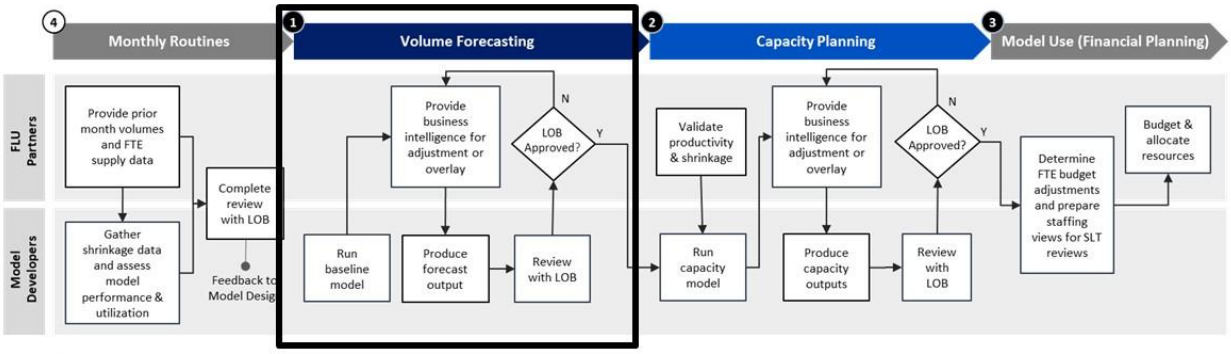
2. *Capacity Planning:* Process to forecast future monthly **FTE demand** for a given process on a cadence consistent with the formal Financial Cycles (0+12, 4+8, 8+4)
3. *Model Use:* Output of forecasting process that is leveraged by Line of Business leaders and Finance to inform staffing and budgeting decisions
4. *Monthly Routines:* Ongoing process of updating model inputs and assumptions based on recent data, process changes, and business intelligence

Session 3.1 – Volume Forecasting

Process Overview



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Session 3.1 – Volume Forecasting

Volume Forecasting

Let's Talk About Variances

- We continually refine our forecasts, as this is essential for resource planning, and thus controlling the Efficiency Ratio
- Failing to get this right results in too few (many) resources being allocated to the areas that need them the most (least)
  - How does this harm the business?
- Many focus on averages (e.g., mean), but highly volatile observations distort reality
- The Variance tells us how far an observation is from an average
- In investing, the greater the variance, the riskier an investment is said to be
  - Well, maybe…

Session 3.1 – Volume Forecasting

Volume Forecasting

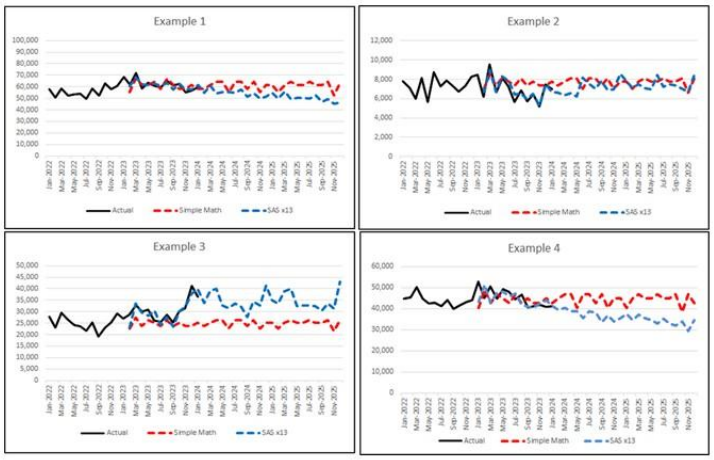
X-13 Methodology

- Volume forecast models developed using statistical methods improve forecasting accuracy and precision over time, and across segments, while creating long-term consistency
- A more statistically rigorous method, **X-13 ARIMA** has been implemented where sufficient historical data exists
  - Method developed by the U.S. Census Bureau
  - Built on historical volumes (36+ months historical data needed)
  - Decomposes historical data into three components based on best fit:
    - Trend-Cycle (underlying trend in month over month volumes)
    - Seasonality (seasonal impacts that repeat over time)
    - Irregularity (remaining components beyond trend/seasonal – typically excluded from future forecast)
- Allows for an improved estimation of the seasonal components and reduces fluctuations in the forecast as new data becomes available. Also includes trading day, length of month, seasonal, and holiday adjustment capabilities

Session 3.1 – Volume Forecasting

Volume Forecasting

Forecasting Method Comparison



- Global Operations examples of forecast variance using simple math and SAS X-13
  - Underlying trend and seasonality captured significantly better
  - SAS X-13 better accounts for month over month volatility
- SAS X-13 absolute variance is lower, and directional variance is mixed which implies more controlled forecast

	% Variance		Abs % Variance	
	SAS x13	Simple Math	SAS x13	Simple Math
Example 1	-1.7%	3.7%	3.4%	4.8%
Example 2	2.0%	14.0%	4.5%	16.1%
Example 3	1.9%	17.7%	7.4%	17.7%
Example 4	-0.4%	5.5%	3.1%	5.1%

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Session 3.1 – Volume Forecasting

Volume Forecasting

Front Line Unit (FLU)	LOBs with X-13 ARIMA Coverage	FLU Coverage %
Enterprise Transaction Services (ETS)	Document Fulfillment Services Enterprise Correspondence Operations Enterprise Card Issuance Check Operations Wholesale Lockbox Operations Cash & Transportation Services Unclaimed Property Operations	75%
Global Credit, AML & Onboarding Ops (GCAOO)	Consumer AML Operations High Risk Detection	33%
Specialized Servicing & Fulfillment Operations (SSFO)	National Service & Solutions Estate Servicing Operations Document Imaging Indexing & Vault Operations	100%
Mortgage, Vehicle & Specialty Operations (MVSO)	Client Experience Collateral & Correspondence Core Services Payments & Escrow Legal Order Operations Default Services	75%
Non-Financial Regulatory Reporting, Tax & Credit Reporting Operations (NTCO)	Consumer & Wealth Tax Operations Credit Furnishing and Disputes Operations	25%
Wealth Management Operations (WMO)	Investment & Monetary Controls Investment Information Management Institutional Retirement Record Keeping & Onboarding Onboarding and Maintenance Support Banking & Personal Retirement Cost Basis Trading Operations Securities Settlement & Custody Ops Institutional Retirement Benefits, Payroll & Disbursement	100%
Global Payment Operations (GPO)	Global Payments Global Payment Investigations Global Economic Sanctions Overdraft Exceptions	90%
Global Credit Operations (GCO)	*No coverage - Development underway*	0%
* Global Treasury and Merchant Operations (GTMO)	*No coverage*	0%
Global Markets Operations (GMO)	*No coverage*	0%
Pre-Paid Unemployment Programs (PUP)	*No coverage*	0%

*GTMO executes forecasting/capacity process independently using independent modelling (similar methodologies)

- Note: SAS X-13 use should be fit for purpose
  - Applied against appropriate levels of granularity
  - Should provide significant lift over simpler methods
  - Requires 36+ months of historical data
  - Triggers Model Risk Management requirements

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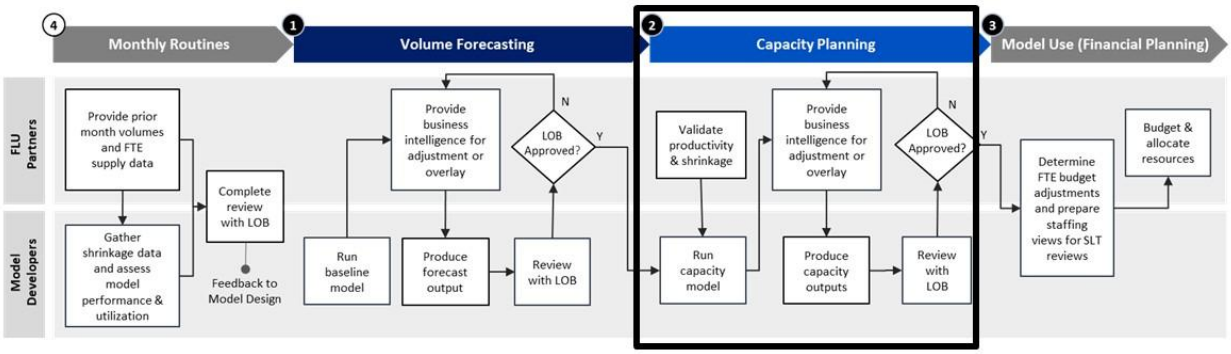
Session 3.1 – Capacity Planning

Capacity Planning

Process Overview



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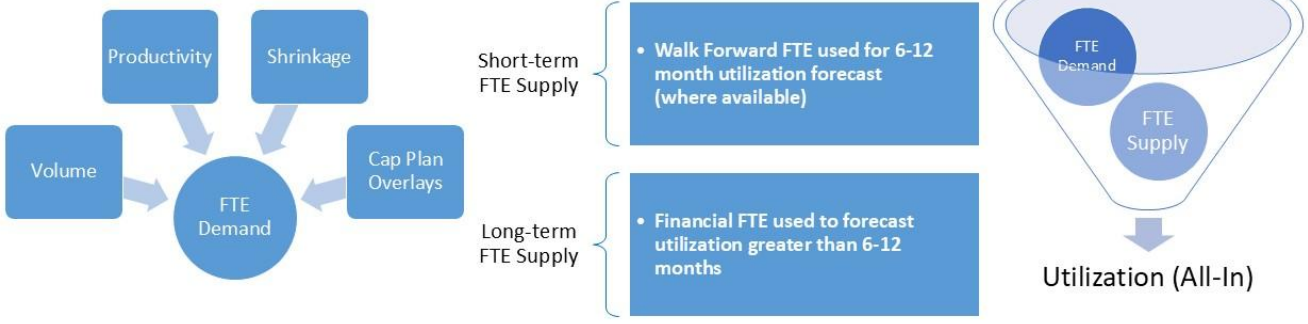
Session 3.1 – Capacity Planning

Capacity Planning

Capacity Plan Components	
Volume	Official Volume Forecast (Baseline + LOB Overlays)
Productivity	Rate or time to process unit of volume when fully productive (e.g., Items/hour, Average Handle Time, Caseload)
Shrinkage	Expected unproductive time as a percentage of total paid time (e.g., vacation, sick/leave, meetings, breaks, etc.). Forecasts are typically a blend of recent trends and historical seasonality. They may also be set to a flat rate to align with a target. Known impacts such as hiring or return to office are also considered.
Capacity Plan Overlays	Non-model driven assumptions built in capacity plan for upcoming initiatives. Typically used when volume and productivity data is limited but initiative is imminent (e.g., new function/volume stream).
FTE Demand	FTE required to complete work as a function of volume, productivity, shrinkage and cap plan overlays (actuals or forecasts)
Utilization	FTE Demand ÷ FTE Supply. Aggregate measure of staffing health. Generally, overstaffed if <100% and understaffed if >100%.

Session 3.1 – Capacity Planning

Capacity Planning



Session 3.1 – Volume Forecasting & Capacity Planning

How The Bank Thinks About Forecast Planning

- The goal is to staff to period averages vs. peaks and valleys
  - Staffing to peaks may be necessary when service quality/SLAs are particularly sensitive
  - Leverage overtime (OT), flexible schedules, and contractors to optimize resources during peaks/valleys
  - Creating fungible resource pools allows for better long-term mitigation of peak/valley impacts
- While data trends matter, business intelligence overlays are critical to identifying changes/impacts that will result in deviation from historical performance
- What are the key drivers/inputs of the forecast-demand model in your business?

Session 3.1 – Volume Forecasting & Capacity Planning

How The Thinks About Forecast Planning

- There is a significant "cost" to **overstaffing** but particularly **understaffing**
  - Contractor costs for one, lost revenue for another
  - Financial ramifications of the latter long-term can be large!
- Utilization will vary by FLU, but target ranges are 95 - 105%.
- Goal: Manage productivity and shrinkage as efficiently as possible.
- You have a significant impact on BAC's efficiency ratios, and thus, capital!

Session 3.1 – Volume Forecasting & Capacity Planning

What External Factors Impact Volume and Capacity Planning?

- Believe it or not, cash circulation within the economy
  - Literal cash printed by the Fed
- Interest rates, of course!
  - Client cash sorting
  - Mortgage origination/refinancing volumes
- Economic confidence, or lack thereof
  - Call volumes
  - Credit card spending and account openings

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Session 3.2

Financial Acumen & Operations

Unit Costing

Dr. Kevin Koharki

PURDUE UNIVERSITY

SESSION 3.2 FINANCIAL ACUMEN – UNIT COSTING

Kevin Koharki, MBA, PhD
Associate Professor of Accounting
Mitch Daniels School of Business

Module 3 – Financial Acumen & Operations

Session 3.2 – Unit Costing

Description

Accurately measuring and analyzing unit-level costs are key to understanding business unit-level performance. In this session, we will examine how to accurately calculate, monitor, and interpret unit-costs to make key business decisions.

Session Objective

Calculate the most accurate unit-level cost metrics possible, to maximize business unit-level performance.

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Session 3.2 - Introduction

What do these quotes from the Q1 ' 25 earnings call suggest about expense control?

"With operating leverage this quarter as revenue grew 300 basis points faster than expenses compares to Q1 '24." – Alastair Borthwick

"You remember, over the last several years, we've been investing in basically building up more commercial bankers across the world....

We've grown more private bankers and more in the Wealth Management team under Merrill, what we call Wealth Management Bankers to support those teams who've grown them.... So that's why you're seeing us sort of do better in the competition just in like quarter loan growth...

But the real reason we're driving our capabilities is more capacity and then making that, honestly, also making that capacity more efficient using some artificial intelligence machine learning to direct that calling capacity and that's allowed us to take what we call new logos in commercial business." – Brian Moynihan

Session 3.2 – Unit Costing

Traditional Costing

- A traditional costing approach uses broad averages to spread costs among products and services
- Some resources will not be consumed in proportion to the activity of the cost driver
- In several instances cost drivers will not be adequately identified, if at all

Session 3.2 – Unit Costing

Implications

- Leads to overcosting and undercosting of products and services
- If some products are overcosted, other products are undercosted
- The overcosted products are subsidizing the undercosted products
- Potential to reward (punish) employees for bad (good) decisions

Session 3.2 – Unit Costing

Activity-Based Costing (ABC)

- Focus on individual activities as the basic cost objects
- An activity is an event, task, or unit of work with a specified purpose
- Examples of activities include certain overhead costs, direct labor, indirect labor, to name a few
- These may be allocated to other departments for good reason, but this can "hide" key information regarding the true costs of a product, service, or customer

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Session 3.2 – Unit Costing

How Has the Bank Historically Thought About Unit Costs?

- Occupancy is charged to the BU until it is completely "sold"
- Only short-term variable costs are used to determine unit costs
- Overhead is allocated to BUs, similar to activity-based costing

Session 3.2 – Unit Costing

Bank Example: Global Mkt Ops Shared Operations

Ops Functions

Operational Component	VUC Total	VUCA : GMSO Admin	VUCE : Shared Operations Reconciliations	VUCG : Quantitative Services	VUCI : Fees and Billing	VUCW : Global Funding and Cash Mgmt
FTE's	199	9	62	0	32	96
Contractor	8	0	3	0	2	3
GBS	201	1	92	0	59	49
Total Resources	408	10	157	0	93	148

Variable

Expense Component	VUC Total	VUCA : GMSO Admin	VUCE : Shared Operations Reconciliations	VUCG : Quantitative Services	VUCI : Fees and Billing	VUCW : Global Funding and Cash Mgmt
Professional Fees	$ 0.0	$ -	$ -	$ -	$ -	$ 0.0
Subscription Services	$ 0.6	$ -	$ 0.0	$ 0.1	$ -	$ 0.4
Resource Cost	$ 29.3	$ 2.0	$ 10.2	$ (0.0)	$ 5.6	$ 11.4
Total Variable Cost	$ 29.9	$ 2.0	$ 10.2	$ 0.1	$ 5.6	$ 11.9

Long Term Variable

Occupancy and equipment	$ 1.4	$ 0.0	$ 0.4	$ 0.1	$ 0.3	$ 0.7
Other Long Term Direct Expenses	$ 1.4	$ 0.1	$ 0.4	$ -	$ 0.2	$ 0.7
Total Long Term Variable Cost	$ 2.8	$ 0.1	$ 0.8	$ 0.1	$ 0.5	$ 1.3
Total Cost	$ 32.7	$ 2.1	$ 11.0	$ 0.2	$ 6.1	$ 13.2

Global Banking	9%	8%	8%	8%	0%	15%
Global Markets	76%	75%	75%	75%	100%	66%
FICC	30%	21%	21%	21%	36%	37%
Commodities	1%	0%	0%	0%	3%	0%
Counterparty Portfolio Mgmt	2%	1%	1%	1%	0%	3%
FICC Management	0%	0%	0%	0%	0%	0%
Global Credit	3%	6%	6%	6%	4%	1%
Global Financing and Futures	11%	5%	5%	5%	18%	13%
Global FX and LCT Trading	4%	0%	0%	0%	6%	7%
Global Rates	5%	6%	6%	6%	5%	5%
Mortgage Products	3%	3%	3%	3%	0%	5%
Municipal Banking and Markets	1%	0%	0%	0%	0%	3%
Global Equities	44%	53%	53%	53%	59%	27%
Equities Management	1%	0%	0%	0%	0%	3%
Equity Derivatives	4%	1%	1%	1%	9%	4%
Equity Execution Services	18%	33%	33%	33%	19%	4%
Prime Financing	21%	20%	20%	20%	30%	17%
Global Research	1%	0%	0%	0%	5%	0%
GM Admin Other	2%	1%	1%	1%	0%	2%
Merrill Wealth Management	10%	14%	14%	14%	0%	10%
Private Bank	1%	0%	0%	0%	0%	1%
Consumer	4%	2%	2%	2%	0%	8%
	100%	100%	100%	100%	100%	100%

