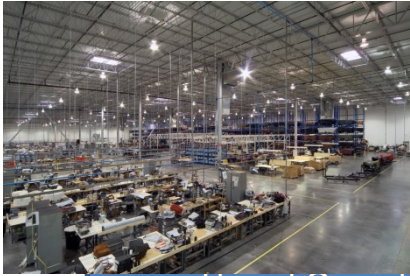


Operation Management (OM)

Introduction

Ing.J.Skorkovský, CSc,
Department of Corporate Economy
FACULTY OF ECONOMICS AND ADMINISTRATION
Masaryk University Brno
Czech Republic

What is going on ?

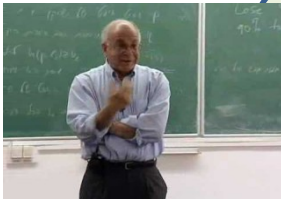
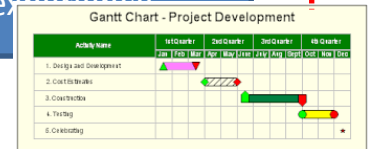


Use of Operations Management (OM) in external environment
(main target)



General knowledge of OM methods acquired at university and long-standing experiences

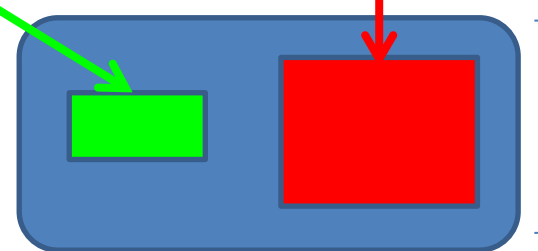
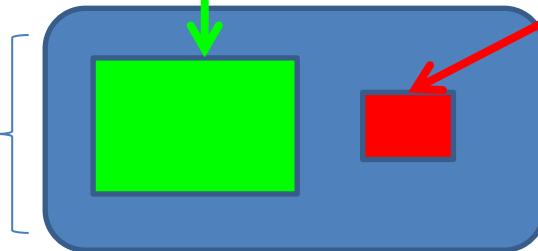
$$= \frac{\sum_{x_1} f_1(x_1) f_2(x_2, x_1)}{\sum_{x_1} f_1(x_1) \sum_{x_2} f_2(x_2, x_1)}$$



Knowledge of methods and experience from research and literature - **teachers**



Knowledge of methods and experience from outside world – **consultants, managers, ...**



Extent of knowledge

Extent of knowledge



Synergy and put OM into practice

OM all around us

OM is the management of all processes used to design, supply, produce, and deliver valuable goods and services to customers



IN

Processing-transformation

Out

TQM = Total Quality Management

ERP: Logistics, Transportation

MRP, JIT, APS, Lean Manufacturing, Little's law

ERP: Marketing, Selling, Invoicing, Payment,....

Some OM methods

- Theory of Constraints
- Balanced Scorecard
- Project Management methods (Critical Chain, SCRUM,...)
- Material Requirement Planning and Just-in-Time
- Advanced Planning and Scheduling
- Six Sigma – quality management
- Boston, SWOT and Magic Quadrant Matrices
- Little 's Law (relations between WIP, Throughput and Cycle time)
- Linear programming
- Yield Management
- Kepner-Tregoe (support of decision making)

Some tools

CRONUS International Ltd. - Microsoft Dynamics NAV Classic

File Edit View Tools Window Help

Financial Management

- General Ledger
 - Chart of Accounts
 - Budgets
 - General Journals
 - Analysis & Reporting
 - Intercompany Postings
 - Reports
 - History
 - Periodic Activities
 - Cash Management
 - Receivables
 - Payables
 - Fixed
 - Invent
 - Setup
- Sales & Marketing
- Purchase
- Warehouse
- Manufacturing
- Jobs
- Resource Planning
- Service
- Human Resources
- Administration
- Shortcuts

Chart of Accounts

No.	Name	Income/Balance	Account Type	Totaling	G... G... G...	Net Change	Balance
6620	Job Sales	Income Statement	Posting				
6695	Total Sales of Jobs	Income Statement	End-Total	6605..6695			
6710	Consulting Fees - Dom.	Income Statement	Posting		S.. N.. S..	-235 592,91	-235 592,91
6810	Fees and Charges Rec. - Dom.	Income Statement	Posting		S.. N.. M..	-961,03	-961,03
6910	Discount Granted	Income Statement	Posting			36 610,08	36 610,08
6950	Sales of Service Contracts	Income Statement	Begin-Total				
6955	Service Contract Sale	Income Statement	Posting		S.. N.. S..		
6959	Total Sale of Serv. Contracts	Income Statement	End-Total	6950..6959			
6995	Total Revenue	Income Statement	End-Total	6100..6995		-7 401 205,36	7 401 205,36
7100	Cost	Income Statement	Begin-Total				

6110 Sales, Retail - Dom. - General Ledger Entries

Posting Date	Document Type	Document No.	G/L Account No.	Description	Department Code	G... G... G... T... P... P... Amount	Bal. A... Bal. T... Account No.	Entry No.
15.01.12	Credit Memo	104001	6110	Credit Memo 104001	SALES	S.. N.. R... 246,60 G...		2590
16.01.12	Invoice							2771
17.01.12	Invoice							2617
17.01.12	Credit Memo							2622
18.01.12	Invoice							2762
20.01.12	Credit Memo							2656

103018 The Cannon Group PLC - Posted Sales Invoice

General Invoicing Shipping Foreign Trade BizTalk

No. 103018 Posting Date 18.01.12

Sell-to Customer No. 10000 Document Date 18.01.12

Sell-to Contact No. CT000001 Quote No.

Sell-to Customer Name The Cannon Group PLC Order No. 6005

Sell-to Address 192 Market Square Pre-Assigned No.

Sell-to Address 2 External Document No.

Sell-to Post Code/City B27 4KT Birmingham Salesperson Code PS

Sell-to Contact Mr. Andy Teal Responsibility Center BIRMINGHAM

No. Printed 0

T... No.	Description	Quantity	Unit of M...	Unit Price...	Line Amount E...	Line ...
I... 1964-W	INNSBRUCK Storage Unit/G.Door	10	PCS	292,00	2 920,00	
I... 70011	Glass Door	5	PCS	72,30	361,50	

Invoice Line Functions Print... Navigate Help

Nav... [Icons]

MS Dynamics NAV 2009

Some basic processes controlled by ERP –I.

80103-T 19" M009 Monitor - Items by Location

Options

Show Items in Transit . . .

Show Column Name . . .

No.	Description	BLUE	GREEN	RED	SILVER	WHITE	YELLOW
1908-S	LONDON Swivel Chair, blue	237	57	14	0	0	0
1920-S	ANTWERP Conference Table	31	65	10	0	7	0
1924-W	CHAMONIX Base Storage Unit	1	8	2	0	0	15
1928-S	AMSTERDAM Lamp	149	-19	55	0	0	97
1928-W	ST.MORITZ Storage Unit/Drawers	4	23	-1	0	0	41
1936-S	BERLIN Guest Chair, yellow	46	46	50	0	0	0
1952-W	OSLO Storage Unit/Shelf	9	-1	7	0	0	0
1960-S	ROME Guest Chair, green	145	0	24	0	0	0
1964-S	TOKYO Guest Chair, blue	58	60	29	0	0	0
1964-W	INNSBRUCK Storage Unit/G.Door	14	27	-2	0	0	8
1968-S	MEXICO Swivel Chair, black	233	14	17	0	0	0
1968-W	GRENOBLE Whiteboard, red	10	4	4	0	0	10
1972-S	MUNICH Swivel Chair, yellow	35	-1	-4	0	0	90
1972-W	SAPPORO Whiteboard, black	3	2	5	0	0	0
1976-W	INNSBRUCK Storage Unit/W.Door	3	-2	-3	0	0	3
1980-S	MOSCOW Swivel Chair, red	53	14	21	0	0	0
1984-W	SARAJEVO Whiteboard, blue	3	3	4	0	0	0
1988-S	SEOUL Guest Chair, red	41	83	0	0	0	43
1988-W	CALGARY Whiteboard, yellow	0	8	5	0	0	13
1992-W	ALBERTVILLE Whiteboard, green	6	5	-1	0	0	0
1996-S	ATLANTA Whiteboard, base	44	-1	22	0	0	116
2000-S	SYDNEY Swivel Chair, green	134	17	12	0	0	0
766BC-A	CONTOSO Conference System	0	0	0	0	0	0
766BC-B	CONTOSO Office System	3	0	1	0	0	1
766BC-C	CONTOSO Storage System	2	-1	1	0	0	0
80102-T	17" M780 Monitor	5	0	0	0	0	0
80103-T	19" M009 Monitor	0	0	0	0	0	0

Item Help

Used abbreviations : **EOQ** – Economic Order Quantity; **ROP** – Reorder Point; **MRP** –Material Requirement Planning; **COGS** – Cost of Good Sold

Some basic processes controlled by ERP –II.

