11th International Conference of the
TOC Practitioners Alliance - TOCPA
www.tocpractice.com
March 14-15, 2014 Sao Paulo, Brazil

Recommendations for developing and using money buffers in TOC logistical solutions

Oded Cohen

TOC Strategic Solutions, Israel

14 March, 2014

Oded Cohen

Oded has over 35 years of experience in developing, teaching and implementing TOC methodology, solutions and implementation processes working directly with Dr. Goldratt all over the world. Among the countries to which Oded brings his expertise are the USA, Canada, Japan, India, China, the UK, Poland, Russia, Ukraine, Colombia, Chile, Peru, Turkey and many others.

Oded has authored multiple TOC articles and contributed to numerous TOC books.

Oded in the is the author of *Ever Improve – A Guide to Managing Production the TOC Way*, published in June 2010. Oded co-authored the book *Deming & Goldratt: The Theory of Constraints and the System of Profound Knowledge – The Decalogue.*

Together with Jelena Fedurko Oded has co-authored the book *Theory of Constraints Fundamentals.*

Oded is International Director of TOC Strategic Solutions Ltd and Founder and Co-President of TOCPA.

oded.cohen.gs@gmail.com
www.toc-strategicsolutions.com

TOC Money Buffer for TOC Logistical Solutions

- Introduction
- Managing Production the TOC Way
- TOC Buffers
- The financial side of the logistical buffers
- Money Buffers

Introduction
Money for Buffers

The financial performance of the company is predicted in the planning phase. However, the way of managing during the execution of the plan dictates what actually is achieved. Hence there are inherent conflicts – as reflected in the core clouds of each subject.

The TOC Logistical Solutions – MTO, MTA, DTA and CCPM focus on managing the flow. The top priority is given to the logistical commitment: on time delivery and availability.

Yet, the logistical management must consider the financial impact of their decisions. Any activity that deviates from the "standard" (what has been put in the budget) causes to increase the expense. To reduce the financial clash, all TOC solutions give early warning through buffer status. Nevertheless, most corrective actions demand extra money.

To handle this issue we suggest to add to the logistical buffers – Time and Stock, also the Money Buffers for managing flow.

Production Management

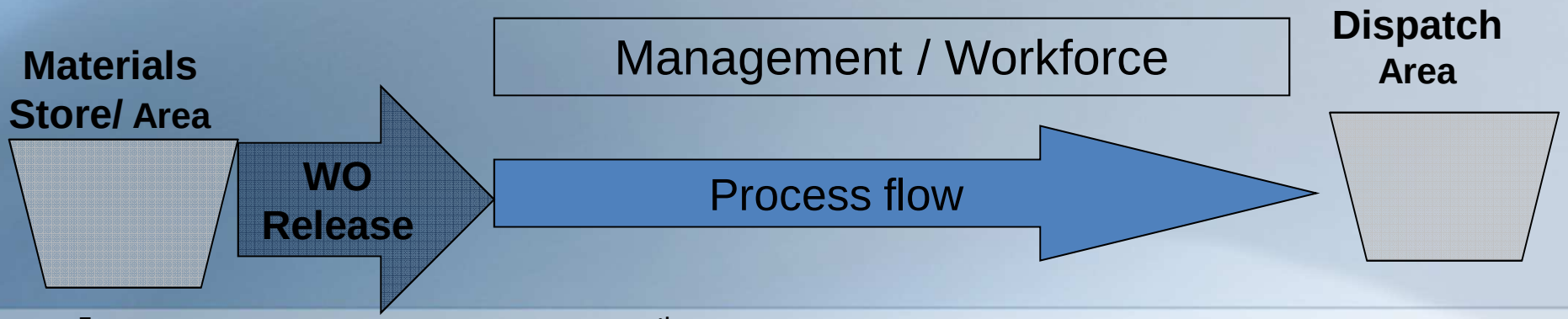
Managing the FLOW!!!

The Purpose of Production: To produce the goods needed for the customers' orders (and by that contribute to the goal of the organization)

Managing Production means organising the environment in Work Orders – WOs (or in batches) and to ensure their on time completion.

It contains:

- **Planning – WO release – What/When/How much**
- **Maintaining/controlling the flow of released WOs**

