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Flow Accounting Assessment

Driving Continuous Improvement.

An introduction to a financial analysis of the Current State

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Julia Schmitz

Julia is the Manufacturing Manager of the world's leading provider of road sweeping equipment, Johnston Sweepers Ltd.
She has an MSc in Lean Operations from Cardiff University and her area of expertise is Flow Accounting Assessment and alternative accounting methods.

Throughout her career, which started as a professional welder and fabricator, she gained unique insights into manufacturing and management strategies by working for years in Germany, Denmark, Latvia and, currently, the UK. Since her career has progressed into senior management, she uses this knowledge to solve organisational challenges through continuous improvement and production optimisation.

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Flow Accounting Assessment
Why change?

- To “make money now and in future”, companies need to improve.

- Due to the capacity pressures (time /money), these improvements should be **focussed** and in the area were they have the **biggest effect on the whole** (often the constraint) and they should be measurable (ideally in monetary terms) .

Why not use standard Cost Accounting to identify these areas?

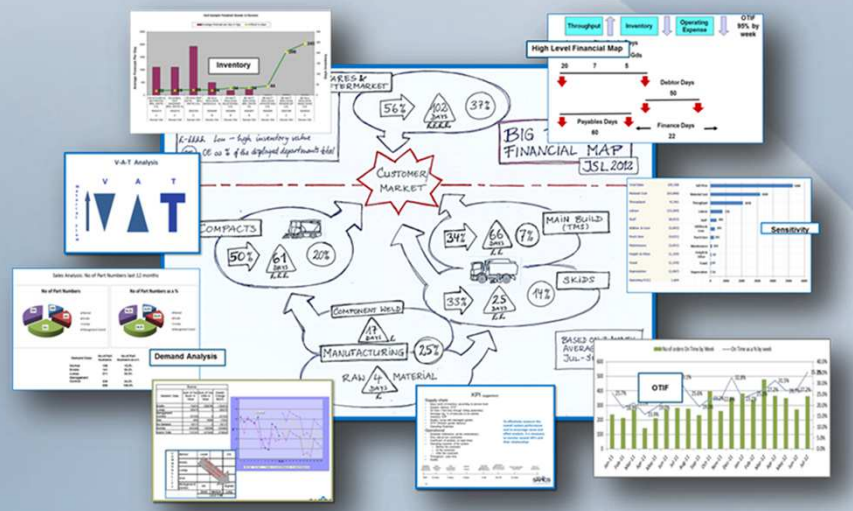
Because Cost Accounting does….

- Actively work against flow
  1. Encourage bigger batches to reduce “unit costs”
  2. Treat bottlenecks and non bottlenecks the same
- Leads to the wrong decisions
  1. Focus on costs instead of value
  2. Encourage local efficiencies
- Is confusing and complex to people
  1. Give credit for over production
  2. Encourage “cost reductions” which often prove to be mirages

What is the Flow Accounting Assessment?

The Flow Accounting Assessment is a method to analyse a business based on its financial data to assess the scope for improvement in the business, expressed in monetary terms, and visualise it with a Big Picture Financial Map (BPFM).

The Flow Accounting Assessment contains different methods and investigates a variety of aspects of the business which eventually come together to a multi-layered interpretation of the current situation and, based on that, recommendations for improvement resulting in increased bottom-line results as well as Key Performance Indicators (KPI) to track progress and success.



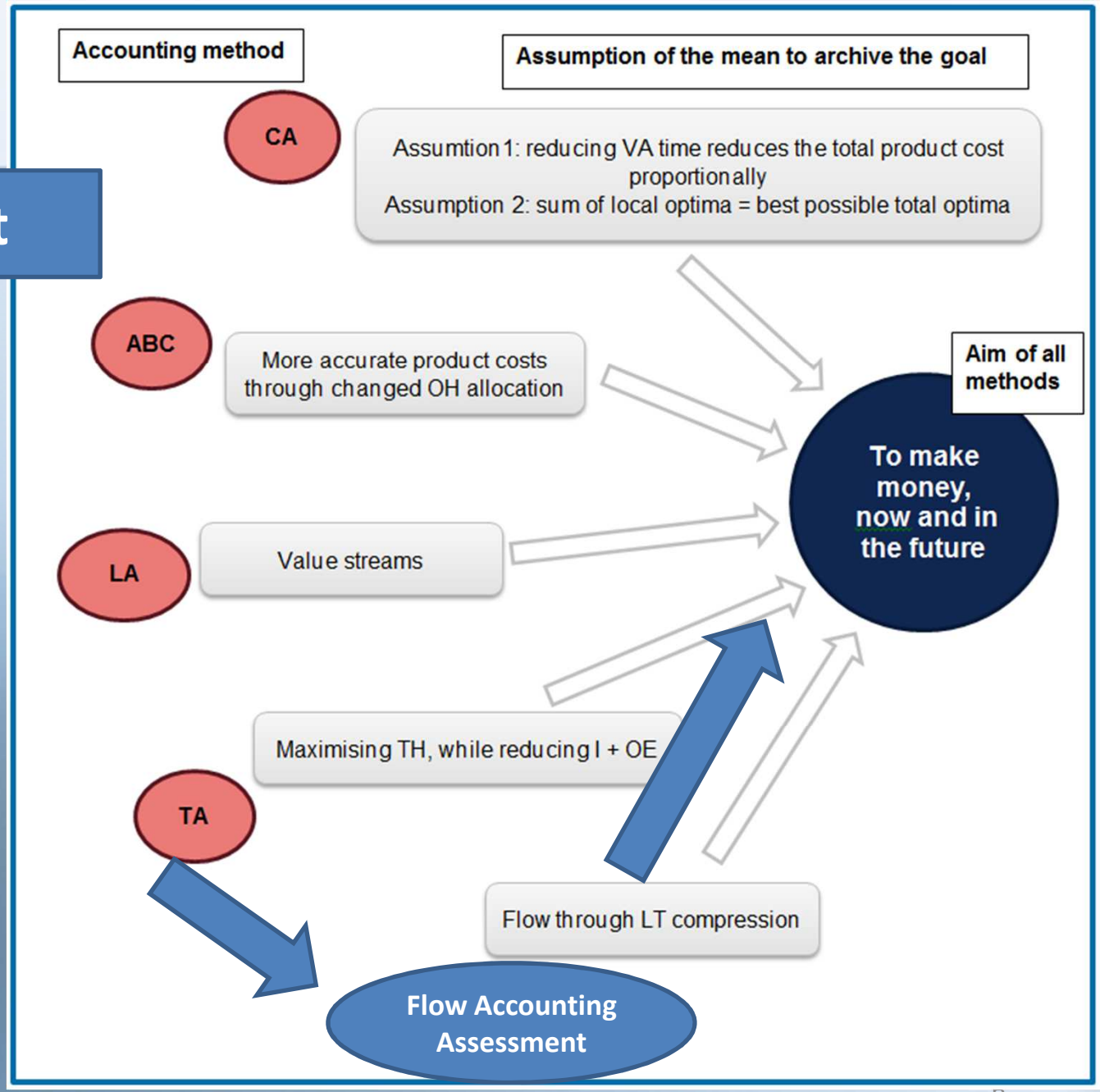
What to expect?

This presentation will set the Flow Accounting Assessment briefly into the context of other alternative Accounting methods and it's roots in Throughput Accounting, and then introduce the Flow Accounting Assessment (FAA) analysis method's one by one.

Agenda

- Context/ different Accounting methods
- FAA + Throughput Accounting
- FAA -3 stages
- The FAA analysis methods
- Summary

Context


Accounting method
Assumption of the mean to archive the goal
CA
Assumtion 1: reducing VA time reduces the total product cost proportionally
Assumption 2: sum of local optima = best possible total optima
ABC
More accurate product costs through changed OH allocation
Aim of all methods
To make money, now and in the future
LA
Value streams
Maximising TH, while reducing I + OE
TA
Flow through LT compression
Flow Accounting Assessment

Context

Referring back to Goldratt :a companies aim is to make money now and in future: To make sure the “future “ is happening, companies have to improve.

The improvement is usually measured in financial terms.

Finance and accountancy methods are used to interpret the raw company data as well as specify which data are collected, therefore it is important to align accounting method with a companies strategy. The main method used in businesses (due to legal, external reasons) is Cost Accounting. However, there are several other methods, all aiming for the same goal, but based on different assumptions: for example ABC, and LA.

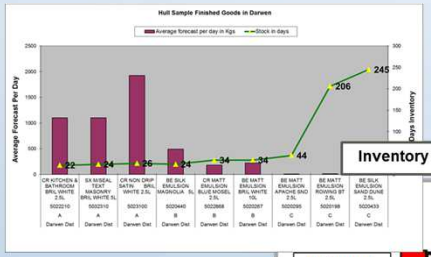
Everybody who is familiar with Throughput Accounting (TA) knows that TA focusses on increasing TH, while, at least proportionally, reducing I and OE. Flow Accounting Assessment focusses on reducing lead time.

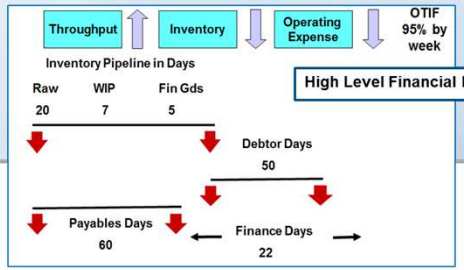
TA =accounting method, FAA method building on same concept (TOC), but it is an assessment, which is based on financials to quantify in monetary terms CI opportunities.

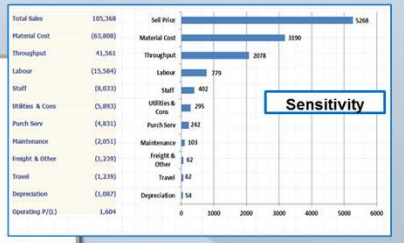
Flow Accounting

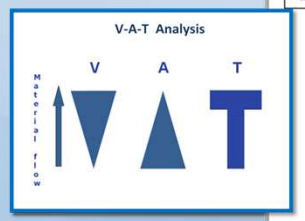
FA seen as an improvement process in 3 steps like most CI approaches; however, the main part of the analysis is done when establishing the current state. Therefore the focus of this presentation is on the current state analysis methods.

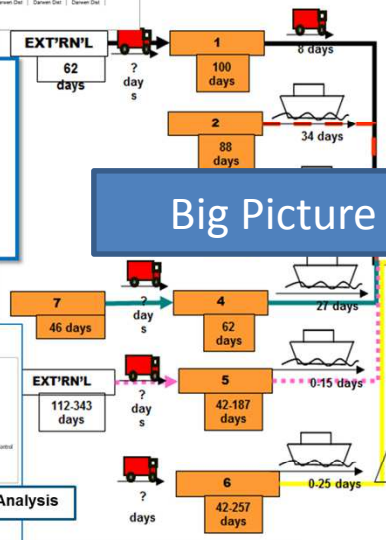
Flow Accounting Assessment analysis tools overview