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Session 3.2 – Unit Costing

Bank Example: Card Issuance

Ops Functions

Operational Component	Total ECI	Consumer Credit	Debit	Merrill	Large Commercial	Small Business	Prepaid – Nonstate	HELOC	Health Savings
Volume driver	←				Cards produced				→
Volume	48MM	22MM	23MM	225K	870K	1.2MM	250K	70K	500K
Resources	176								

Variable Cost

Variable Cost Component	Total ECI	Consumer Credit	Debit	Merrill	Large Commercial	Small Business	Prepaid – Nonstate	HELOC	Health Savings
Paper/Packaging	$4.6MM	$2.2MM	$2.1MM	$25K	$95K	$135K	$30K	$9K	$69K
Plastic* (vendor)	$57.4MM	$29.4MM	$24.7MM	$180K	$1.0MM	$1.4MM	$150K	$25K	$425K
Postage (standard)	$27.6MM	$11.5MM	$12.3MM	$2.0MM	$550K	$750K	$150K	$40K	$330K
Postage (expedited)	$28.9MM	$16.9MM	$12.0MM	n/a	n/a	n/a	n/a	n/a	n/a
Destruction	$24.3MM	$15.5MM	$8.8MM	n/a	n/a	n/a	n/a	n/a	n/a
Long Term Variable Cost**	$36.5MM	$16.7MM	$17.4MM	$175K	$650K	$900K	$200K	$50K	$400K
Total Variable Cost	**$179.3MM**	**$92MM**	**$77MM**	**$2MM**	**$2MM**	**$3MM**	**$500K**	**$100K**	**$1MM**
Variable Unit Cost (Variable Cost / Volume)		**$4.20**	**$3.37**	**$10.49**	**$2.66**	**$2.65**	**$2.06**	**$1.87**	**$2.31**
Vs 2019		***+$0.93***	***+$0.64***	***+$0.11***	***+$0.17***	***+$0.17***	***+$0.07***	***$0.03***	***+$0.46***

Driven by increase in destruction and postage costs

Driven by increased cost of chip cards and use of recycled plastic beginning in 2023

9

Session 3.2 – Unit Costing

Bank Example: Check Operations

Ops Functions

Operational Component	Total CO	Paper Processing	Image Clearing	Day 1 Deposits	Returns & Exceptions	Research & Adjustments	Paper Storage	Other
Volume driver		Paper Items Processed*	Items Processed	Deposits Processed	Exceptions Processed	Exceptions Processed	Retrieval Requests	n/a
Volume		**2.1MM**	**625M**	**528MM**	**28.3MM**	**700.2K**	**376K**	**n/a**
Resources	568	50	166	100	72	101	52	27
Notes – alignment to business overview doc	*Onshore and GBS included*	*Bank by Mail, Foreign Checks (FCO), Check and Draft Collections (Domestic)*	*Managed Forward Image Clearing Annual Volume*	*Deposits*	*Returns & Exceptions processed*	*Research and Adjustment cases resolved*	*Paper Storage retrieval requests*	*TBD*

Variable Cost

Variable Cost Component	Total ITS	Paper Processing	Image Clearing	Day 1 Deposits	Returns & Exceptions	Research & Adjustments	Paper Storage	Other
Viewpointe	$10.9MM		$10.9MM					
Fed Clearing Fees	$4.5MM		$4.5MM					
Armored Services	$3.1MM		$3.1MM					
Returned Check Fees	$1.3MM				$1.3MM			
Other Vendor Costs	$4.4MM		$1.6MM					$2.8MM
Ops Resource Cost	$56.9MM	$4.3MM	$11.6MM	$12.1MM	$8.0MM	$7.8MM	$11.5MM	$1.6MM
Total Variable Cost	**$81.1MM**	**$4.3MM**	**$31.7MM**	**$12.1MM**	**$9.3MM**	**$7.8MM**	**$11.5MM**	**$4.4MM**
Variable Unit Cost (Variable Cost / Volume)		**$2.04**	**$0.05**	**$0.02**	**$0.33**	**$11.14**	**$30.59**	
Vs 2019		***+$0.80***	***+$0.04***	***-$0.07***	***-$0.20***	***+$1.17***	***n/m***	

2019 potentially included multiple handling. 2024 uses one time through count

Driven by change in metric tracked – from items touched to retrieval requests

10

How Will the Bank Think About Unit Costing

- To improve transparency, costs will be charged to each revenue center
- Most overhead will be reallocated; leaving people, vendor, and equipment costs for unit cost allocation
- Better volume forecasting will result in better FTE allocation
  - The Bank reallocates unused resources, optimizing compensation costs
- More accurate unit costs should improve efficiency ratios!

Session 3.2 – Unit Costing

Table Discussion

What factors drive unit costs in your business?

Come up with an example of unit costing and why it matters for your group

What are you currently doing to improve unit costs?

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Session 3.2 – Unit Costing

What External Factors Impact Unit Costs

- Inflation, inflation, inflation!
  - Labor rates
  - Materials
  - Demand for services
- Adoption rates of technology
- Interest rates yet again!
  - Demand, and thus volumes

THANK YOU

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Session 3.3

Financial Acumen & Operations

Building a Business Case

Dr. Kevin Koharki

PURDUE UNIVERSITY

SESSION 3.3 FINANCIAL ACUMEN – BUILDING A SUCCESSFUL BUSINESS CASE

Kevin Koharki, MBA, PhD

Associate Professor of Accounting

Mitch Daniels School of Business

Module 3 – Financial Acumen & Operations

Session 3.3 – Business Case

Description

To achieve support for business proposals, employees must be able to develop intelligent business cases that will gain approval from senior leaders. In this session, we will focus on common best practices to develop successful business proposals that add value to the organization.

Session Objective

Develop a successful business case for key initiatives business leaders with to pursue.

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Session 3.3 - Introduction

How Does the Bank Think About Investing in Its Businesses?

"**And I guess, so depending on how the capital rules are tweaked, it could make some businesses more profitable, right? Even though you have enough capital to put to those businesses, if returns aren't making your hurdles**... Again, we don't know exactly how it's going to play out, but do you envision any kind of changes to how you evaluate businesses?" – Matthew O'Connor, Analyst

"**Yeah, I think it won't change how we evaluate businesses because regulatory capital is only one of the ways we look at it**. We look at the risk and sort of market-based capital and other things.... **But you also have to remember the ROA and the mix of businesses**, and there's another side to this because we have 6%, you know, tangible common equity, and we got to produce returns on that, and low ROA of businesses affect that... in our company, we can have other businesses which have very high ROAs to make up for it." – Brian Moynihan

Session 3.3 – Building a Business Case

Building A Successful Business Case

- Part of a culture of continuous improvement
- Phase 1 - Understand the end-to-end process
  - Analyze current state to identify opportunities
- Phase 2 - Define the problem
- Phase 3 - Design a multi-generational (MGP) plan for process changes
  - Identify technology gaps that exist, if any
- Phase 4 - Estimate the cost of technology solution and build the business case for investment funding
  - Key is understanding "hard" vs. "soft" savings
- Phase 5 - Monitor changes implemented to ensure progress is in line with MGP

Session 3.3 – Building a Business Case

Strategic Priorities to Deliver Benefits at Scale

- 1) Attempt to eliminate the work
  - Provide a client-led, fully automated experience
- 2) Automate what cannot be eliminated
  - Capture client requests/transactions in a structured manner to automate most of the work
- 3) Streamline processes to take advantage of scale efficiencies
- 4) Enable workforce to handle most complex tasks
  - Simplify processes and provide employee productivity tools

Session 3.3 – Building a Business Case

Weighted Average Cost of Capital (WACC)

$$\frac{\left(\text{After-tax cost of debt} \times \text{Market value of debt}\right) + \left(\text{Cost of equity capital} \times \text{Market value of equity}\right)}{\text{Market value of debt} + \text{Market value of equity}}$$

- Cost of Debt is easy to determine
  - Interest charges specified in lending agreements
- Cost of Equity is theoretical in nature
  - Has several shortcomings

Session 3.3 – Building a Business Case

Core Metric – The Payback Period

- How long does it take for a project to recoup its initial investment?
- What is the maximum length for a project to recoup its initial investment before the proposal is rejected?
- Maximum: 3 years
  - Since time is a function of wealth, a shorter Payback Period suggests a higher rate of return

Session 3.3 – Building a Business Case

Core Metric – The Payback Period

The Bank wants to invest in a new product. The amount required for investment is $120m. The Bank's tax rate is 25%. Determine the payback period in years assuming the following pre-tax cash flows:

Yr 1: $20m
Yr 2: $25m
Yr 3: $30m
Yr 4: $30m
Yr 5: $30m
Yr 6: $30m

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Session 3.3 – Building a Business Case

Core Metric – Return on Investment

- What is the expected return on the proposed investment?
- What is the "cost" of entering the proposed investment?
- Will the proposed investment earn an adequate return for the Bank to achieve its long-term goals?

Session 3.3 – Building a Business Case

Core Metric – Return on Investment

The Bank wants to invest in a new product. The amount required for investment is $120m. The Bank's tax rate is 25%. Determine the payback period in years assuming the following pre-tax cash flows:

Yr 1: $20m
Yr 2: $25m
Yr 3: $30m
Yr 4: $30m
Yr 5: $30m
Yr 6: $30m

Session 3.3 – Building a Business Case

Bank Example: Bank Wire Payments

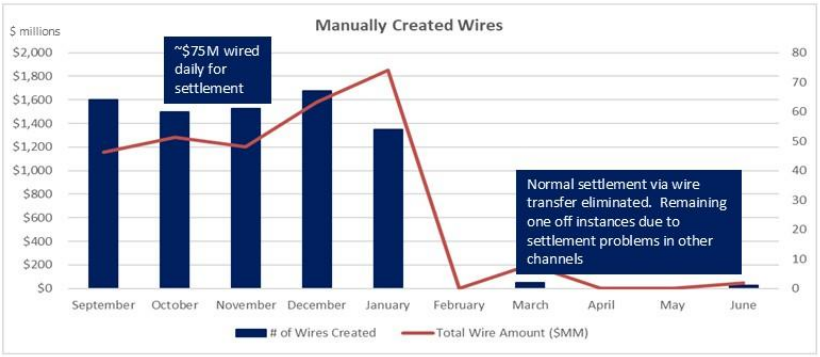
Strategic business decisions to simplify the work can lead to process improvements without the need for funding.

Checks exchanged between banks are transmitted electronically and settlement is completed

Example:

Checks deposited at Bank A but drawn on Bank B are electronically transmitted to Bank B so they can be posted

Bank B completes a manual wire transfer to Bank A on the day of receipt to settle the transaction



Exited partner bank relationships settled via wire transfer strategically to streamline operations.

- **Risk Reduction**: Elimination of manual wires used for interbank settlement and retired Legal Bilateral Agreements
- **Process Simplification**: Elimination of network connections, and settlement process
- **Process Efficiency**: Reduction of file tracking and general ledger reconciliation for Clearing and Settlement and downstream LOB partners

Session 3.3 – Building a Business Case

Bank Example: Legal Order Modernization and Efficiencies

Overview	Current Process	Future Process
In 2024, Legal Order processes were enhanced to improve Compliance and support Consent Order requirements. A multi-year plan is established to bring efficiency and modernization to the environment. **$8.7M spend over 2 years; $4.67M Run Rate** **2025 – Improving intake of Legal Orders (79% paper) – ($4.7M cost) –** *cleaning up the incoming work to modernize downstream steps….* • Migrate to Centralized DII Mailroom with enhanced indexing ($2.5) • Onboard additional agencies to Digital intake (X9) for Attachments ($2.0) • Redirect printing services for Small Business to DFS ($.22) **2026 – Automating fulfillment steps – ($4M cost) –** *Relying on data, system connections and rules to drive the completion of Legal Orders….* • Rules based decision engine for Attachment processes ($2.0) • Subpoena document ordering connectivity ($2.0)	▪ *Vertical LOSO mailroom ingests documents with desktop scanners and limited indexing capability. 79% of legal orders are via paper channels.* ▪ *8 Agencies are enrolled to submit digital Attachment request that have automated fulfillment.* ▪ *Attachments are processed manually, with limited data available in the system to develop rules.* ▪ *Subpoena Case Managers access several applications to manual request documents.*	▪ *Legal Orders will be ingested and indexed through DII Mailroom processes and capabilities.* ▪ *Expand to ~14 agencies to leverage digital and automated submissions through X9.* ▪ *A decision engine that can access centralized data to automate state and federal requirements for holding and releasing funds.* ▪ *LTS will have ability to request documents to high volume systems through one screen.*

Phase 1	*Phase 2*	Phase 3
2023 - Compliance	**2024 – Compliance & Streamline**	**2025/2026 - Modernize**
Building controls & process improvements in highly manual environment	Iteratively enhancing the process with core functionality established	Improving the intake AND automating the fulfillment of legal orders

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Session 3.3 – Building a Business Case

Bank Example: Equity Operations Platform Deficient Reduction

Funding Request Overview

The goal of the initiative is to have GMOT/ELT resources co-locate with Operations to work through the technical deficit, advance our strategic roadmap, and introduce small enhancements designed to further our straight through processing rates.

- LOB business objective: cost savings ($1.37M Save)
- Business priority: H
- Data impact: N
- Estimated duration: 2 years

Work / Activity Impact

Current Process

- *The Equities post trade stack is complex and derived from a combination of strategic and legacy architecture. The complexity creates exceptions that require time and resources to investigate and resolve.*
- *Global Equity Operations daily average for exceptions across Q3/Q4 2022 was 60K. The age profile extends through +30 days as it can often take coordination across multiple teams/divisions to resolve.*
- *MAPS is currently tracking 785 Productions Known Exceptions that are linked back to Securities Operations.*
- *Development Teams currently tracking +3K pending JIRAs related to process enhancements.*

Improvements / Target State

- *Operations is tracking a list of +30 enhancements aimed at (1) progressing our strategic roadmap (2) addressing known platform limitations (3) introducing small enhancements for more straight through processing.*
  - *Move to OTCS model in the Spanish Market*
  - *Migrate additional clients to JET for central clearing*
  - *Reduction in daily aged break exceptions*
  - *Migrate additional models on to Deal Approval Workflow*

***If we don't do this**: Operations will continue to face inefficiency due to platform deficiencies and an increased risk profile attributed to daily creation of exceptions requiring manual investigation.*

1. Not included in tech init funding, only contemplated as business case is evaluated
2. Tech and non-tech post implementation costs associated with supporting the solution created by implementing the proposed solution, in perpetuity
3. Calculated as (Revenue + Expense Reduction + Loss Reduction)
4. Calculated as (Total Benefit - Total Investment)
5. Expense Pay-back: Time in years it takes to recover investment based on expense savings projection by year; includes one-year discount
6. NIBT Pay-back: Time in years it takes to recover investment based on NIBT projection by year; includes one-year discount
7. Investment includes one-time tech init funding only; excludes other LOB investment and capital investment
8. Calculated as (Run-Rate Revenue Impact- Run-Rate Expense Impact)/Total Tech Init Funding
9. Calculated as (Run-Rate Revenue Impact- (Run-Rate Expense Impact + Run-Rate Net Credit Losses Impact)/Total Tech Init Funding

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Session 3.3 – Building a Business Case

Bank Example: Equity Operations Platform Deficient Reduction

BC submission date:	4/21/2023
Initiative Name:	Equity Operations Platform Deficient Reduction
Initiative Start Year:	2024
Sponsoring LOB:	GO
LOB/SCF(s) where saves are realized	GO & GM

$ in millions	2024	2025	2026	2027	2028	Run-Rate	Total
Total Investment - One Time & Ongoing Costs	**$1.2**	**$1.2**	**$0.0**	**$0.0**	**$0.0**	**N/A**	**$2.4**
Tech Initiative Funding	$1.2	$1.2	$0.0	$0.0	$0.0	N/A	$2.4
Other Investments	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Other LOB Investment [1]	*$0.0*	*$0.0*	*$0.0*	*$0.0*	*$0.0*	*N/A*	*$0.0*
Capital Investment [1]	*$0.0*	*$0.0*	*$0.0*	*$0.0*	*$0.0*	*N/A*	*$0.0*
Ongoing Operating Costs[2]	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
Total Benefit[3] – Favorable/(Unfavorable)	**$0.0**	**$1.4**	**$1.4**	**$1.4**	**$1.4**	**$1.4**	
Revenue Impact – Favorable/(Unfavorable)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
Net Credit Losses – (Favorable)/Unfavorable	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
Expense Impact – (Favorable)/Unfavorable	$0.0	-$1.4	-$1.4	-$1.4	-$1.4	-$1.4	

Financial Impact

Total Program Return[4] – Favorable/(Unfavorable)	**-$1.2**	**$0.2**	**$1.4**	**$1.4**	**$1.4**	**N/A**
Role Impacts - (Fav)/Unfav Impacts	**0**	**(10)**	**(10)**	**(10)**	**(10)**	**(10)**
Capacity Created (Hours)	**0**	**0**	**0**	**0**	**0**	**0**

Other Metrics	
Benefits Run-Rate Year	2025
Payback Period Years Expense Only[5]	2.75
Payback Period Years NIBT[6]	2.75
Return on Investment[7,8]	57%
Return on Investment (NIBT)[7,9]	57%

Other Information	
LOB/SCF(s) where saves are realized	GO & GM
Source of Saves, if not People	People & BC&E Fees

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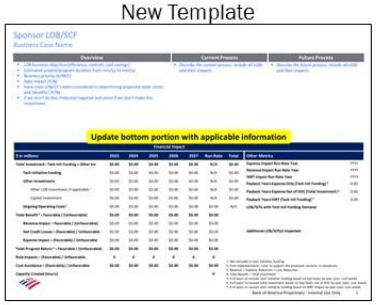
Session 3.3 – Building a Business Case

Bank Example: 2026 Initiative Planning Approach

- **GO will continue to utilize the Centralized Initiative Portal (CIP)**
- **Funding Options:**
  1. **Enterprise OpEx funding**
  2. **LOB funding**. All FLUs with submissions to a particular funding tier will present in that funding tier's review session.
     - Consumer, Digital & Cross Banking, Enterprise Credit, Global Payments Solutions, Global Markets, Wealth Management, Other (if applicable)
  3. **Global Operations funding**
- **New OpEx initiatives only:** SPI and Client Journey Alignment required

New Template



Benefits Constraints

- Must have Expense and/or HC Savings
- Run-rate period to recover tech init funding with expense savings only is ≤ 3 years
- Can have revenue benefits, but must adhere to the above two bullets as well

Other Metrics	
Expense Impact Run-Rate Year	2026
Revenue Impact Run-Rate Year	2027
NIBT Impact Run-Rate Year	2027
Payback Period Years Expense Only (Tech Init Funding) [5]	2.00
Payback Period Years Expense Net of OOC (Total Investment) [6]	3.00
Payback Period Years NIBT (Tech Init Funding) [7]	1.82

Funding Constraints

- Implementation must be complete by Dec 2027
- ≤ $25M in 2026 funding (year 1)
- ≤ $40M over 2026 and 2027 (year 1 and 2)

Governance

- Funding and benefits will be closely monitored
- No changes are permitted to funding or benefits without prior discussion/approval by Enterprise Technology Initiative Planning
- No LOB re-prioritization of funds is permitted

Session 3.3 – Building a Business Case

What External Factors Impact Business Case Approval

- Interest rates, and not because you're a bank
- Interest rates, because you're a bank
- Regulatory thresholds
- General economic factors such as GDP, unemployment, etc.

