Operational Analytics: The Analyst Role

Creating AHA Moment Visualizations

MODERATED BY

D. Scott Sink
Adjunct Prof, Va Tech
Global Perf Excellence Webinars
Team Lead, IIEE

Ben Amaba,
Ph.D., P.E.
CTO
IBM

Jared Frederici, MBB
Sr. Consultant
The Poirier Group

Peter Murphy, BB
Consultant
The Poirier Group

Matheus Scuta
Product Mgr Analytics and
Tech Integration
Ford

Alex Monahan
OR Engineer
Intel

Webinars that Matter in Times of Turblence

8 July 2021
Our “On-Demand” Op Excellence ‘Store’ provides you with learning videos that support your ongoing growth and development

THEMES:

- Enterprise Transformation and OpEx
- Operational Analytics
  - Cultures to support Perf Excellence
  - Integration of People, Strategy, Process and Technology
  - Integrated LeanSigma
  - Industry, Service, Healthcare 4.0
  - Personal and Professional Learning and Development
  - Change Leadership and Management
  - Navigating through Turbulent (VUCA) times
  - Supply Chain and Logistics Optionality
Thank You to Our Sponsors and Partners

Our Sponsor for Today

IISE Professional Affinity Groups (Partners)

Chapter #1 (Columbus)
IISE’s 1st Chapter (1949) and 1st Virtual Chapter (2016)
Housekeeping

These sessions are recorded and will be available to you, on-demand for up to a year.

Download the presentation **DURING** the Webinar/Session

Questions? Ask questions and use the chat functionality during the session.

Follow up questions are welcome and contact information is provided at the end of the presentation.

Certificates of attendance are available

**Membership Has Privileges!!**
PURPOSE: to continue our Operational Analytics sequence of training sessions and focus on creating “AHA” moment Visualizations to support/provoke timely decisions and actions.

11:00 Scott Framing with interspersed Panel Perspectives and Points of View

11:12 Panelist Share AHA moment Graphic Visualizations, Slides and Explain

11:55 On the Fly Synthesis of Principles of the “Art”

12:10 Close out and Adjourn
Fundamental Questions/Agenda

1—What is Operational Analytics (OA)?

2—What is an AHA Moment and why is this concept relevant to Operational Analytics?

3—What are Foundational Principles for Op Analytics and also for creating AHA Moments with ‘visualizations’?

4—SME sharing examples of AHA Moment Visualizations they’ve created and worked with

5—Pull out their principles for you

6—Close-out
ISE’s Create Value by Integrating People, Strategy, Process and Technology

Operational Analytics is the ‘central nervous system and brain’ behind this integration

The Analyst Role is a rapidly growing and critical to success function in Op Excellence.
Operations Analysis

The abundance and growth of machine data, which can include anything from IT machines to sensors and meters and GPS devices, is another major driver of big data solutions. In its raw format, many organizations are unable to leverage machine data. Yet disregarding this data means that organizations are making business decisions based only on a subset of available information. Leveraging machine data and combining it with existing enterprise data enables a new generation of applications that are able to analyze and gain insight from large volumes of multi-structured machine data—which in turn improves business results.

**Get the Context**
Overcome complexities to perform advanced analysis and provide context across different data sets.

**Raw Logs & Machine Data**

**Capture a Complete View**
Access large volumes of machine, operational and transactional data and combine with other enterprise data.

**Get Insights From Analytics**
Release intelligence trapped in your data, allowing agile interpretation and action.

**WHAT DO YOU NEED TO SUCCEED?**

**THE RESULTS**

**Empower the C-Suite**
Reassure decision makers that they are acting with full knowledge & understanding of all available data.

**Improve Reliability**
Perform root cause analysis on data to more easily identify and preempt system failures, keeping customers happy.

**Speed Operations**
Help departments proactively minimize the problems and bottlenecks that stymie the flow of operations.

**Monitor & React**
Visualize streaming data to monitor the end-to-end infrastructure and deliver real-time alerts.

Learn more at IBM.com/BigData
Moving from Ad Hoc, Process Maturity Level 1 with Operational Analytics to PML’s 3-5 as appropriate.

A nice picture for Op Analytics I think...
The Management Systems Model—who Manages, what’s managed, how we manage

Leadership & management team
(wisdom application, data/facts to information conversion process)

Upstream Systems and Inputs: Suppliers & customer orders

The Business Processes/Value Streams

Downstream Systems and Outputs: Orders Fulfilled

Data management and Operational Analytics

Data capture
Data entry
Data Organization

Decisions
Actions

Information perception/understanding / insights
Information portrayal

Information portrayal

Information perception/understanding / insights
Two Fundamental Roles involved in “Analytics” work to Support Enterprise Performance Optimization

- Most ISE/ILSS Process Improvement Projects require that the ISE/Belt do both roles, certification requires that
- Data is almost never stored in a common place and are not trusted nor available
- the current state process in many large organizations splits data and analytics
- Data are stored in a common place, and are trusted and available

The Basic Roadmap for the OA Triangle

- **“Above the line” analyst role**
  1. What are the fundamental Questions that have to be answered?
  2. What data elements do those questions require?
  3. Organize the data and facts and then export to your analytics app.
  4. Extract features from data through integration and manipulation of data that move us closer to answers. (torture the data)
  5. Apply business acumen to data & analyses – create new knowledge
  6. Apply data visualization techniques to aid in telling the right story – as in life, so in business: the best story wins …