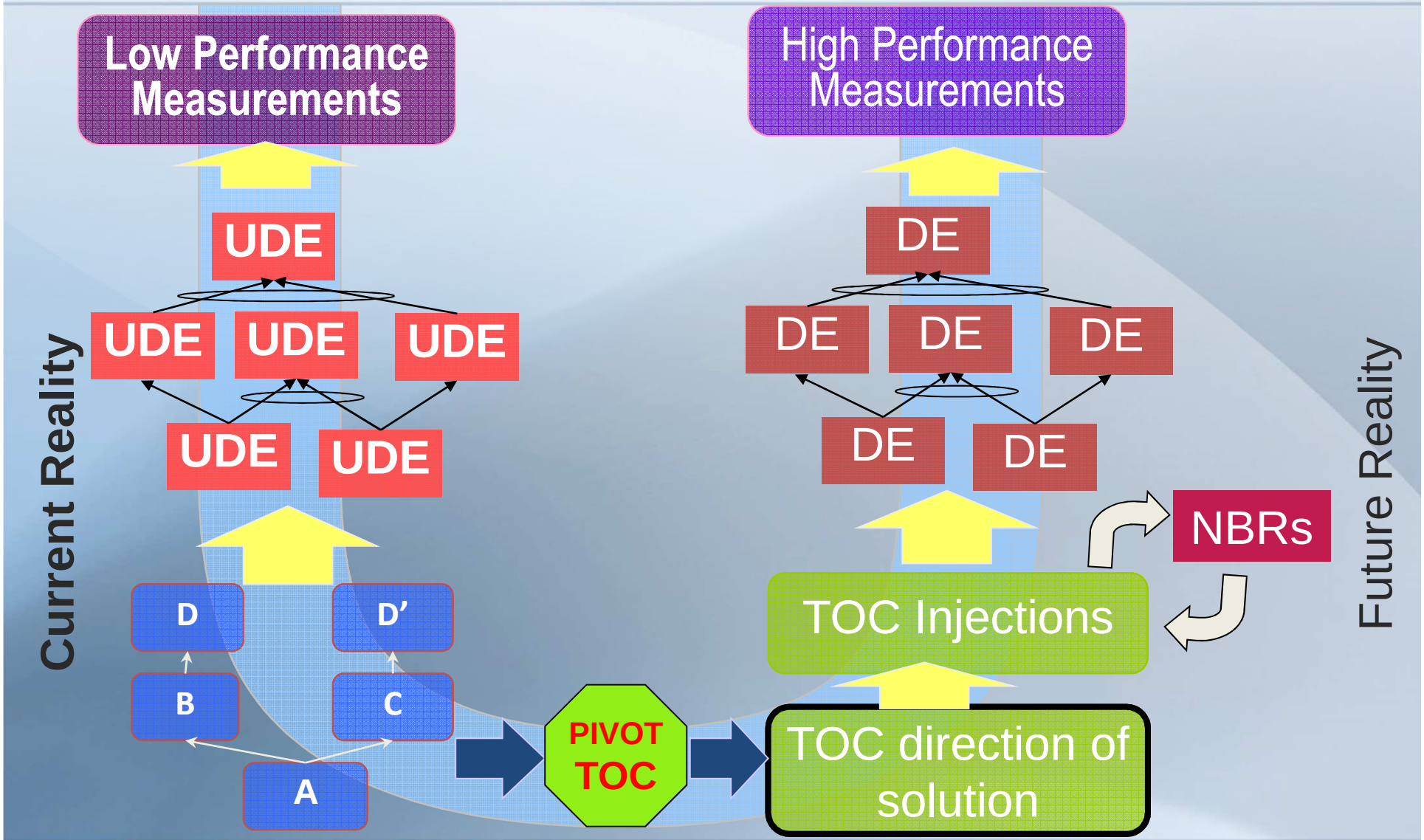


The Core Problem

The Core Problem has to do with the way production is planned and thereafter, the way dynamic decisions are done while WOs are in process

PPC – Production Planning & Control System allows flooding the shop floor with work and allows too much freedom in the execution phase.

TOC Direction of the Solution



The Direction of the Solution:

Use the TOC Pivot to Better Manage the Flow

Focus-Flow

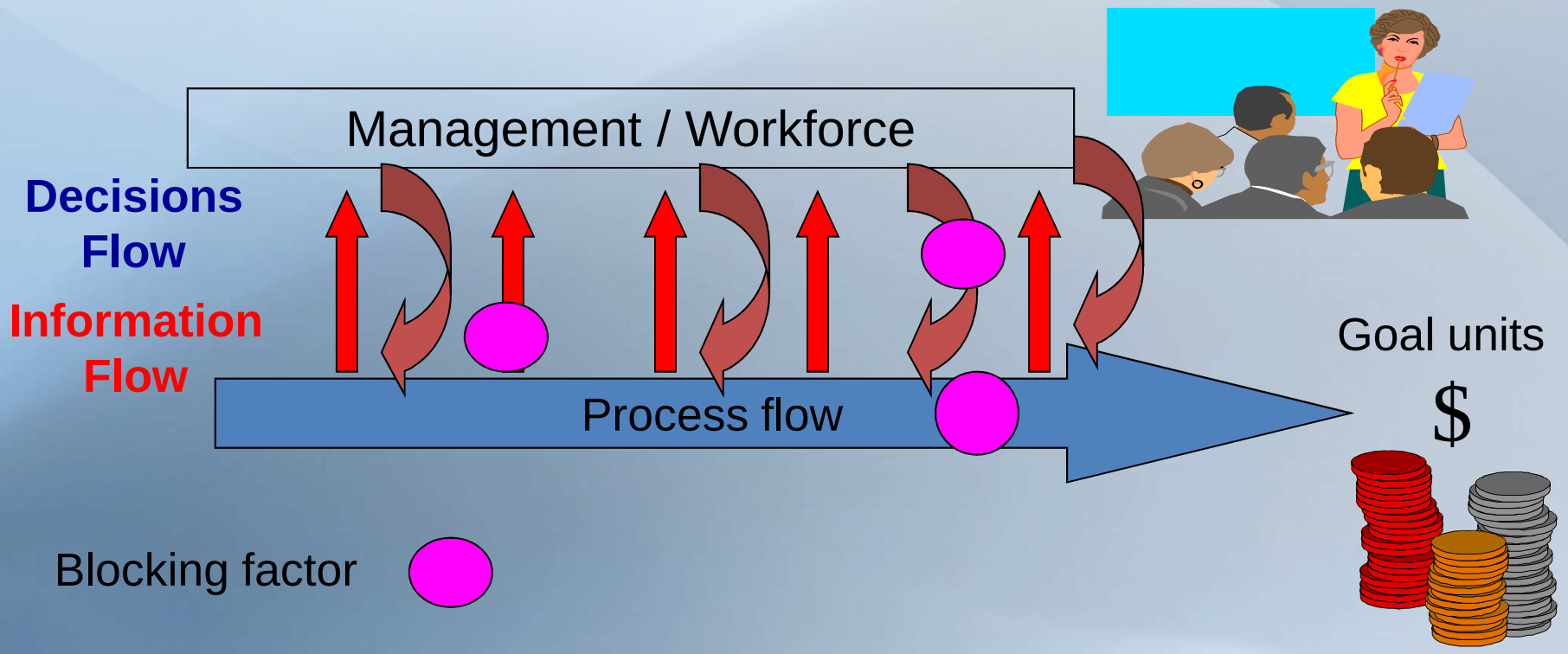
Managing the TOC Way
Using the TOC Pivot

- The Basic Assumptions
- The Flows within the system
- The Constraint
- Types of Constraints
- Managing through the Constraint
- The Five steps of Focusing