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Tying it All Together

Session 3.3 – Conclusion

Bank's Overarching Goals

- Invest in technology to drive customer satisfaction and reduce costs
  - CapEx was $4.0B in 2025 and higher in 2026
- Drive adoption of digital applications and thus, organic growth
  - Deposits, loans, investment banking-related fees, among others
- Improve efficiency ratio to below 60% via operating leverage
  - Unit costs matter!
- Maintain 50 basis point gap between actual and required CET1 level
  - This is key!!!

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Session 3.3 – Conclusion

The Flywheel in Action…

"On investments we made, we added bankers and advisors across most of our businesses in 2024, and we also increased investments in our brand… And we increased our investments around technology, as well as financial centers….

We're a growth company, and we continue to invest in our future. As far as headcount goes, we've managed our headcount carefully….

OK, let's go back to our expense and how to think about a forward view. First, most importantly, we remain focused on growing the company and driving operating leverage."
– Alastair Borthwick

Session 3.3 – Conclusion

Continued Organic Growth in 2025

Consumer Banking

- Added ~680,000 net new checking accounts; completed 28 consecutive quarters of net growth
- ~3.8MM new credit card accounts[1]
- Consumer investment assets of $599B,[2] up 16% YoY; over 4MM accounts with $19B flows since 4Q24
- Grew average Small Business loans 7% YoY

Global Wealth & Investment Management

- $4.8T client balances,[2] up 12% YoY, with AUM balances of $2.2T, up 16%
- Added ~21,000 net new relationships across Merrill and Private Bank
- Opened ~114,000 new bank accounts; 64% of clients have banking relationship

- $6.5T total deposits, loans, and investment balances[3]
- $115B total net wealth spectrum client flows since 4Q24[4]

Global Banking

- #3 investment banking fee ranking[5]
- Treasury service charges increased 13% YoY
- Grew average Middle Market loans 6% YoY[6]
- Grew average deposits 13% YoY

Global Markets

- Record sales and trading revenue
- 15 consecutive quarters of YoY sales and trading revenue growth
- Record Equities sales and trading revenue
- 21 consecutive quarters of average loan growth

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Session 3.3 – Conclusion

Bank of America Corporation and Subsidiaries
Consumer Banking Segment Results

(Dollars in millions)

	Year Ended December 31		Fourth Quarter 2025	Third Quarter 2025	Second Quarter 2025	First Quarter 2025	Fourth Quarter 2024
	2025	2024					
Net interest income	$35,309	$ 33,078	$ 9,090	$ 8,988	$ 8,726	$ 8,505	$ 8,485
Noninterest income:							
Card income	5,456	5,432	1,341	1,403	1,415	1,297	1,397
Service charges	2,528	2,445	638	645	627	618	622
All other income	380	481	132	130	45	73	142
Total noninterest income	8,364	8,358	2,111	2,178	2,087	1,988	2,161
Total revenue, net of interest expense	43,673	41,436	11,201	11,166	10,813	10,493	10,646
Provision for credit losses	4,649	4,987	1,066	1,009	1,282	1,292	1,254
Noninterest expense	22,697	22,104	5,729	5,575	5,567	5,826	5,631
Income before income taxes	16,327	14,345	4,406	4,582	3,964	3,375	3,761
Income tax expense	4,082	3,586	1,102	1,145	991	844	940
Net income	$12,245	$ 10,759	$ 3,304	$ 3,437	$ 2,973	$ 2,531	$ 2,821
Net interest yield	3.56 %	3.34 %	3.64 %	3.59 %	3.51 %	3.48 %	3.42 %
Efficiency ratio	51.97	53.35	51.15	49.92	51.48	55.53	52.89
Return on average allocated capital [1]	28	25	30	31	27	23	26

3/31/2026 21

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Bank of America Corporation and Subsidiaries
Global Wealth & Investment Management Segment Results

(Dollars in millions)

	Year Ended December 31		Fourth Quarter 2025	Third Quarter 2025	Second Quarter 2025	First Quarter 2025	Fourth Quarter 2024
	2025	2024					
Net interest income	$ 7,197	$ 6,969	$ 1,870	$ 1,800	$ 1,762	$ 1,765	$ 1,753
Noninterest income:							
Investment and brokerage services	17,019	15,238	4,563	4,334	4,033	4,089	4,057
All other income	667	722	185	178	142	162	192
Total noninterest income	17,686	15,960	4,748	4,512	4,175	4,251	4,249
Total revenue, net of interest expense	24,883	22,929	6,618	6,312	5,937	6,016	6,002
Provision for credit losses	35	4	(3)	4	20	14	3
Noninterest expense	18,621	17,241	4,747	4,622	4,593	4,659	4,438
Income before income taxes	6,227	5,684	1,874	1,686	1,324	1,343	1,561
Income tax expense	1,557	1,421	469	421	331	336	390
Net income	$ 4,670	$ 4,263	$ 1,405	$ 1,265	$ 993	$ 1,007	$ 1,171
Net interest yield	2.32 %	2.20 %	2.39 %	2.33 %	2.31 %	2.26 %	2.21 %
Efficiency ratio	74.84	75.19	71.75	73.22	77.36	77.44	73.93
Return on average allocated capital [1]	24	23	28	26	20	21	25

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Session 3.3 – Conclusion

Bank of America Corporation and Subsidiaries
Global Banking Segment Results

(Dollars in millions)

	Year Ended December 31		Fourth Quarter 2025	Third Quarter 2025	Second Quarter 2025	First Quarter 2025	Fourth Quarter 2024
	2025	2024					
Net interest income	$12,611	$ 13,235	$ 3,238	$ 3,141	$ 3,081	$ 3,151	$ 3,270
Noninterest income:							
Service charges	3,438	3,135	885	863	864	826	808
Investment banking fees	3,742	3,453	973	1,155	767	847	985
All other income	4,317	3,925	1,142	1,030	977	1,168	1,033
Total noninterest income	11,497	10,513	3,000	3,048	2,608	2,841	2,826
Total revenue, net of interest expense	24,108	23,748	6,238	6,189	5,689	5,992	6,096
Provision for credit losses	943	883	243	269	277	154	190
Noninterest expense	12,416	11,853	3,118	3,044	3,070	3,184	2,951
Income before income taxes	10,749	11,012	2,877	2,876	2,342	2,654	2,955
Income tax expense	2,956	3,028	791	791	644	730	812
Net income	$ 7,793	$ 7,984	$ 2,086	$ 2,085	$ 1,698	$ 1,924	$ 2,143
Net interest yield	1.94 %	2.29 %	1.86 %	1.87 %	1.94 %	2.10 %	2.12 %
Efficiency ratio	51.51	49.91	50.01	49.16	53.98	53.14	48.39
Return on average allocated capital [1]	15	16	16	16	13	15	17

Session 3.3 – Conclusion

Bank of America Corporation and Subsidiaries
Global Markets Segment Results

(Dollars in millions)

	Year Ended December 31		Fourth Quarter 2025	Third Quarter 2025	Second Quarter 2025	First Quarter 2025	Fourth Quarter 2024
	2025	2024					
Net interest income	$ 5,690	$ 3,375	$ 1,750	$ 1,484	$ 1,267	$ 1,189	$ 1,026
Noninterest income:							
Investment and brokerage services	2,511	2,128	628	614	642	627	555
Investment banking fees	2,837	2,655	656	834	666	681	639
Market making and similar activities	12,064	12,778	2,001	3,141	3,300	3,622	2,381
All other income	994	876	269	152	107	466	237
Total noninterest income	18,406	18,437	3,554	4,741	4,715	5,396	3,812
Total revenue, net of interest expense [1]	24,096	21,812	5,304	6,225	5,982	6,585	4,838
Provision for credit losses	71	(32)	12	9	22	28	10
Noninterest expense	15,418	13,926	3,906	3,895	3,806	3,811	3,505
Income before income taxes	8,607	7,918	1,386	2,321	2,154	2,746	1,323
Income tax expense	2,496	2,296	402	673	625	796	384
Net income	$ 6,111	$ 5,622	$ 984	$ 1,648	$ 1,529	$ 1,950	$ 939
Efficiency ratio	63.99 %	63.85 %	73.64 %	62.58 %	63.61 %	57.88 %	72.43 %
Return on average allocated capital [2]	13	12	8	13	13	16	8

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Session 3.3 – Conclusion

Key Business Fundamentals

- Rising interest rates negatively impact bond values (and capital levels) but positively impact net interest income (NII)
- CET1 improves via net income but worsens from buybacks, dividends, RWA, and OCI on AFS (recently)
- As securities mature, they can reinvest in higher-yield assets, reducing RWA and improving capital levels
- Long-duration deposits add stability to the balance sheet and allows for long-term investment in the business (e.g., loans)
  - 2/3 of deposits has duration of 10+ years

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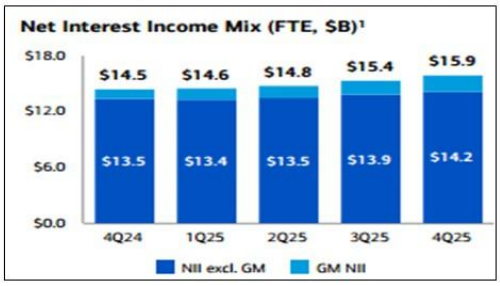

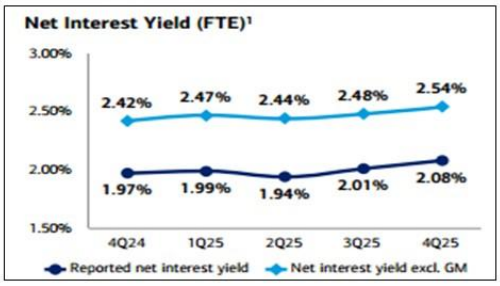

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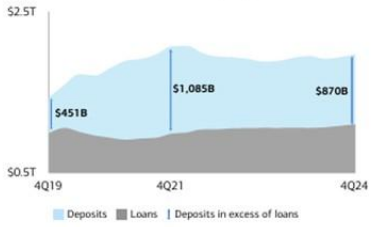
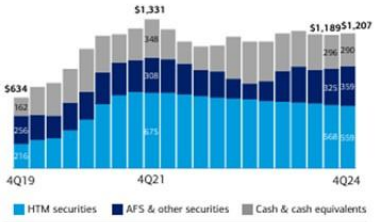
Managing Excess Deposits

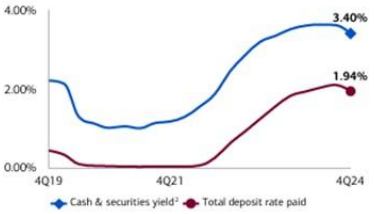
Deposits in Excess of Loans (EOP)



Cash and Securities Portfolios ($B)[1]



Cash & Securities Yield vs. Deposit Rate Paid



- Deposits in excess of loans were $870B in 4Q24
- Excess deposits stored in cash and investment securities
  - 54% cash and AFS and 46% HTM in 4Q24
  - Cash levels of $290B remained well above pre-pandemic ($162B in 4Q19)
- AFS securities mostly hedged with floating rate swaps, which substantially eliminates regulatory capital impacts; duration less than 0.5 years
- HTM securities book has declined $125B since peaking at $683B in 3Q21; down $36B vs. 4Q23 and $9B vs. 3Q24
  - MBS[1] of $430B down $9B, and U.S. Treasuries and other securities of $129B flat vs. 3Q24
- Blended cash and securities yield is 146 bps above deposit rate paid

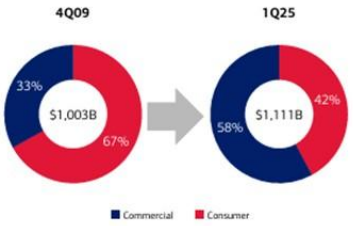
Note: Amounts may not total due to rounding.
[1] HTM stands for held-to-maturity. AFS stands for available-for-sale. MBS stands for mortgage-backed securities.
[2] Yields based on average balances. Yield on cash represents yield on interest-bearing deposits with the Federal Reserve, non-U.S. central banks, and other banks.

Session 3.3 – Conclusion

Credit Risk Transformation Reflects Responsible Growth Strategy

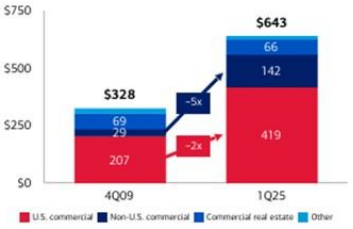
(EOP)

Loan Mix[1]

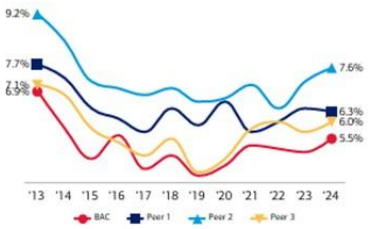


Consumer Loan Portfolio ($B)[1]

Commercial Loan Portfolio ($B)[1]



Federal Reserve Stress Test Loan Loss Rates (%)[2]



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Session 3.3 – Conclusion

Balance Sheet Highlights

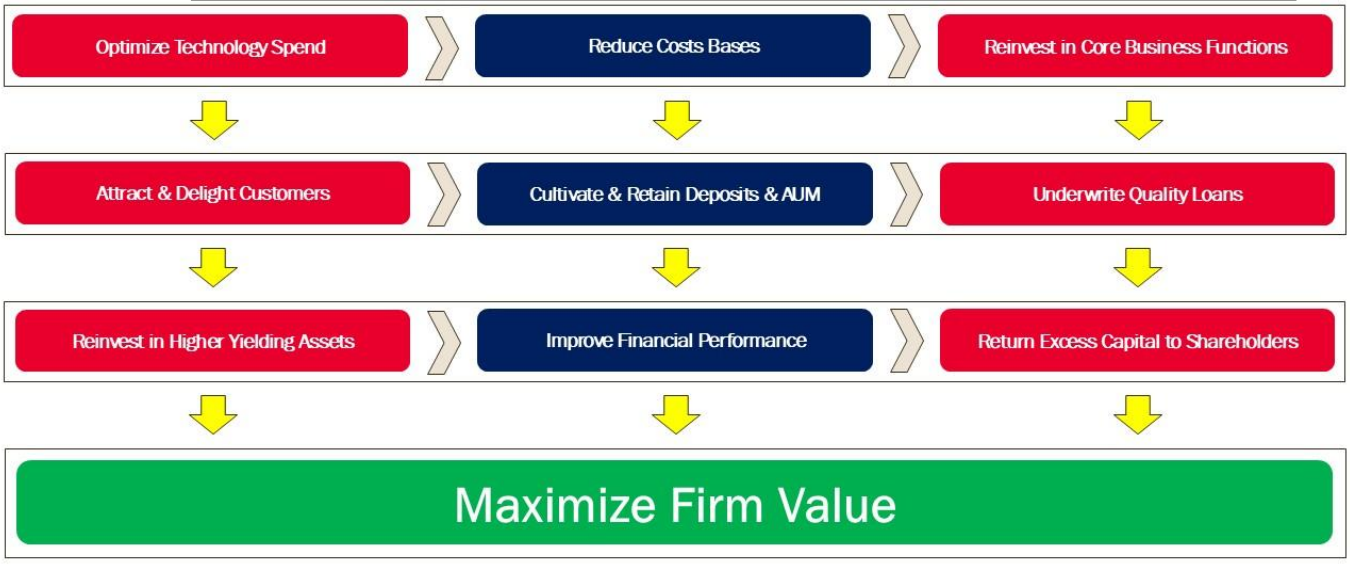
(EOP basis unless noted)

Metric	4Q09	4Q19	1Q25
Total loans and leases[1]	**$1,003B**	**$983B**	**$1,111B**
Consumer	$675B	$466B	$468B
Consumer credit card *% FICO <660*	$161B 26%	$98B 12%	$100B 12%
Home equity	$154B	$41B	$26B
GWIM loans *% of total loans*	$100B 10%	$177B 18%	$234B 21%
Total Commercial *% Non-U.S. commercial*	$328B 9%	$518B 21%	$643B 22%
Commercial real estate *% CRE construction*	$69B 39%	$63B 12%	$66B 15%
Nonperforming loans	**3.75%**	**0.36%**	**0.55%**
NCOs[1]	**$11B**	**$1.0B**	**$1.5B**
Nine-quarter stressed net credit losses[2]	**$104B / 10.0%**	**$44B / 4.4%**	**$60B / 5.5%**
Tangible common shareholders' equity[1,3]	**$112B**	**$172B**	**$205B**
Global Liquidity Sources[4]	**$214B**	**$576B**	**$942B**

Transformation through Responsible Growth

- Our loan portfolio is more balanced today and has less inherent risk than in earlier periods
  - Lower concentration in the consumer loan portfolio
  - Less exposure to unsecured consumer credit and home equity loans
  - GWIM loans more than doubled since 4Q09
  - Commercial loan portfolio more balanced, with less concentration in construction loans
    - 91% investment grade or secured
  - Stress test results indicate significantly lower credit losses expected in a severe downturn
- Our capital base and liquidity have also increased significantly since 4Q09
  - $93B higher tangible common equity[3]
  - Global Liquidity Sources[4] are more than four times higher

Session 3.3 – Conclusion



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Session 4.1

End-to-End Processes

Value Stream Analysis & a Case for PI Tools

Mr. Stalin Encarnacion

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SESSION 4.1 END-TO-END PROCESSES EVALUATE END-TO-END PROCESS AND CUSTOMER JOURNEY

Stalin Encarnación
Purdue Manufacturing Extension Partnership

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Module 4 – End-to-End Processes

Session 4.1 – Process Improvement Tools Continued

Description

This session is to help you gain familiarity with a range of process analysis and improvement tools. The session will focus on why these concepts matter, how to leverage their power, understanding lean principles, and will include examples from process owners.