CONTRIB - DEFAULT - Acc. Schedule Overview

General | Dimension Filters | Options

Account Schedule Name : CONTRIB Date Filter : 01.01.15..31.12.15
 Column Layout Name : DEFAULT Budget Filter :

Row No.	Description	Net Change Debit	Net Change Credit	Balance at Date Debit	Balance at Date Credit
	Contribution margin analysis				
RM	Raw Materials		13,44	577 719,32	
RC	Direct Cost Applied, Cap.		1 824,00		2 846,80
OVC	Overhead Applied, Cap.		380,00		491,10
R	Sales, Retail - Dom.		2 700,00		1 132 035,33
TC	Total direct costs		1 837,44	574 872,52	
▶ KP	Contribution margin	862,56		1 706 907,85	
AM	Margin	482,56		1 706 416,75	
AM%	Margin in %	68,05			50,78

1 7 31 3 12 Functions Help

Some basic processes controlled by ERP –III.

The screenshot shows a software window titled "1000 Bicycle - Production BOM". The "General" tab is active, displaying several input fields: "No." (1000), "Search Name" (BICYCLE), "Description" (Bicycle), "Unit of Measure Code" (PCS), "Status" (Certified), "Version Nos.", "Active Version.", and "Last Date Modified" (11.12.10). Below these fields is a table with columns: Type, No., Description, Quantity, Unit of Measure, Scrap, and Routing Li... The table lists components for a bicycle, with the first row (1100 Front Wheel) highlighted. At the bottom, there are buttons for "Prod. BOM", "Component", "Functions", and "Help".

Type	No.	Description	Quantity	Unit of Measure	Scrap	Routing Li...
Item	1100	Front Wheel	1	PCS	0	
Item	1200	Back Wheel	1	PCS	0	
Item	1300	Chain Assy	1	PCS	0	
Item	1400	Mudguard front	1	PCS	0	
Item	1450	Mudguard back	1	PCS	0	
Item	1500	Lamp	1	PCS	0	
Item	1600	Bell	1	PCS	0	
Item	1700	Brake	1	PCS	0	
Item	1800	Handlebars	1	PCS	0	
Item	1850	Saddle	1	PCS	0	
Item	1900	Frame	1	PCS	0	

Some basic processes controlled by ERP –IV.

OP100016 Assembling furniture - Opportunity Card

General

No. OP100016 Campaign No.

Description Assembling furniture Priority Normal

Contact No. CT000002 Sales Cycle Code EX-SMALL

Contact Name. Selangorian Ltd. Status Won

Contact Company Name. Selangorian Ltd. Closed

Salesperson Code PS Creation Date. 04.01.12

Sales Document Type Date Closed. 21.01.12

Sales Document No.

Active	Action Taken	Sales Cycle Stage	Date of Change	Estimated Close Date	Estimated Value (LCY)	Calcd. Current Value (LCY)	Completed %	Chances of Success %	Probability %
<input checked="" type="checkbox"/>	Won	0	21.01.12	21.01.12	5 500,00	5 500,00	100	100	100
<input type="checkbox"/>	Next	4	17.01.12	21.01.12	5 500,00	5 087,50	95	90	93
<input type="checkbox"/>	Next	3	12.01.12	21.01.12	5 500,00	3 987,50	80	65	73
<input type="checkbox"/>	Next	2	08.01.12	21.01.12	5 500,00	2 337,50	50	35	43
<input type="checkbox"/>		1	06.01.12	21.01.12	5 000,00	550,00	2	20	11
<input type="checkbox"/>									
<input type="checkbox"/>									
<input type="checkbox"/>									
<input type="checkbox"/>									
<input type="checkbox"/>									
<input type="checkbox"/>									

Opportunity Functions Create Oppo... Help

Some basic processes controlled by ERP –V.

2009 Deerfield Graphics Company - Sales Order

General Invoicing Shipping Foreign Trade E-Commerce Prepayment

No. 2009 [edit] Posting Date 18.01.12

Sell-to Customer No. 40000 [up] Order Date 18.01.12

Sell-to Contact No. CT000004 [up] Document Date 18.01.12

Sell-to Customer Name Deerfield Graphics Company Requested Delivery Date []

Sell-to Address 10 Deerfield Road Promised Delivery Date []

Sell-to Address 2 [] Quote No. []

Sell-to Post Code/City GL1 9HM [up] Gloucester [up] External Document No. []

Sell-to Contact Mr. Kevin Wright Salesperson Code PS [up]

No. of Archived Versions. [0] Campaign No. [up]

Opportunity No. [up]

Responsibility Center [up]

Assigned User ID [up]

Status Released

Type	No.	Description	Location Code	Quantity	Reserved Quantity	Unit of Measu...	S... P...	Unit Price Excl. VAT	Line Amount Excl. VAT	Line Disco...	Appl.-to Item Entry
Item	LS-10PC	Loudspeakers, White for PC	WHITE	12		BOX		59,00	708,00		
Item	LS-150	Loudspeaker, Cherry, 150W	WHITE	8		PCS		129,00	1 032,00		

Customer Information

Sell-to Customer [edit]

- Ship-to Addresses (0)
- Contacts (1)
- Sales History

Bill-to Customer

- Avail. Credit 0

Item Information

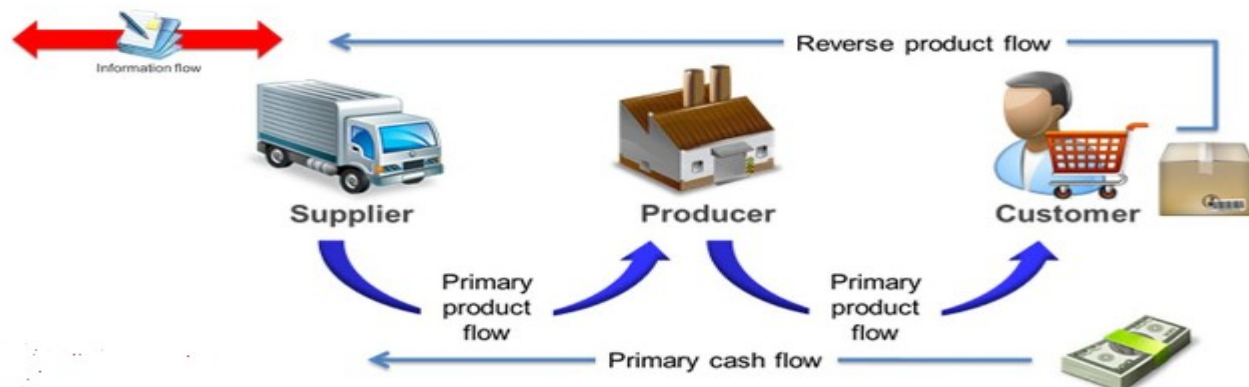
- Item Card [edit]
- Availability (-46)
- Substitutions (0)
- Sales Prices (0)
- Sales Line Di... (0)

Order Line Functions Posting Print Help

Used abbreviations : ATP|CTP– Available to Promise | Capable to Promise

Controlling processes in Supply Chain Management (SCM)