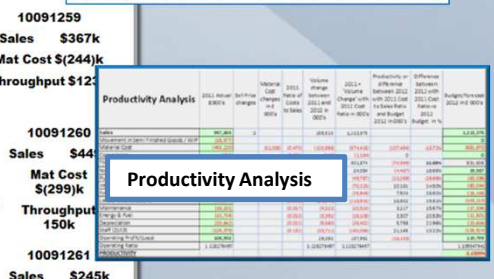


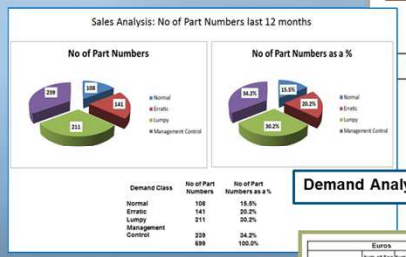


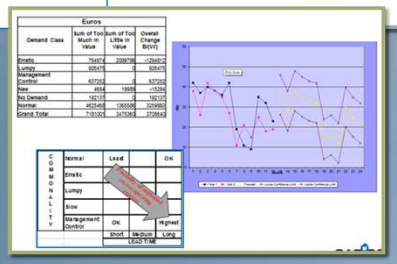


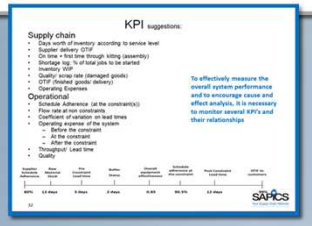


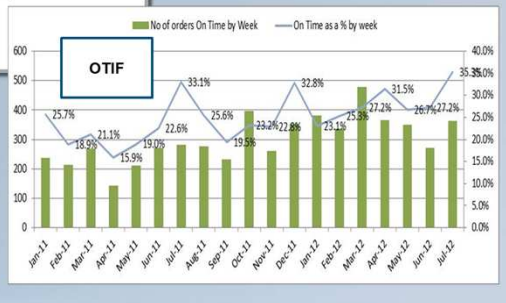




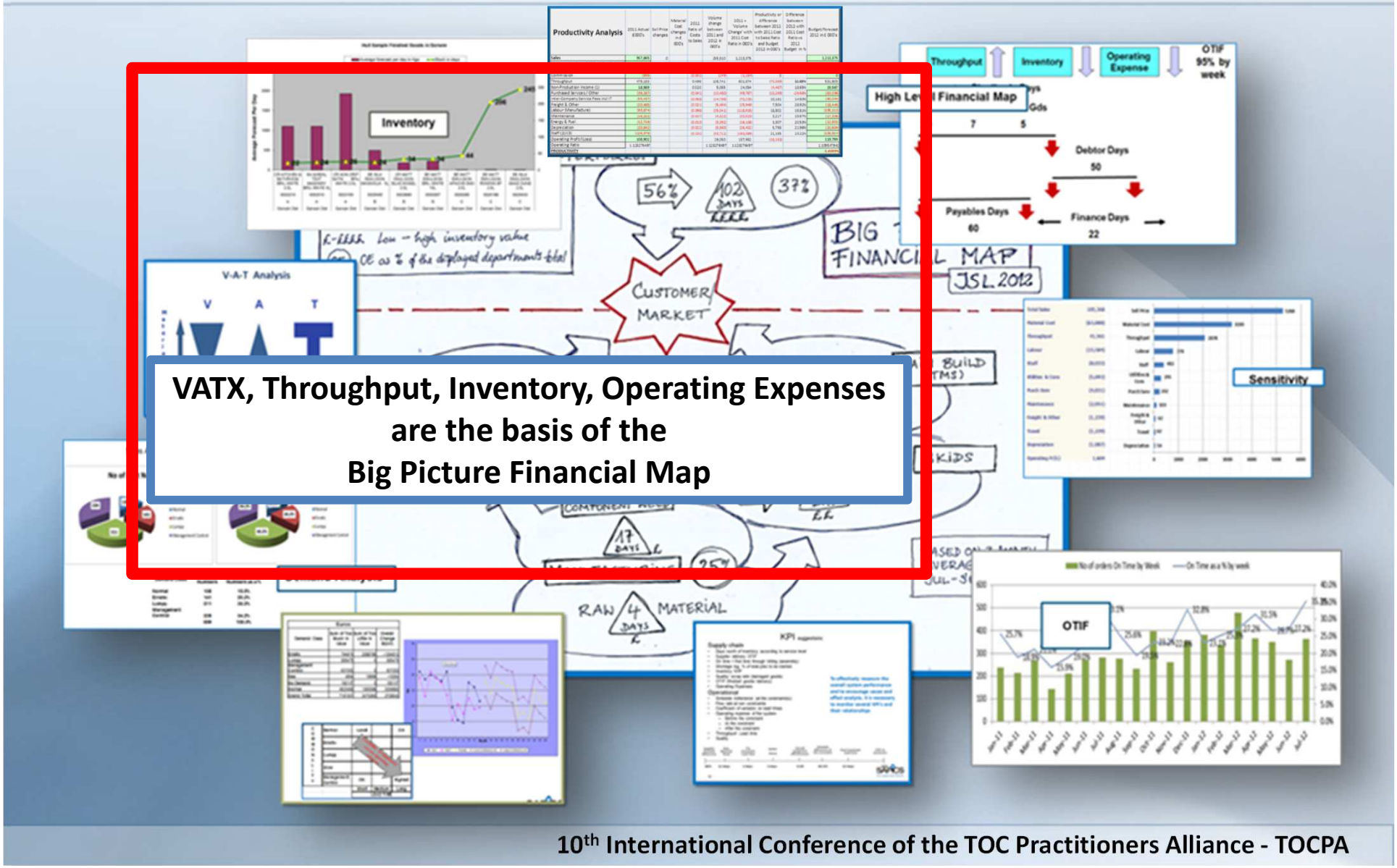








The Big Picture Financial Map



VATX, Throughput, Inventory, Operating Expenses are the basis of the Big Picture Financial Map

VATX analysis

VATX analysis classifies plants by the BOM/ material flow structure.

The purpose of a VAT analysis is **to outline and conceptualise the main material flow through a system** (e.g., supply chain, company or department), based on the BOM structure and on knowledge of the business.

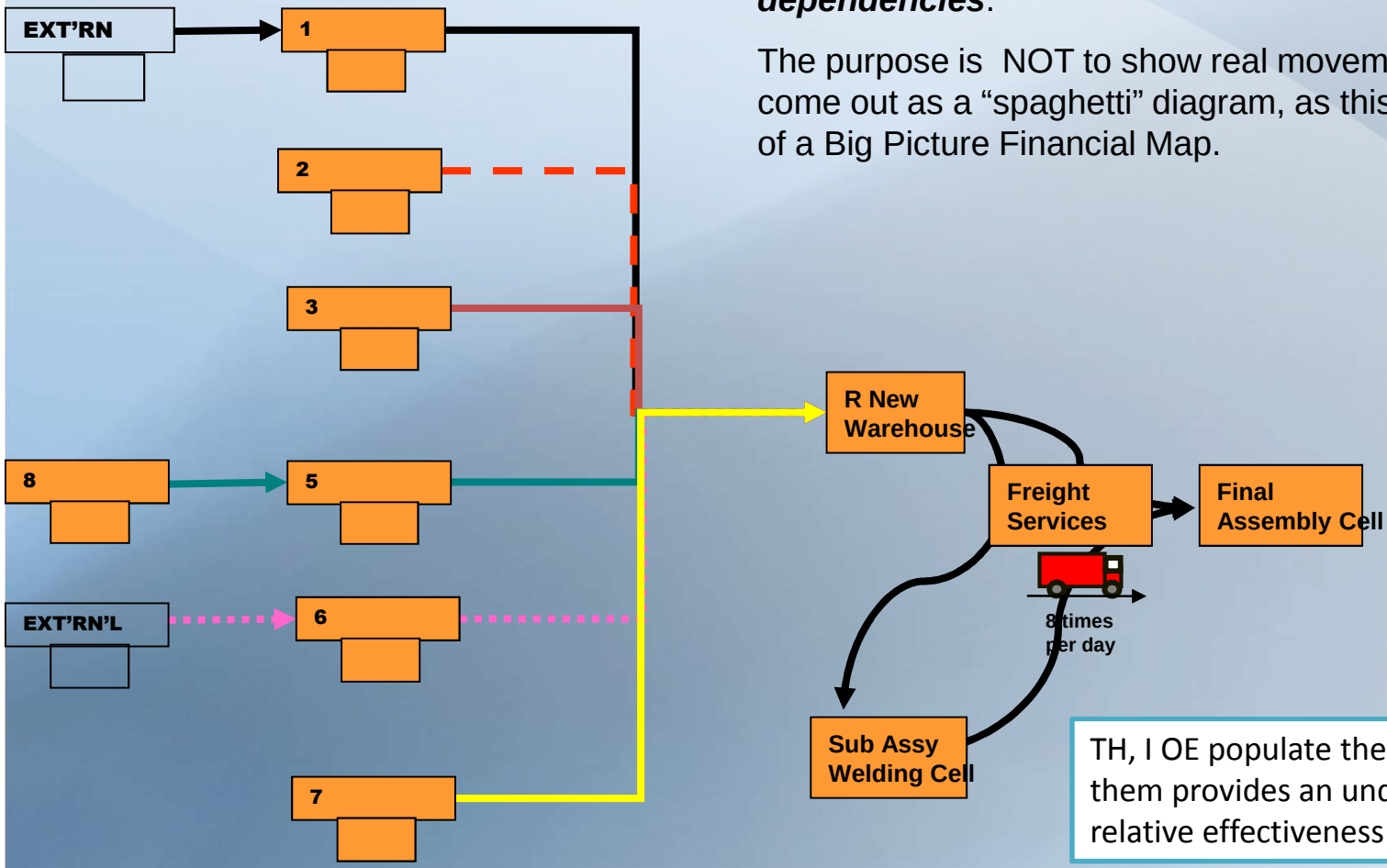
The assumption is that the different structures relate to typical issues which, when managed well, **stabilise flow** through a department.

Big Picture Financial Mapping (BPFM) .....

What are the key resources, major dependencies and routes?

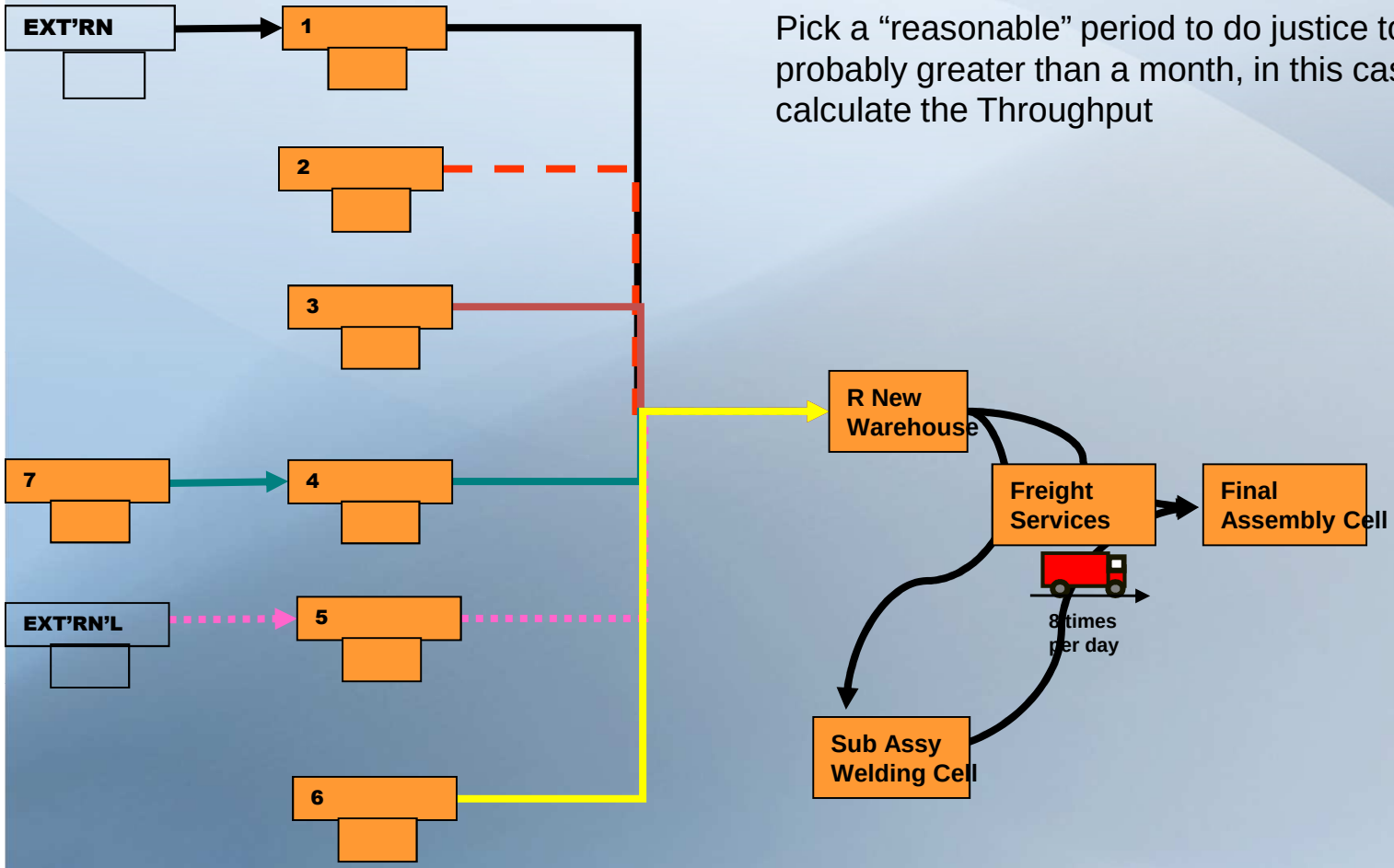
Drawn with a logical flow in mind considering the ***major dependencies***.

The purpose is NOT to show real movements which might come out as a "spaghetti" diagram, as this is not the objective of a Big Picture Financial Map.



TH, I OE populate the content. Comparing them provides an understanding of the relative effectiveness of the departments.