Session Objective

Use select/powerful process analysis and improvement tools to gain practical familiarity (e.g., value stream mapping and waste identification and elimination).

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End-to-End Processes

Overview

I. End-to-End Process Thinking

II. Lean: Value-added vs. Non-value added

III. 8 Wastes from Lean in Banking

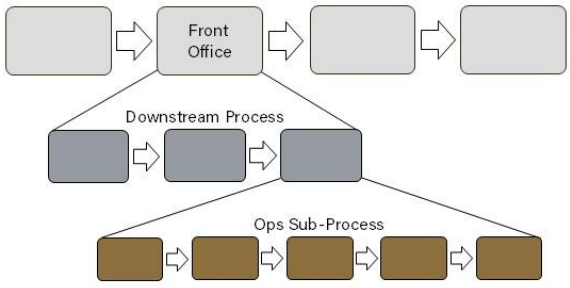
IV. Value Stream Analysis (VSA)

End-to-End Process Thinking

Process Mapping is a graphical method for illustrating how a product or transaction is processed, including all inputs (X), outputs (Y), and opportunities for improvement.

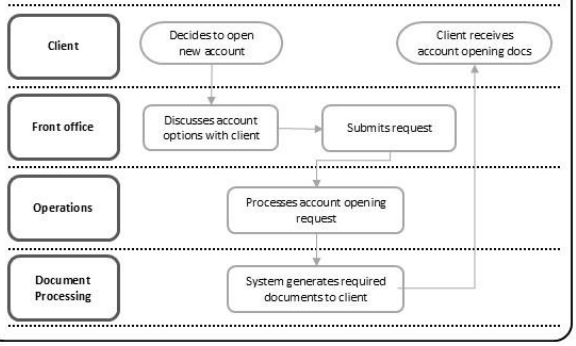
The End-to-End Process

Applicable to any type of process: loan application, transaction processing, manufacturing, or service.



Cross-Functional Mapping

A cross-functional map illustrates an end-to-end view, incorporating multiple groups' involvement in a process.



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End-to-End Process Thinking

Downstream/Upstream thinking promotes collaboration with E2E partners to eliminate and reduce defects while generating process efficiencies.

Process and customer journey mapping provide an opportunity to think 'cross-stream'

End-to-End Processes

Overview

I. End-to-end Process Thinking

II. **Lean: Value-added vs. Non-value added**

III. 8 Wastes from Lean in Banking

IV. Value Stream Analysis (VSA)

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Defining Lean

Lean Principles

- Lean philosophy is a systematic approach to identifying and eliminating **waste** **(non-value-added activities)** through **continuous improvement** by flowing the product at the **pull of the customer** in pursuit of perfection.

Value-added:

Any activity that increases the market form or function of the product or service.

- These are things the customer is willing to pay for.

Non-value-added:

Any activity that does not add market form or function or is not necessary.

- These activities should be eliminated, simplified, reduced, or integrated.

Non-value-added work is true waste.

- Lean is about finding waste (Shingō, 1987; Thomé, Sousa, & Scavarda do Carmo, 2014)

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Defining Lean: Non-value added required

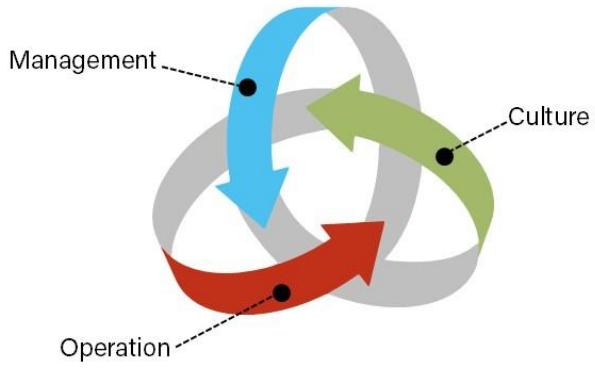
Non-value added required

(Often referred to as "value-enabling.")

Activities that may not add value to the customer but are required to be performed.

- Activities required by law or regulation.
- Responding to customer complaints.
- QA steps.
- Any activity the organization **believes** is necessary to maintain its viability.

The core principle in implementing LEAN is to **eliminate waste** to **continually improve a process** (Oppenheim, 2017).



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Key Points

- Non-value-added activities are ***waste.***
- Waste uses up ***time*** and ***resources***.
- **The goal of lean** is to ***eliminate*** wastes.
- Lean is a powerful system for ***reducing costs, improving quality***, and ***reducing lead time***.

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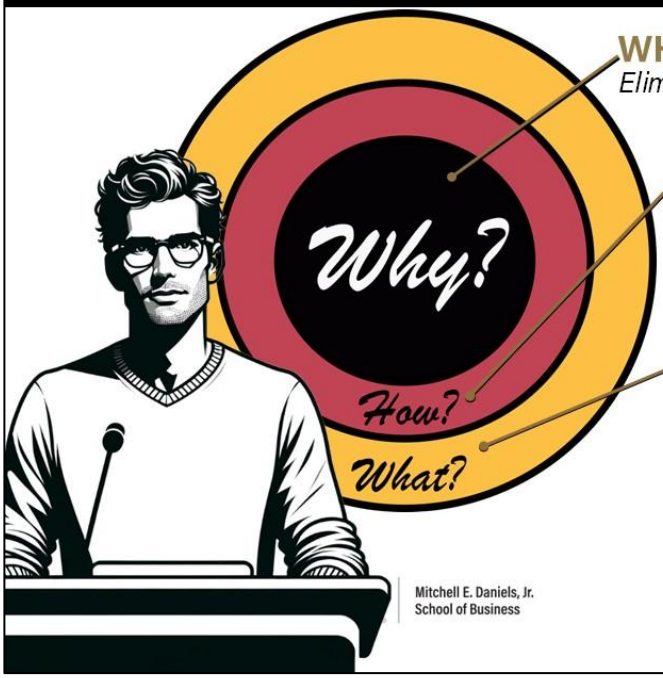
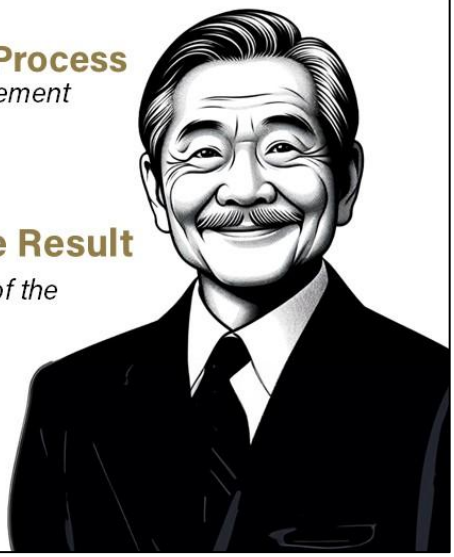
The Why, How and What of Lean



WHY? = The Purpose
Eliminate waste

HOW? = The Process
Continuous improvement

WHAT? = The Result
Flowing at the pull of the customer in pursuit of perfection.



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Efficiency and Effectiveness

EFFICIENCY

Optimizing resources and eliminating waste.

- Identifying and eliminating non-value-added activities.
- Maximizing resources by eliminating waste.
- Improves input-output ratio.

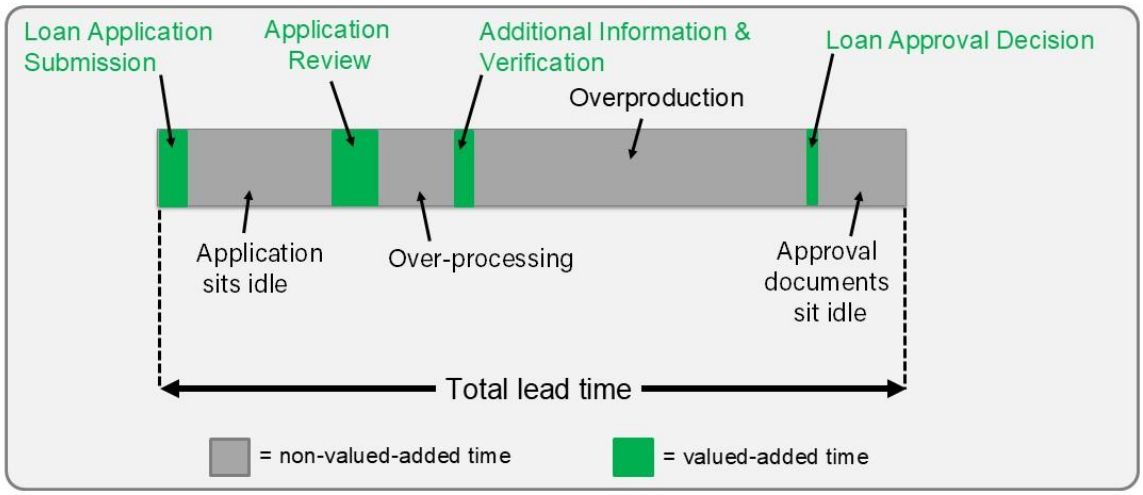
EFFECTIVENESS

Delivering quality through value-added activities

- Ensuring quality and functionality.
- Achieving intended outcomes and goals.
- Focusing on output quality and value.

Lead time time-line

Loan Approval



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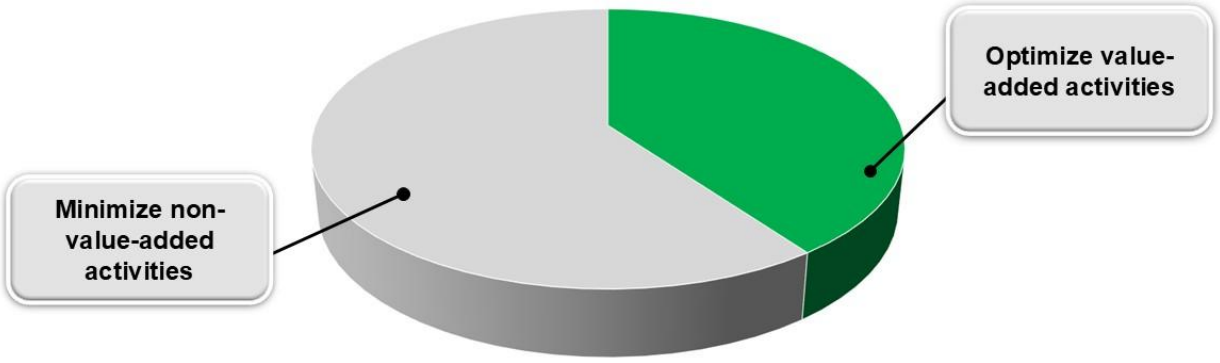
The Goal of Lean

The goal of lean is to **optimize** value-added activities by **minimizing** non-valued-added activities:



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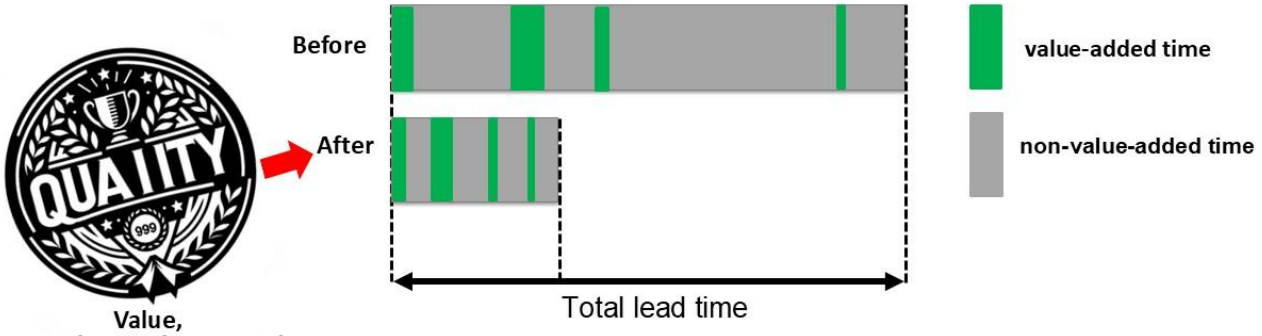
How is lead time affected when we minimize non-value-added activities?

The Goal of Lean



Value,
Less Time and Resource!

Business Improvement = Minimize Process Variations: reduce defects + Eliminate waste in Process/Systems → Six Sigma, LEAN

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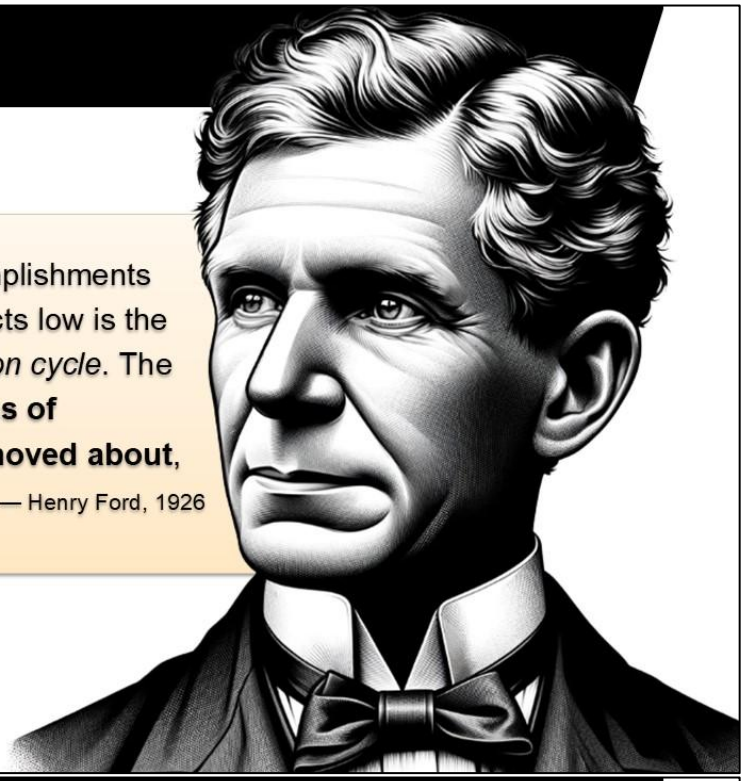
Lead Time Reduction

Lean can lead to reduced lead time.

"One of the most noteworthy accomplishments in keeping the price of Ford products low is the gradual *shortening of the production cycle*. The **longer an article is in the process of manufacture** and the **more it is moved about**, the greater is its ultimate cost." — Henry Ford, 1926



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End-to-End Processes

Overview

I. End-to-End Process Thinking

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Eight Wastes in Banking

Waste is any activity that consumes resources but creates no value for the customer

In Banking, it ranges from internal processes like cash ordering to external processes involving customers such as loan origination.

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Waste #1 - Errors

The customer receives the wrong product/service.

WHAT IS IT? **Errors** occur when internal processes **allow the introduction** of mistakes that lead to the delivery of the **wrong product or service.**

SOME CAUSES OF WASTE #1 – Errors:

- ❑ Product or process or procedure not designed well.
  - → Customer **needs** not understood.
- ❑ **Incorrect data entry** by team member or customers.
  - → **Poor** or nonexistent **quality control**.
- ❑ **Confusing** procedures.
  - → **Lack of proper training** on procedures or regulations.
- ❑ **Miscommunication** between departments or with customers.

WHAT HAPPENS AS A RESULT?

- **Transactions must be reversed**, corrected, or reprocessed.
- **Compliance risks increase**, potentially leading to other issues.
- **Discrepancies** in payments while billing.
- **Incorrect entries** in cash flow data.
- **Financial Center balancing** the inventory in their cash drawer incorrectly.
- **Missed** loan specification.