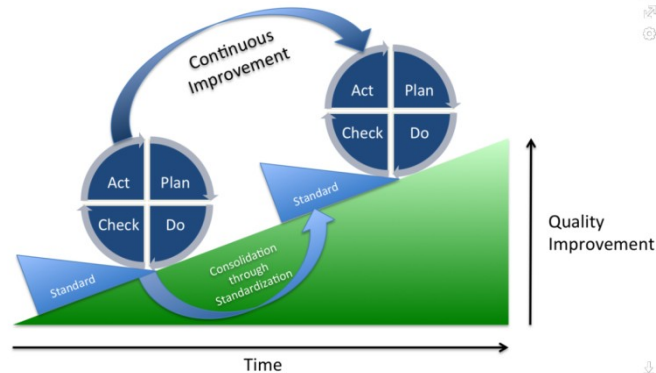
		Supply	Production	Orders	
Planning levels	Strategic	← Operation Strategies and Innovations , R&D →			Demand Planning
	Tactical	Forecasts, Blank Orders	Long term planning	Marketing	
	Operational	Logistic operations	Routing control, TQM	Packaging , Transportation	
	Operational	MRP, Replenishment	MRP_II ; JIT, Capacities	Cash flow	



Used abbreviations : R&D –Research and Development; TQM-Total Quality Management; JIT- Just –In-Time; MRP_II-Manufacturing and Resource Planning

Used abbreviations (slide number 3) : ERP - Enterprise Resource Planning ; APS – Advanced Planning and Scheduling

Deming cycle (based on periodicity)



Plan: Define the problem to be addressed, collect relevant data, and ascertain the **problem's root cause** (e.g. by use of TOC)

Do: Develop and implement a solution; decide upon a measurement to gauge its effectiveness.

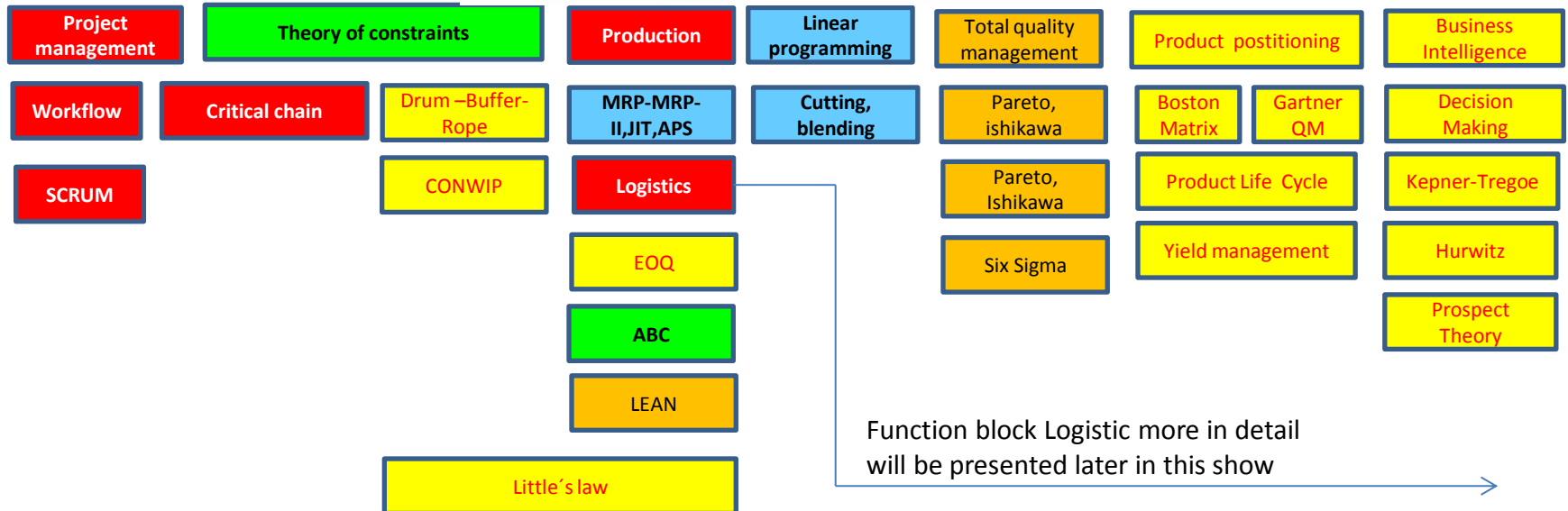
Check: Confirm the results through before-and-after data comparison.

Act: Document the results, inform others about process changes, and make recommendations for the problem to be addressed in the next PDCA cycle.

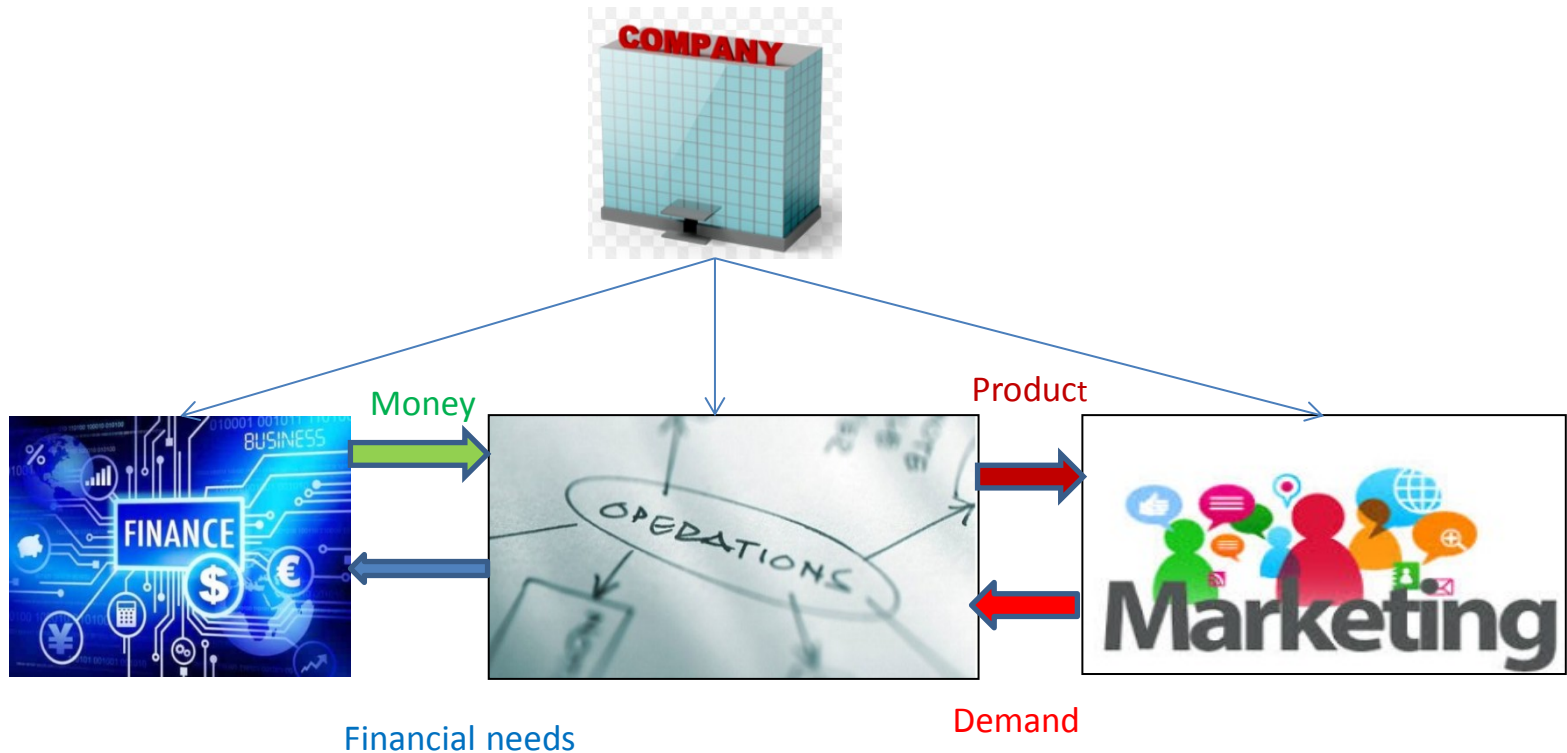
Another point of view



This will be modified in following **South African** project show (use of Balanced Score Card)