- **Foundational data role**
  1. What do we need to know in order to achieve the performance objectives—what are the questions we have to answer?
  2. Architect/Create the Measurement and Analytics Plan (Data Model included)
  3. Select and gather data from many sources, preferably through automated extract, transfer, & load (ET&L) process
  4. Create (observation, interviews, etc.) any data elements that don’t exist (ISE Measurement)
  5. Assure data are cleaned & ready for analysts or you to use – data quality monitors
  6. Assure data are integrated & can be joined with other data – think LEGO
  7. Assure data storage is high reliability & user-friendly – SSAS cubes, databases
  8. Integration and organization of foundational data elements as well as derivative data and other key metrics of interest
Operational Analytics, done right, minimizes latencies and enhances ability to drive more rapid benefits realization.

Reduce the cycle times on each step in this implicit process.

Executing the Analytics Triangle effectively enables more rapid decisions and actions and positions for more rapid benefits realization.
1—What is Operational Analytics (OA)?

2—What is an AHA Moment and why is this concept relevant to Operational Analytics?

3—What are Foundational Principles for Op Analytics and also for creating AHA Moments with ‘visualizations’?

4—SME sharing examples of AHA Moment Visualizations they’ve created and worked with

5—Pull out their principles for you

6—Close-out
The AHA Moment is actually a sudden comprehension that solves a problem, reinterprets a situation, explains a joke, or resolves an ambiguous percept.

In Op Analytics it is the creation of visualizations that spark insights, understanding, trust, confidence and hence provokes timely decisions and actions that allow for rapid benefits realization.
1—What is Operational Analytics (OA)?

2—What is an AHA Moment and why is this concept relevant to Operational Analytics?

3—**What are Foundational Principles for Op Analytics and also for creating AHA Moments with ‘visualizations’?**

4—SME sharing examples of AHA Moment Visualizations they’ve created and worked with

5—Pull out their principles for you

6—Close-out
Contextual Fundamental Guiding Principles for Analysts

Operational Analytics Certificate & Certification Program
Context – reading list

- Journey from craft to volume
- Profit from fixing inefficiencies
- Understand why things fail
- Recognize human biases
Illustrations of established Principles for OA
Key points

1. Good analytics come from good context understanding, use case clarity, *good problem/opportunity statements*, clear understanding of DONE
   - Good problem/opportunity statements have to be have an associated DONE and OKR’s;
   - Analysts need an all-access pass to data and facts & the wisdom and intentionality to collect it
   - Simple techniques trump complex techniques

2. Some people have every skill – *business acumen, data management, analytics understanding* – to perform a good Operational Analytics – but it tends to be the result of a slow ‘craft’ development process for most
   - Analytics exist on the learning curve – what used to take six months now takes two weeks with the right data and analytics
   - There is little time for ‘craft’ in businesses– speed wins
Key points

3. Investment in the data foundation has a positive ROI, as analysts move faster when they trust the data – results in faster results
   – Rule for Data Management: storage and speed are generally not issues any more, if it’s there store it, you might need it later (can always aggregate can’t get more granular if it isn’t there)
   – Second Rule of Business Intelligence/Op Analytics – maintain the illusion of simplicity for your customers, Understand the Use Case and the stakeholders keep it simple for them.

4. Good data visualizations can tell the right story quickly, because people are predisposed to believe what they see in a chart ...
   – Be on guard! Some folks use How to Lie with Statistics as a field guide
   – Kahneman’s (Thinking Fast and Slow) and other research on Decision Making and Action Taking Styles and Methods are invaluable prep for Operational Analytics Specialists.

S. Cunningham; Intel Corporation; 2013
Key points

5. There is very positive ROI in getting Operational Analytics well designed and developed—small analytics teams can wield disproportionate influence on the bottom line
   - Hire Intentionally and Intelligently—there are few people who have the curiosity, sense of urgency, tolerance of ambiguity, and humility for this role
   - The catalyst, change agent role is very powerful when powered with great Operational Analytics—get in, learn, analyze, win, get out

6. Good Operational Analytics provokes more timely decisions and actions—indeed, in most organizational systems, simple and persuasive/influential beats complex/ambiguous every time
   - Learn to Tell Stories on individual Slides and ‘Decks’ that Provoke timely improvement and accelerate benefits realization
   - Be a fast follower with Analytics Technology, people are enamored with shiny objects, keep it simple, more toys and elegance lose, pragmatic Operational Analytics aimed at rapidly improving process performance wins.
Resonate, Persuade, Tell a Story, apply Pyramid Principle

The story line for the overall ‘deck’ has to flow

The Story Line for each slide has to ‘flow’

• The within the overall story line story..

• Each slide should have a key point, the slides should stand on their own, just like the overall ‘deck’ should stand on its own.

• It’s all about ‘connecting’ to the stakeholders, ensuring they ‘get it’, it’s more a pull process than a push process. Not ‘show and tell’, not about you, it’s about the audience, make them the hero’s in the story.

Delivery then is everything!!!
Craft a visual story that takes the audience on a journey from WHAT to WHY to HOW.

resonate
PRESENT VISUAL STORIES
THAT TRANSFORM AUDIENCES
NANCY DUARTE
1. Resonance causes change.