The Flows of a Commercial Business

PIVOT TOC

The Goal: To make money now and in the future

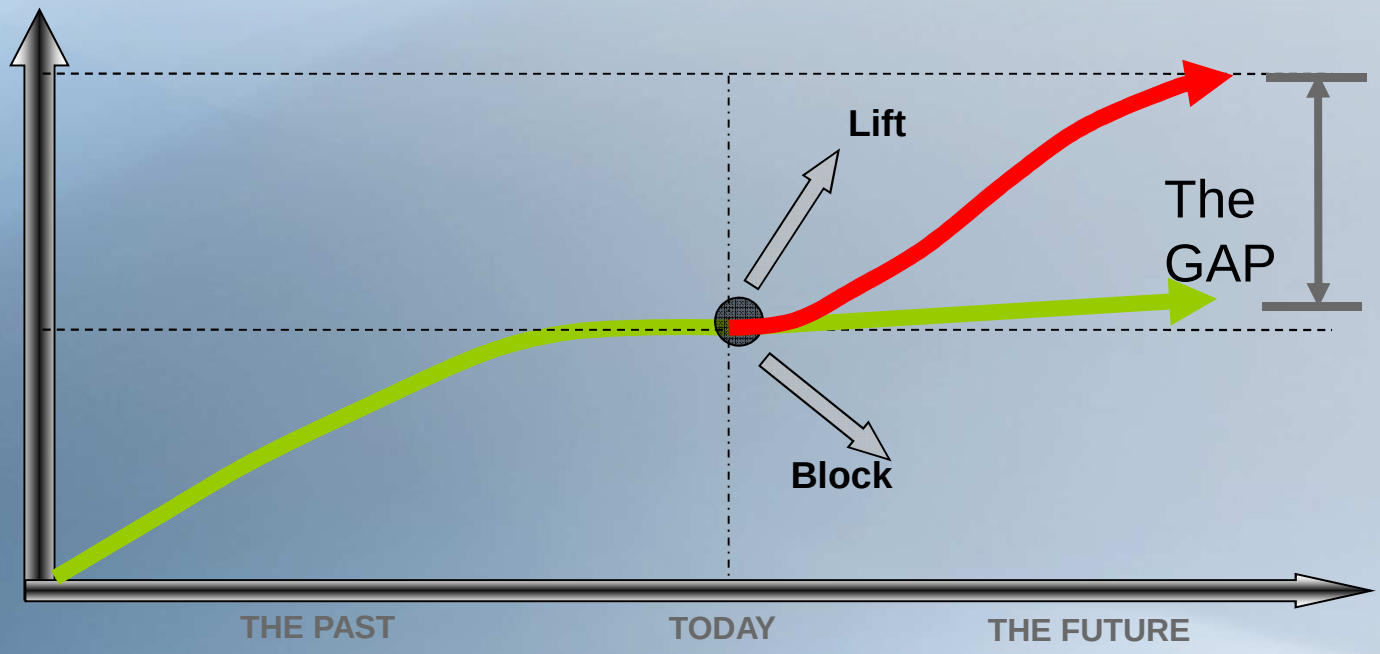


The Constraint

PIVOT TOC

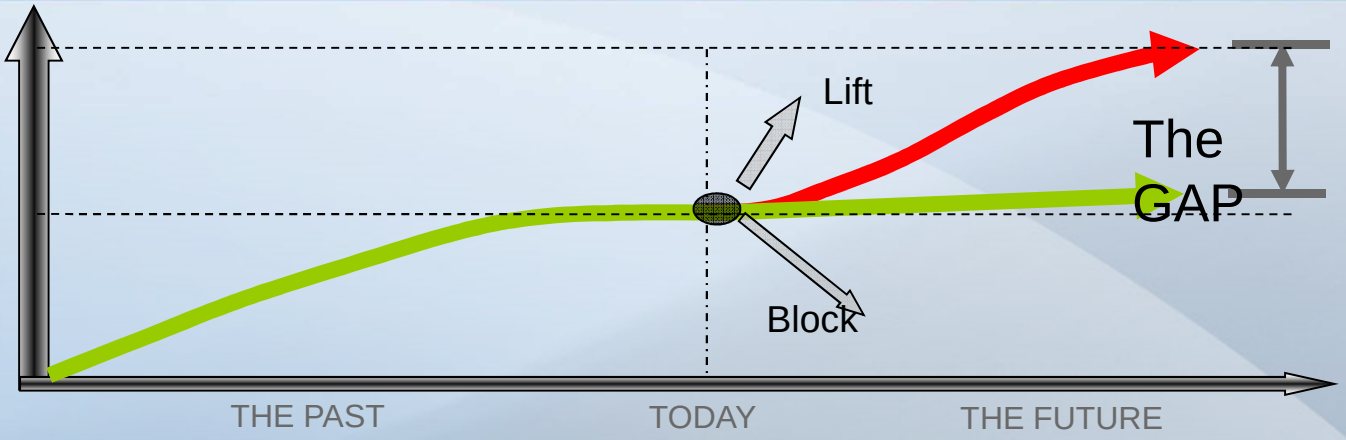
CONSTRAINTS –

factors or elements that determine how much the system can accomplish



The TOC Pivot
Managing Constraints

PIVOT TOC



What is the constraint of the Manufacturing Environment?

.

The Primary Constraint is the is the Market.

The Secondary Constraint is identified through:
"What does the market want and what factor of the production determines the level of customer satisfaction?"

The market wants RELIABILTY.

Managing Production Flow the TOC Way

- Flow is characterized as dependent activities coupled with statistical fluctuations
- The TOC Way for managing Flow is by using Buffers for Planning and Buffer Management for controlling and monitoring the Execution of the plans.
- A TOC Buffer – A mechanism to absorb statistical fluctuations as well as to provide management with early signals that the process is in danger of going out of control (and hence are under threat of not achieving the goal/purpose of the system).