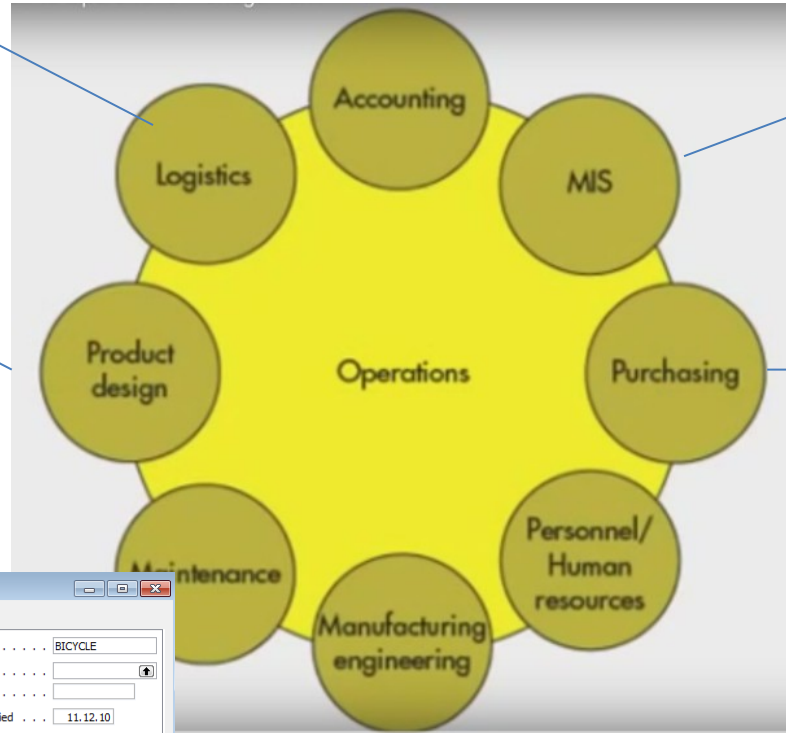


Another point of view



Operations

See next slide



Manufacturing

- Product Design
 - Items
 - Production BOM
 - Routings
 - Families
 - Exchange Production BOM Item
 - Delete Expired Components
 - Calculate Low-Level Code
- Reports
- Capacities
- Planning
- Execution
- Costing

1000 Bicycle - Production BOM

General

No. 1000 Search Name BICYCLE

Description Bicycle Version No.

Unit of Measure Code PCS Active Version

Status Certified Last Date Modified 11.12.10

Type	No.	Description	Quantity	Unit of Measu...	Scrap...	Routing Li...
Item	1000	Front Wheel	1	PCS	0	
Item	1200	Back Wheel	1	PCS	0	
Item	1300	Chain Assy	1	PCS	0	
Item	1400	Mudguard front	1	PCS	0	
Item	1450	Mudguard back	1	PCS	0	
Item	1500	Lamp	1	PCS	0	
Item	1600	Bell	1	PCS	0	
Item	1700	Brake	1	PCS	0	
Item	1800	Handlebars	1	PCS	0	
Item	1850	Saddle	1	PCS	0	
Item	1900	Frame	1	PCS	0	

Prod. BOM Component Functions Help

Bill of material

Microsoft Dynamics NAV 2009 R2

Version W1 6.0 R2 (6.00.32012)

Copyright (C) 2010 Microsoft. All rights reserved.

This product is licensed to:
4805500
NAVERTICA a.s.
Sumavska 15

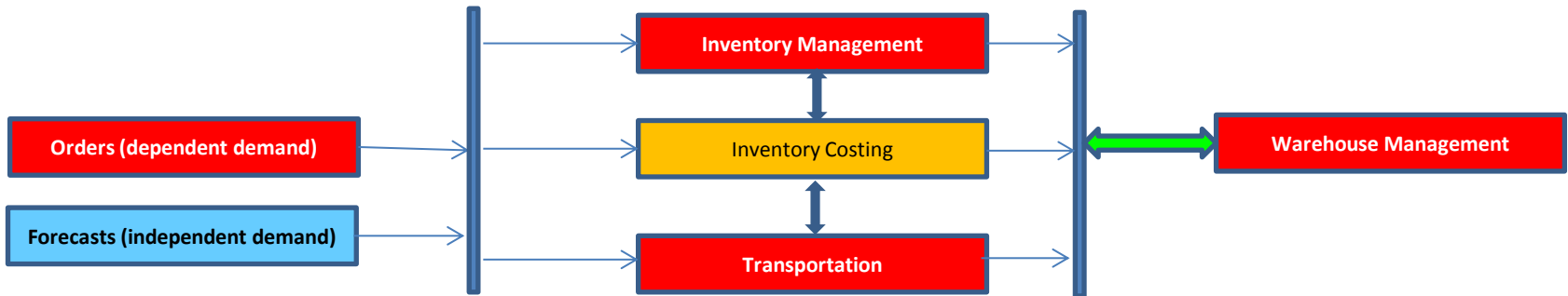
Brno 602 00

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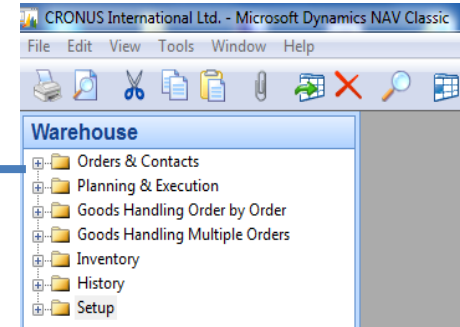
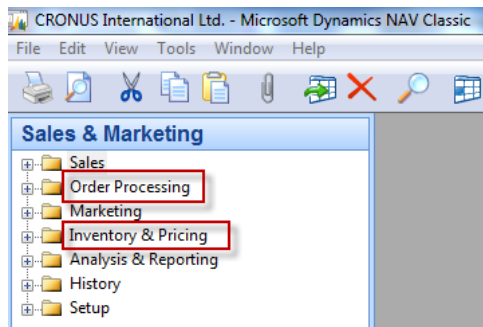
Purchase

- Planning
 - Items
 - Vendors
 - Requisition Worksheets
 - Recurring Req. Worksheet
 - Order Planning
 - Production Forecasts
 - Purchase Orders
 - Sales Orders
 - Blanket Sales Orders
 - Planned Production Orders
 - Firm Planned Prod. Orders
 - Transfer Orders
- Reports
- Documents
- Setup
- Order Processing
- Inventory & Costing
- Analysis & Reporting
- History
- Setup