2. Incorporating story into presentations has an exponential effect on outcomes.

3. If a presenter knows the audience’s resonant frequency and tunes to that, the audience will move.

4. Every audience will persist in a state of rest, unless compelled to change.

5. Use the big idea to filter out all frequencies other than the resonant frequency.

6. Structure is greater than the sum of its parts.

7. Memorable moments are repeated and retransmitted so they cover longer distances.

8. Audience interest is directly proportional to the presenter’s preparation.

9. Your imagination can create a reality.

@SELBELINA
Follow me on Instagram & Snapchat
Operational Analytics, done right, minimizes latencies and enhances ability to drive more rapid benefits realization.

Reduce the cycle times on each step in this implicit process.

Executing the Analytics Triangle effectively enables more rapid decisions and actions and positions for more rapid benefits realization.
1 — What is Operational Analytics (OA)?

2 — What is an AHA Moment and why is this concept relevant to Operational Analytics?

3 — What are Foundational Principles for Op Analytics and also for creating AHA Moments with ‘visualizations’?

4 — SME sharing examples of AHA Moment Visualizations they’ve created and worked with

5 — Pull out their principles for you

6 — Close-out
Panelists: Please Share an example of a Graphic Visualization, Slide that you felt had/has AHA moment characteristics and briefly explain what makes it that way.
Bridge the gap between Advanced Mathematics and Industrial Operations by removing latency on capture, analysis and decision.

Apply Mathematics to Operations and put it in the hands of the Business Users. Reduce by 50% the time to deliver solutions targeted to solve your specific operational problems.

- Custom Business Solutions
- Industry-specific Modules
- IBM’s goal on the DOC Platform
- IBM’s history: CPLEX, Machine Learning

- **Flexibility** to adapt to your specific business needs
- **Reduced time and risk** of developing customized solutions
- **Align with your processes** (models, UI components,...) **simplifying adoption process**

STATE-OF-THE-ART OPEN-SOURCE TECHNOLOGY

www.DecisionBrain.com
Routing and load optimization for inbound logistics in automotive removes latency

Planning delivering of auto parts from suppliers to assembly plants just-in-time

1. Maximize loading (3D loading)
2. Minimize transportation costs
3. Ensure load balancing

Used monthly to build daily transportation plan

**TOYOTA**

- **COST REDUCTION: 10%-15%**
- **FROM ONE WEEK TO A FEW MINUTES TO BUILD A PLAN**
- **10% REDUCTION IN CO2 EMISSIONS**

[www.DecisionBrain.com](http://www.DecisionBrain.com)
Maintenance and Lease Cost Optimization for Aviation

- Determine the optimal maintenance plan of each engine and engine components over a 36 months horizon
- Defined optimal lease return dates for aircrafts
  - Regulatory constraints for maintenance
  - Constraints on max number of simultaneous aircrafts grounded
  - Constraints on the status of aircraft returned after the lease period

- COST REDUCTION OF 10+%
- OPTIMIZE COMBINED MAINTENANCE AND LEASE COST

→ www.DecisionBrain.com
Container Terminal Multi-vessel, Load/Discharge Optimization

Hong Kong (HIT) Transshipment Terminals and Shenzhen (YICT) Import/Export Terminals are two of the busiest container terminals in the world.

- Congestions and delays in loading, discharging impact path on vessels
- Reduce Yard Clash and Traffic Jam
- Smooth overall operations
- Used daily since 2014

- YARD CLASH: -70%
- WORKLOAD PEAK: -15%
- RESHUFFLING: -15%

www.DecisionBrain.com
Evolution of Analytics in Industrial Engineering is now integrating Machine Learning and Artificial Intelligence

**Descriptive Analytics**

Analyzing the data to prove or disprove a certain hypothesis

- Statistical Methods
- Regression Analysis
- Correlation
- ANOVA
- Chi-Square
- Root Cause Analysis

**Predictive & Prescriptive Analytics**

Letting the models learn from structured and unstructured data

- Supervised Machine Learning
  - Natural Language Processing
  - Computer Vision
- Unsupervised Machine Learning
- Deep Learning
- Neural Networks, Case Based Reasoning, Fuzzy Logic and Genetic Algorithm
Machine learning and Deep Learning provide a data-centric approach that can find the patterns in large volumes of data.

Now you can build models for tens of thousands of products, where for each product a model can learn from:

- Product history,
- History of the entire portfolio/product family...
- ...and hundreds of external drivers and their histories from weather to other unstructured data

Today we have the data and the computational capacity to make more informed decisions at scale (Moore’s Law and Metcalf’s Law)
Democratization of Operational Analytics and ML/AI

- These dashboard pages translate the CPLEX output into actionable insights – Providing distributors and warehouse managers a procurement plan and identifying bottlenecks and high-cost distribution segments.
Let’s see if we can extract the Principles from what you’ve shared:

1. 
2. 
3. 
4. 
5. 
Panelists: Please Share an example of a Graphic Visualization, Slide that you felt had/has AHA moment characteristics and briefly explain what makes it that way.
Scenario modeling with an optimization model helps Intel make roadmap decisions

- Optimization model scenarios require many precise input adjustments
- Executive decisions made at a summary level
- Waterfall visual provides a range of likely outcomes and shows magnitude of each event and all in combination
- This visual has recently been used to recommend an easier-to-manufacture product to customers

