

Measurements For Product Development Organizations

A Perspective From
The Theory Of Constraints

Eugene Kania

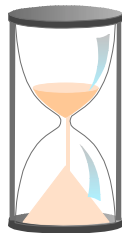


Overview

- Measurements and Behavior
- Performance vs. Operational Measurements
- Theory Of Constraints (TOC)
- Critical Chain Method
- Multi-Project Management Method
- TOC Buffer Management as an Operational Measurement
- Successful Implementation
- TOC Performance Measurements
- Questions



**"Tell me
how you
measure me,
and I'll tell you
how I'll behave."**



— Dr. Eliyahu Y. Goldratt



The Measurements Triangle



The Measurements Triangle

PERFORMANCE



- Rear view mirror look
- What happened
- Month, quarter, year
- Framed as results
- Appraisal, evaluation
- Learn lesson from past

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The Measurements Triangle

OPERATIONAL



- Out the windshield look
- What to do
- Hour, day, week
- Framed as questions
- Feedback, guidance
- Used to make a decision affecting the value of the measure

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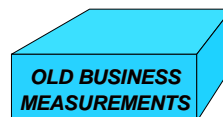


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PROFIT
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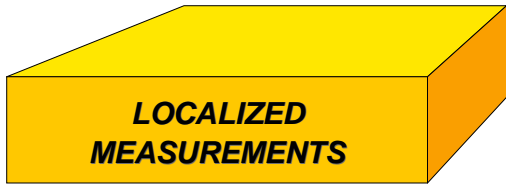
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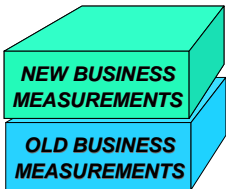
EVA
PVA
CVA



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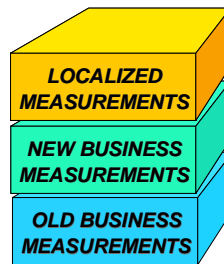
No. of Lines of Code
 No. of Widgets Designed
 No. of Sales Calls



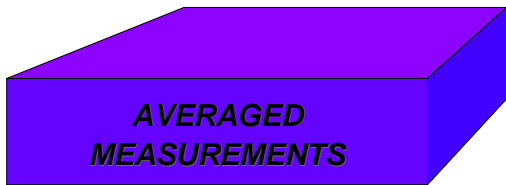
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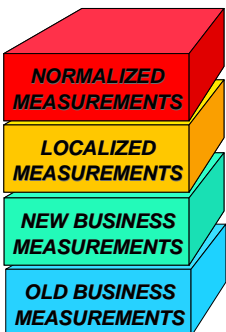
No. of Lines of Code per Engineer
 No. of Sales Calls per Salesperson
 No. of Purchase Orders per Buyer



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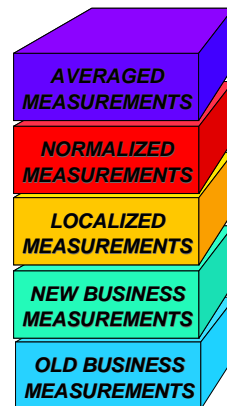
Avg. Cost per Drawing over last Fiscal Year
 Avg. Cost of Purch. Req.
 Cost per Hour of System Lab Time



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What's the Problem?

- In the words of a colleague, we measure things that are mere observable quantities, and we act as if we could control them directly.
- We try to use performance measurements as operational measurements to make day-to-day, operational decisions.



- **CONCLUSION:** We have no effective operational measurements for product development!



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A Sure Sign!

- Trying to use performance measurements as operational measurements causes conflicts for managers and employees.
- All employees and managers who are subjected to incorrect operational measurements face frequent conflicts, between the choices that improve their measurements and the choices that they know are best for the greater organization or business.



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Theory Of Constraints - TOC

- TOC was founded by Dr. E. M. Goldratt (Eli).
- TOC focuses on improving the performance of the entire organizational system, not that of individual pieces of the system.
- TOC provides operational measurements which allow managers of subsystems to make local decisions which directly affect the performance or goal of the entire system.
- TOC requires that we **DEFINE THE SYSTEM** and that we **KNOW ITS GOAL**.

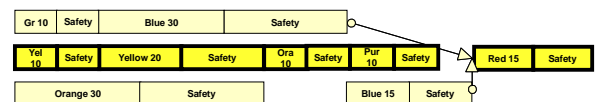
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Goal Of Product Development

- If our companies live or die by our ability to bring new products to market faster than our competitors, then the following are true for our companies:
 - Quality, value, reliability, service, etc., are necessary conditions that must be met.
 - Each new product is a money pump, designed to create a new flow of cash from the market, into the corporation.
 - Our stockholders want us to create high-capacity money pumps and to turn them on as fast as possible. Therefore...
 - The goal of our product development organizations is THROUGHPUT!