BPFM …Throughput: We only MAKE MONEY one way: by selling to 3rd party customers (Not inter co, the monies we owe ourselves!) so let's show this on the map



Pick a "reasonable" period to do justice to the mix of sales probably greater than a month, in this case 1st Quarter to calculate the Throughput

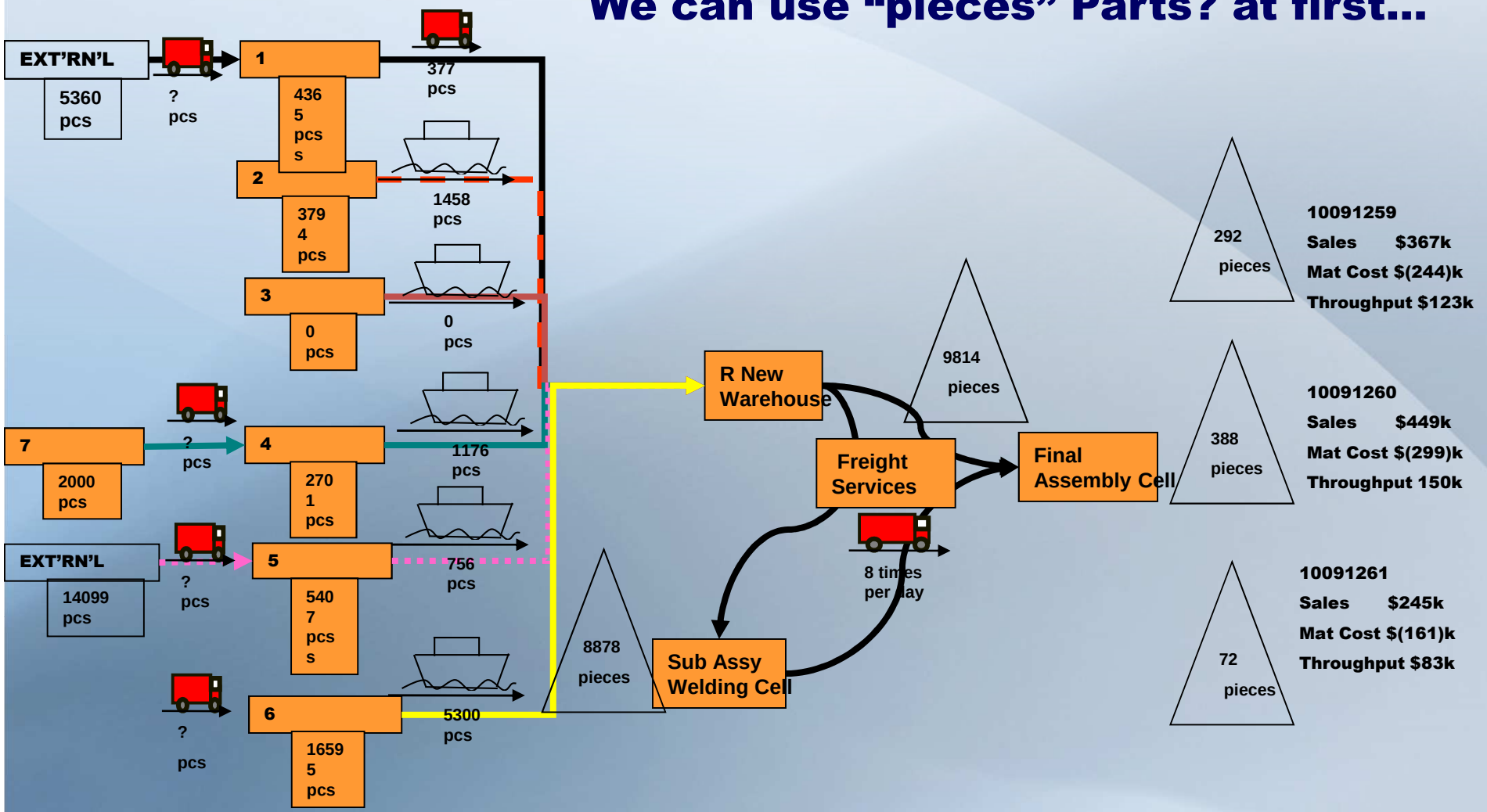
10091259
Sales $367k
Mat Cost $(244)k
Throughput $123k

10091260
Sales $449k
Mat Cost $(299)k
Throughput 150k

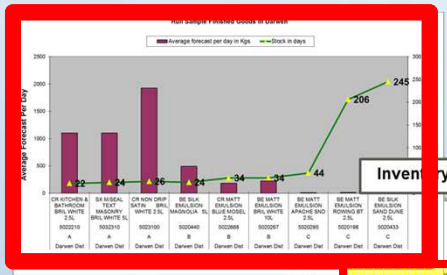
10091261
Sales $245k
Mat Cost $(161)k
Throughput $83k

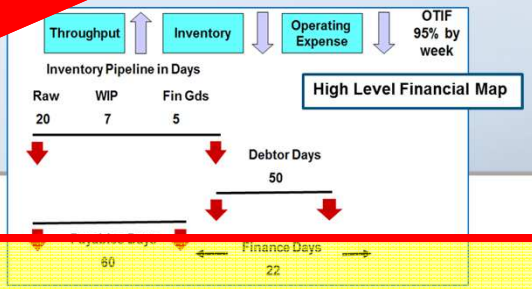
BPFM .....Where is the Inventory? Where is the money "tied up" in the system?

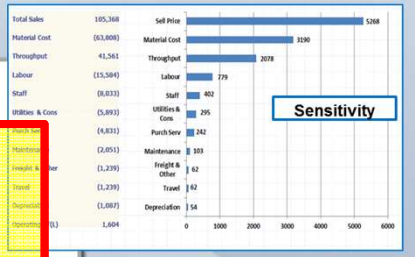
We can use "pieces" Parts? at first...

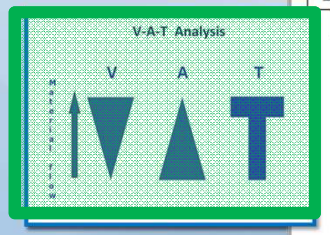


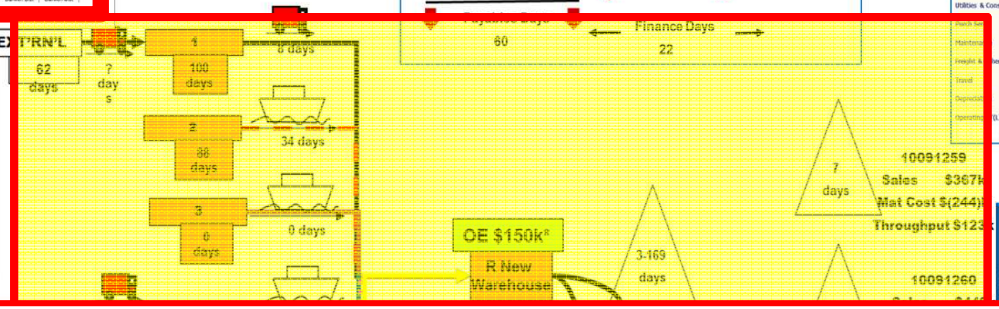
Flow Accounting Assessment

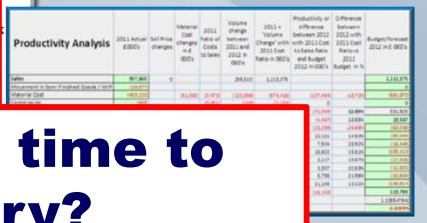


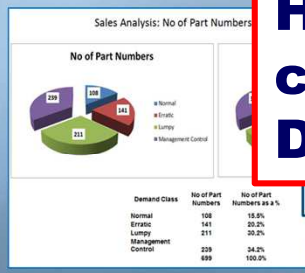


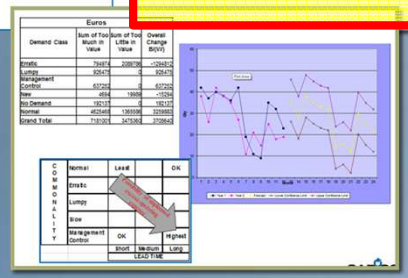


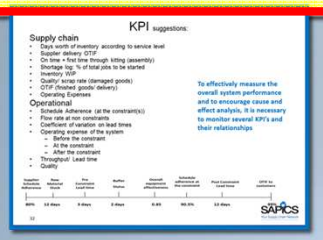


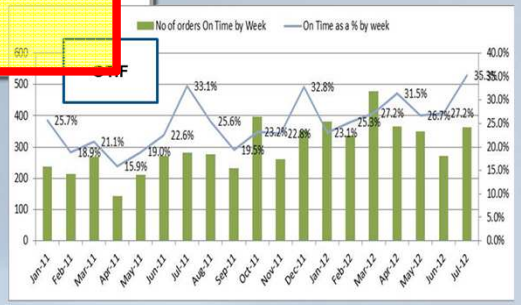












How can we convert the inventory into time to compare the different levels of inventory?
Days of sales cover are used as time unit.

Big Picture Financial Mapping…….

How can we convert the inventory into time, in terms of days of sales cover?

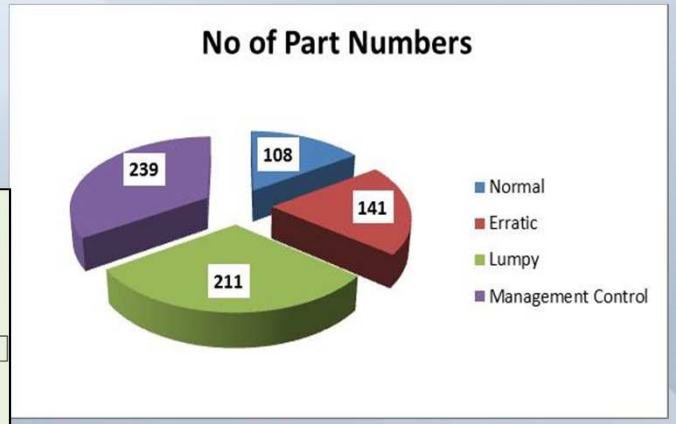
Apply the “smoothed” demand figures to the inventory balances at each point in the BPFM

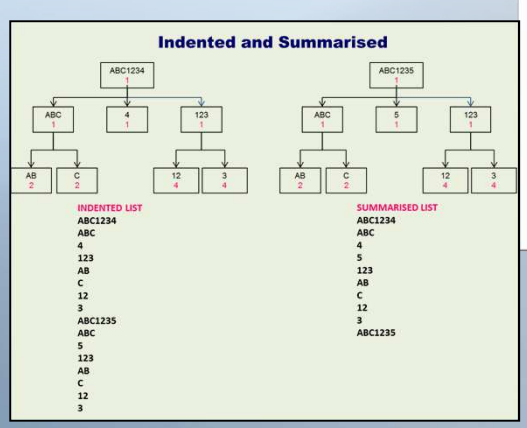
Weekly Demand over next 12 wks (average)	**308 / 7 days = 44 units/day**
Final Assembly Finished Goods 10091259	**292 / 308 x 7 days = 6.63 days**
Mexico 10074400	**4365 / 308_ x 7 days = 99.2 days**
Average Demand over next 12 wks	**308**

Note we use 7 days even if the plant only works a 5 day week because we want to show the financial impact of the investment in inventory. Think of it like this, most of us have a loan to buy our homes, and we have to pay the interest over the week end as well, (unfortunately!).