Thanks to Laura Nibbelink and Jon Fine for contributing their expertise to this slide!
Visualizing the manufacturing flow helps identify roadmap opportunities

- Deliberately de-features parts to match demand
- Opportunity to market higher performing products
Factories meet commitments, but increased loadings slowing TPT

- Factories miss the commit on <1% of lots
- As loadings increase, may approach the commit
  - Forecasting a full load
- Reduced variability suggests that system is in control, with limited quick wins for improvement
An aggressive commit requires inventory to consistently feed downstream processing steps

- Downstream steps are also constrained
- If lots are missing commits, die inventory is needed to keep subsequent factories loaded
- Inventory reduces output improvements assumed with faster TPT

**Factory Throughput Time (TPT)**

- X TPT: 15% misses
- Y TPT: 6% misses
- Z TPT: <1% misses
Let’s see if we can extract the Principles from your examples...

<table>
<thead>
<tr>
<th>Principles</th>
<th>Requirements</th>
</tr>
</thead>
</table>


Panelists: Please Share an example of a Graphic Visualization, Slide that you felt had/has AHA moment characteristics and briefly explain what makes it that way.
Panelists: Please Share an example of a Graphic Visualization, Slide that you felt had/has AHA moment characteristics and briefly explain what makes it that way.
Jared and Peter Principles

Principles

Requirements
The Way We Present Data Matters

Q4

- When we present data we often choose representations that are easy or colorful without considering what we are trying to convey.
- As a result we feel accomplished, we feel aware of the business and on top of the situation.
- We don’t use this data to drive decisions, just to keep us up to date.
- We see this data every day/week/month/quarter, and with it answer the question: How are we doing?

We should be looking at data in a way that answers the following questions:
- How should we be doing?
- Is there something wrong?
- What have we missed?
- Do we need to change how we do things?

\[ y = -2.38x + 94.50 \]
A Chatbot was launched on November 5th 2020 to help reduce cases on a specified of topics coming into a support center. The baseline was recorded from January to October of 2020.

“We reject the null hypothesis based on the ‘hot damn, check out this chart’ test” – Randall Monroe
A client came with a request during their initiation study to devise an optimal grouping strategy to reduce travel invoices amongst their asset managers.

**Strategy:**
- Redistribution of properties by geographic area
- Groupings will enable smoother transition of properties in the future

**Impacts:**
- Average of 4.2 trips per year required (including driving).
- Easy small groupings of properties to hand off in a way that reduces workload on the AM

This solution reduced an average of 2.4 flights a year per Asset Manager.
A-ha! Moments are Commonly Generated by Exposing a New Point of View

The above figure tracks **Time To Answer (TTA)** for a call center, what % of calls were answered within a particular timeframe (Q1).

This graph tells us that the call center is failing, over the course of 3 months the proportion being answered within 1 minute has roughly halved. We can conclude that something has negatively impacted our agents’ productivity.

The above figure tracks **Time To Answer (TTA)** for a call center, How many calls were answered within a particular timeframe (Q1).

Over the course of 3 months the number of calls has doubled while the number of calls answered within 1 minute has stayed the same. We can conclude that our agents are just as productive, they just have twice as much work.
Benefit to Burden Matrix for the 27 Programs
IMPACT OF WORKSTREAM ON 3 MAJOR METRICS

As of: March 1, 2020 data

WAIT TIMES:

TARGET: Reduce wait time

OUTCOME: All 9 work streams contribute to reducing wait time. Target is achievable in M11

CC Reorg/IVR Revamp is the largest contributor

CALL DURATION:

TARGET: Reduce call duration <

OUTCOME: 8 work streams contribute to reducing call duration. Target is achievable in M12

Performance Management and Agent Education are the largest contributors

CASE VOLUME:

TARGET: Reduce case vol by 25-

OUTCOME: All 9 work streams contribute to reducing case volume. Target is achievable in M12

Self Service is the largest contributor
KEY HIGHLIGHTS – SERVICE COST ($USD)

THE FACTS:
- Total 2019 Spend on Call Center Operations (2019 Actuals) $2,995 M
- Total 2019 Lot Items Sold: 542,486 (2019 Simulation - average)

INSIGHTS:
- '19 Total Interactions: 379,210 (Run Rate)
  Of all interactions, the CORE team handles approx. 70% of the volume. Emails: 30% Calls: 70%
- Cost Per Interaction ('19): $7.90
  On average, each interaction with a customer costs $7.90 (including call & email contact)
  Breakdown: CAM CPC: $10.36, CPSS CPC: $10.01, Core CPC: $6.51
- Contact Ratio ('19): 56.6%
  The Contact-to-Units Sold ratio is approx. 56.6%
  More than half of the units purchased have encouraged a call/email to the contact centre
**Panelists:** Please Share an example of a Graphic Visualization, Slide that you felt had/has AHA moment characteristics and briefly explain what makes it that way.
Scott’s ‘know it when I see it’ principles

1. I rapidly search for key points, the logic in the visualization(s).
2. I’m not adversely influenced by ‘denseness’ if it’s clearly logical, there is a clear story line, key point(s) that are transparent. (that’s my INTJ coming out)
3. I like innovation, creative portrayals, putting concepts juxtaposition with related concepts/abstractions that tell a new story.
4. I look for strong story line, logical flow from slide to slide, front to back and clear separation of Front Matter from Back Matter.
5. I want to see the end first, start with the answer, Pyramid Principle being put to use.
6. I’m looking to see if the overall logic (between and within) hangs together, makes sense to me, ‘cracks the code’ on the thing in focus.
7. Professional look and feel is crucial for me, color schemes, layout, fonts, etc. Form is important as is Substance.
Drain Utilization “Hot Spot” Chart
Where do we attack Waste Generation?