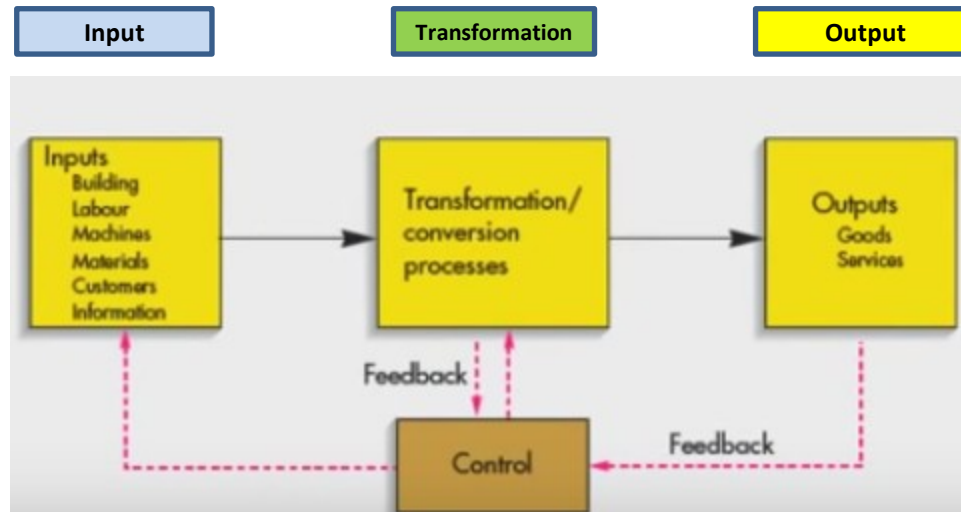
Function block Logistic-simplified



Will be part of our course regarding ERP system MS Dynamics NAV



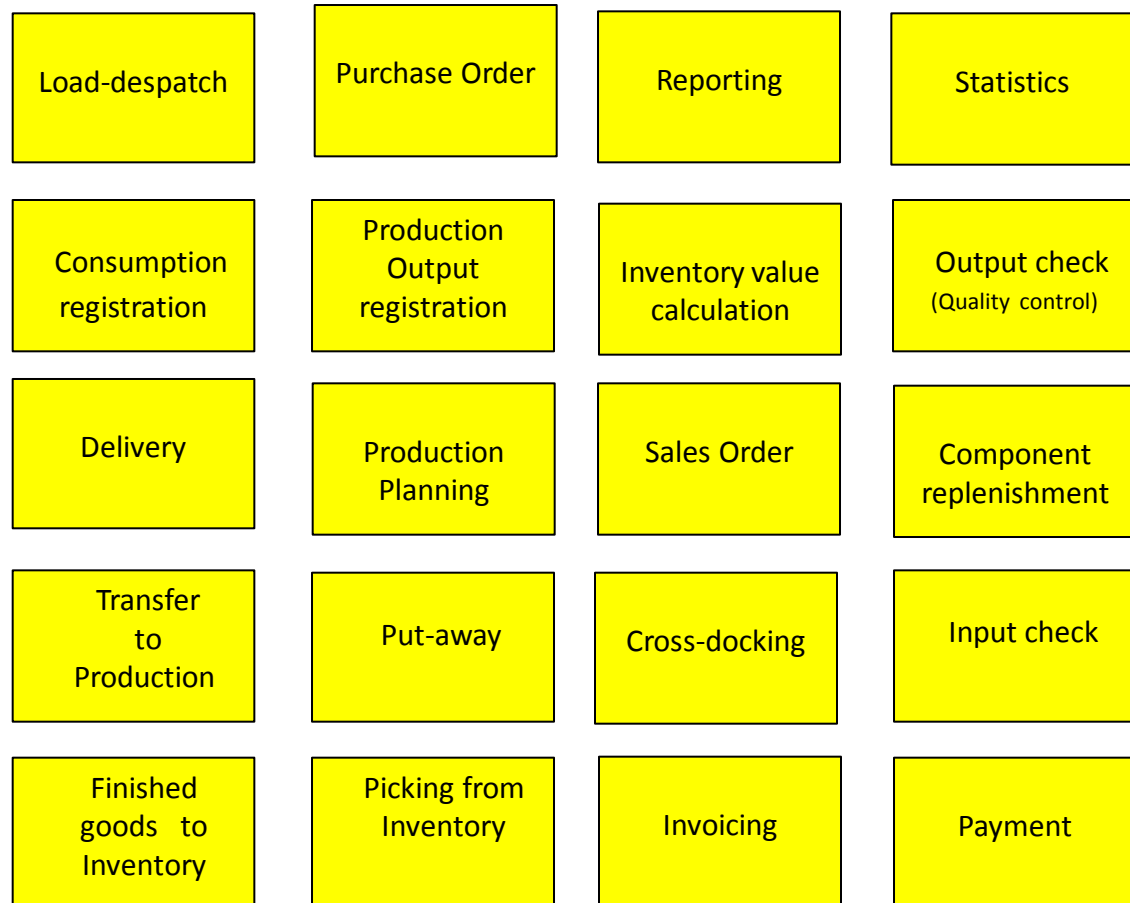
Procedures-simplified



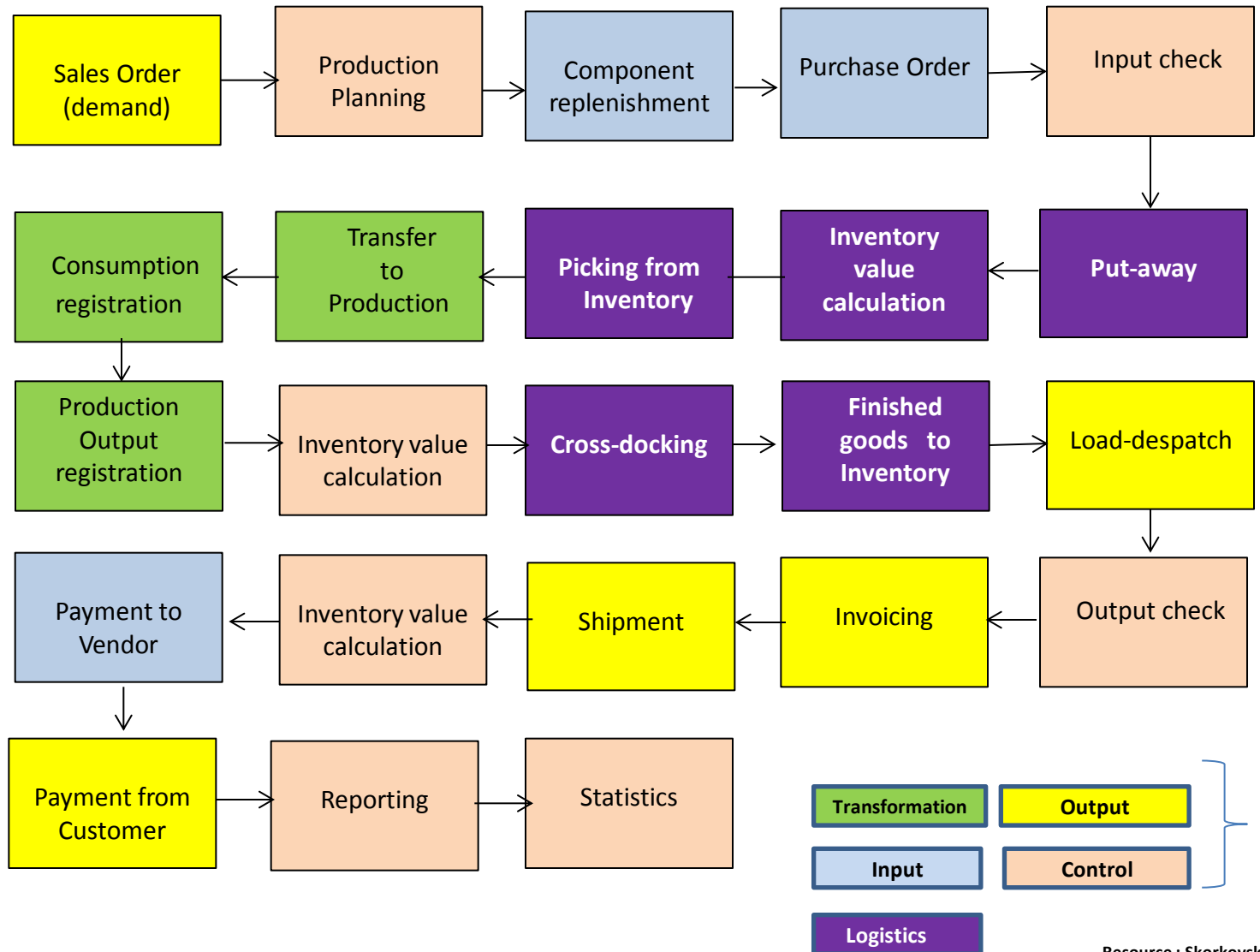
} Color agenda used later

Processing

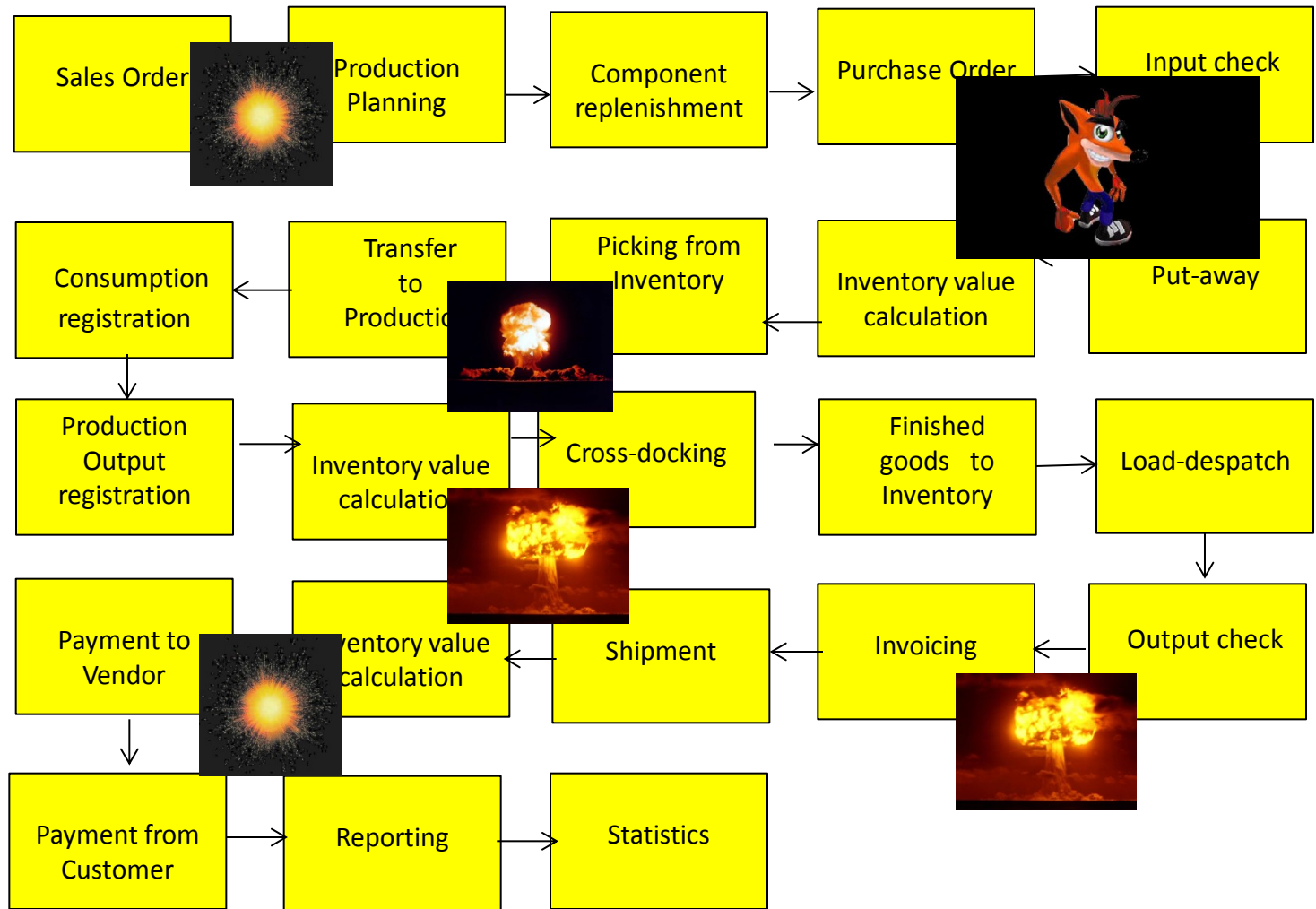
(not organised set of processes, will be presented also as a introduction to project management PWP presentation later)