Buffer Management

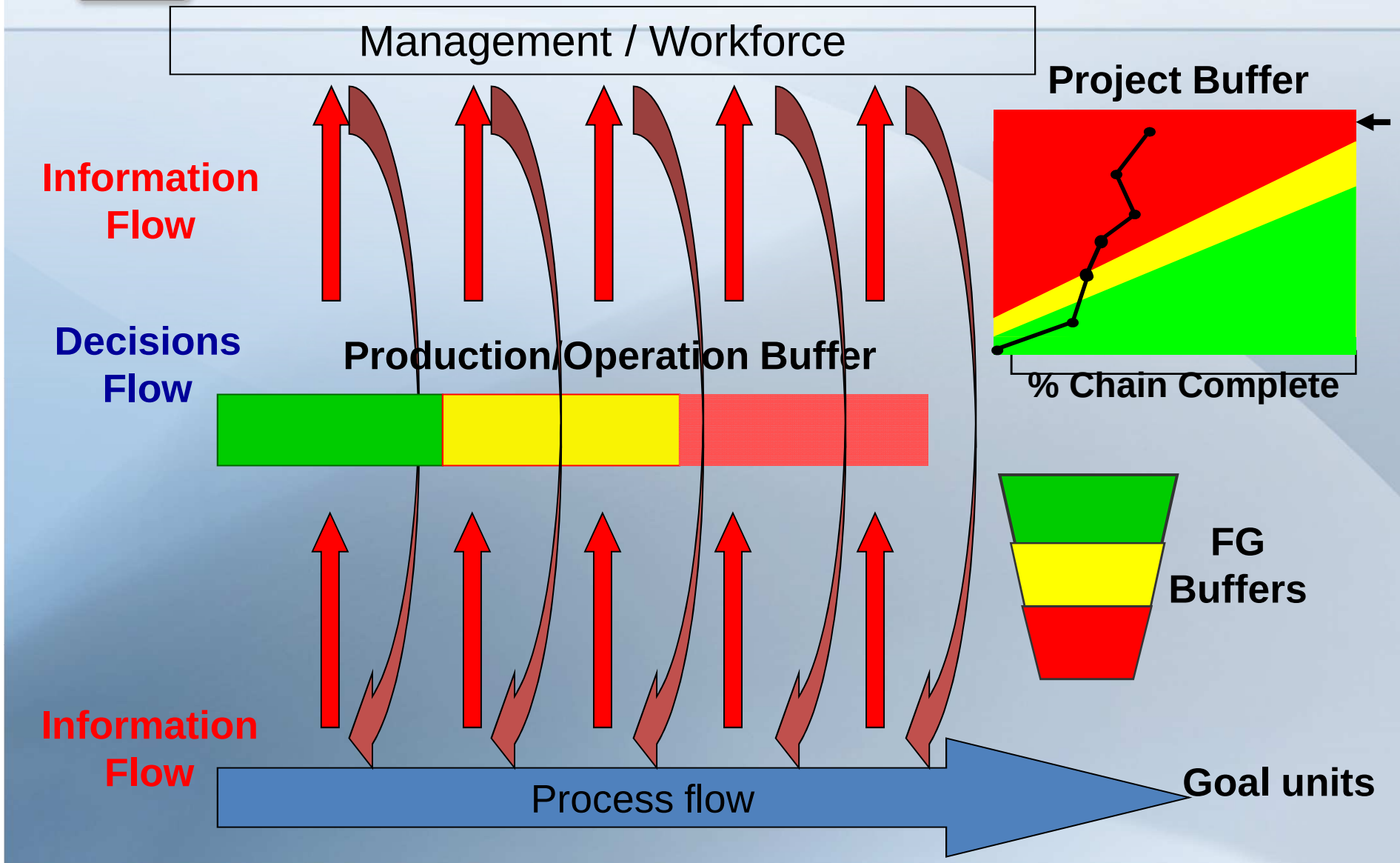
Buffer Management – a mechanism that informs management about the true status of the flow though the continues update of the buffer situation as compared with the plan.

Buffers are used during the execution are used for:

1. **Setting up the priorities for assigning resources to perform jobs**
2. **Prompting recovery actions to ensure enough buffers for the rest of the flow**
3. **Proper sizing of the buffers – through Dynamic Buffer Management or managing PLT – Production Lead Time**
4. **Identifying reoccurring problems in the flow and eliminate them**

Buffer management is always oriented to the future.

Managing the FLOW



Time Buffer

A Buffer that is measured in units of time (hour/days etc.)

The Buffer prescribes the amount of time that is given to management to be used during the execution phase.

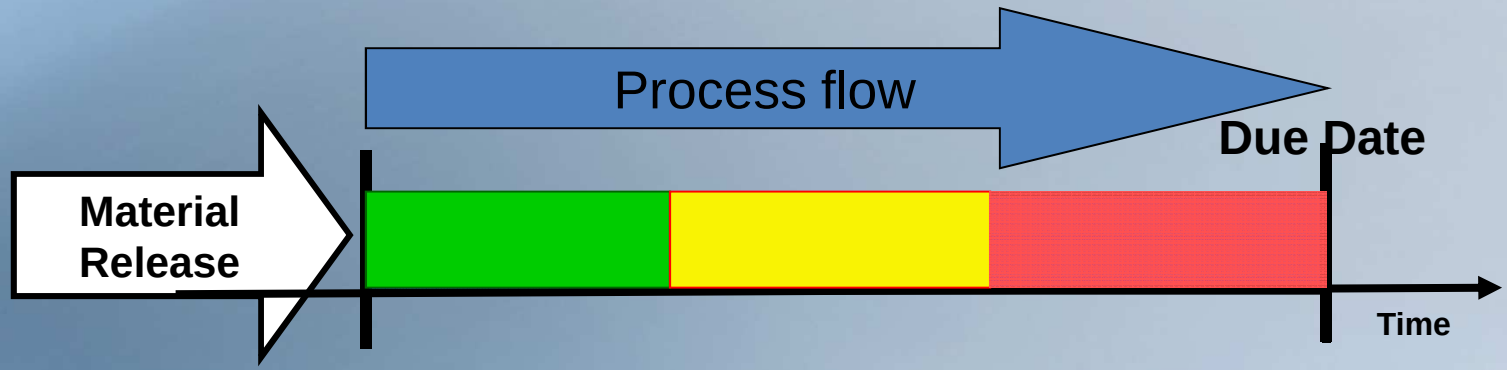
The Purpose of the buffer is to protect the delivery date that has been promised by the system.