Legend

• 70% of Waste Collected from:

• 25% of Waste Collected from:

• 5% of Waste Collected from:

• 5 Worst Drains: 37, 9, 20, 21, 2

• 3 “Areas” to Target: Raw Process, Bagger Area, Dishwash

Data Collection Defense
So far we have seen a reduction in:

- Average by 3 minutes
- Deviation by 4.5 minutes

Current State

Future State (Forecasted)

Improvement Implementation Plan

\[ X = 16.03 \text{ min/unit} \]

\[ X = 7.62 \text{ min/unit} \]
SMED Method Development and Implementation

Meeting with David and all pressmen to edit first copy of SMED method

Meeting with David Kirkman to form Final SMED Method

SMED Implemented 2/15/10

Staging Solution Elements
Project Plan and Next Steps

Recently Completed (Actual Completion Date)
- Maintenance and Staging Improvements Test Completed and Measured (2/12/10)
- SMED Method Established and Implemented (2/15/10)
- Control Plan and PTP Developed (2/20/10)
- Improve/Control Tollgate (2/24/10)

In Progress (Target Completion Date)
- SMED Test Run (2/26/10)

Upcoming Events (Start Date - Finish Date)
- Measure SMED Method Improvement (2/27/10 – 2/30/10)
- Audit Time Recordings (3/1/10 – 3/12/10)
- Hand Off Control Plan (2/26/10)
- Project Realization and Completion (3/1/10 – 3/12/10)
Opportunity and Current to Future State

**Current State**

- **(All Colors)**
  - 10/14/09
  - Make Readies take 23.5 minutes/unit on average
  - Lack of standardization in process
  - Ink standards not established

- **(4C-7C)**
  - 11/25/09
  - Make Readies take 15.8 minutes/unit on average
  - Lack of standardization in process
  - Ink standards not established
  - 1C 3C jobs are rarer and not truly representative of the process

**Future State**

- 3/12/10
  - Make Readies take 7.5 minutes/unit on average
  - Standardization in process between all shifts
  - Color Curve Established
  - SMED methods implemented

**Define**

- 10/14/09

**Measure**

- 12/2/09

**Analyze**

- 1/27/09

**Improve**

- 2/24/09

**Control**
Discovery and realization of root causes

**Prioritized List of Root Causes**

1. Lack of standardization in how to perform the process between crews
2. Waiting waste – parts of process than can be done during run (internal activities) are being done after the run is completed.
3. Pre-press Errors (eg paper missing or incorrect, job bags are confusing
4. Old press rollers and dryers causing printing errors
5. Lack of color curve standard on new inks resulting in long impression make readies
6. Materials scattered and distance from the work areas

**Why are these Root Causes?**

- Interviewing, suggestions, and knowledge from experience through pressmen, David Kirkman, Dave Moore, Mark Acree, and Dr. Sink
- Analysis of Make Ready data to weed out sources of variance
- Inspection of the process
- Research
  - Case Study of DMAIC project done in the Pharma industry on changeover reduction with several similar root causes
Developing and prioritizing of solution elements

**Prioritized List of Solution Elements**

1. Standardization of the process
2. Machine Maintenance
3. Implementing SMED on the process
4. Material Staging and 5S
5. Establishing Color Curve Standards

**Why are these Solution Elements?**

- Interviewing, suggestions, and knowledge from experience through pressmen, David Kirkman, Dave Moore, Mark Acree, and Dr. Sink
- Inspection of process and studying of standardization and SMED
- Research
  - [http://www.cma4results.com/AREnmag809.pdf](http://www.cma4results.com/AREnmag809.pdf)
    - The benefits and uses of standardized work
    - Case study where standardization, 5S and SMED are uses
How Developed Solution Elements will Address our Root Causes

Prioritized List of Solution Elements

1. Standardization of the process
2. Machine Maintenance
3. Implementing SMED on the process
4. Material Staging and 5S
5. Establishing Color Curve Standards

Prioritized List of Root Causes

1. Lack of standardization in how to perform the process between crews
2. Waiting waste – parts of process than can be done during run (internal activities) are being done after the run is completed.
3. Pre-press Errors (eg paper missing or incorrect, job bags are confusing
4. Old press rollers and dryers causing printing errors
5. Lack of color curve standard on new inks resulting in long impression make readies
6. Materials scattered and distance from the work areas
Standardized Method Test Run Results – Improvement on Make Ready Average and Variance

- Learning curve: data trending down
  - A run of 9 data points below the mean is a RED FLAG showing a definite shift or change in the process
- Average = 14.34 min/unit

- Decrease in mean time from 16.02 min/unit to 14.34 min/unit
- Decrease in variance by 1.22 min/unit
Material Staging Improvements

Changes Include....