Your main task (to organize processes based on business logic)



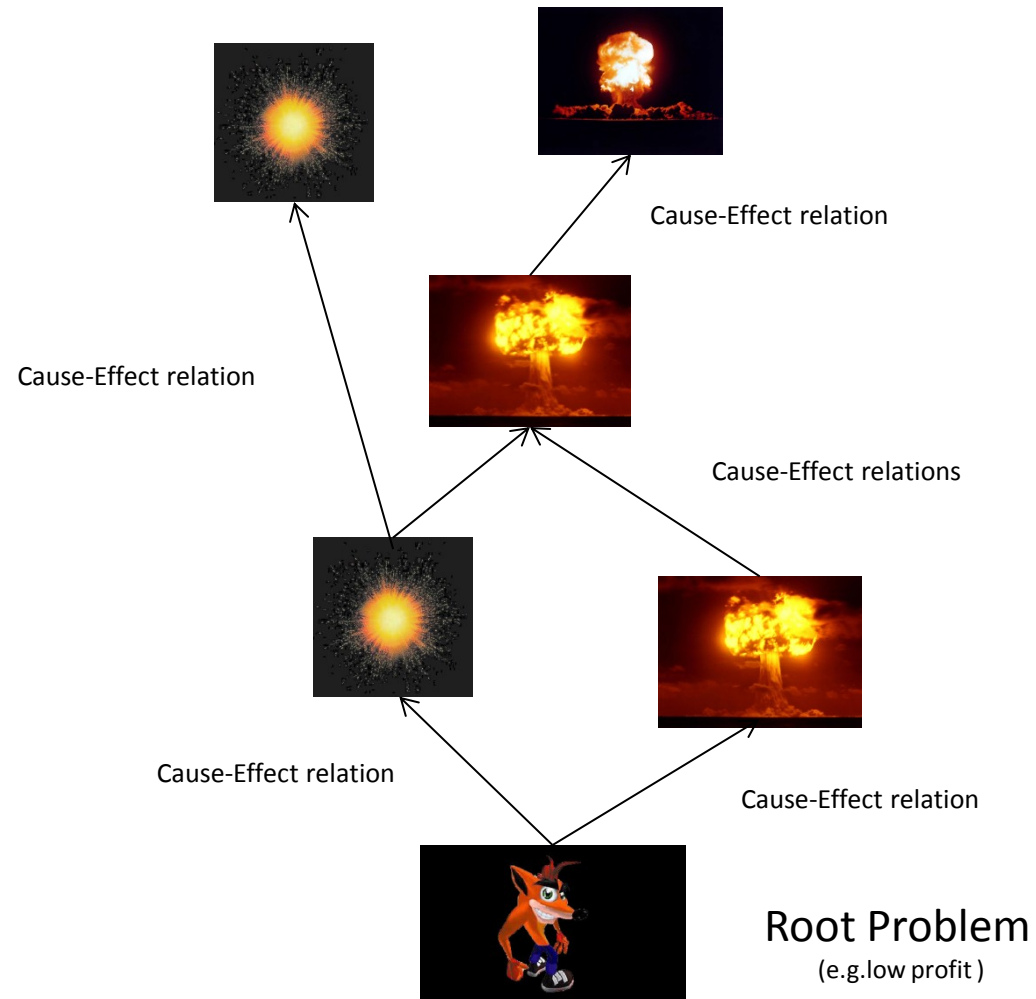
Your main task (possible problems, bottlenecks, undesirable effects..)



Application of TOC ->thinking tools->Current Reality Tree – first stage

Your main task

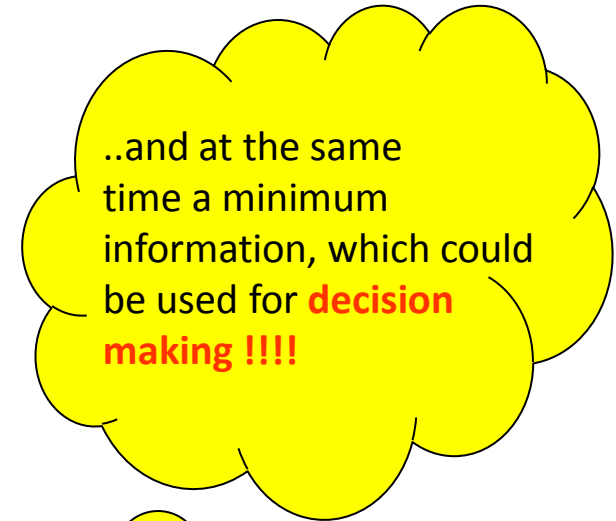
(Search - **HOW** ??? Measure impacts -**HOW** ??? and Destroy - **HOW** ???)