Time Buffer is continuously monitored to ensure that is not completely depleted before reaching to the end-line.

Time Buffer – For Production

Production / Operation Buffer
Used in S-DBR for MTO

It is the prescribed time that is given to production from the start producing what is needed for the customer's order (which is also known as the point of "Material Release") until it is ready to be sent to the customer.



Usually, this time buffer is split into 3 equal time zones that are colored accordingly

Stock Buffer for Replenishment Systems

A Buffer that it measured in stock keeping units (SKU) - Pieces, kilograms (for weight), meters (length), liters etc.

The Buffer is the TOTAL amount of stock in the system that is planned for a specific SKU (in a specific location).

The TOC replenishment operates as a “closed loop” system.

The Buffer contains three types of inventory:
On-Hand On The Way To Be Ordered

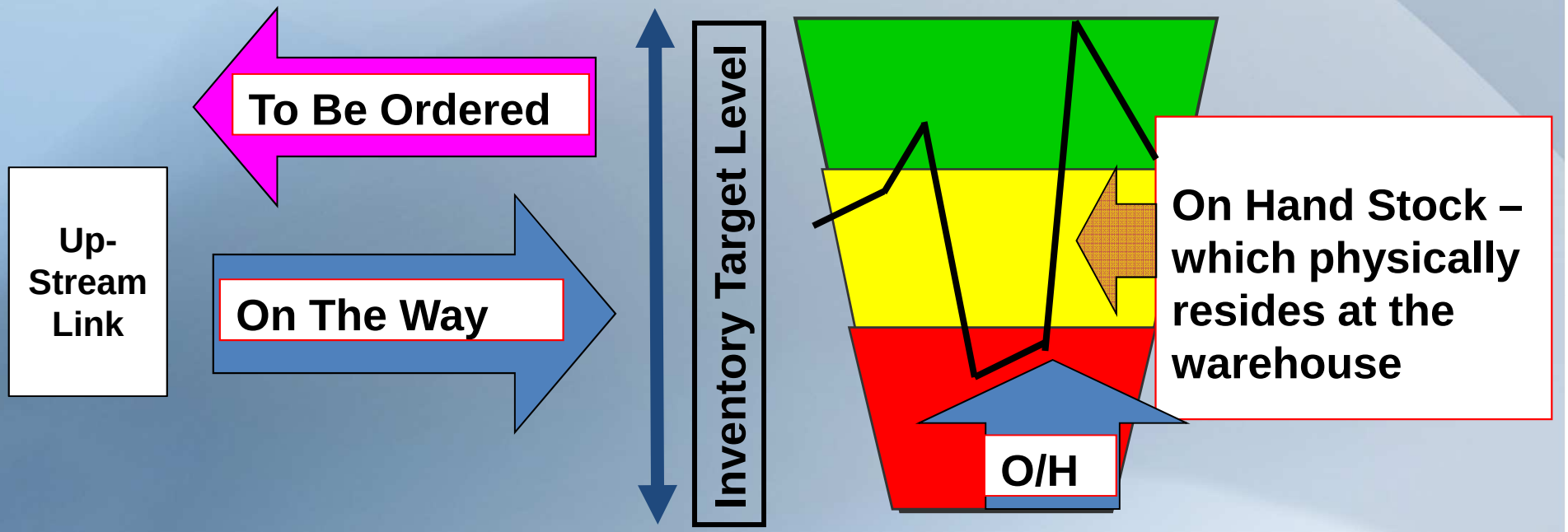
The amount of stock is called:
Buffer Size, or
Inventory Target Level

Buffer Size = On-Hand + On The Way + To Be Ordered

Stock Buffer for Replenishment Systems

Stock Buffers are used in:
MTA – Make to Availability
DTA – Distribute to Availability (Distribution, Retail etc.)
PTA – Purchase to Availability

Buffer Size = On-Hand + On The Way + To Be Ordered



Planning – The TOC Way

Planning the TOC Way – is the mechanism for management to exploit the system's strategic constraint(s).

- **The Strategic Constraint of every system is the Market – the amount of customers' orders.**
- **Therefore, the plans of the logistical systems are geared to give the existing customers outstanding service.**
- **This can be achieved by putting a proper plan (and thereafter, make it happen).**

Planning – The TOC Way (cont.)

High level of service for the different types of systems is achieved through:

- **For MTO Production (S-DBR) – by ensuring high on time deliveries while having competitive quoted lead times (QLT).**
- **For MTA Production – by ensuring high level of availability coupled with no excess inventory.**
- **For DTA (Replenishment) – the same as MTA.**
- **Project Management – On time delivery of projects while continuously reducing projects lead time.**

Buffers For Planning

Building a plan – demands management to make decisions and commitments at the time of planning (present) that will realize in the future.

Planning is going into the unknown.

The future – after the planning has been completed is full of surprises and unexpected situations!

This presents a challenge to the planning.