In a moment, **you will identify** one example of this waste in one of the processes you are working on. **Be ready.**

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Tips for eliminating the waste of Errors

- ❑ Establish **standardized work** procedures and forms.
  - ❑ Everyone performs the work the same way – the best agreed-upon way, for now.
    - → It uses the **most effective combination** of people, technology, methods, and materials.
- ❑ Include drop **down lists** / automated field population.
- ❑ Provide **continuous training** on compliance, data accuracy, and system updates to minimize human errors.
- ❑ Utilize **real-time alerts and feedback** (instant notifications or rule-based validation to flag inconsistencies before transactions are processed).
- ❑ Working with transformation partners on opportunities to utilize AI to prevent errors/defects."

What could happen if we fail to identify and eliminate this waste?

Customer Impact and Satisfaction

- Frustration due to errors
- Complaints

Financial and Operational Losses

- Wasted resources and time
- Costly transaction rework

The impact on the team

- Increased workload for staff
- Low morale from repeated mistakes

Waste #2 - Inaccurate Inventory

For instance, having either too much or too little cash.

WHAT IS IT? **Inaccurate inventory** occurs when the bank holds **too much or too little** cash or financial assets, leading to inefficiencies in operations, liquidity management, and profitability.

SOME CAUSES OF WASTE #2 – Inaccurate Inventory:

- ❑ **Poor forecasting** of cash flow needs
- ❑ **Lack** of real-time tracking
  - → Over-reliance on manual processes in cash management
  - → Existence of irrelevant data
- ❑ Just-in-case logic

Examples include:
* Purchasing excessive supply materials
* Having either too much or too little cash.

WHAT HAPPENS AS A RESULT?

- Banks average for excess cash in a Financial Center or vault.
  - **Too much cash:** Idle funds are not invested, *reducing profitability.*
  - Contrary, **other banks run out of denominations** in a device to cause *emergency shipment and unhappy customers.*

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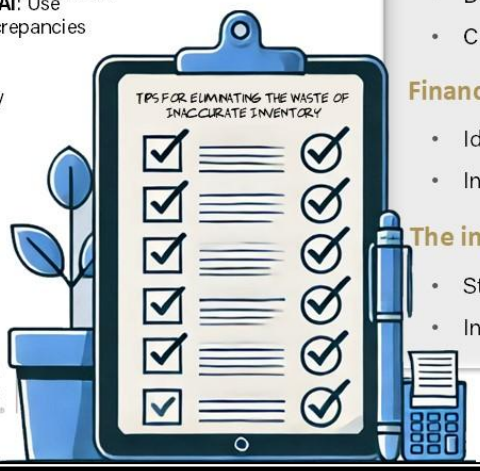
Tips for eliminating the waste of Inaccurate Inventory

- Utilize digital Cash Inventory Management System.
  - **Implement Real-Time Cash Monitoring:** Track cash levels across financial centers and ATMs to prevent shortages or excess reserves.
  - **Set Dynamic Cash Holding Limits:** Adjust cash reserves based on transaction trends and seasonal fluctuations.
  - **Enhance Data Accuracy with AI**: Use machine learning to detect discrepancies and predict future cash needs.
- **Forecast demand** and plan inventory and supply to improve service levels.
- **Apply technology for prescriptive analytics** to suggest decision for opportunity and mitigating risk.



What could happen if we fail to identify and eliminate this waste?

Customer Impact and Satisfaction

- Delays in withdrawals and transactions
- Cash shortages frustrate customers

Financial and Operational Losses

- Idle cash reduces profitability
- Inefficient resource allocation

The impact on the team

- Stress from managing cash shortages
- Increased workload adjusting reserves

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Waste #3 – Unnecessary Movement

WHAT IS IT? **Unnecessary movement** refers to excessive or redundant steps in transactions, approvals, or customer service processes that add no value and slow down operations.

SOME CAUSES OF WASTE #3 – Unnecessary Movement:

- Requiring multiple approvals for simple transactions.
- Inefficient interaction workflows.
- Excessive back-and-forth communication between departments and customers.
- Manual paperwork instead of digital processing.
- Redundant verification steps due to poor data integration.

WHAT HAPPENS AS A RESULT?

- Inter-financial center transfers occur when **a location think they** are low in denomination, but it could be low only for **their comfort level.**
- An increase in the number of times a check is handled before it is deposited.
- Frequent armored car delivery schedules.
- **Delays in approvals** and decision-making, reducing efficiency.
- **Unnecessary** meetings and calls.
- **Searching** for files and folders.
- **Walking** to/from printer/copier.

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Tips for eliminating the waste of Unnecessary Movement

- ❑ **Reduce inventory** via the digital cash supply chain network.
- ❑ **Optimize** the delivery and routing network to reduce transportation and logistics costs.
- ❑ **Standardize service** levels for deliveries to and from the Financial Center or ATM based on demand profile.
- ❑ **Implement digital workflows** to eliminate unnecessary manual sign-offs
- ❑ When possible, **eliminate physical paper** movement by storing and accessing documents electronically.

What could happen if we fail to identify and eliminate this waste?

Customer Impact and Satisfaction

- Longer wait times for services
- Lower satisfaction with banking experience

Financial and Operational Losses

- Increased resource waste in logistics
- Delays in revenue-generating activities

The impact on the team

- Time wasted on redundant tasks
- Lower productivity due to excessive approvals

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Waste #4 – Inefficient Communication

WHAT IS IT? **Inefficient communication** occurs when unclear, delayed, or excessive information exchange leads to errors and wastes.

SOME CAUSES OF WASTE #4

Inefficient communication:

- ❑ Providing customers with **too much detail** or unclear instructions.
  - → **Lack of standardized** communication protocols between departments.
- ❑ **Delayed responses** to customer inquiries or internal requests.
  - → Over-reliance on a **single communication mechanism** instead of proactively adjusting to *real-time collaboration tools.*
  - → **Poor integration** of communication channels (phone, email, chat, in-person).

WHAT HAPPENS AS A RESULT?

- Delays.
- Errors and bottlenecks.
- Confusing instructions for customers.
- Higher operational costs.

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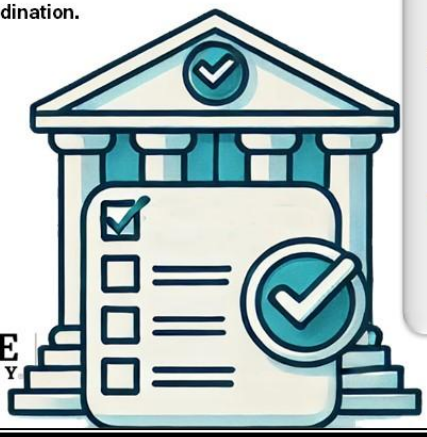
Tips for eliminating the waste of Inefficient Communication

- ❑ Establish a **workflow sequence** to satisfy the downstream customer.
- ❑ Create **workplace norms and standards** for each process.
- ❑ Implement **real-time communication tools**.
- ❑ Create **signal devices** to prevent early processing.
- ❑ Enhance **cross-department coordination.**



What could happen if we fail to identify and eliminate this waste?

Customer Impact and Satisfaction

- Confusing instructions frustrate customers
- Delayed responses reduce trust

Financial and Operational Losses

- Transaction delays increase costs
- Lost business due to poor service

The impact on the team

- Wasted time clarifying instructions
- Low morale due to misalignment

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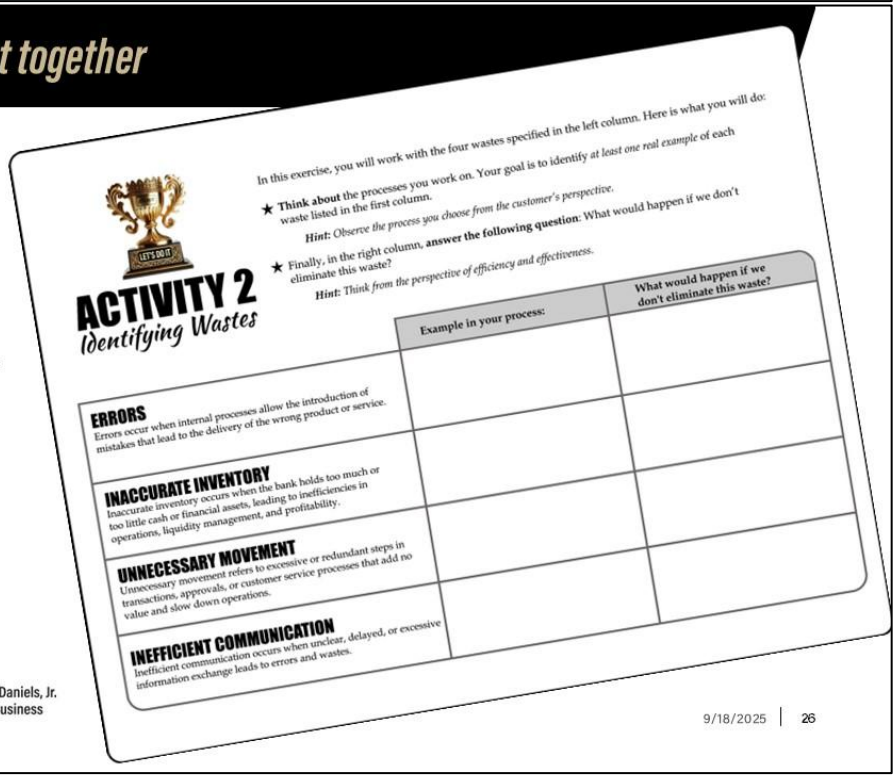
Let's do something great together

Use the page located after slide #27.

1. Choose a partner.
2. Answer the questions.
3. Be ready to share with the class.



ACTIVITY 2
Identifying Wastes

In this exercise, you will work with the four wastes specified in the left column. Here is what you will do:

★ **Think about** the processes you work on. Your goal is to identify at least one real example of each waste listed in the first column.
Hint: *Observe the process you choose from the customer's perspective.*

★ Finally, in the right column, **answer the following question**: What would happen if we don't eliminate this waste?
Hint: *Think from the perspective of efficiency and effectiveness.*

	Example in your process:	What would happen if we don't eliminate this waste?
ERRORS Errors occur when internal processes allow the introduction of mistakes that lead to the delivery of the wrong product or service.		
INACCURATE INVENTORY Inaccurate inventory occurs when the bank holds too much or too little cash or financial assets, leading to inefficiencies in operations, liquidity management, and profitability.		
UNNECESSARY MOVEMENT Unnecessary movement refers to excessive or redundant steps in transactions, approvals, or customer service processes that add no value and slow down operations.		
INEFFICIENT COMMUNICATION Inefficient communication occurs when unclear, delayed, or excessive information exchange leads to errors and wastes.		

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Waste #5 – Opportunity Lost

WHAT IS IT? **Opportunity Loss** occurs when we fail to capitalize on potential revenue, customer relationships, or efficiency improvements.

CIRCUMSTANCES CHANGE OVER TIME THAT DETERMINE YOUR GOALS AND RESULTS

SOME CAUSES OF WASTE #5 – Opportunity Lost:

- ❑ Too little cash means missing the opportunity to minimize armored car deliverables – increase transportation costs.
- ❑ Excess cash equates to a large amount of money sitting idle when it could have reinvested to create a profit.
- ❑ Failure to identify actual needs.
- ❑ Slow decision-making and approval processes.
- ❑ Resistance to understanding change.
- ❑ An inflexible mindset or business approach.

WHAT HAPPENS AS A RESULT?

- **Lost revenue.**
- **Negative impact** on customers due to not meeting their expectations.

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Tips for eliminating the waste of Opportunity Lost

- ❑ **Standardize work locations** and the number of processing units.
- ❑ Ensure that **work arrives at the downstream** process when it is required and does not sit there.
- ❑ **Produce only enough** to satisfy the work requirements of your downstream customer.
- ❑ **Leverage customer data analytics:** Use insights to anticipate customer needs and offer relevant products.
- ❑ **Streamline approval processes:** Minimize unnecessary approvals
- ❑ **Proactively engage with customers:** Follow up on inquiries.

What could happen if we fail to identify and eliminate this waste?

Customer Impact and Satisfaction

- Lack of personalized service could reduce loyalty.
- Unmet needs could drive customers to competitors.

Financial and Operational Losses

- Inefficiencies lead to increased operational costs

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Waste #6 – Duplication

WHAT IS IT? **Duplication occurs** when the same work or steps are processed multiple times but are not required by the customer.

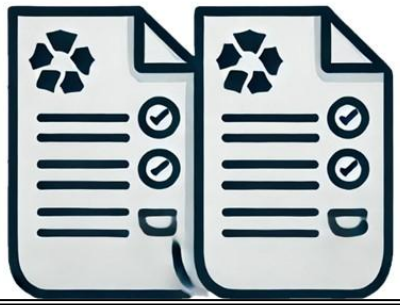
SOME CAUSES OF WASTE #6

– **Duplication occurs:**

- ❑ Pulling data from reports manually into other reports/dashboards
- ❑ Agents copying the same notes into two different systems
- ❑ Multiple steps of loan approval process.
- ❑ Requiring unnecessary signatures on the documents.
- ❑ Requiring customers to provide the same information repeatedly.
- → Manual data entry across multiple systems without integration.
- → Lack of standardized processes for document sharing and approvals.
- → Multiple teams working on the same issue without coordination.
- → Unclear communication, leading to repeated requests for information.

WHAT HAPPENS AS A RESULT?

- Customers experience **delays** due to unnecessary rework.
- **Employees waste time** entering or verifying the same information multiple times.
- **Operational costs increase** as resources are spent on redundant processes.



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Tips for eliminating the waste of Duplication

Work should be done only once.

- ❑ Improve the cybersecurity system to minimize unnecessary steps for accessing the online systems.
- ❑ Review all signature requirements and eliminate signatures wherever possible.
- ❑ Implement a centralized document management system – Ensure all departments access the same updated files to avoid redundant requests.
- ❑ Integrate systems for seamless data sharing by connecting different platforms to eliminate the need for manual data re-entry.

What could happen if we fail to identify and eliminate this waste?

Customer Impact

- Longer processing times for transactions.
- Lower trust due to inconsistent responses.

Financial and Operational Losses

- Higher costs from redundant work.
- Delays in revenue-generating activities.

The impact on the team

- Wasted time on repetitive tasks.
- Increased workload due to inefficient processes.

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Waste #7 - Delays

WHAT IS IT? **Delivery delays** due to **unforeseen circumstances** or **unnecessary waiting** times hinder the timely processing of transactions, approvals, and customer requests.

SOME CAUSES OF WASTE #7

– Delays:

- ❑ A holiday falls on a scheduled delivery day.
- ❑ Vacation/Time off with no back-up.
- → Ineffective communication between people, processes or systems.
- ❑ Waiting on unnecessary approval or email replies
- ❑ Delayed responses to customer inquiries or internal requests.
- ❑ Manual processing of tasks that could be automated.
- ❑ Cash orders were waiting from unexpected transportation delays.
- ❑ Other Financial Center doesn't place their cash order on time.
- → Ineffective processes that slow down decision-making.

WHAT HAPPENS AS A RESULT?

- Customers experience frustration due to long wait times.
- Slow approvals and transaction processing reduce operational efficiency.
- People or equipment are idle.
- Downstream quality problems.

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Tips for eliminating the waste of Delays

- ❑ Review signature requirements and eliminate unnecessary ones.
- ❑ Use workflow automation to reduce manual intervention in decision-making.
- ❑ Cross-train employees to allow workflow to continue while someone is out.
- ❑ Balance the workload throughout the day to ensure that all people are being used optimally.
- ❑ Make sure all your IT equipment is reliable.

What could happen if we fail to identify and eliminate this waste?

Customer Impact and Satisfaction

- Missed opportunities
- Long delays cause frustration.

Financial and Operational Losses

- Slow processing reduces revenue potential
- Bottlenecks increase operational costs

The impact on the team

- Wasting time tracking delayed requests.
- Prioritizing pending or delayed work impacts day-to-day operations.

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Waste #8 – Wasted Talent (Or Not Utilizing Talents KSA*)

WHAT IS IT? **Wasted Talent** occurs when the workforce's skills, knowledge, abilities, and talents are underutilized.

SOME CAUSES OF WASTE #8 – Wasted Talent:

- ❑ Retrieving or storing files.
- ❑ Working outside area of responsibility.
- ❑ Poor alignment of task with role.
- ❑ High employee turnover.
- → Failure to recognize and leverage employee strengths.
- → Micromanagement.
- ❑ Lack of formal CI training and/or mentorship programs.
- ❑ Lack of employee involvement in decision-making.
- ❑ Inefficient workload distribution: Some employees are overburdened while others are underutilized.

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*Knowledge, Skills, Ability

WHAT HAPPENS AS A RESULT?

- Innovative ideas are overlooked
- Employee disengagement increases, leading to higher turnover and lower morale.

Tips for eliminating the waste of Wasted Talent

- Establish **regular process improvement** dialogues with employees.
- ❑ Create processes to **collect and implement** employee ideas.
- ❑ Give **formal recognition** – consistent and often.
- ❑ Develop **mentorship and coaching** programs.
- ❑ Encourage **cross-functional collaboration**.
- ❑ Create teams of people who have PDCA skills and lean-specific knowledge who are empowered to make decisions and take action to facilitate positive changes in the workplace.

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What could happen if we fail to identify and eliminate this waste?

Customer Impact and Satisfaction

- Slower problem resolution

Financial and Operational Losses

- Missed opportunities

The impact on the team

- Reduced collaboration.
- High turnover.