Basic problem I. (one of many)

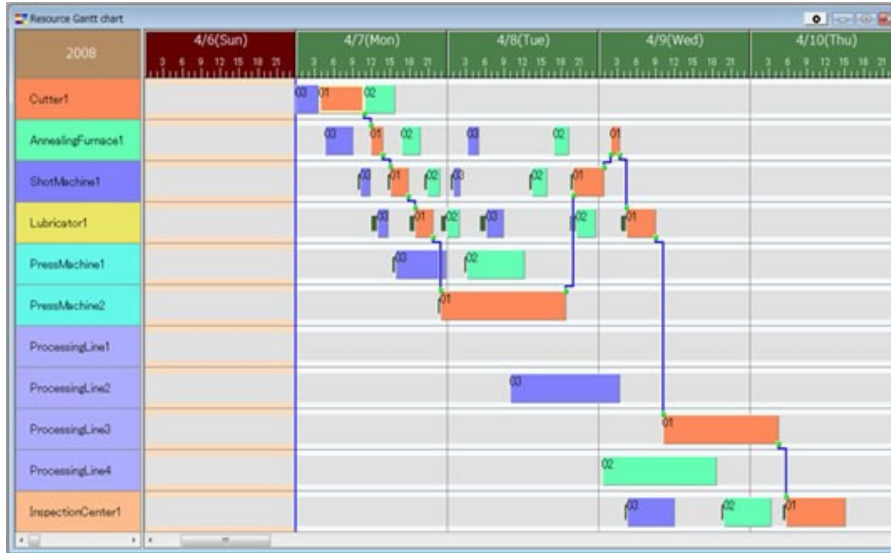
We cannot solve our problems with the same level of thinking that created them !

Statement by Albert Einstein)



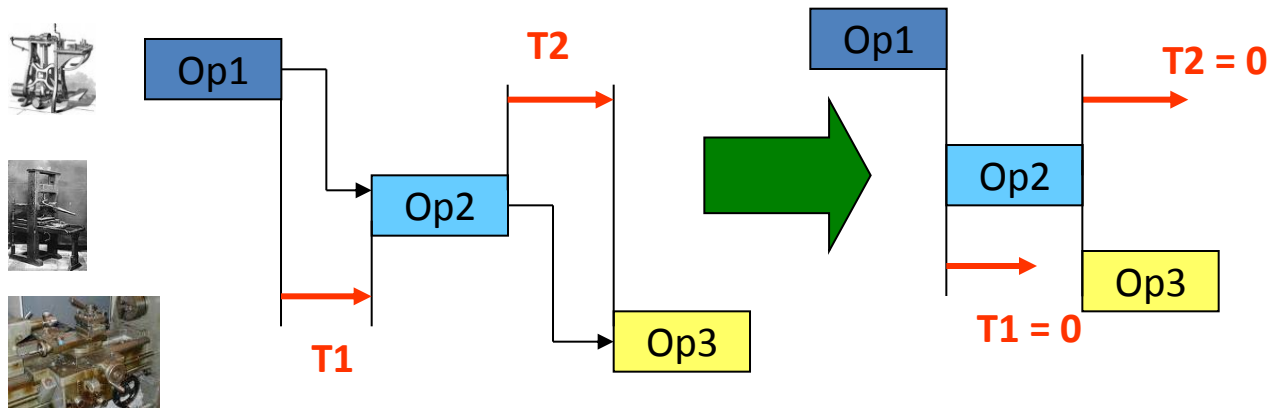
* Basic problem II. (we need reliable data)

To solve it we should use finite capacity scheduling (APS)- will be presented later

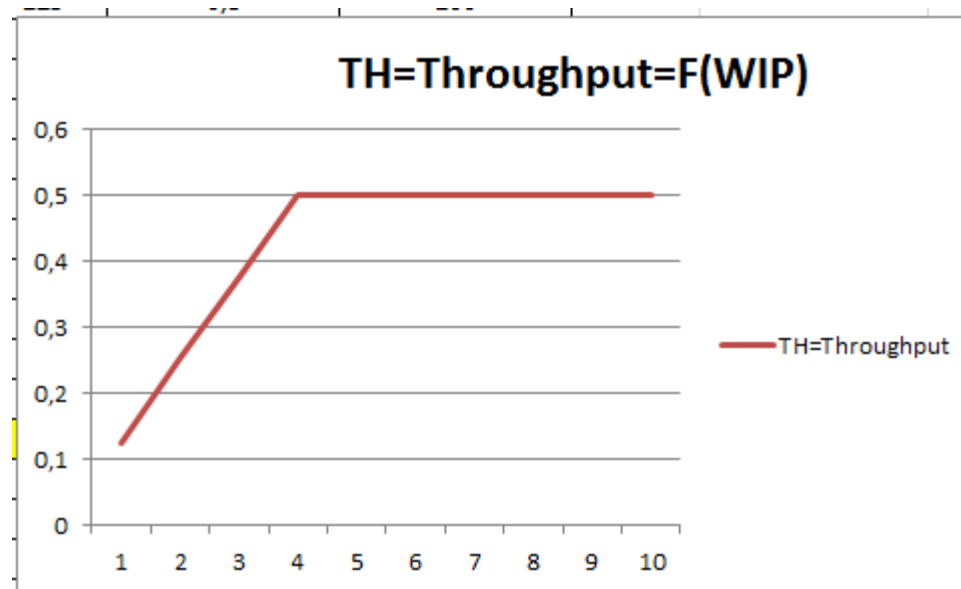


$$T1+T2=X$$

$$Opt=Min(X)$$



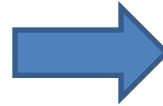
Basic problem III.



Will be explained in Little's law presentation

Basic problem IV.

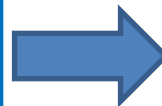
Black



White



White



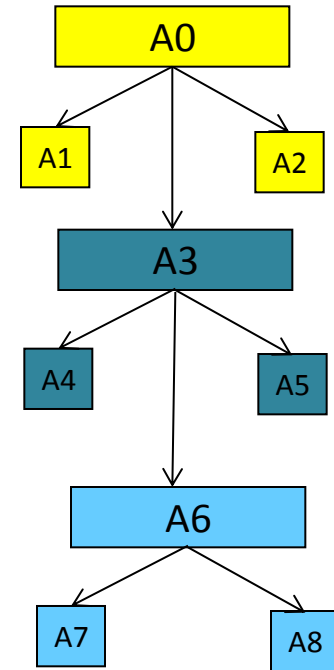
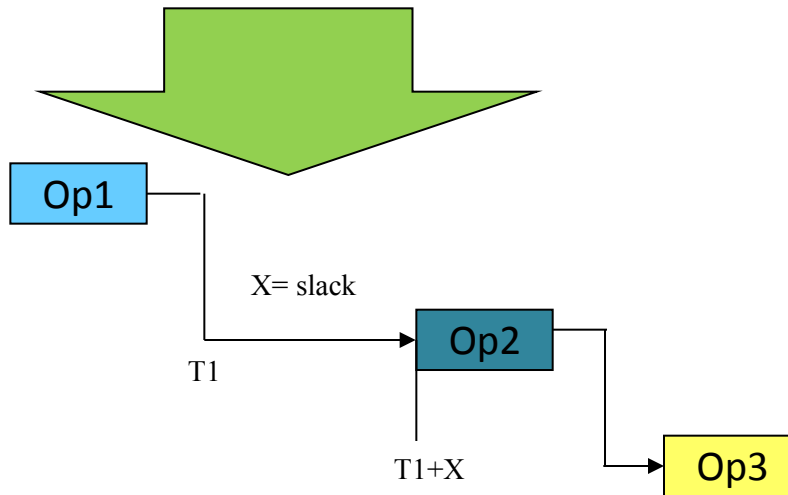
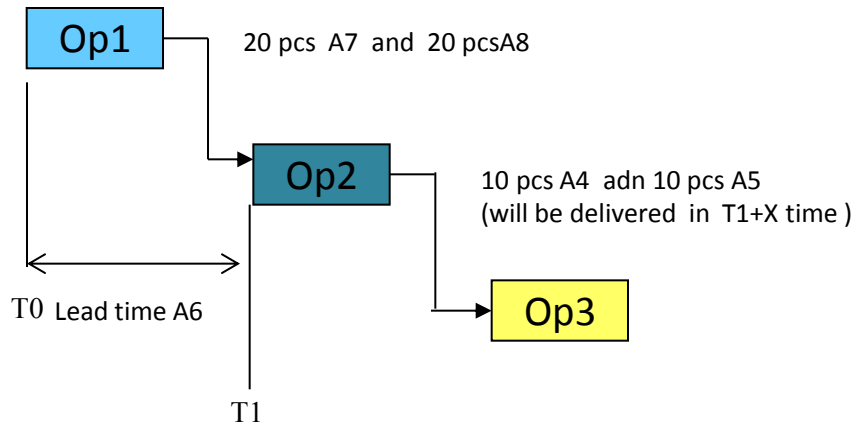
Black