TOC provides a major tool for the planning through the Buffers.

Buffers For Planning
(cont.)

The Role of Buffers for planning:

- **MTO Production (S-DBR) – Production Buffer provides the timing of the release of the WOs and the plan for the needed materials.**

  In case of CCR the Production buffer helps to suggest reliable delivery time of a new customer's order.

- **For MTA Production and DTA – the Target Stock (the Buffer) provides the base for planning how much inventory should be in the system.**

Planning is simple!

Buffers For Execution Control

The TOC Buffers coupled with Buffer Management provide management with visual and measureable mechanism for controlling the execution of the plans.

Control - is execution as per the plan or it slips away from the plan. These signals are provided by the Buffer Status with assigned colors.

- Green – the situation is OK - according to plan
- Yellow – warning - there is a potential risk of slipping away form the plan
- Red – a strong possibility that the deviation from the plan will lead to not achieving the objectives of the plan. Management is expected to take actions to recover of the buffers.
- Black – the plan has not been fulfilled.
- Light Blue - the plan is not followed (earlier release or over stocking).

The general structure of a TOC Solutions for Managing Production/Operations

The General Structure of TOC Solutions for Reliability

Tactics: Production and Material Management are on the TOC Logistical systems

The General Flow of the TOC Solution

1. Agree on the objective of the system – Competitive Reliability
2. Establish the two leading measurements
3. Establish the relevant buffers
4. Release work to production based on the buffers
5. Prioritize the assignment of work to resources based on Buffer Status
6. Monitor Buffer Status (frequently) and take recovery actions when necessary (in Red and in Black)
7. Ensure availability of RM and components
8. Use BM Statistics for POOGI
9. Manage CCR when necessary
10. Resize batch quantities when necessary

The TOC Solution is based on Buffers

1. Agree on the objective of the system – Competitive Reliability
2. Establish the two leading measurements
3. Establish the relevant buffers
4. Release work to production based on the buffers
5. Prioritize the assignment of work to resources based on Buffer Status
6. Monitor Buffer Status (frequently) and take recovery actions when necessary (in Red and in Black)
7. Ensure availability of RM and components – using Buffers
8. Use Buffer Management Statistics for POOGI
9. Manage CCR when necessary
10. Resize batch quantities when necessary – revealed by BM

The Financial side of the Logistical Buffers

Buffers are built for protection.

- Protecting performance and ensuring high level of service and customer satisfaction.
- Guiding POOGI - for continuous improvement

Protection, like insurance policy – costs money.

Hence there is a need to:

- Assess the amount of money needed in order to set up the buffers and include this money in the budget.
- Continuously watch the buffers, the use of the buffers and the use of money for taking recovery actions.
- Ensure that the buffers are of the right size and adjust them to the unfolding reality. For Stock Buffers there is the DBM and for Time Buffers we can use the reports on LoS – Length of Stay.

The Financial side of the logistical Buffers In the Planning Phase

Time Buffers used in the planning determine the projected financial performance of the system.

They determine:

- The timing of realizing the throughput
- The length of time of the investment in the TVC – purchasing materials, components and direct services for the deliverables.
- The time delay until the throughput generated contributes to cover the Operating Expenses of the system.

Conclusion – the time buffers can provide the base for projecting system profit and cash flow.

The Financial side of the logistical Buffers In the Planning Phase

Stock Buffers – determine the level of availability.

The target levels – the size of the buffers – determine the level of investment that is captured in the planned inventory.

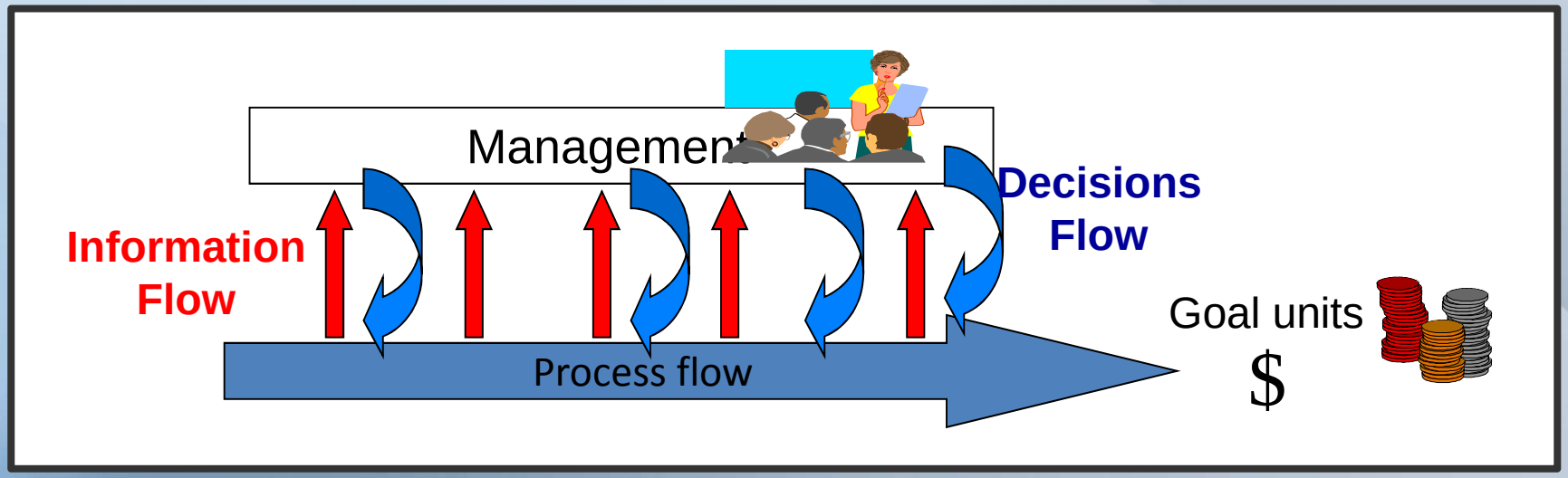
It is a commitment to produce or purchase the entire quantity that is planned for the replenishment system.