Demand Analysis

- **Future demand**
- ➢ **Demand class**





Demand Classification

Normal

Erratic

Lumpy

Slow

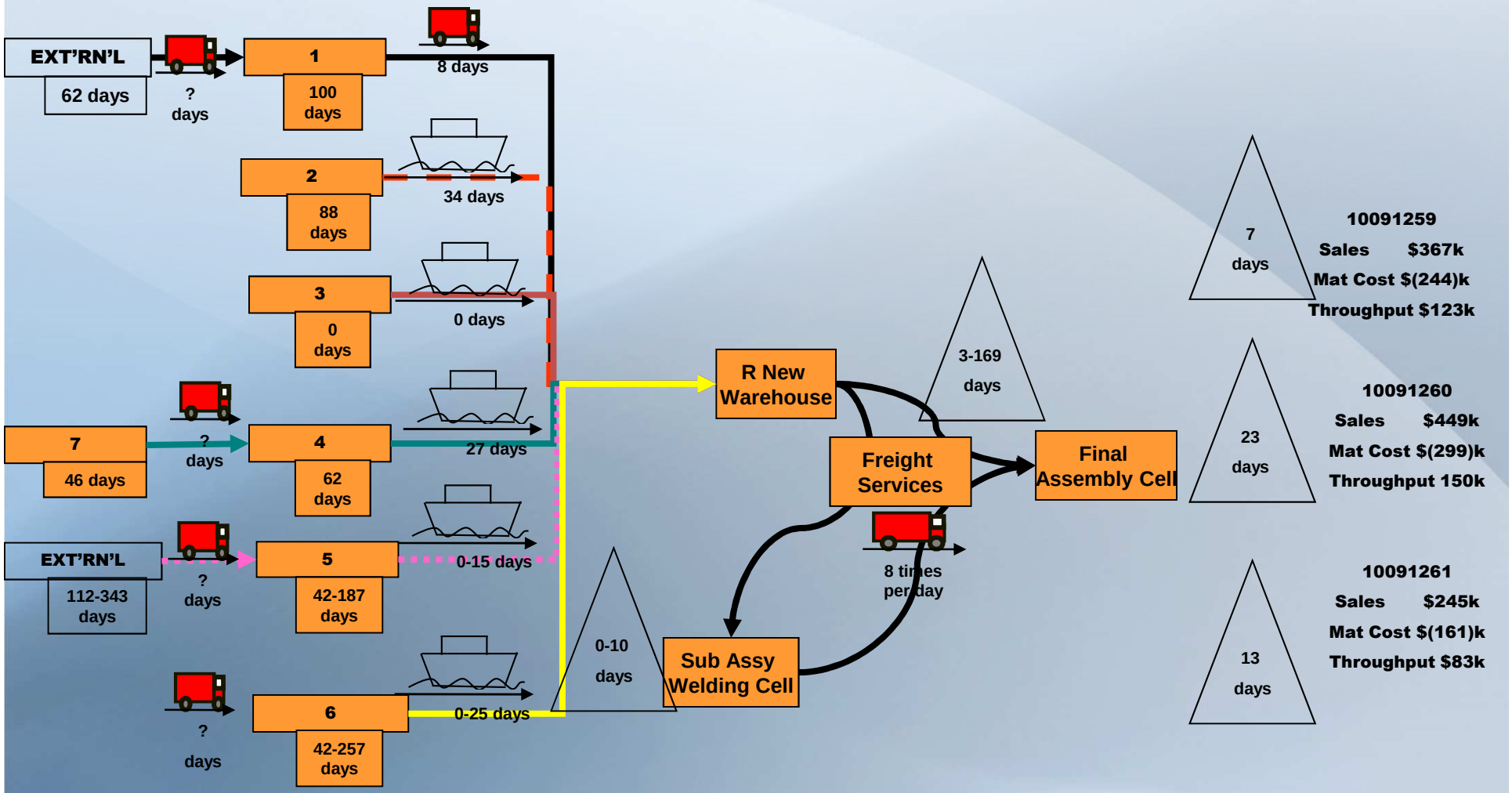
Management Control

New

All Demands Zero

Demand Class	No of Part Numbers	No of Part Numbers as a %
Normal	**108**	**15.5%**
Erratic	**141**	**20.2%**
Lumpy	**211**	**30.2%**
Management Control	**239**	**34.2%**
	699	**100.0%**

BPFM .....Where is the inventory? Let's put it onto the Map in Days of Sales.

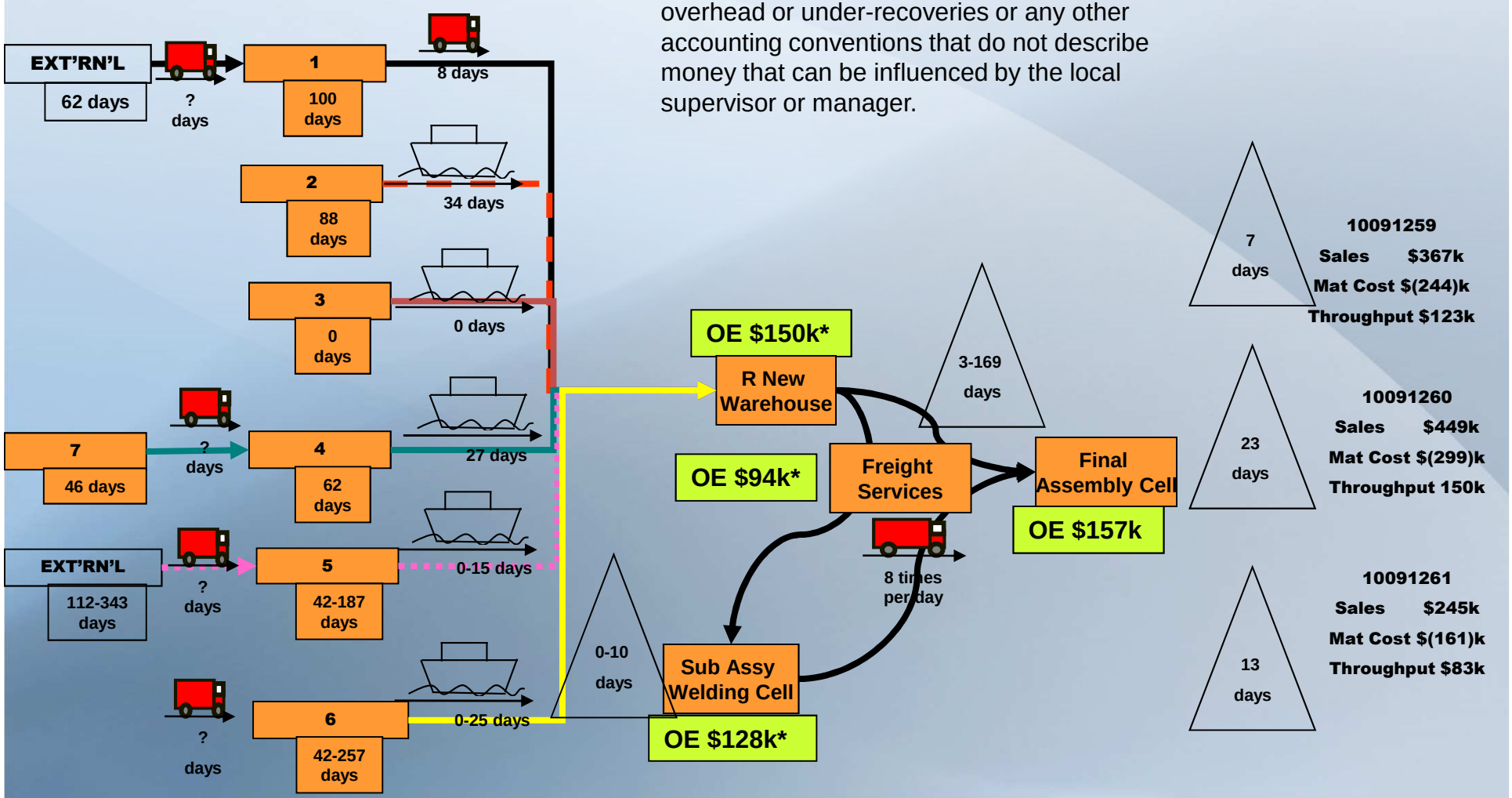


Operating Expenses

- Excluding overhead, under- and over-recoveries
- The aim is to compare TH, I and OE to understand the relative effectiveness of a department or segment of the system.
- OE can usually be picked out straight away of ERP or the finance report

BPFM .....Now let's put the Operating Expenses (OE) on the map; where we can identify them.

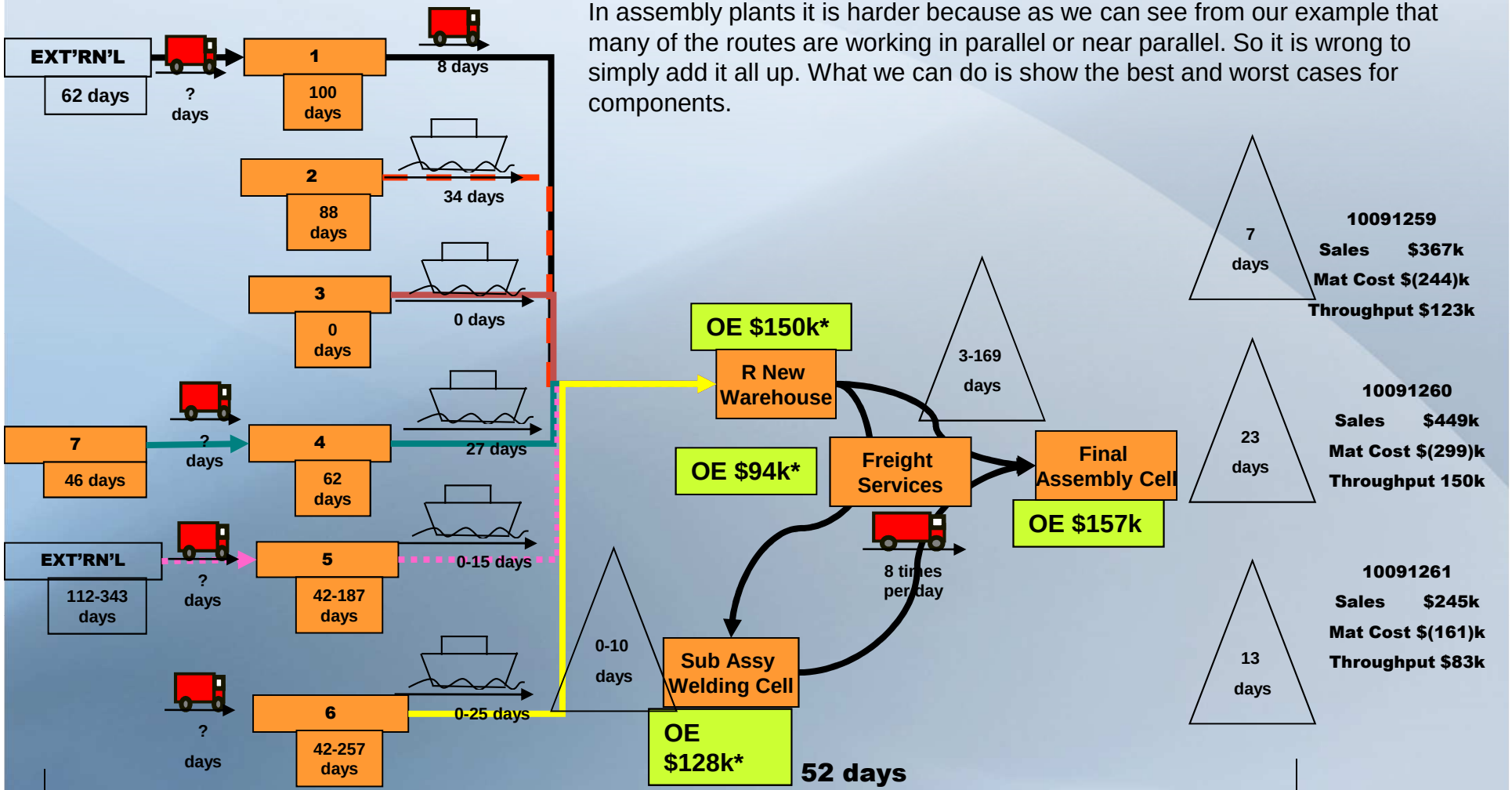
Note that there are NO ALLOCATIONS of overhead or under-recoveries or any other accounting conventions that do not describe money that can be influenced by the local supervisor or manager.



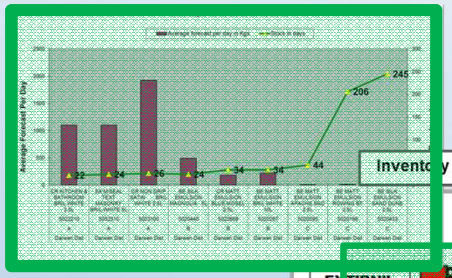
BPFM .....Can we put a Time Line on this map?

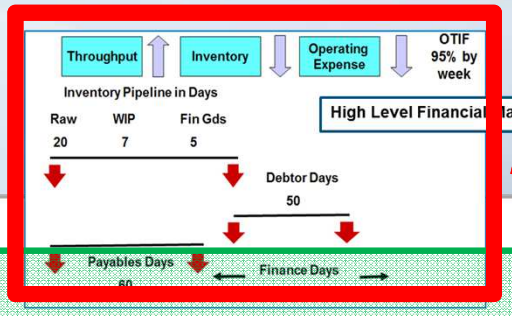
The aim is to add the Lead Time to the map, as it shows us the “delay” in our system of turning Inventory into Throughput.

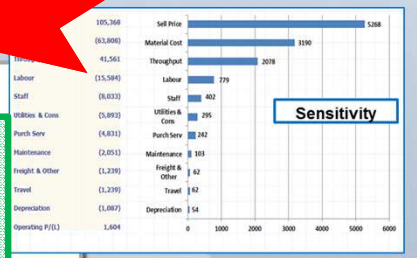
In assembly plants it is harder because as we can see from our example that many of the routes are working in parallel or near parallel. So it is wrong to simply add it all up. What we can do is show the best and worst cases for components.