- Ink staging areas closer to the presses
  - Benefits:
    - Decreasing travel time to obtain inks

- Organizing and shadow boxing staging areas for skids and finished product:
  - Benefits:
    - More organized work area
    - Define area to obtain skids and to place finished product

- Plate staging closer to the presses
  - Benefits:
    - Decreased travel time to obtain plates
    - Easier to access plates/bags to inspect for errors

Previous Area

New Area
The Bakery had an immense need for an accurate and consistent waste measurement system in order to replace chaotic time-consuming reports.
Throughout Define and Measure the current system was documented, the pain points were identified, and performance was evaluated.

At this point, we zoomed in on the Saltine line to determine where, specifically the waste was coming from.
From this point in the project on, we followed the path outlined in this graphic: first we needed to fix data capture, then data portrayal...
Level 1 Business Case: Enterprise Value Map

Shareholder Value

Revenue Growth

Operating Margin

Asset Efficiency

Expectations

Long Run Tangible Benefits:

Once the measurement system has been designed, the following benefits will be realized:

- Increase material efficiency
- Increase production efficiency
- Increase value add time
- Decrease batch sizes
- Reduce raw material
- Better utilization of WIP
- Increase equipment efficiency
- Decrease downtime

Short Run Intangible Benefits:

Improve the sharing of knowledge across organization boundaries → increase potential for organizational excellence

Deloitte Enterprise Value Map is a graphical tool to aid business leaders in the identification of potential opportunities for increasing in shareholder value.
Relationship between Level 1, Level 2 and Level 3 to future direct savings

CURRENT WASTE COST CALCULATION (actual)
Date: April 1, 2011 – April 30, 2011
Department: Cookie Cracker
Product: Saltine Crackers (Band 2)

REDUCED WASTE COST CALCULATION (theoretical)
Date: April 1, 2012 – April 30, 2012
Department: Cookie Cracker
Product: Saltine Crackers (Band 2)

Materials Savings: $20,000 / mo. = $240,000 / yr.
Labor Savings: $260,000 / yr.

$500,000 /yr.
Where are we in relation to “done”, April 2014

Current State (August 2013):

- High non-value-added time
- Poor information flow and communication
- Average of 3.2 order errors a month, about 39 per year.
- Tribal knowledge in procedures and self-directed workflow
- Schedules constantly changing

Define and Measure Stages

- Focus on NVA time for workers, and poor info flow and communication
- Data collection and analysis
  - Kitting process is efficient
  - Overall work day has inefficiencies
- Long lead times for kits, as well as idle times

End of Project (April 2014):

- A fully developed plan to reduced NVA time for kits as well as workers
- Set of business requirements for a modified pull system
- Implementation plan and strategy
- Standard work for processes
- Scheduling tool requirements

PROJECT SHIFT

Concept and Design of a Pull System

- Focus on idle time of kits — NVA time for the kits as well as the workers

Verify Future Project Plan

- Design the ideal pull system
- Complete quick wins/begin tasks
- Hand off document with projects
- Timeline and leads established

Packer receives production order and
Kit set aside or put on shelf for packers, send necessary items to shipping

Pick list generated for packers, send necessary items to shipping

Order confirmed and verified by shippers

Order staged for truck loaders

Kit set aside or put on shelf

Pick list generated for packers, send necessary items to shipping

Order confirmed and verified by shippers

Order staged for truck loaders

Packer receives production order and
Recap of Concepts for the Future State

Moving From:

- Order release
- Order scheduling
- Production order process times
- Pick list distribution in shipping
- Floor scale workflow adjustment
- Truck scale order staging

Moving To:

We reviewed these elements in our last meeting...and where they occurred in the process...and detailed how the process will work at each step.

Now what?

1. FS shipper will have orders to process immediately upon arrival
2. Pick list will be received a designated time before order leaves (1-8)
3. Order will be done and staged a designated time before (1-4)
4. Time buffer for complications
Floor Scale Process—what lean elements will come into play?

These elements are all going to help the overall functioning of the pull system, and will be addressed via the project plans that are being created.

**Defect Prevention** by eliminating a step that allows miscommunication—the ramps/frames.

**Layout and flow** will impact the lead time and the capacity of the system (capacity more or less set from Joey’s project).

**Lead time expectations** will affect when scales must be done.

**Inventory buildup** is unavoidable here due to the nature of the delivery schedule.

**Core pull by day** is attainable with tool in assembly—only producing what will ship that day, controls the **lead time**.

**Changeover/Setup Reduction** by doing scales in predetermined optimal sequence.

**Visual processes** can be improved with more devoted use to hour by hour board.
Floor Scale Process—where do the projects that are planned come in the process?

There are key projects that will be detailed in the project transition and handoff, and they integrate the lean elements.

- **Process/Workflow Redesign** to enable completed scales to be sent to shipper and eliminate rework/idle time of unfinished goods
- **Defect Prevention**
- **Assembly** receives schedule
- **Assembly completes scales**
- **Assembly transports scales to shipping area**
- **Semi Finished Goods**
- **Shipper adds necessary items**
- **Shipper completes paperwork**
- **Order ready on dock**
- **Finished Goods**
- **Customer Demand**
- **Inventory buildup is unavoidable**
- **Capacity planning and demand analysis** could lead to realization that certain roles can be a floater at times or better utilized
- **Scheduling and order release** improvements will enable more visibility of work content and better utilization
- **Lead time expectations**
- **Layout and flow**
- **Changeover/Setup Reduction**
- **Visual processes**
- **Core pull by day**

**SAP Integration** will take place to make order release/BOM changes
Floor Scale Process—who do the projects that are planned come in the process?