The timing of the throughput is not certain as the market is not committed to buy even if the goods are available.

Therefore, the planning is geared toward having a higher level of Inventory Turns to support higher level of ROI.

The Financial side of the logistical Buffers In the Execution Phase

During the Execution Phase management gets continuous signals about the FLOW. The majority of the information is supplied by the Buffers!



When the Buffers Status is Red or Black, management must take Corrective Actions.

But in many cases these actions need funding.

For that they need the Money Buffers.

Money Buffers for MTO

MTO has a Production Buffer - it is a Time Buffer to give early warning to management to ensure that the Work Order is not blocked and to take actions that are not that expensive to complete the order on time.

Yet – MTO-Injection 4 demands from management to take recovery actions. In most cases these actions increase OE and in some cases reduce Throughput (like by purchasing more expensive RM or components).

To ensure quick reaction for MTO-Injection 4 – we suggest giving Production Management a Money Buffer. This is an amount of money that is allocated to production and allows them to finance the recovery actions.

MTO-Injection 4 has a forum (such as the daily production meetings) for making decisions for the recovery actions. When a resolution for recovery action is made – the amount of expense it needs is withdrawn from the money buffer.

The amount of money in the money buffer should be sufficient to cover a pre-determined period (month, quarter or a year).

Money Buffers for MTO

Determining the size of the Money Buffer for MTO

Many companies have statistics of deviations from standard. These statistics present the amount of money that was paid out as compared to the set budget.

Usually, the deviation is negative – which means that the amount that was spent was larger than the amount that was budgeted.

We suggest to set an initial value of the Money Buffer to be:

50% of the typical Negative Deviation per the period the Money Buffer is set for.

Once the money buffer is set – it is subject to buffer management with the three zones G-Y-R – as if it was a Stock Buffer (of money).

Buffer Recovery:

- Any positive variation should be credited back to the money buffer.
- If the money buffer goes to red – the issue must be escalated to higher management for consideration of "Topping up" the buffer with one-off sums.

Money Buffers for Stock Buffers MTA/MTIA/DTA

MTA/DTA have Stock Buffers measured in number of units. Not in money!

Production Management is committed – through MTA-Injection 1 – to availability with no excess stock.

MTA-Injection 2 determines the level of stock in the system. As such it determines the amount of money that is attached to the system.

Having the stock buffers helps to determine the budget for the system.

Note: Raw materials, components etc. that are bought to be stocked for production and are replenished to availability are managed the same way as PTA - Purchase to Availability.

Money Buffers for Stock Buffers MTA/MTIA/DTA

Reality is bound to be different from what is planned.

We can expect two types of variations:

1. DBM – Dynamic Buffer Management may call for increase in the buffer size. This will demand additional expenditure for producing the extra volume (RM, and additional OE). This can be offset by the reduction in another SKU stock buffer, but not fully.
2. MTA-Injection 4 – instructs management to take recovery actions. These actions may demand extra money.

One common money buffer that covers all stock buffers in the system will help to address and control these extra costs.

Money Buffers for Stock Buffers MTA/MTIA/DTA

Determining the size of the Money Buffer for MTA/DTA

The purpose of the money buffer is to finance the actions that need to take the on-hand stock level in the buffer out from the red zone before shortages happen.

In setting the buffer size, there is a need to consider two portions:

1. Money for MTA-Injection 4 – to finance recovery actions. This portion should be handled like the money buffer of MTO.
2. For DBM – there is a need to establish a buffer due to the mismatch between the plan and the unfolding reality. As MTA/DTA is a new feature – for the calculation of the initial size of money buffer there is no historical data to support the calculation of how much money should be put in the money buffer. [In the pre-implementation pilot it is expected that this subject is examined and directions are given for setting the size of the money buffer}