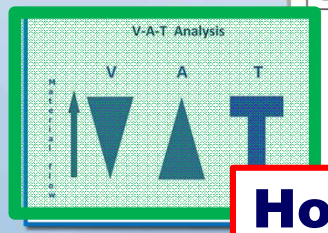


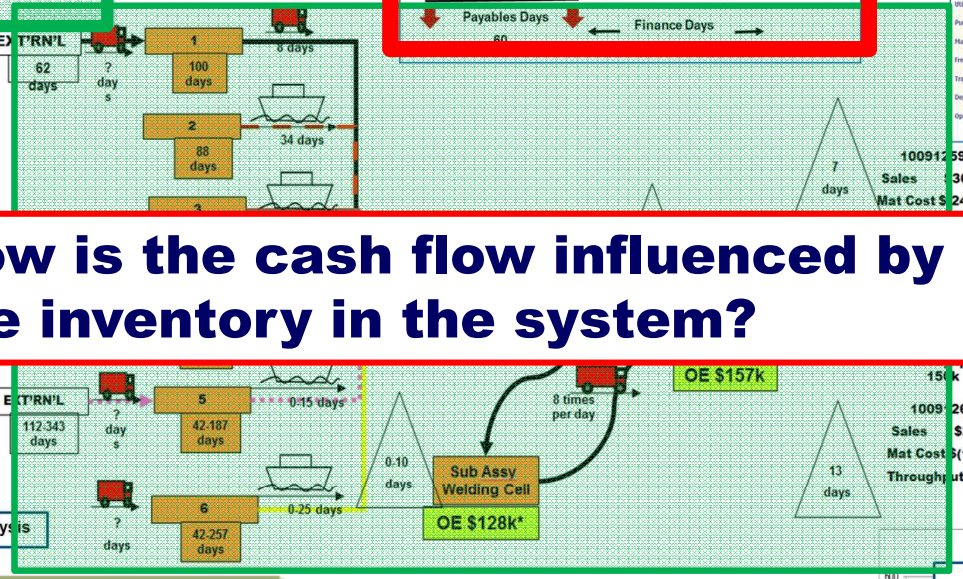
Flow Accounting Assessment



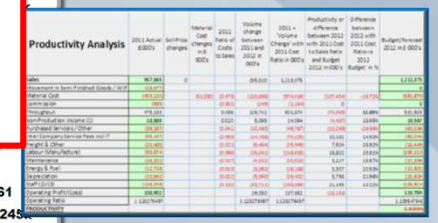


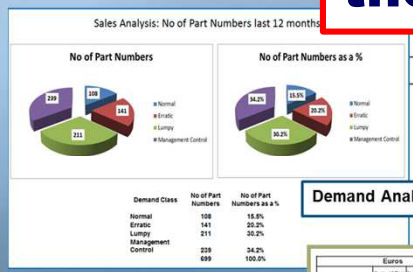


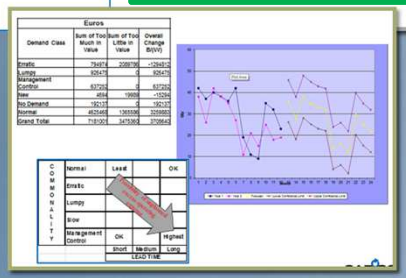


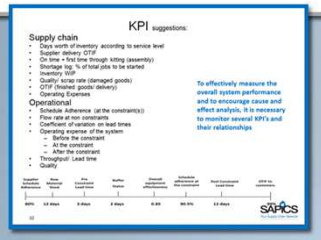


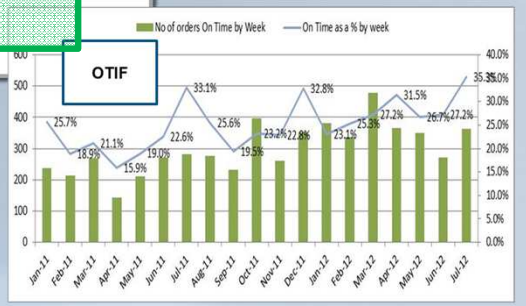
How is the cash flow influenced by the inventory in the system?



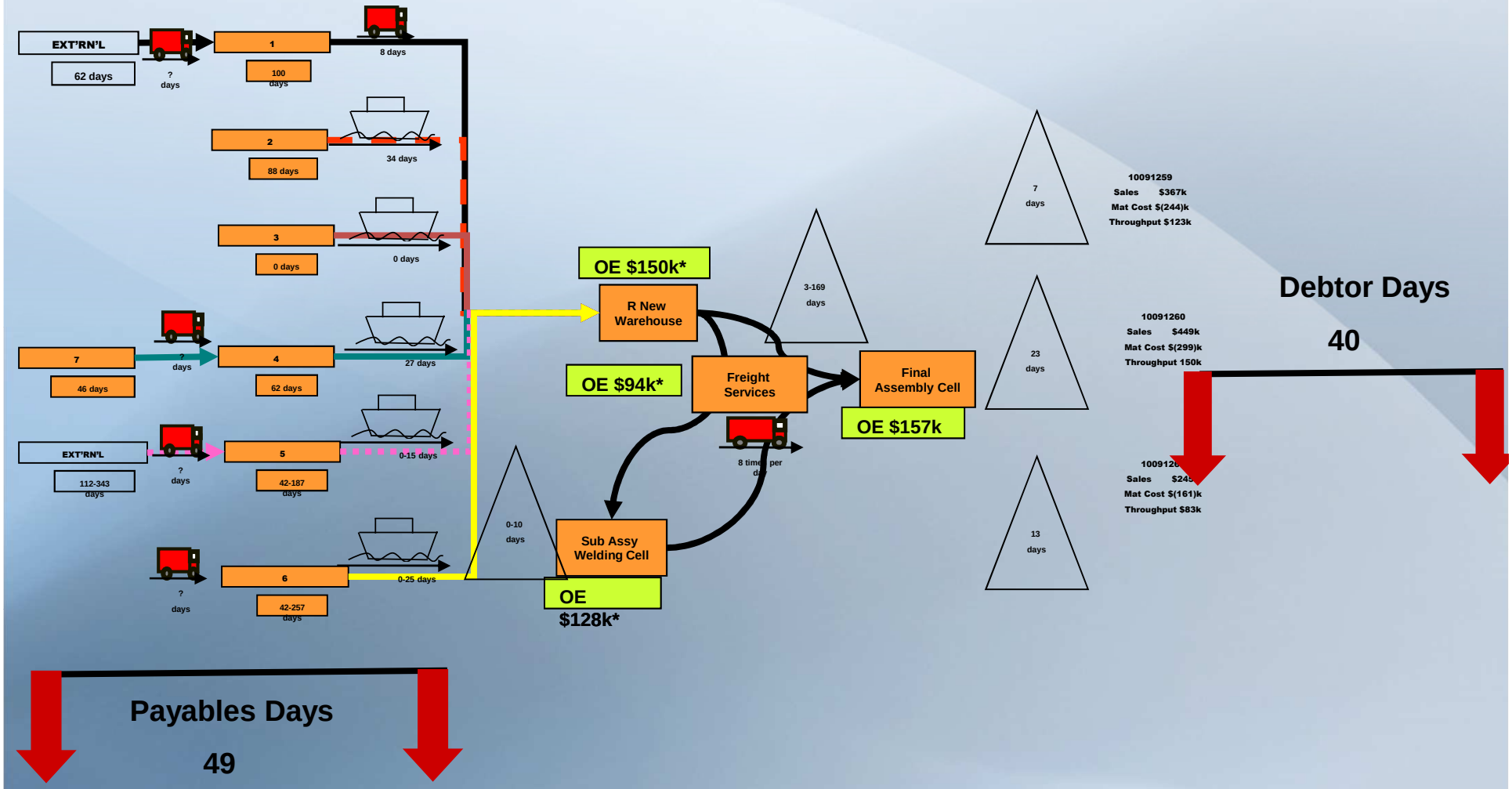




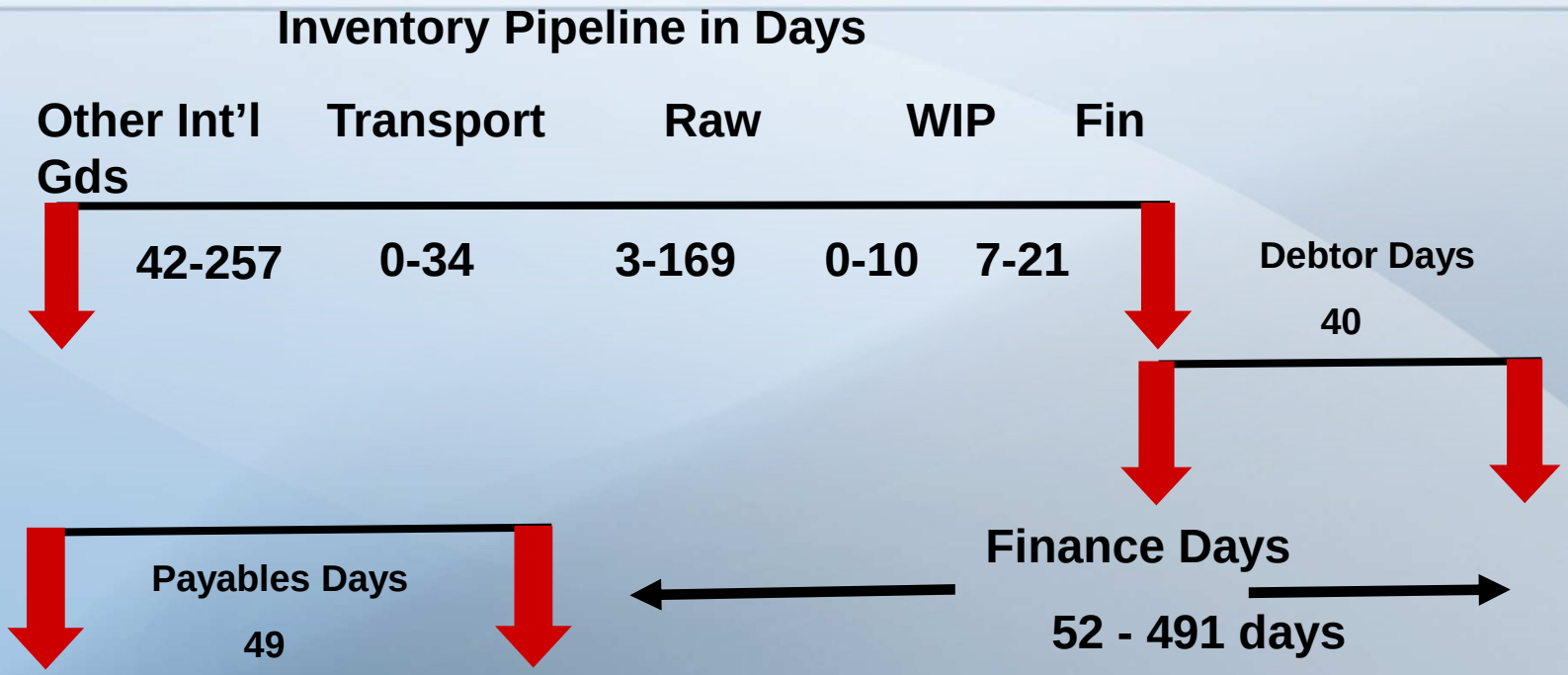




BPFM .....What is the money implications of this supply chain?

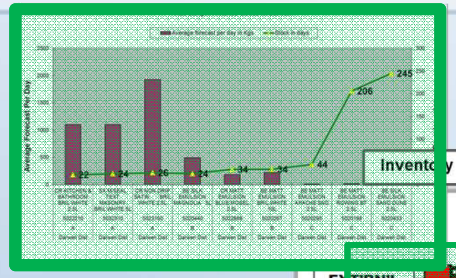


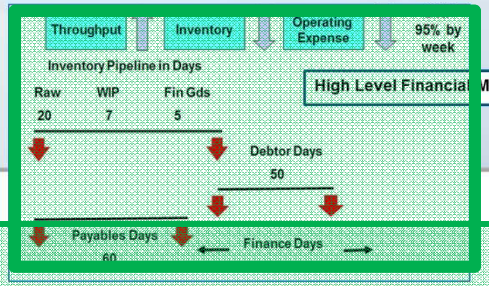
Working Capital Relationships Current State: - Supply Chain Combined

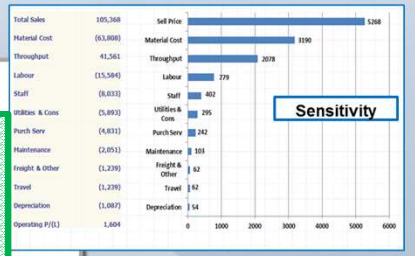


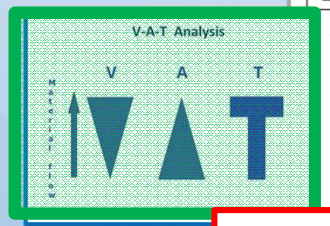
The "Inventory Pipeline" numbers are mostly at the component level and the debtors at the assembled level but the chart is designed to show the early commitment of money in the supply chain. E.g.: For a Throughput of $356k per quarter in this case there is typically $11.6m cash in transit at any point in time.