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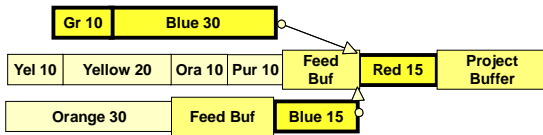
The Current Method



- The critical path, above, ignores resource dependencies.
- Even when resource contention is eliminated, the critical path is not redefined.
- We plan the project with safety in every task.
- We work to task due dates.
 - We become dependent on and use all the safety.
 - We multi-task to meet the task due dates.
 - We pass on delays but not early finishes.
- We react to EVERYTHING.

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The TOC Critical Chain Method



- The critical chain, above, takes into account not only the task dependencies but also the resource dependencies. It can jump from path to path.
- All resource contention within the project is explicitly eliminated.
- We plan the project by aggregating safety in strategic locations.
- We work in "relay race mode".
 - No milestones or planned durations.
 - Stay on task until finished unless buffer management indicates need to shift.
 - We pass on early finishes.
- We FOCUS on and manage strategic buffers to insure project success..

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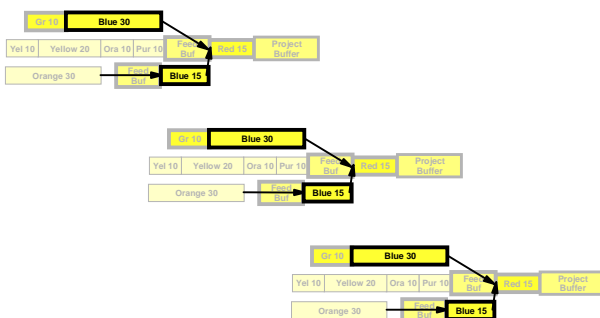
The TOC Multi-Project Mgmt. Method

The 5 components:

1. Prioritize the projects.
2. Plan the projects per the Critical Chain Method.
3. Stagger the projects.
4. Measure and report the buffers.
5. Manage by the buffers.

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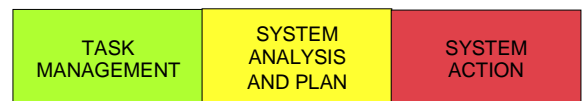
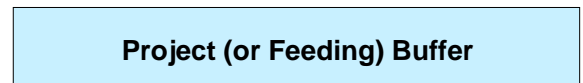
3. Stagger the Projects



- The Critical Chain Method lets us resolve resource contention within each project.
- By staggering the projects, we also eliminate most of the resource contention across projects.

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4. Measure & Report the Buffers



- Buffers are used to provide focus and early warning to protect the due date of the project.
- During project execution, resources regularly provide "time to complete task" estimates for the tasks in progress which are then used to calculate the current buffer sizes.

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5. Manage by the Buffers

- Developers are given only one task to do at a time, according to the following guidelines:

- Urgent customer problems interrupt every thing. Think of these as unfinished work from the LAST project, whose project buffer is long gone.
- Tasks that threaten project buffers interrupt tasks that threaten only feeding buffers.
- If two tasks threaten similar buffers, then the task whose buffer is threatened to a greater degree is done first.
- Tasks that are not associated with any buffers have the lowest priority.

- At times, excessive project buffer consumption warrants a recovery plan.

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TOC Buffer Management

- Is this an effective operational measurement for product development?

- Let's check!

Performance

- Rear view mirror look
- What happened
- Month, quarter, year
- Framed as results
- Appraisal, evaluation
- Learn lesson from past

Operational

- Out the windshield look
- What to do
- Hour, day, week
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YES, TOC Buffer Management is an effective operational measurement for product development!

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Successful Implementation



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Leadership

- Top management buy-in is the key as in any other major cultural change.
- Only top management can replace the ineffective, existing measurements with the effective, operational measurement of TOC Buffer Management.
- Top management must actively and visibly lead the change.
- A word about PILOTS:
 - You don't do a pilot to demonstrate interval reduction. A pilot demonstrates feasibility, identifies policies opposed to TOC, paints a picture of how the system will operate in the future under TOC.

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Discipline

- Invest in training everyone in the organization.
- Project planning must become a disciplined and integral part of the product development process.
- Project planning must focus on the work and deliverables for the project as opposed to milestone dates.
- The project team must have confidence in the project plan.

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Focus

- Buffer reports must be visible to everyone in the organization.
- All priorities and decisions must be based on buffer status.
- "The only date that matters is the end date."
- "What's the problem?"
"What are we doing to fix the problem?"
"What are we going to do to make sure this problem doesn't occur in the future?"