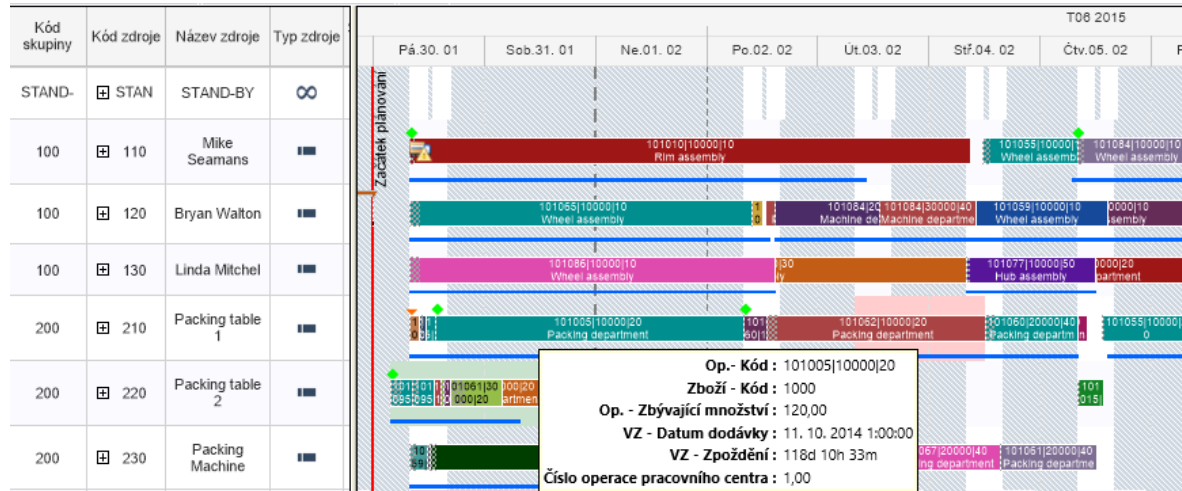
(Black ->White, Setup time=60 minut)

(White->Black, Setup time = 20 minut)

Basic problem V-I. (availability of components)



Basic problem V-II. (availability of components)



Prod. Order Routing ▾

Type to filter (F3) Prod. Order No. ▾

Filter: Firm Planned • 101005 • 10000 • 10

Operati... No.	Type	No.	Description	Starting Date-Time	Ending Date-Time	Setup Time	Run Time	Material Fixed Date
10	Work Center	100	Wheel assembly	18. 8. 2014 14:41	22. 8. 2014 8:31	110	12	23. 8. 2014 0:00
20	Work Center	200	Packing department	27. 8. 2014 8:31	1. 9. 2014 14:46	15	15	10. 9. 2014 0:00
30	Work Center	300	Painting department	1. 9. 2014 14:46	4. 9. 2014 10:46	10	20	
40	Work Center	400	Machine department	4. 9. 2014 11:11	5. 9. 2014 12:21	10	8	

APS result ->18.8.->23.8. a 27.8.->10.9

Basic problem VI-I. (over budget)

2012 - Budget

General Filters Options

Budget Name 2012 ↑

Show as Lines G/L Account ↑

Show as Columns Period ↑

Code	Name	Budgeted Amount	26.03.12	02.04.12
8100	Building Maintenance Expenses			
8110	Cleaning	1 160,00	1 000,00	
8120	Electricity and Heating	1 120,00	1 000,00	
8130	Repairs and Maintenance	1 160,00	1 000,00	
8190	Total Bldg. Maint. Expenses	3 440,00	3 000,00	
8200	Administrative Expenses			
8210	Office Supplies	510,00	500,00	
8230	Phone and Fax	800,00	800,00	
8240	Postage	1 390,00	1 200,00	
8290	Total Administrative Expenses	2 700,00	2 500,00	
8300	Computer Expenses			
8310	Software	1 000,00	1 000,00	

1 7 31 3 12

Balance Functions Help

* Basic problem VI-II. (over budget)

1015 London Postmaster - Purchase Invoice

General Invoicing Shipping Foreign Trade E-Commerce

No. 1015

Posting Date 26.03.12

Buy-from Vendor No. 10000

Document Date 26.03.12

Buy-from Contact No. CT000066

Vendor Invoice No. Miki-0983

Buy-from Vendor Name London Postmaster

Order Address Code.

Buy-from Address 10 North Lake Avenue

Purchaser Code RL

Buy-from Address 2

Campaign No.

Buy-from Post Code/City N12 5XY London

Responsibility Center LONDON

Buy-from Contact Mrs. Carol Philips

Assigned User ID

Status Open

Type	No.	Description	Location Code	Quantity	Unit of Measure ...	Direct Unit Cost Excl...	Line Amount Excl. VAT	Line Disco...	Qty. to Assign
G/L Ac...	8110	Cleaning		10	HOUR	100,00	1 000,00		
G/L Ac...	8120	Electricity and Heating		20	HOUR	200,00	4 000,00		
G/L Ac...	8130	Repairs and Maintenance		30	HOUR	300,00	9 000,00		
G/L Ac...	8210	Office Supplies		10	HOUR	100,00	1 000,00		
G/L Ac...	8230	Phone and Fax		20	HOUR	200,00	4 000,00		
▶ G/L Ac...	8240	Postage		30	HOUR	300,00	9 000,00		

Invoice Line Functions Posting Help



Basic problem VI-III.

(over budget)

G/L Balance/Budget

Options

Date Filter 01.03.12..31.03.12 Budget Filter 2012

Department Filter Closing Entries Include

Project Filter

No.	Name	I... Debit Amount	Credit Amount	Balance/Budget (%)	Budgeted Debit Amount	Budge... Credit Amount	Budgeted Amount
8100	Building Maintenance Expenses	L...					
▶ 8110	Cleaning	I... 1 000,00		100,0	1 000,00		1 000,00
8120	Electricity and Heating	I... 4 000,00		400,0	1 000,00		1 000,00
8130	Repairs and Maintenance	I... 9 000,00		900,0	1 000,00		1 000,00
8190	Total Bldg. Maint. Expenses	L... 14 000,00		466,7	3 000,00		3 000,00
8200	Administrative Expenses	L...					
8210	Office Supplies	I... 1 000,00		200,0	500,00		500,00
8230	Phone and Fax	I... 4 000,00		500,0	800,00		800,00
8240	Postage	I... 9 000,00		750,0	1 200,00		1 200,00
8290	Total Administrative Expenses	L... 14 000,00		560,0	2 500,00		2 500,00
8300	Computer Expenses	L...					
8310	Software	I...			1 000,00		1 000,00

1 7 31 3 12 | Account | Functions | Help