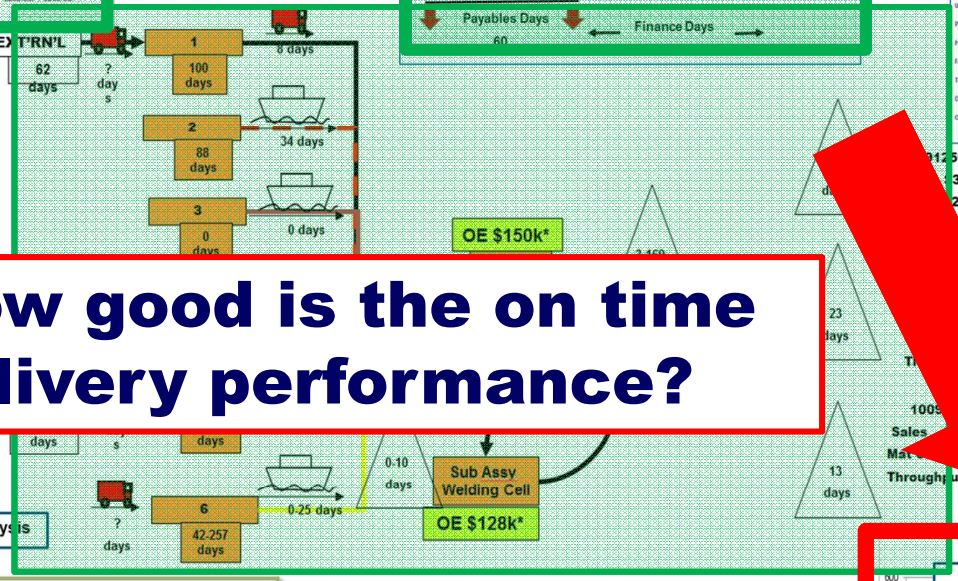
Flow Accounting Assessment



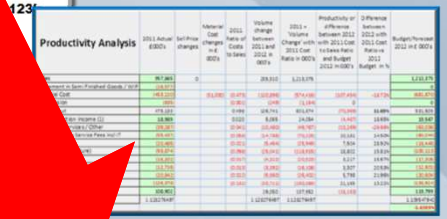


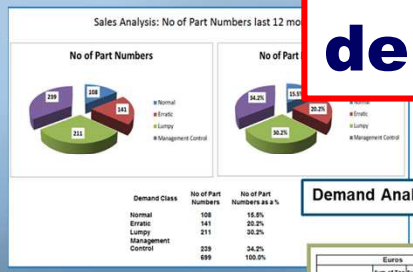


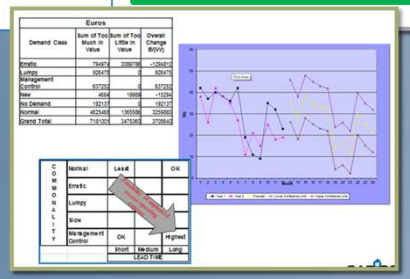


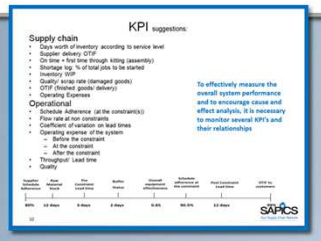


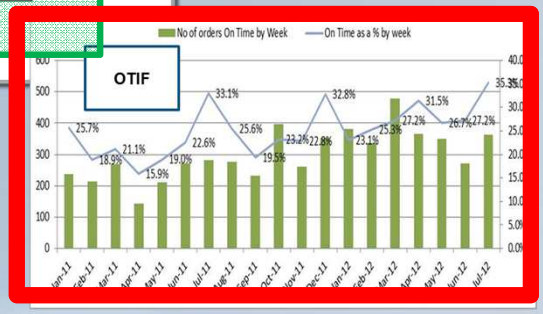
How good is the on time delivery performance?





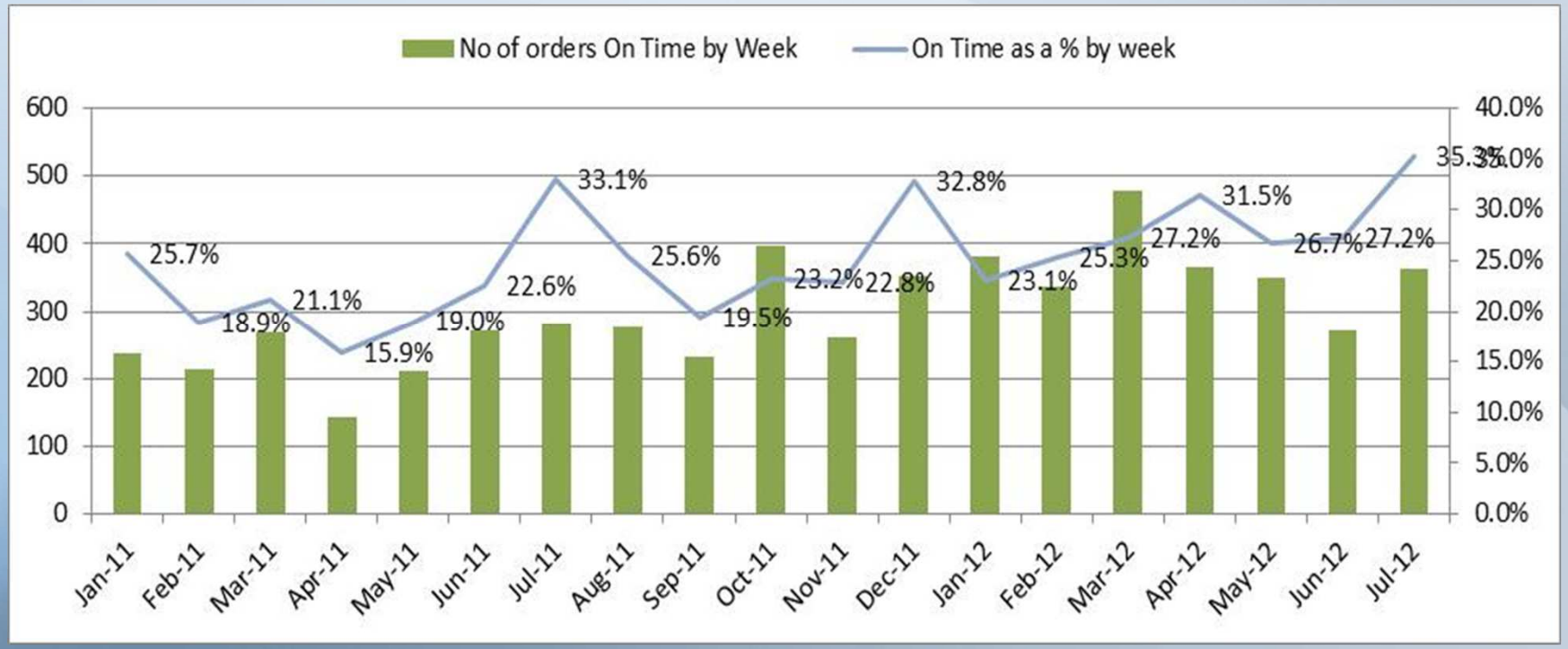






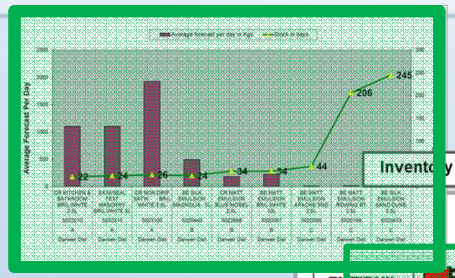
OTIF

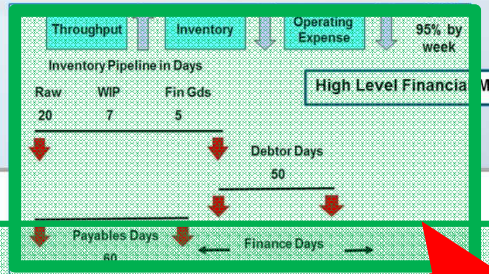
(On Time In Full)

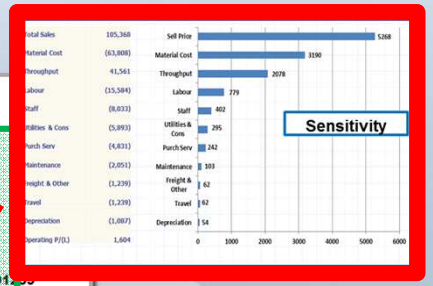


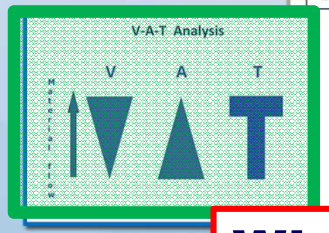
On Time In Full shows how well the system (the company) as an entity is performing

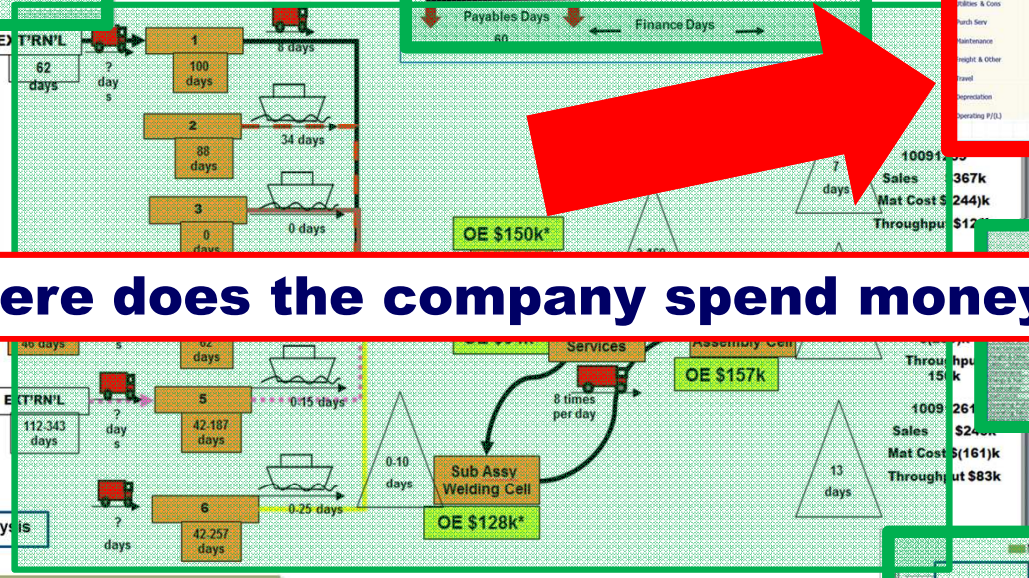
Flow Accounting Assessment



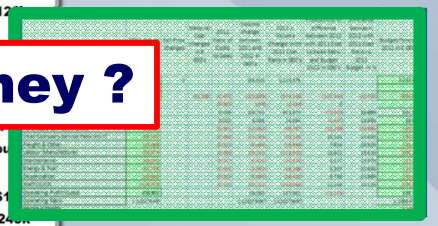


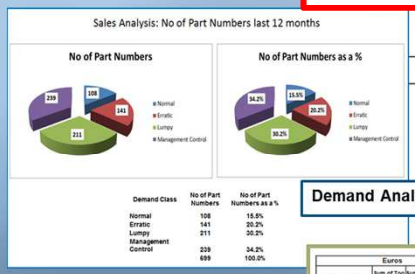


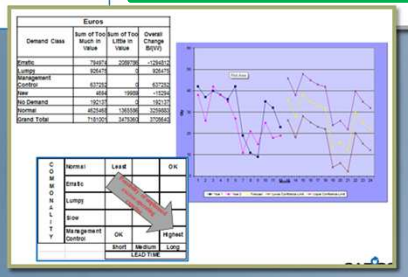


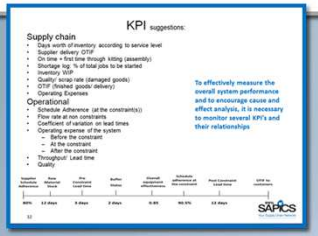


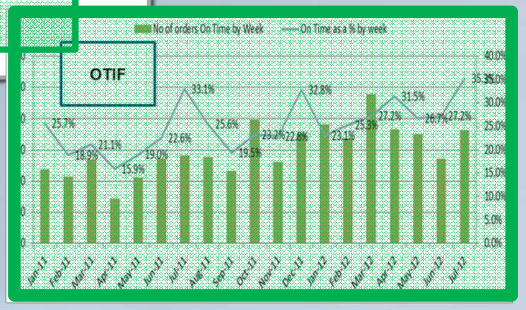
Where does the company spend money ?