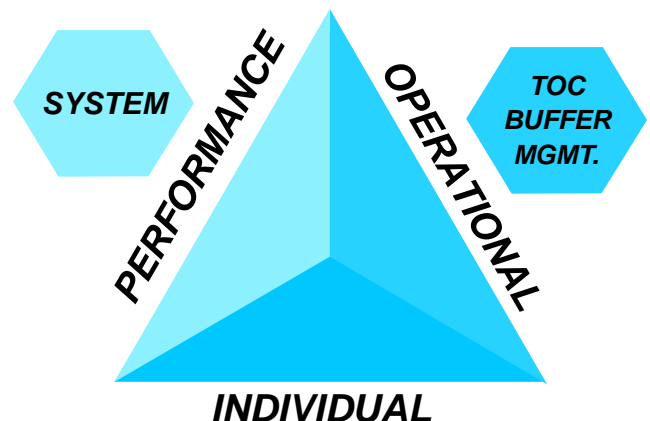
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The Measurements Triangle



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A TOC Measurements Triangle



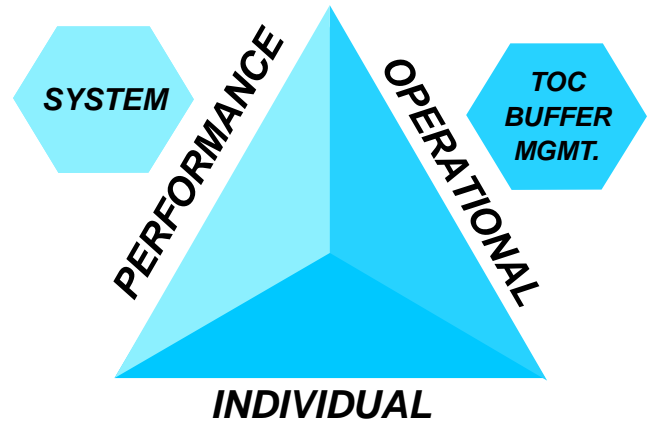
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System Performance Measurement

- Are project deliveries satisfying customer needs?
- Are projects getting done faster?
- Are we getting more projects out the door?
- Are we turning on the "money pumps" faster?
- Do we have more capacity now to take on new projects?
- Is our THROUGHPUT going up?

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A TOC Measurements Triangle



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But What About Individual Performance?

- One of Deming's 7 Deadly Diseases:
 - Evaluation of performance, merit rating, or annual review
- TOC requires a change from quantitative performance analysis to qualitative or subjective performance analysis.
- We must shift our focus from an individual's output to their behavior.
- Performance measures must address 2 key behavior changes peculiar to TOC:
 - Operating in relay race mode
 - Protecting project buffers

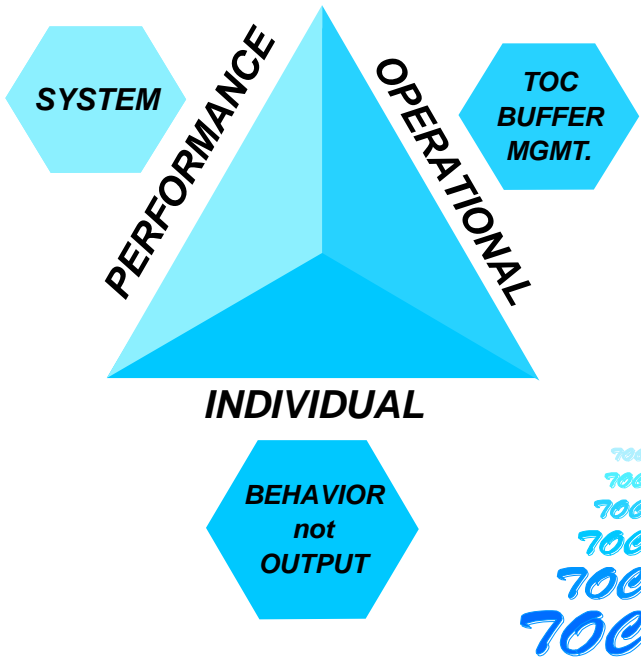
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Individual Performance Measurement

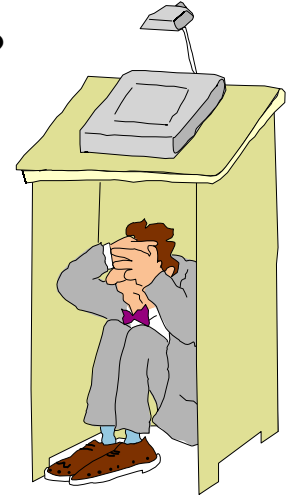
- Are people providing task updates regularly?
- Are people announcing finishes immediately?
- Are people prioritizing their work according to buffer guidelines?
- Are people on the Critical Chain staying focused and avoiding interrupts?
- Are people starting tasks early?
- Are people subordinating to the Critical Chain?
- Are people buffer focused and oriented?

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A TOC Measurements Triangle



Questions???



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