A few tools were created to address capacity and scheduling issues addressed in previous meeting, and a handoff guide is being developed.

Gantt Chart will lay out future projects to aid in the transition.

Floor scale capacity and scheduling tool

Changeover/Setup Reduction

Process/Workflow Redesign

Defect Prevention

SAP Integration

Lead time expectations

Layout and flow

Inventory buildup is unavoidable here.

Core pull by day

Visual processes

Scheduling and order release project

Capacity planning and demand

Now, a closer look at the tool.
A few tools were created to address capacity and scheduling issues addressed in previous meeting, and a handoff guide is being developed.

**Pick/Pack Initiative (led by Aaron)**

- Packer receives production order and assembles kit
- Kit set aside or put on shelf
- Semi Finished Goods
- Pick list generated for packers
- Send necessary items to shipping
- Pick list generated for shippers, gather remainder of order
- Order confirmed and verified by shippers
- Order staged for truck loaders
- Finished Goods
- Order loaded on truck
- Truck departs
- Customer Demand

**Scheduling and order release**

**Visual processes**

**Strategic buffer/kanban**

**SAP Integration**

**Truck Scale Planning Tool** will dictate release until SAP/scheduling is fully adjusted.

**Capacity planning and demand analysis**

**Gantt Chart** will lay out future projects to aid in the transition.

**Lead time expectations**

**Core pull by order**

**Now, let’s look more closely at the tool!**
Current State:

Order release
- Released early to keep workers busy or get ahead (lots of orders coming)
- Release is independent of need

Order scheduling
- Released throughout the day
- "get ahead and keep busy" mindset

Production order process times
- Prod. orders with a day due date
- May be given days in advance
- Worker prioritizes work

Pick list distribution in shipping
- Assembly often not complete, paperwork is not released
- Steve writes down from VA03
- Not working how SAP is designed

Floor scale workflow adjustment
- Shipping worker adds ramps and frames per customer order
- Miscommunications cause more work (scales arrive packed, but must add component)

Truck scale order staging
- Pick list not received early
- More time pressure/stress
- May be picking while truck is there

Failure Modes:
- Inconsistencies between actual process and SAP could cause missing parts
- Self-paced and self-directed work is likely increasing NVA time

My first tasks:

- Capacity planning/analysis to determine if orders need to be released early
- Could a floater avoid releasing early?

- "Needs a lot of detailed design"
- Determine prioritization/division of work and proper sequencing

- Ensure process time estimates are correct/known
- Linked to scheduling to optimize, known by scheduler

- How this would affect assembly and their capacity
- Determine shipper’s workload w/o this
- Potential to be a floater at times

- How can order be staged at t-4
- Find buffer time needed vs. SAP
- Determine when production orders should be released prior to this

How will we achieve the future state?

Schedule Project
- Will have algorithm for an efficient sequence of work
- Provide order and time for when an order/pick list should be complete
- Will print a schedule or generate at workstation

Process Adjustment/Work Allocation
- Potentially involve moving the ramps and frames upstream
- Provide order and time for when an order/pick list should be complete
- Will print a schedule or generate at workstation
- Flexibility of worker roles in PPS, floaters vs. dedicated to certain work
- Will take into account new pick/pack project with standard kits

SAP Integration Project
- Detail changes to BOM/release rules
- Look into proper buffer times
- Provide ease of linkage to scheduling optimizer/sequencer
- Accounts for outcomes of some of the other projects

Future State:

Order release
- No orders released early

Order scheduling
- Daily work set and visible
- Set time for production orders
- Available pick lists are released/completed first

Production order process times
- Production orders w/ associated process time (also in SAP)
- Release and due times are based on process times

Pick list distribution in shipping
- Steve receives pick list the shift before a truck goes out (t-8 working hours)

Floor scale workflow adjustment
- Move all ramps and frame upstream to assembly
- Shipping worker only weighs, add kits, paperwork

Truck scale order staging
- Order staged and ready four hours before scheduled delivery
- Allows a small buffer, and accounts for possible early arrival by truck

Failure Modes:
- Less room for error
- Unexpected absences could cause issues if high volume of work

Key Performance Indicators:
- Release accuracy: 31.2% on time
- Avg time sitting for pick lists: 43 min
- Scheduling time: ~5hrs/day
- Order errors: ~4/mo

Key Performance Indicators:
- Release accuracy: >90% on time
- Avg time sitting for pick lists: 15 min
- Scheduling time: none
- Order errors: 0
Op Analytics Development Options

**On campus or Hybrid MS Programs**

- 1-2 yrs, $50-100k

**On-Line, Virtual**

- 4 days to 6 mos. $600-$5,000

**Hybrid/Blended Model**

- 120 hours ++, $450 students + $250 for certification
- $675/875 member/non-member + $550 for the certification

Op Analytics represents huge opportunity for ISE’s

In Partnership with:
The Poirier Group

Delivered Uniquely:
IISE Digital Op Ex ‘Mall and Stores’
  o 10+ Video Modules for easy, self-paced consumption/learning
  o ‘Chat’ Support with Coaches
  o Periodic Huddles for virtual coaching
  o Certificate requires an on-line final exam
  o Certification requires the Certificate plus a reduction to practice, proof of skill project