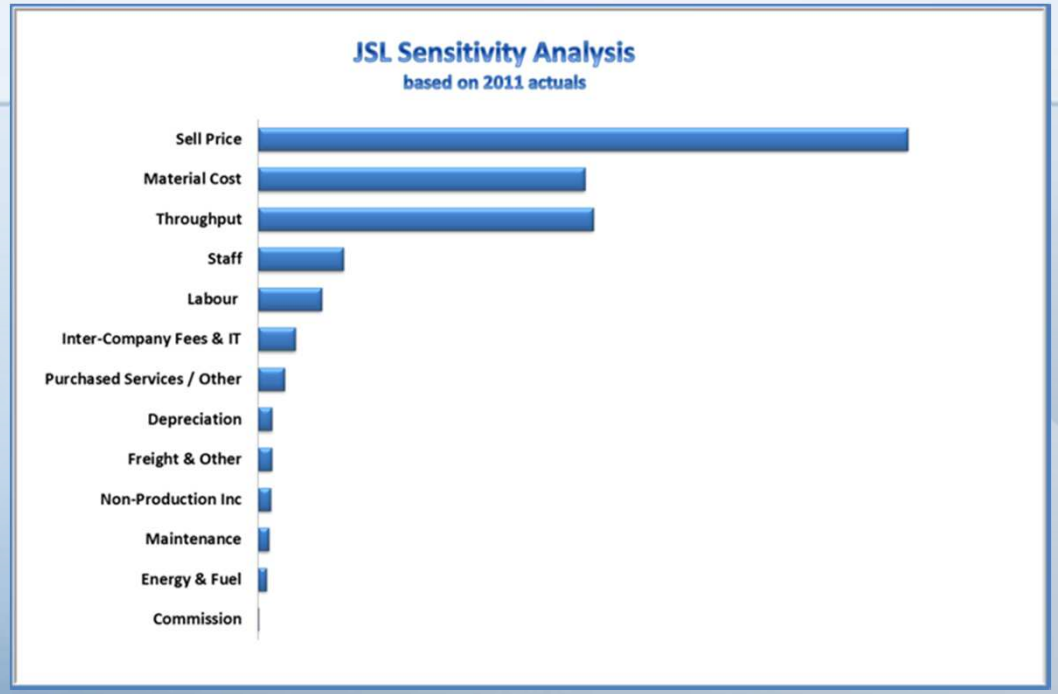












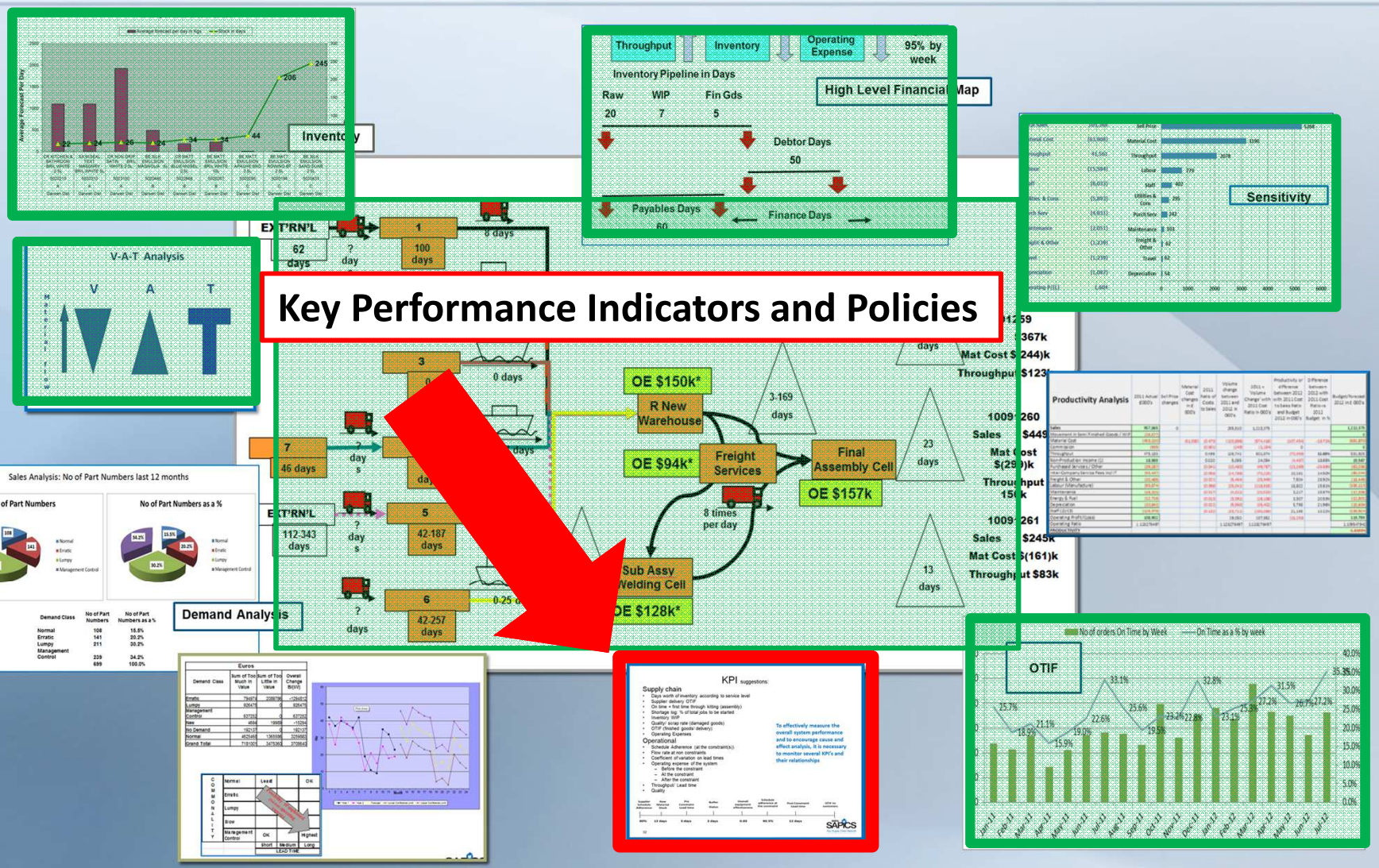
The Sensitivity Analysis is basically a conventional P&L statement. After adding TH, Pareto is used to focus back on the "relative monetary importance of differing aspects of the business" by analysing what effect a 5% improvement on different factors of the business has on the bottom-line.

The sensitivity analysis can fulfil two different purposes:

a) stating the obvious by **visualising the main financial aspects of the business**

b) how well (or not) **the system is performing**

Flow Accounting Assessment



KPI suggestions:

Supply chain

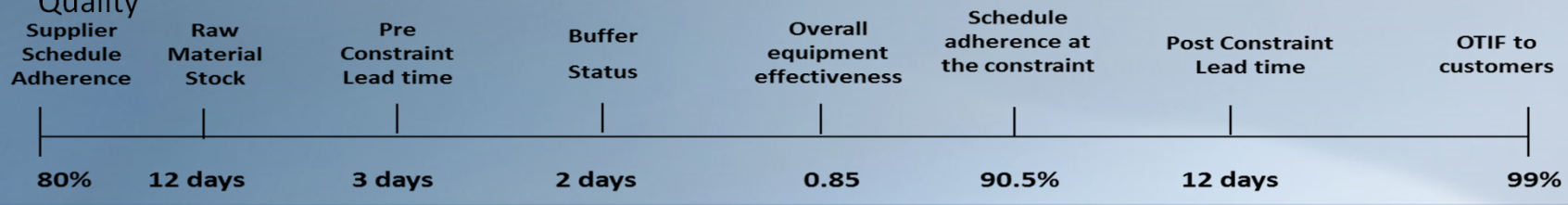
- Supplier delivery OTIF
- Days worth of inventory according to service level
- Stock turns
- Inventory WIP
- OTIF (finished goods/ delivery)
- Operating Expenses
- On time + first time through kitting (assembly)
- Shortage log: % of total jobs to be started
- Quality/ scrap rate (damaged goods)

Operational

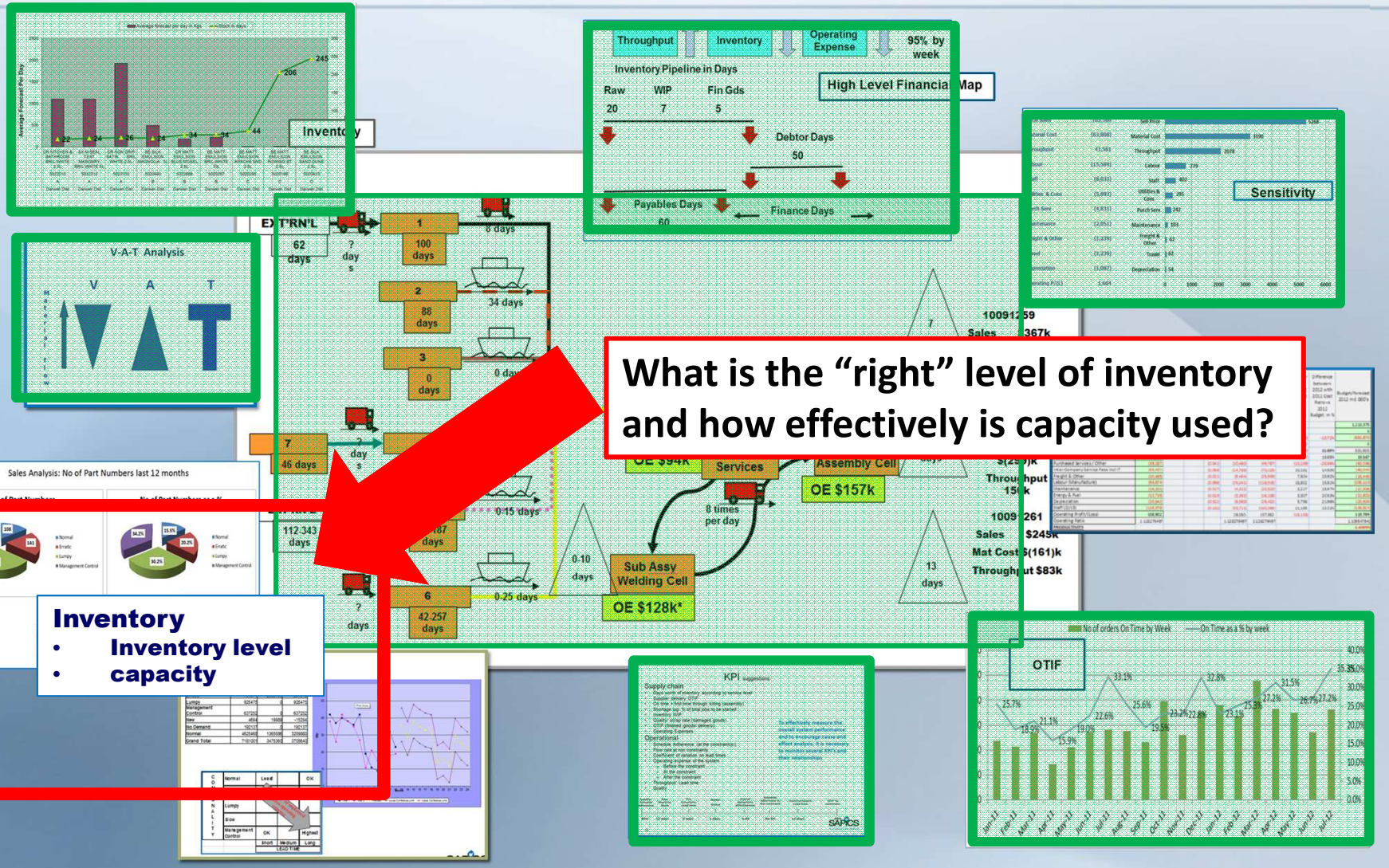
- Schedule Adherence (at the constraint(s))
- Flow rate at non constraints
- Coefficient of variation on lead times
- Operating expense of the system
  - Before the constraint
  - At the constraint
  - After the constraint
- Throughput/ Lead time
- Quality

NB: Policies (as soon as they are measureable) are effectively KPI's as well!