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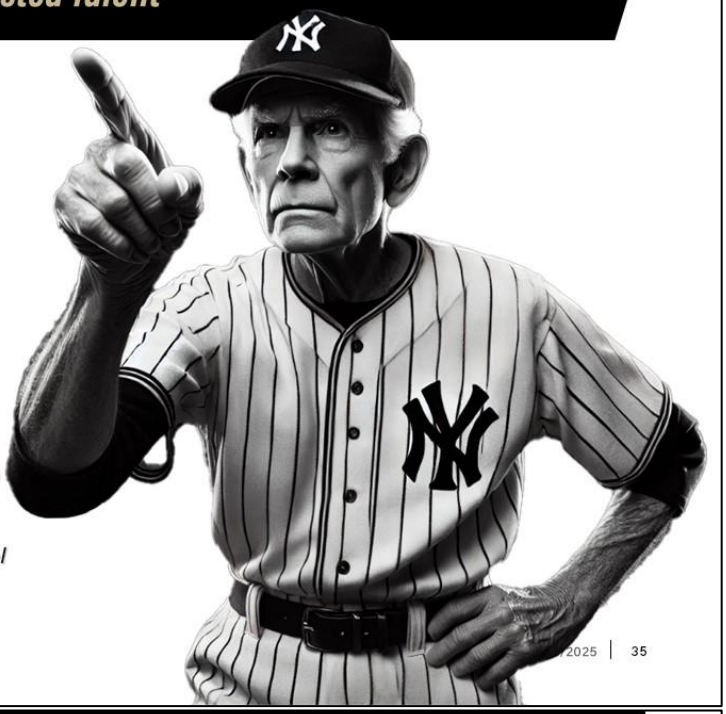
Tips for eliminating the waste of Wasted Talent

- **Brainstorming**
  Method for generating and collecting ideas
  - Clarify what is to be brainstormed
  - Select a scribe and initiate brainstorming
  - Write it down, review, organize and group ideas
    - **After brainstorming**
      Reduce large list of items to a manageable number.
      - List is clearly visible to all
      - Evaluate your ideas and plan for execution.



"It's easy to get the players. Gettin'em to play together, that's the hard part."

--Casey Stengel

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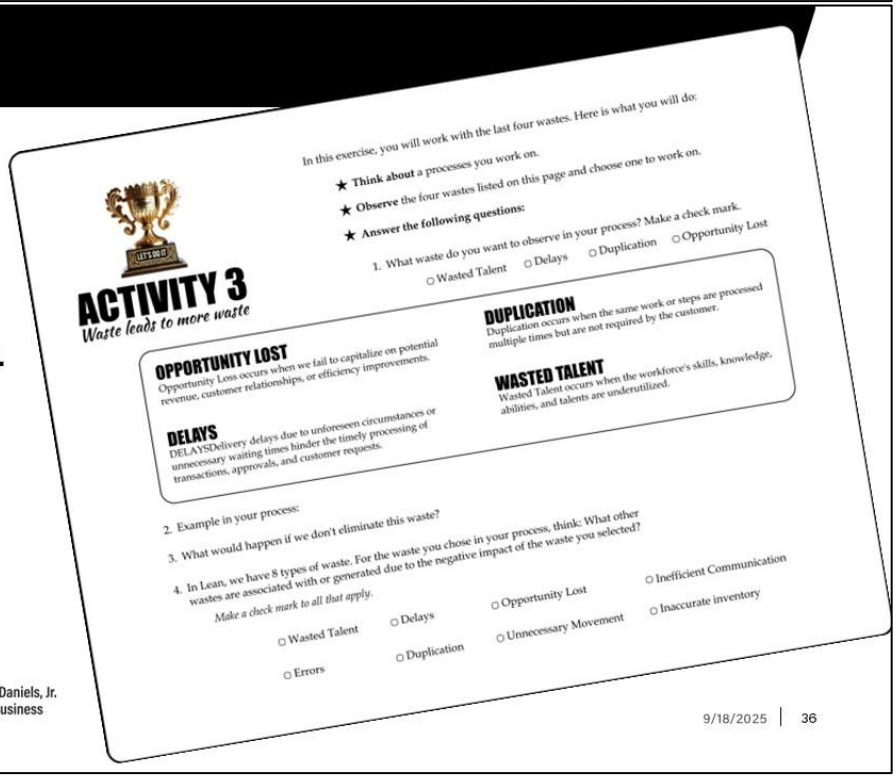
Let's make it happen

Use the page located after slide #36.

1. Choose a partner.
2. Answer the questions.
3. Be ready to share with the class.



ACTIVITY 3
Waste leads to more waste

In this exercise, you will work with the last four wastes. Here is what you will do:

★ **Think about** a processes you work on.
★ **Observe** the four wastes listed on this page and choose one to work on.
★ **Answer the following questions:**

1. What waste do you want to observe in your process? Make a check mark.
○ Wasted Talent ○ Delays ○ Duplication ○ Opportunity Lost

OPPORTUNITY LOST
Opportunity Loss occurs when we fail to capitalize on potential revenue, customer relationships, or efficiency improvements.

DELAYS
DELAYSDelivery delays due to unforeseen circumstances or unnecessary waiting times hinder the timely processing of transactions, approvals, and customer requests.

DUPLICATION
Duplication occurs when the same work or steps are processed multiple times but are not required by the customer.

WASTED TALENT
Wasted Talent occurs when the workforce's skills, knowledge, abilities, and talents are underutilized.

2. Example in your process:
3. What would happen if we don't eliminate this waste?
4. In Lean, we have 8 types of waste. For the waste you chose in your process, think: What other wastes are associated with or generated due to the negative impact of the waste you selected?
Make a check mark to all that apply.
○ Wasted Talent ○ Delays ○ Opportunity Lost ○ Inefficient Communication
○ Errors ○ Duplication ○ Unnecessary Movement ○ Inaccurate inventory

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End-to-End Processes

Overview

I. End-to-End Process Thinking

II. Lean: Value-added vs. Non-value added

III. 8 Wastes from Lean in Banking

IV. Value Stream Analysis (VSA)

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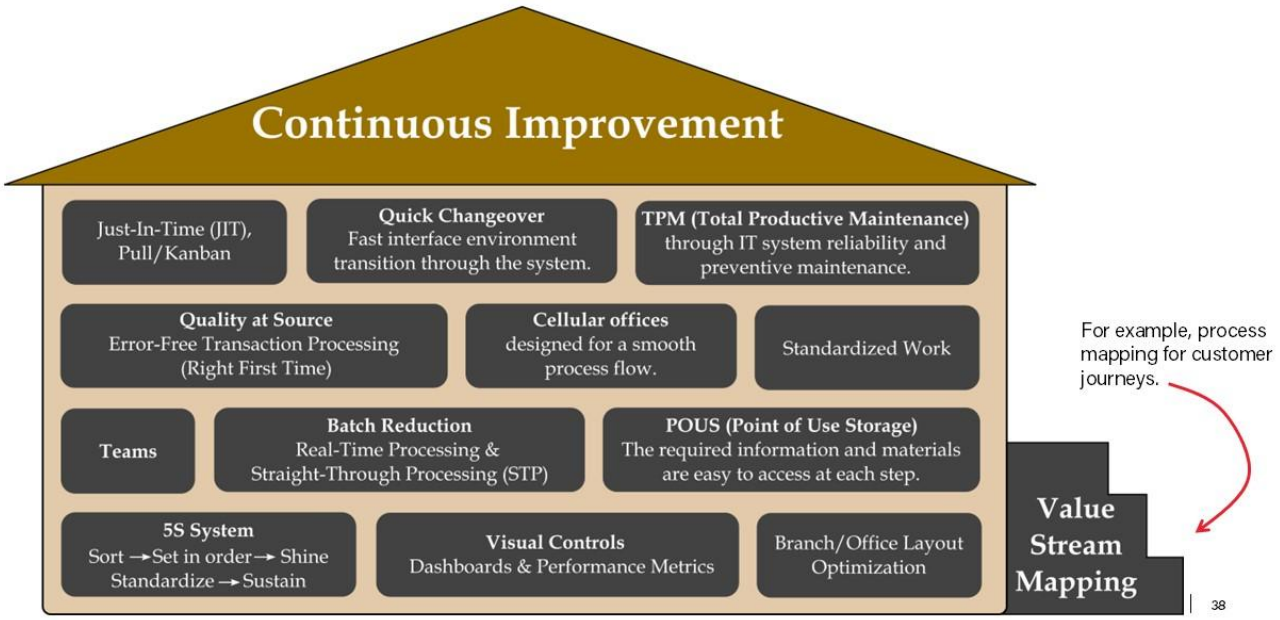
We eliminate waste and achieve lean by implementing lean techniques.



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Value Stream

- A **value stream** is the entire collection of activities necessary to produce and deliver a product or service.
- A **value stream map (VSM)** is a visual depiction of the value stream. The tool **illustrates all steps** (value added and non-value added) required to complete a product or service from beginning to end.
- A **value stream analysis (VSA)** distinguishes the activities that generate value for clients from those that create waste and inefficiencies, resulting in potential opportunities for improvement.

Initially, this value stream map was created by **hand** on paper, then inserted into **VSM software** (not shown in the picture).

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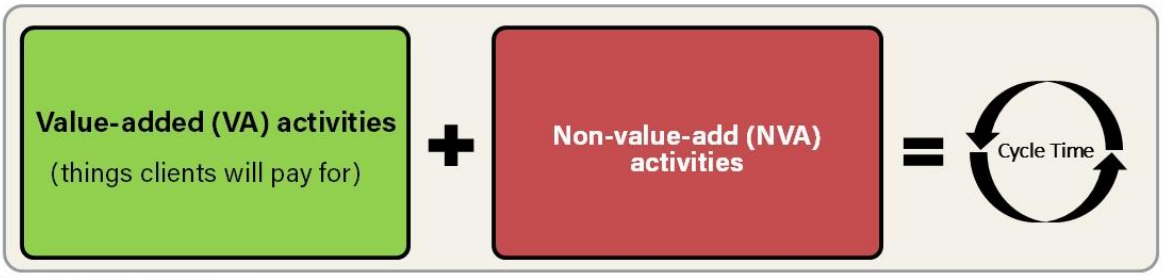
Value Stream

- **VSM is one of the most important tools in the Lean toolbox.**
  - A VSM provides a holistic and visual way to understand how work gets done and serves as a starting point to observe why the work is done the way it is.
  - Helps identify and resolve disconnects, redundancies, and gaps in how work is done.
  - Shows the linkage between materials flow and information flow.

The quantitative nature of VSM provides the foundation for data-driven strategic decision making.



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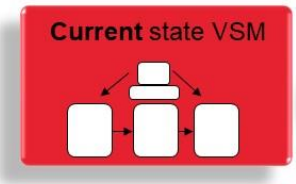
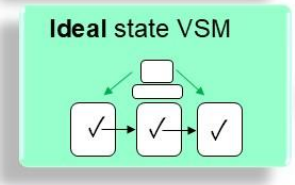
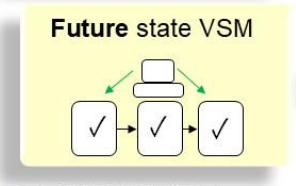
Types of VSMs



Shows the process as it is **now.**



Shows the process with **all waste** or non-valued added activities **eliminated.**



Shows the process as it **realistically could be**, with **as much waste eliminated as possible.**

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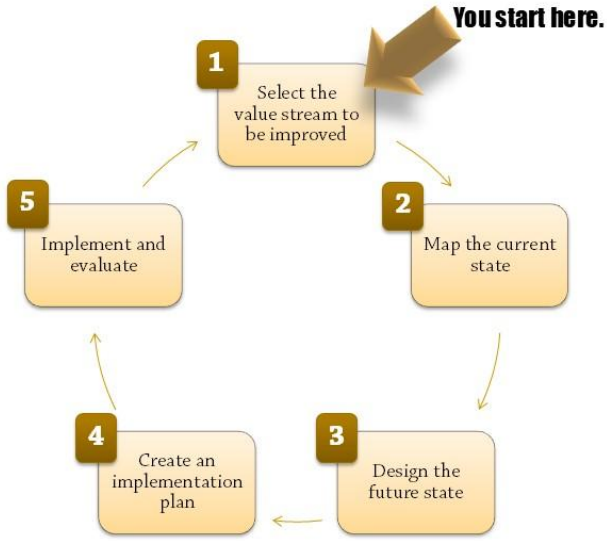
Value Stream Analysis

Why perform a value stream analysis?

- Helps you visualize **how** a process is executed, including all **inputs (X), outputs (Y), VA, and NVA** activities.

  - ✓ **You see** the real flow."
  - ✓ **You discover** more than just waste."
  - ✓ Allows you to **calculate** processing times, handoffs, and the resources used at each step.
  - ✓ **Opens** capacity for growth.



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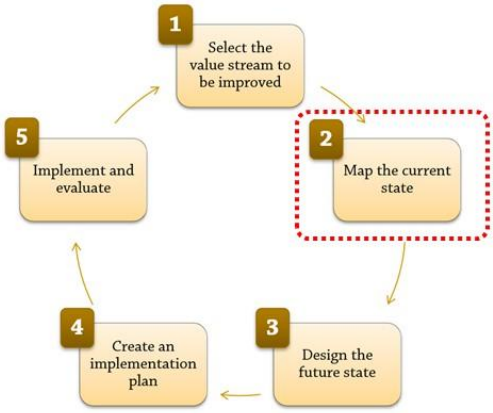
Value Stream Analysis: Guidelines to Document the Current State

- **Go** to the Gemba.
- **Identify** and document the sequence of processes that connect to form the value stream (VS), along with the number of people and required resources at each step.
- **Talk** to people to understand what is being done to transform an input into an output.

Avoid: "I can't believe we do it this way."

- **Discover** VA, NVA, and NVA-R, and the time spent on each type of activity.
- **Complete** the calculations – you might be surprised to see the % of value-add activities.



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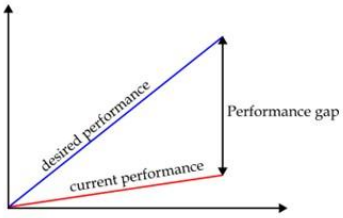
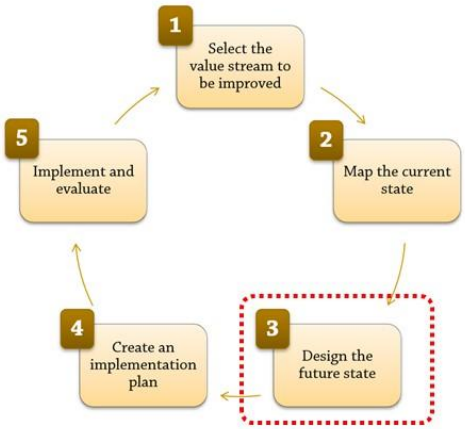
Value Stream Analysis: Future State

Why? How?

- Identify inefficiencies (NVA) in your process and **eliminate**
  - ☐ Highly manual steps
  - ☐ Excessive error or rework
  - ☐ Multiple Handoffs
  - ☐ Long wait times





- Instead of streamlining a NVA process, **eliminate it!**
  - ☐ Ask: Do we really need this step in the process?

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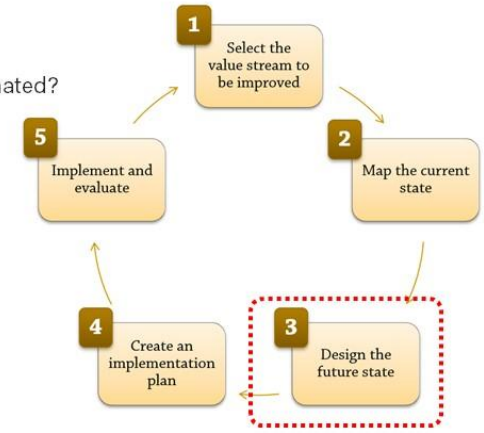
Value Stream Analysis: Future State

There is no single "right" future state map.

- **Frame** questions such as:
  - What is the "right work" to do?
  - Which NVA process steps can be optimized, combined, or eliminated?
  - What VA processes must be added?
  - How to make the "right work" flow across the value stream?
- **Embrace** continuous improvement..
  - Think of questions such as:
    - How will we determine if the VS is performing as intended?
    - How will we monitor and manage VS performance?
- **Challenge** yourself:
  - What are my assumptions?



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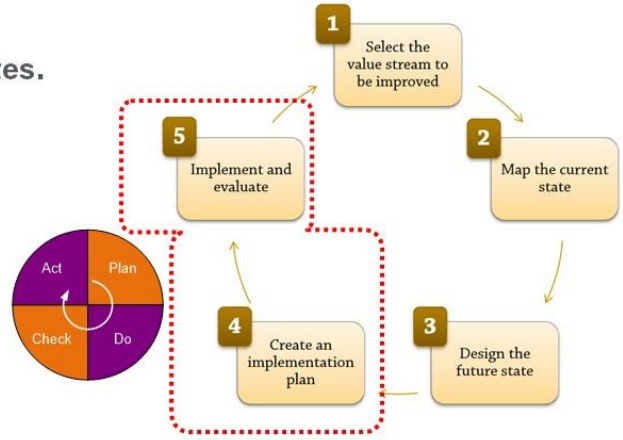
VSM Future State: Prioritizing Improvements

When prioritizing improvements, consider:

- ☐ Implementation difficulty vs. impact
- ☐ Risk mitigation difficulty vs. risk severity

Use the map to identify significant wastes.

- ☐ Use the future state questions as a guide.
- ☐ Try "what-if" studies when possible.