Module 1: OA Thought Leader Perspectives
Module 2: Operational Analytics Perspectives, Points of View and Foundational Principles and Methods and Models
Module 3: Operational Analytics: The Foundational Data Management Role
Module 4: Operational Analytics: The Analyst, Decision/Action Support Role
Module 5: Data Sciences and The New Industrial and Systems Engineering
Module 6: Operational Analytics: Value Stream and Process Improvement Analytics
Module 7: Operational Analytics—Visual Measurement/Management Systems
Module 8: Operational Analytics: Putting it All Together: Management Systems Engineering Role
Module 9: Operational Analytics: Case Studies
Module 10: Final Exam and Certification Requirements Definition Document
Module 11: Bonus Module—ISET’s Engineering Value in Times of Disruption
10 fundamental modules make up the certificate program.

On-demand Learning Management System.

Chat Coaching and periodic ‘huddle’ coaching included.

Approximately 120 hours of studying and practicing designed to be completed in 6 months or less.

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Module I: Op Analytics Certificate and Certification Program Overview—includes Syllabus and Plan of Study and Assignment List Module</td>
</tr>
<tr>
<td>2.</td>
<td>Assignment I.1 Assignment</td>
</tr>
<tr>
<td>3.</td>
<td>Assignment I.2 Assignment</td>
</tr>
<tr>
<td>4.</td>
<td>Module II: Op Analytics: Perspectives and Overview Module</td>
</tr>
<tr>
<td>5.</td>
<td>Assignment II.1 and 2 (Module II) Assignment</td>
</tr>
<tr>
<td>6.</td>
<td>Module III: Op Analytics: Data Management Role Module</td>
</tr>
<tr>
<td>7.</td>
<td>Assignment III Part I--DR Inc. Data Management Role Practice/Exercise (Data Organization to Support Feature Extraction) Assignment</td>
</tr>
<tr>
<td>8.</td>
<td>Assignment III --Part II: Data Management Role Common Failure Modes and Key Requirements for Success Assignment</td>
</tr>
<tr>
<td>10.</td>
<td>Module IV Part I Assignment Organized Data to Feature Extraction Practice Assignment</td>
</tr>
<tr>
<td>11.</td>
<td>Module IV--Part II Practice with Minitab Analytics and Feature Extraction Assignment</td>
</tr>
</tbody>
</table>
• **“Above the line” analyst role**
  1. What are the fundamental Questions that have to be answered?
  2. What data elements do those questions require?
  3. Organize the data and facts and then export to your analytics app.
  4. Extract features from data through integration and manipulation of data that move us closer to answers. (torture the data)
  5. Apply business acumen to data & analyses – create new knowledge
  6. Apply data visualization techniques to aid in telling the right story – as in life, so in business: the best story wins …

• **Foundational data role**
  1. What do we need to know in order to achieve the performance objectives—what are the questions we have to answer?
  2. Architect/Create the Measurement and Analytics Plan (Data Model included)
  3. Select and gather data from many sources, preferably through automated extract, transfer, & load (ET&L) process
  4. Create (observation, interviews, etc.) any data elements that don’t exist (ISE Measurement)
  5. Assure data are cleaned & ready for analysts or you to use – data quality monitors
  6. Assure data are integrated & can be joined with other data – think LEGOs
  7. Assure data storage is high reliability & user-friendly – SSAS cubes, databases
  8. Integration and organization of foundational data elements as well as derivative data and other key metrics of interest
Customer and Member Satisfaction and Feedback Survey

Operational Analytics: Creating AHA Moments with your Visualizations

You can download the deck (handouts)
You will receive an e-mail tomorrow with certificate and link to recording. You can go to this IISE link soon and get deck and recording.  https://www.iise.org/details.aspx?id=46729
Thank You!

Enjoy the IIEE Annual Conference and the rest of our Performance Excellence Track Sessions

Contact us for More Info:

Jared Frederici:
- Jared.frederici@thepoiriergroup.com
- https://www.thepoiriergroup.com/team/jared-frederici/

Scott Sink:
- https://www.linkedin.com/in/dscottsink/
- ssink@jumpcurves.com

Ben Amaba:
- https://www.linkedin.com/in/benamaba/

Matheus Scuta:
- https://www.linkedin.com/in/matheus-zanatelli-scuta/

Alex Monahan:
- https://www.linkedin.com/in/alex-monahan-64814292/
Where to find our digital library of past Webinars

Over 50 recorded Webinars on a wide spectrum of Performance Excellence Topics are available to members of IISE by clicking on this link.

Our IISE TV Channel is allowing you to customize what you have personalized access to.

Quarter 3&4 Webinar Program/Lineup is shaping up well based on voice of member input

July 8: Operational Analytics: The Science and Art of Creating “AHA” moments with your Analytic Deliverables

July/August: IISE Networking Event with Remo (Sponsored by CISE)

August 10: Operational Excellence: Industry Benchmarking Best Practices

August 24: Social Service Systems Engineering: Bringing ISE to this Sector

Sept 7: Operational Analytics Certification Program Launch—Overview for ISE Students and Practitioners

Sept 21: Creating Cultures to Support and Drive Operational Excellence