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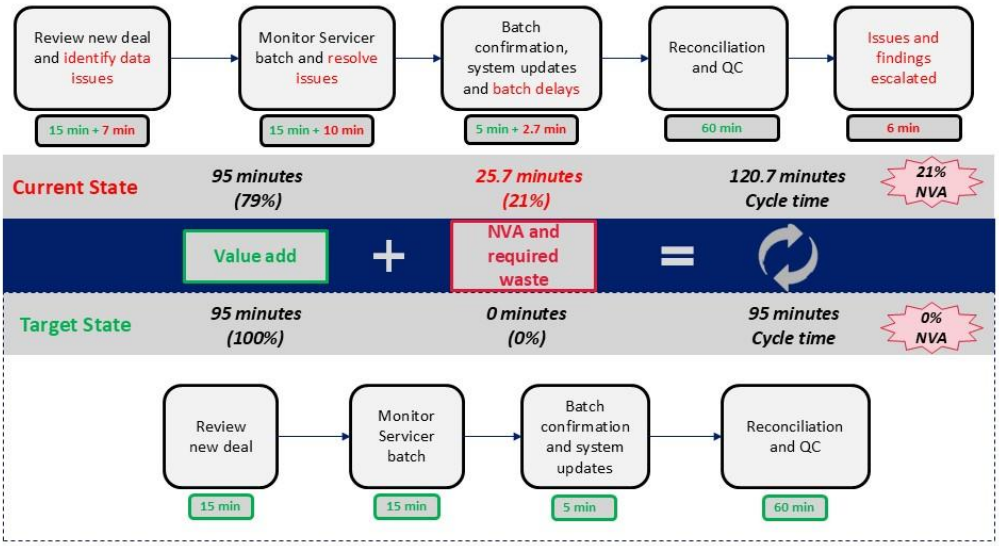
Value Stream Analysis

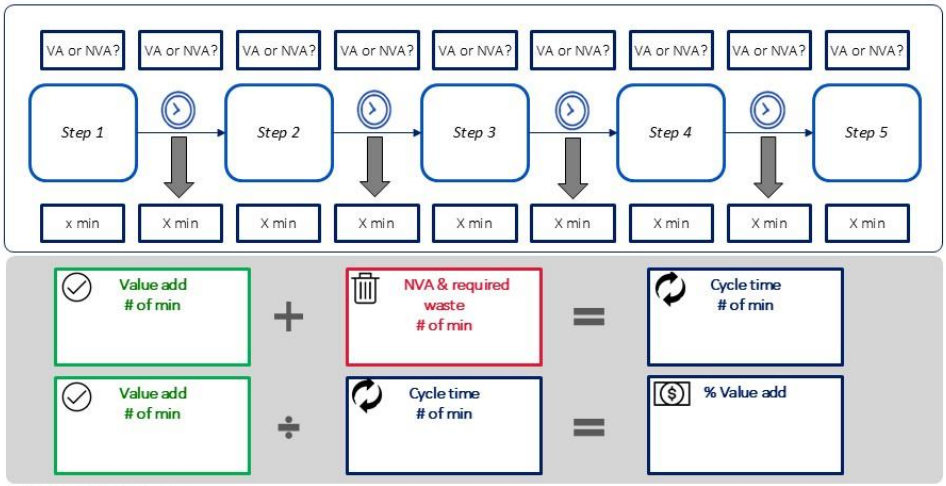
VSA Example: Mortgage Electronic Registration System



SAVE: 11,100 minutes (185 hours) per year

End-to-End Processes

VSA Template Example



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VSM: Eliminate, Optimize, or Integrate? Should Your Process Stay or Go?

- Creating a Value Stream Map (VSM) is a **powerful way** to visualize every step of a process and analyze its efficiency. When deciding whether to optimize, integrate, or **eliminate a process**, here are critical questions to consider:

1. What is the purpose of this process?
2. Can the desired outcome of this process be achieved another way?
3. What value does this process add to the customer?
4. How much does it cost to execute this process compared to the value it delivers?
5. What are the risks of eliminating this process?

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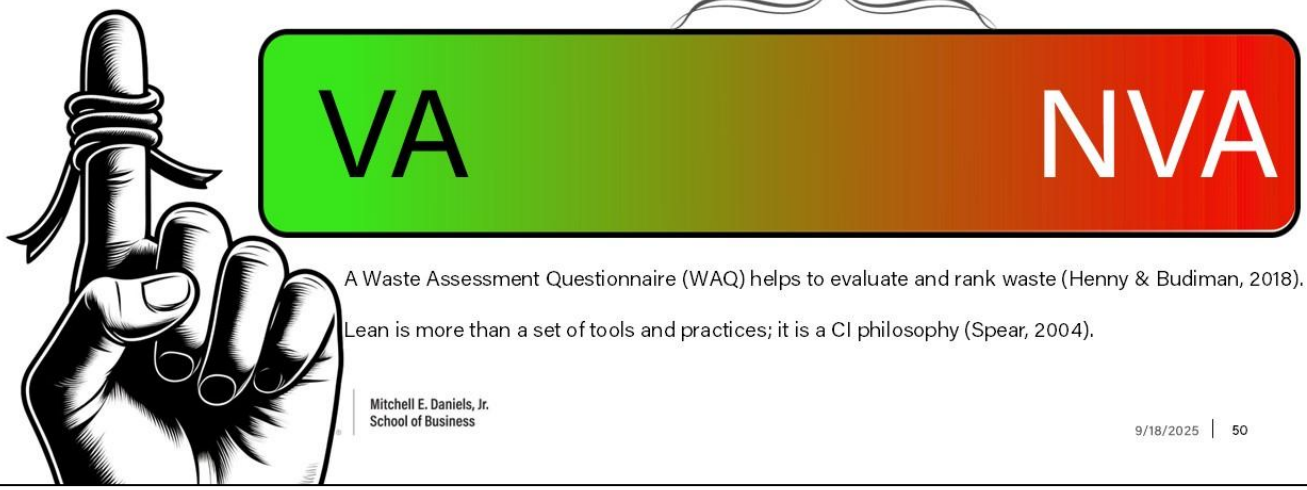
The Challenge

- One of the biggest problems is **understanding** and **quantifying** waste(Sunder & Ganesh, 2020).
- Wastes are activities that *do not add value but may still appear* as necessary activities.



A Waste Assessment Questionnaire (WAQ) helps to evaluate and rank waste (Henny & Budiman, 2018).

Lean is more than a set of tools and practices; it is a CI philosophy (Spear, 2004).

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FIFO, WIP and Batch

FIFO methodology (First In First Out)

FIFO ensures that customer transactions, loan applications, or service requests are processed **in the order they are received**, *minimizing delays.*

WIP (Work in Progress)

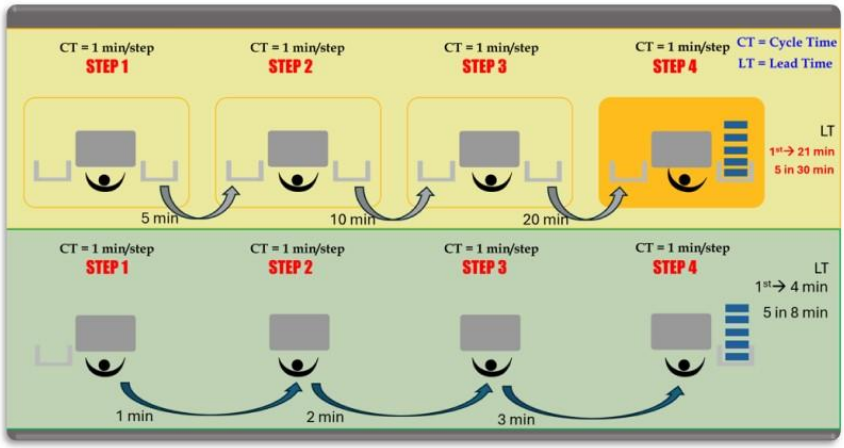
Incomplete tasks, transactions, or processes that are in progress but not yet finalized.

Batch Size Processing:

Transactions or tasks are grouped and processed together at scheduled intervals.

Real-Time FIFO Processing

Ensures that **transactions are processed immediately** and in the order they are received, minimizing delays and enhancing efficiency.



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Session 4.1 - Value Stream Analysis

Bank Example: Perform Check Client Onboarding and Float Pricing

Potential Process Improvements:

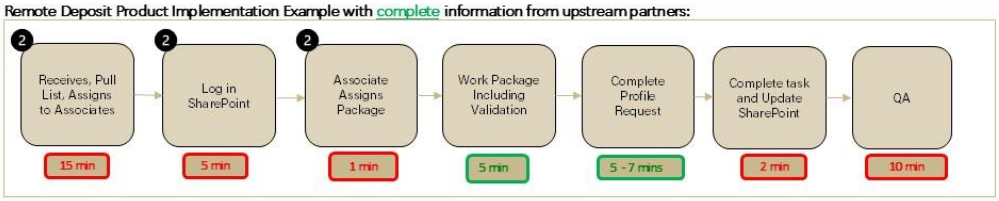
Significant time savings leading to a better customer experience

1. Reduce cycle time by **reducing incomplete information received from upstream partners** eliminating rejects and associated delays **(affects +20% of cases!)**

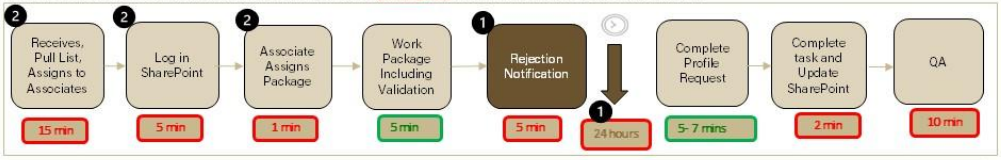
Eliminate 48% of the non-value added steps in the process by eliminating the case assignment steps

2. Reduce cycle time by having **team self assign cases using First In First Out (FIFO)** methodology

Remote Deposit Product Implementation Example with complete information from upstream partners:

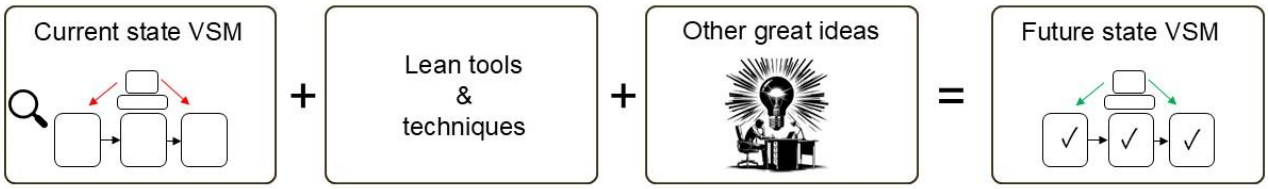


Remote Deposit Product Implementation Example with incomplete information from upstream partners:



How Do We Get to the Future State?

- We take the current state map, **analyze it**, and **identify improvements** we could implement to eliminate waste and optimize.



- Imagine the impact you create by devoting quality time to improving your value stream.

Think for a moment about all the topics we have covered regarding Lean Philosophy and Lean tools, such as VSM, VSA, VA, NVA, and CI. Answer the following question:

LAST ACTIVITY

Write down one thing you will do at the bank *once you get back to your office.* In other words, **how** do you plan to put into practice the topics we reviewed today?

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Remember

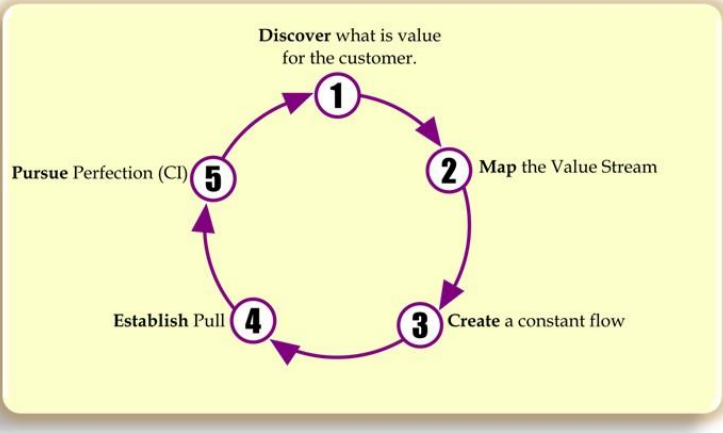
Lean is a systematic approach to identifying and eliminating waste (non-value-added activities) through continuous improvement by flowing the product at the **pull of the customer** in **pursuit of perfection**.

$$R = Q \times A$$

Results — quality of processes — acceptance

Over the past 20+ years, Purdue MEP has worked with many organizations (including healthcare, service, logistics, government, manufacturing, airlines, banks, etc.) to develop value-added/lean systems.

- Experience has indicated a required need for **a process beyond the technical training** to help sustain their Lean improvements.



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Ref.: Stalin Encarnación inspired by the work of Womack & Jones, 1996.

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THANK YOU

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Session 4.2

End-to-End Processes

Role Play Exercise

Dr. Doug Pruim

Handouts Provided

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Session 4.3

End-to-End Processes

Client Journey

Mr. Mike Hyzy

Handouts Provided

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Session 5.0

Operations Foundry

Dr. Erica Lott & Mat Trampski

Handouts Provided

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Session 5.2(b)

Operations Foundry

Mat Trampski
Dr. Jim Stratton

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Red Bead Experiment

Help Wanted

- **Operator 1** – Must be able to lift 50 beads
- **Operator 2** – Must be able to lift 50 beads
- **Quality Control Specialist** – Must be able to count to 50
- **Data Recorder** – Must be able to write/type numbers up to 50
- **Supervisor** – Must be able to supervise with unwavering authority and determination
- **Tom Scrivener** – We will accept look-alikes

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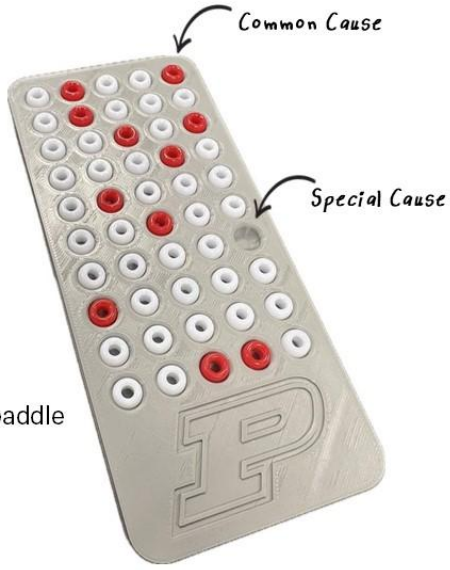
Red Bead Experiment

Ground Rules

- Scoop must be made with the Purdue-approved paddle
- Scoop must not take longer than 10 seconds
- Red beads are counted as DEFECTS
- Empty holes are also counted as DEFECTS
- You cannot clear beads off the paddle with your hand
- You can touch the beads, you cannot place them on the paddle



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Red Bead Experiment

Initial Process Map

The regulators have said you cannot have more than 8 defects each month

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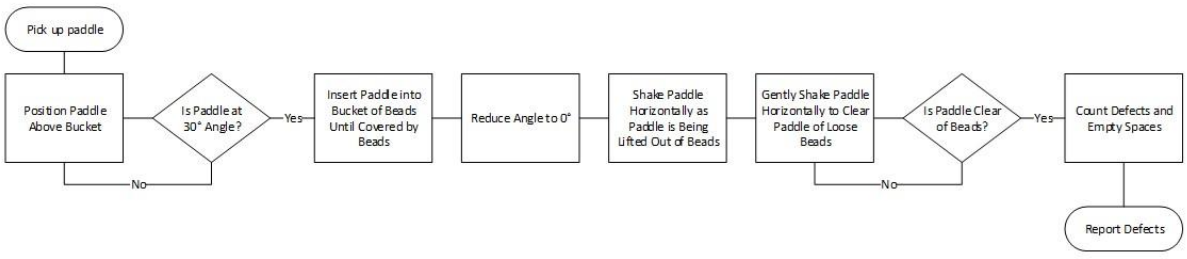
Red Bead Experiment

Phase 1 – Performance Year 1

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sample												



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Red Bead Experiment

Wow that was bad...

- What challenges did you experience?
- Were you able to please the regulators?

We need a process change!

- You have 2 minutes to discuss your proposed changes in private
- You have 2 minutes to implement those changes!
- Once your changes have been made, please be ready to report your updates

Red Bead Experiment

Phase 2 – Performance Year 2

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sample												

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Red Bead Experiment

Debrief

- Rewards are often given based on pure change, and random system noise.
  - Rewarding "good" employees, punishing "bad" employees
- The only way to reduce variation is to remove defects!

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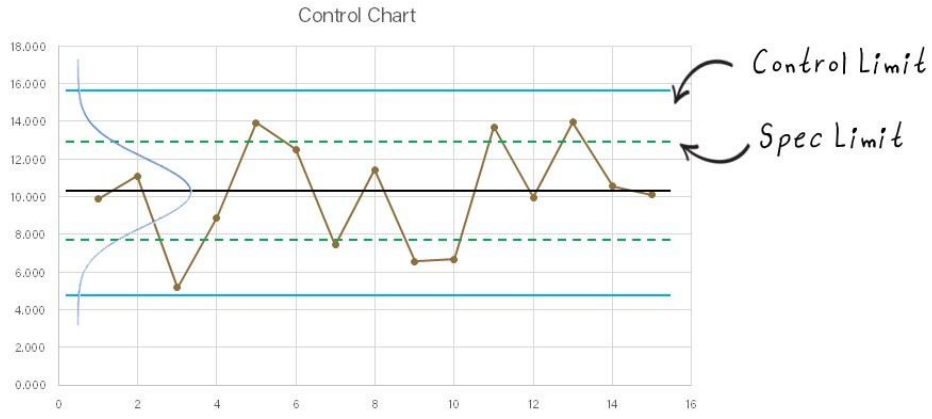
Red Bead Experiment

Embracing the RED



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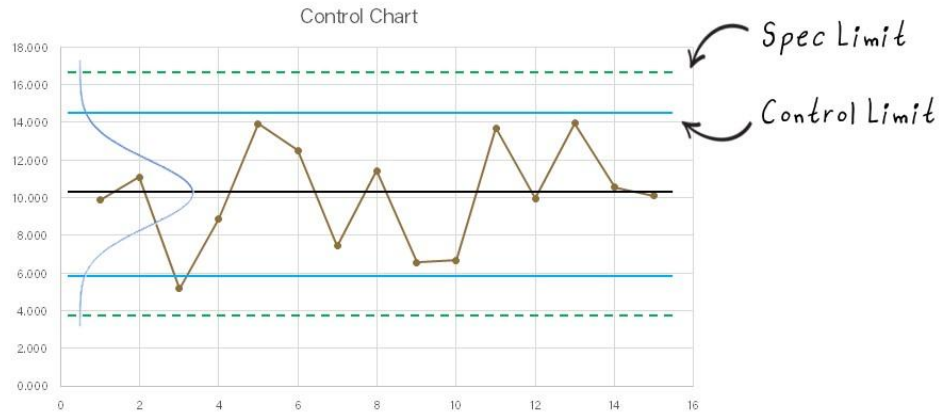
Red Bead Experiment

Go to the GREEN



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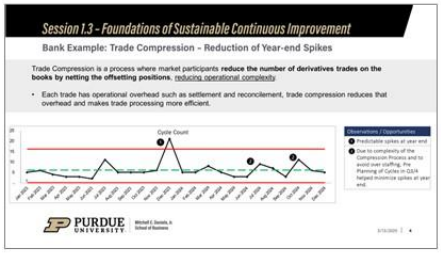
DON'T SHARE SLIDE UNTIL AFTER PARTICIPANTS CREATE THEIR CONTROL CHART

Session 1.3 – FOUNDRY HANDS-ON CONTROL CHART EXAMPLES

Example 1: Trade Compression (sharing data for example in session 1.3)



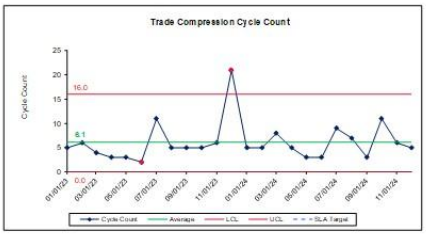
DATA FILE: Control Chart Example 1

Process Metric Control Chart v4.0 *Make edits to blue cells ONLY

Last Update Date:	
Process/FLU Name	Trade Compression
Metric Name	Cycle Count
No. Rows to include	24
Maximum Boundary (optional)	
Minimum Boundary (optional)	0
Process Change Date (optional)	
SLA Target Value (optional)	
New Target (optional)	
New Target Date (optional)	

Rule No	Alarm turned on	Pattern
1	Yes	One or more points beyond the control limits
2	Yes	2 out of 3 consecutive points at 2 or more Std Dev on one side of the average
3	Yes	4 out of 5 consecutive points at 1 or more Std Dev on one side of the average
4	Yes	8 or more consecutive points on one side of the average
5	Yes	6 consecutive points trending up or trending down
6	Yes	8 consecutive points with no points within 1 Std Dev of the average
7	Yes	15 consecutive points all within 1 Std Dev from the average
8	Yes	14 consecutive points alternating up and down

Date	Cycle Count	Alarm
1/1/23	5.000	
2/1/23	6.000	
3/1/23	4.000	
4/1/23	3.000	
5/1/23	3.000	
6/1/23	2.000	Stability Rule # 3
7/1/23	11.000	
8/1/23	5.000	
9/1/23	5.000	
10/1/23	5.000	
11/1/23	6.000	
12/1/23	21.000	Stability Rule #1
1/1/24	5.000	
2/1/24	5.000	
3/1/24	8.000	
4/1/24	5.000	
5/1/24	3.000	
6/1/24	3.000	
7/1/24	5.000	
8/1/24	7.000	
9/1/24	3.000	
10/1/24	11.000	
11/1/24	6.000	
12/1/24	5.000	



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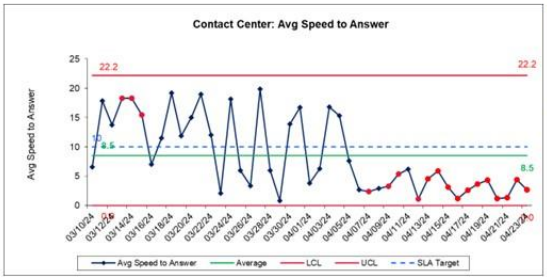
DON'T SHARE SLIDE UNTIL AFTER PARTICIPANTS CREATE THEIR CONTROL CHART

Session 1.3 – FOUNDRY HANDS-ON CONTROL CHART EXAMPLES

Example 2: Contact Center Speed to Answer

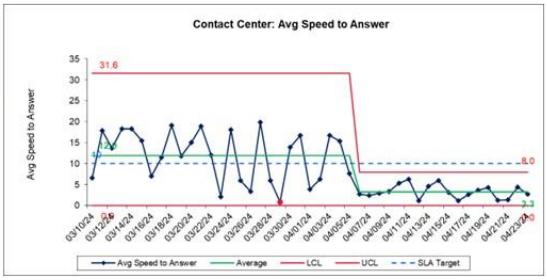
DATA FILE: Control Chart Example 2

Initial View



Process Change Date: 4/6/24

Updated View



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3/19/2025 | 12

THANK YOU

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Purdue Faculty, Staff, & Panelist Bios

Brad Alge

Associate Professor of Management
Mitchel E. Daniels, Jr. School of Business

Dr. Brad Alge holds the position of Associate Professor of Management in the area of Organizational Behavior and Human Resource Management at Purdue's School of Management where he has served since 1999. He has served on the editorial boards at the Academy of Management Review, Journal of Management, and Organizational Behavior and Human Decision Processes. Dr. Alge has over 20 years of experience helping companies to improve their business processes, organizational culture, and human capital.

Research focus:

- Virtual Work; Technology's impact on individual and group attitudes and behaviors on the job
- Employer/employee rights (e.g., privacy, justice, ethics & corporate social responsibility)
- Leadership--particularly in the contexts of distance leadership and organizational control
- Organizational versus employee control
- Social Networks
- Creative Performance

Dr. Alge has provided his expertise and consultation to numerous organizations including US DoD, US DHHS, US Department of Interior, Whirlpool, Alcoa, British Petroleum, ArcelorMittal, Pfizer, Evonik (Eli Lilly), Metropolitan Police Departments, City Public Transportation Departments, INDOT, Valspar, and numerous mid-size and small businesses.

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Pat Brunese

Assistant Department Head, Industrial Engineering

Dr. Patrick Brunese is the Assistant Head of the Edwardson School of Industrial Engineering at Purdue University. He earned his Ph.D. from Purdue University in 2011, following a Master of Science in Industrial Engineering from the University of Alabama in 2007 and a Bachelor of Science in Industrial Engineering from Western New England College in 2005.

Dr. Brunese's research interests include facility logistics systems and operations research.

In his administrative role, he oversees experiential learning programs, emphasizing the application of technical expertise and professional skills through industry partnerships. He has highlighted the advantage Purdue industrial engineering students gain from these hands-on experiences, stating that they not only acquire technical knowledge but also develop essential soft skills through collaboration with industry partners.

Additionally, Dr. Brunese is affiliated with Purdue's Global Engineering Program and serves on the First-Generation Success Team, demonstrating his commitment to supporting diverse student populations and promoting global engagement within the engineering field.

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Stalin Encarnacion

Workforce Development Specialist, Purdue Manufacturing Extension Partnership

Stalin provides workforce development training and consulting services. He delivers a variety of training and workshops including Lean Manufacturing, Problem-Solving Using PDCA, A3, and Root-Cause Analysis; Project Management; Emotional Intelligence; and the Leadership Skills for Success series. He also enjoys designing learning materials and creating engaging activities for participants in Purdue MEP's trainings. Stalin is also responsible for creating and delivering workshops for the Spanish-speaking workforce.

Stalin is an electromechanical engineer with nearly 20 years of expertise. He spent 10 years at Purdue Research Park, where he worked as an engineer, project lead, and research engineer. He has overseen many aspects of the business, including operations and manufacturing, engineering, hardware and software development, quality assurance, and project management. He studied LabView CORE I and CORE II at Bloomy Controls in Marlborough, Massachusetts; Controlling Radiated Emissions by Design at D.L.S. Electronic Systems Inc. in Wheeling, Illinois; Uninterruptible Power Supply at Toshiba Corporation in Houston, Texas; and Electronic Analog and Digital at CEN-INFOTEP in the Dominican Republic.

Stalin earned his Master of Science degree in Engineering with a 3.97/4.00 GPA from Purdue University in 2023. Currently, he is studying Digital Transformation at the Massachusetts Institute of Technology, MIT.
When he is not teaching, he loves playing bass guitar and creating memorable times with his wife, son, and daughter.
In 2023, Stalin was awarded the **Newcomer of the Year** award at the National Institute of Standards and Technology (NIST) Manufacturing Extension Partnership (MEP) National Network Forum. Stalin's passion, energy, and creativity in engaging participants in his teaching sessions helped earn him this prestigious award that represents the entire MEP National Network.

His skills and expertise include:

- Creative Thinking/Innovation
- New Product Design
- R&D Engineering
- Engineering Management
- Problem-Solving
- Leadership Development
- Digital Transformation
- HR/Workforce Development

Leigh Ann Griffin

Project Manager, Technical Assistance Program

Leigh Ann Griffin is the Senior Business Partnership Manager for Purdue University's cyberTAP department since April 2022. In this role, she manages funding projects and executes agreements with clients. Prior to transferring to cyberTAP, she served for seven years as a Senior Quality Advisor for Purdue Healthcare Advisors. In this role, Leigh Ann provided expertise to physicians and hospitals participating in the EHR Incentive Program under Indiana Medicaid, as well as the QPP reporting program for Medicare. Her 20+ years of project management and process improvement experience include working side-by-side with nurses, physicians, administrators, and other staff to design process improvements, install computer systems, and meet project timelines. She has extensive experience in public speaking, employee training, and policy and procedure development. She has also served as a HIPAA standards auditor in a hospital setting.

Leigh Ann has been a member of the Indiana Association for Healthcare Quality (InAHQ) for 25 years, serving on its board in numerous roles, including President from 2019-2022.

Leigh Ann holds a bachelor's degree in business management. She earned her Certified Professional in Healthcare Quality (CPHQ) in 1998 and a Lean Six Sigma for Healthcare Black Belt in 2013. She was also certified as a Strategic Doing Workshop Leader in 2021.

When Leigh Ann is not project managing, she can be found traveling, riding motorcycles, or spending time with her grandchildren.

Angie Hoffine

Associate Program Manager, Mitch Daniels School of Business

Angie Hoffine is currently the Administrative and Logistics Coordinator for the Master's Program in the Mitchel E. Daniels, Jr. School of Business. She has been employed at Purdue University for 19 years. Before coming to the School of Business she worked in the athletics program and Purdue football for 14 years

Courtney Huckstep — Operations Support Administrator, Technical Assistance Program

Courtney Huckstep received her Bachelor of Science in Organizational Leadership and Supervision from Purdue University. Her expertise spans operations management, business development, marketing. She is passionate about innovation and collaboration and creating meaningful impacts in every endeavor she undertakes.

Logan Jordan — Associate Dean for Administration, Mitch Daniels School of Business

Dr. Jordan is the Associate Dean for Administration for the Krannert School of Management. Dr. Jordan's responsibilities include much of the school's infrastructure and support services operations. He also serves in a support role for budgeting and human resource issues. His academic area is strategic management, including the management of technology.

He has taught in the Krannert School's undergraduate, masters, and executive programs, including the American Animal Hospital Association's Veterinary Management Institute and the Purdue Veterinary Practice Management Program. He has also conducted management development programs for Rolls-Royce / Aero Engine Controls, Cendant, Novartis, Pfizer, Lucent, Case Corporation and Owens-Illinois.

Dr. Jordan has served as a facilitator and consultant to a variety of business enterprises, campus departments and not-for-profit organizations and is a member of the Academy of Management, the Strategic Management Society, and the North American Case Research Association.

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Kevin Koharki

Associate Professor of Management, Mitch Daniels School of Business

Kevin Koharki joined the Krannert School of Management at Purdue University as an associate professor in 2018. Prior to joining Purdue University, Kevin held a tenure track appointment at Washington University in St. Louis.

As a researcher, Kevin has published in leading academic journals including: *The Accounting Review*, *Journal of Accounting and Economics*, Review of Accounting Studies, *Contemporary Accounting Research*, and *Management Science*. His research broadly focuses on credit rating agencies and financial institutions.

Kevin has taught courses on both managerial accounting, advanced financial accounting, financial statement analysis, and accounting for EMBA students.

Erica Lott

Director of Teaching and Learning, Mitch Daniels School of Business

Erica Lott is the Director of Teaching and Learning for the Daniels School of Business, and an instructor for the Exploratory Studies department at Purdue University. She received her Ph.D. in College Science Teaching with a concentration in Earth Sciences and Masters in Earth Sciences from Syracuse University. Prior to that, she received her bachelor's with a double major in Geology and Geography from Mount Holyoke College.

Erica joined the School of Business in December 2022, previously coming from the Center for Instructional Excellence where she spent the last six years supporting the entire instructional community at Purdue. At the School of Business, Erica supports curriculum design and development, creation of experiential education opportunities, and online course development, as well as creating and executing programming on teaching and learning development, individual course design support, projects involving teaching and learning, conducting individual and group consultations, and more.

Her research interests include but are not limited to: departmental and course transformation and implications for teaching and learning, learners' understanding and representation of scientific phenomena, discourse analysis, and teaching and learning professional development

Jacqueline McCloskey

Director of Business Development, Fair Oaks Farms

At Fair Oaks Farms, Mrs. McCloskey has served as a brand representative and public spokesperson since 2019, regularly speaking to corporate groups, industry leaders, and Midwestern news outlets. She is involved in sales strategy for the multiple hospitality businesses under the Fair Oaks Farms brand. As part of the brand is a nonprofit business, she leads fundraising efforts for the educational and museum components on the campus. She also serves as the lead for master planning strategies to integrate new businesses into the existing campus. When a new business is identified and approved, she oversees the construction project management for the brand.

Douglas Pruim

Clinical Assistant Professor of Management, Mitch Daniels School of Business

Doug Pruim is an award-winning clinical assistant professor of business communication for the Daniels School of Business. He has a PhD and Masters in Interpersonal Communication from Purdue, as well as a Master of Divinity from Calvin Theological Seminary. He teaches graduate courses on Storytelling with Data, Communication for Accountants, and Persuasive Communication. His undergraduate course, Strategic Thinking and Decision Making, is co-taught with a professor from Purdue Polytechnic School as part of an NSF grant on cross-college collaborative teaching.

Doug has been teaching “speech” classes since 2002, and he spent ten years giving presentations and working with people as a pastor. His publications include “Disaster Day! Integrating speech skills though impromptu group research and presentation,” “Scientific storytelling: A narrative strategy for scientific communicators, “Implications of some “obvious truths” for building theories of deceptive message formulation and production,” “Grown-ups at play: Theorizing quintessential interpersonal experiences of connection, novelty, and mirth,” and “Critically fun: Analyzing humor in political comedy.”

In addition to these “academic” things, Doug has been performing comedy improv for decades, and he announces for women’s roller derby. He’s also pretty sure that these last two details were probably the real reason why he was invited to be part of this training event.

Lisa Roark

Business Operations Administrator, Technical Assistance Program

Lisa currently serves as the Business Operations Administrator for the Purdue Technical Assistance Program. Lisa has vast operations and administration experience from a career with Purdue University and the Purdue Research Foundation (PRF). Recently, Lisa spent over five years as the Investment Office Manager and Executive Assistant to the PRF Chief Investment Officer supporting the Purdue Endowment. Previously, Lisa worked as an assistant with the Purdue Manufacturing Extension Partnership and as the Account Manager for the Purdue College of Pharmacy, Center for Medication Safety Advancement. Along with positions at Purdue and PRF, Lisa has worked for Harley-Davidson and Procter & Gamble. Lisa holds an undergraduate degree in Business from Indiana University-Indianapolis and is a loyal Boilermaker.

Jim Stratton

Assistant Director of Operations, Technical Assistance Program

As the assistant director of operations for the Purdue Technical Assistance Program, Jim manages major programs and grant opportunities from both the public and private sector. He has worked with the Technical Assistance Program since 2009, where he started as a graduate assistant.

He graduated from Eastern Illinois University in 2009 with a BS in Engineering Technology and holds a MS and PhD in Mechanical Engineering Technology from Purdue University, where he graduated in 2016.

Jim's particular areas of interest and expertise include technology adoption practices, industrial automation, process specification, and operations.

Mat Trampski

Executive Director, Technical Assistance Program

Mat Trampski joined the Purdue Technical Assistance Program in 2013. Mat's responsibilities include directing and managing large-scale industry partnerships, directing cyberTAP activities, directing a team focused on business and technical systems, and executing several industry-sponsored programs.

Mat started his career in the Washington D.C. metro area as a systems analyst with Lockheed Martin. After Lockheed Martin, Mat also worked with General Dynamics, Advanced Systems Development Inc., and Blackbird Technologies. During his time with these companies, Mat supported several federal agencies including The National Reconnaissance Office, National Geospatial Intelligence Agency, The Immediate Office of the Secretary of Defense, and other DoD and intelligence agencies.

Mat received a B.S from Purdue University in Computer Technology - Telecommunication & Networking Technology and completed his graduate studies with Purdue University Global, receiving his M.S. in Higher Education Administration. Mat's areas of interest include cybersecurity, cyber-physical systems, enterprise information technology, and education.

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FEEDBACK - NOTES