To effectively measure the overall system performance and to encourage cause and effect analysis, it is necessary to monitor several KPI's and their relationships across the "value stream"

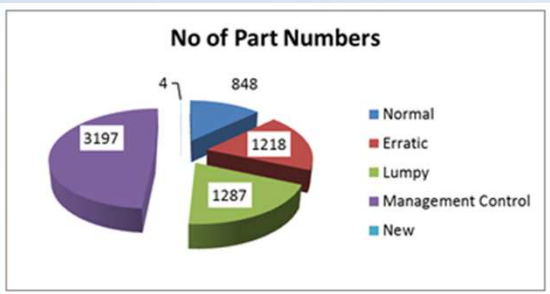


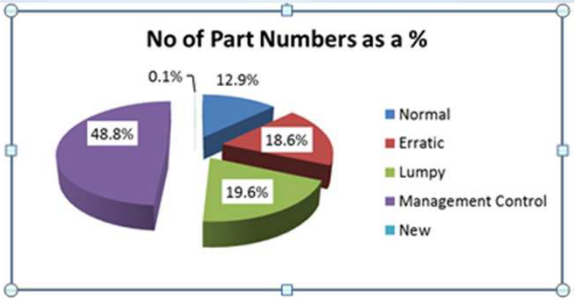
Flow Accounting Assessment

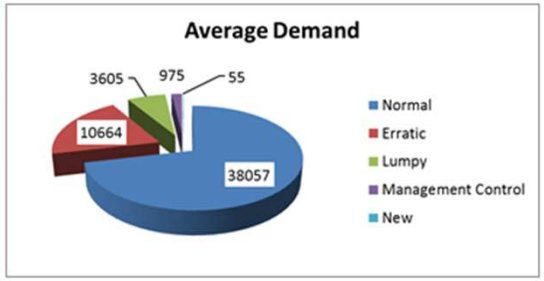


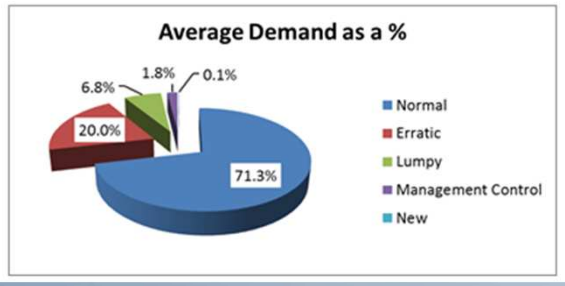
Demand Profile and the ideal inventory level

The “right” (=as little as possible but as much as necessary) inventory level is a consequence of
Demand Profile / Service Level / LT / Review Time / MOQ* = “right” inventory level









*minimum order quantity

Inventory level strategy

Conflicting interests: Production wants high levels of inventory to protect themselves, but to keep investment down virtually no inventory would be ideal

Demand analysis:

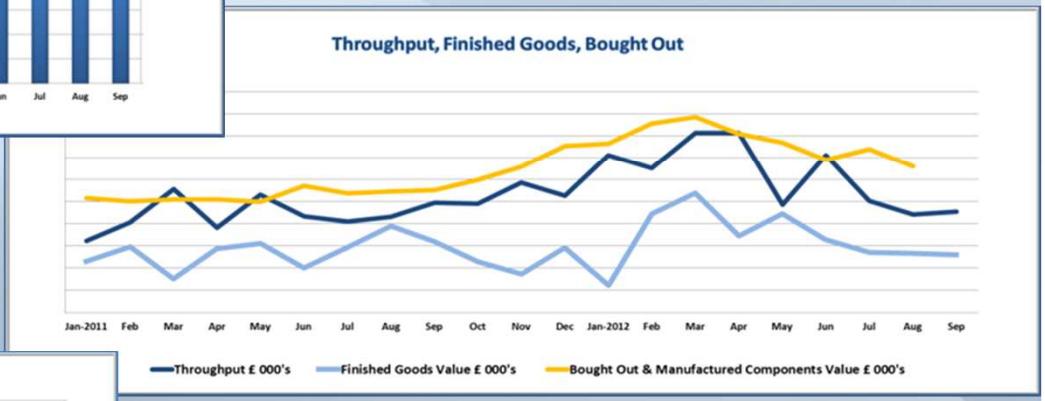
performed on Manufacturing data. The analysis uses a software utilising statistical tools.

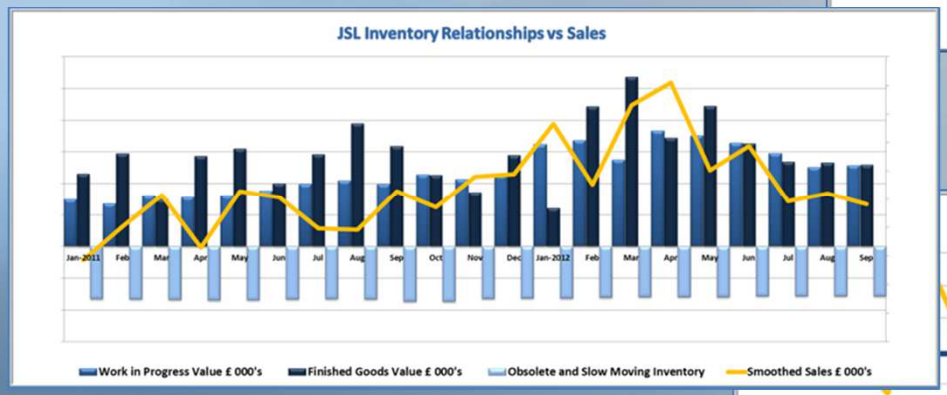
Summary

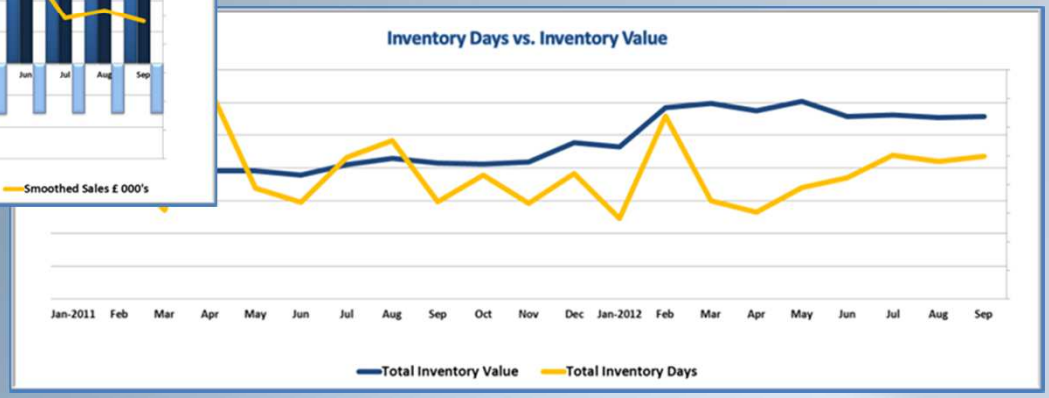
Demand Class	No of Part Numbers	No of Part Numbers as %	Average Demand	Average Demand as %	Average Stock	Recommendation
Normal	848	12.9%	38057	71.3%	31327	**inventory is recommended for these items**
Erratic	1218	18.6%	10664	20.0%	17573	**inventory for these items is recommended**, as long a the coefficient of variation is not 'High2'
Lumpy	1287	19.6%	3605	6.8%	10420	**not recommend as make to stock**
Management Control	3197	48.8%	975	1.8%	7893	**not recommend as make to stock**
New	4	0.1%	55	0.1%	96	
Total	**6554**	**100.0%**	**53356**	**100.0%**		
No Demand in Period	422					

Inventory and Demand Analysis:

Inventory: comparing different factors to extract relationships between them.





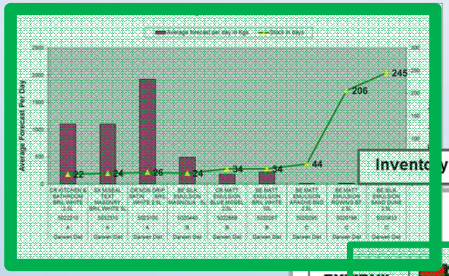


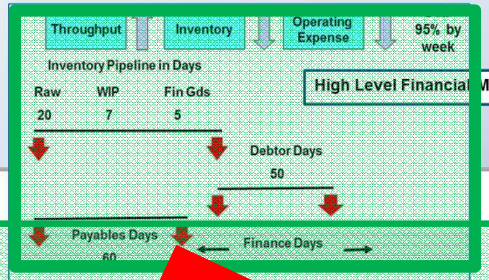
Sometimes this analysis reveals significant insights, other times, like in this case, only confirms the validity of the current system.

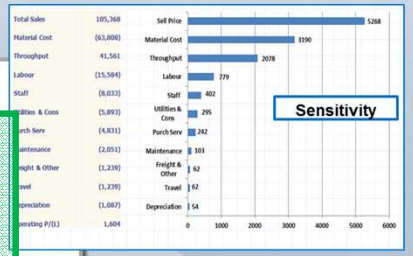
What does the inventory tell us about the usage of capacity?

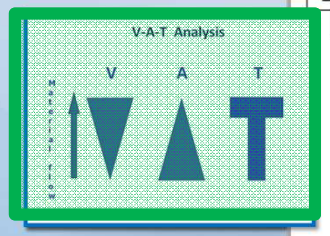
- The “ideal” would be for production to make in exactly the same lot size as the customer requests and in exactly the sequence that customers requires
- However production processes are rarely, if ever, as flexible as demand is variable
- So production processes often have to aggregate into batches and may change sequence of the order book in order to make what customers want in the lead time they require
- The consequences of that is extra work in progress and / or finished goods
- So by examining these two types of inventory it is possible to begin to understand how well capacity is being deployed
- Other influences might be reducing the flexibility of production e.g. perceptions that unit costs are reduced if batches become bigger or any sort of local efficiency measure

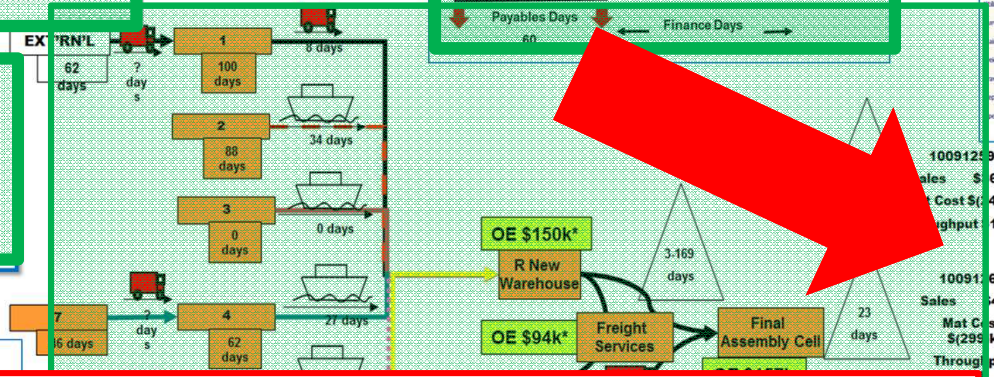
Flow Accounting Assessment

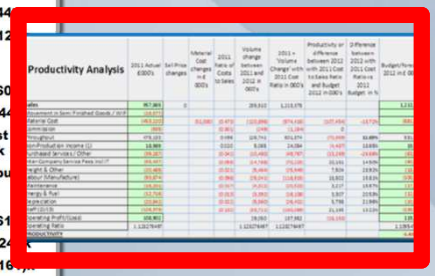


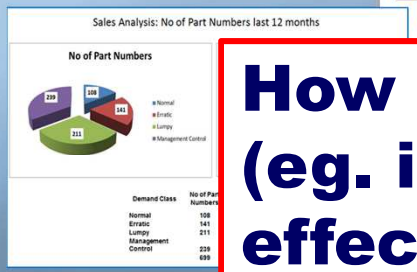




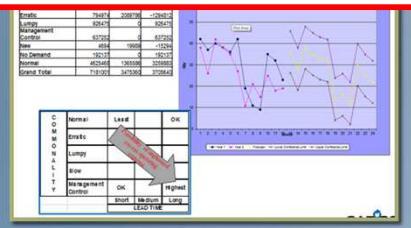


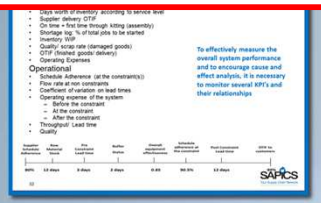


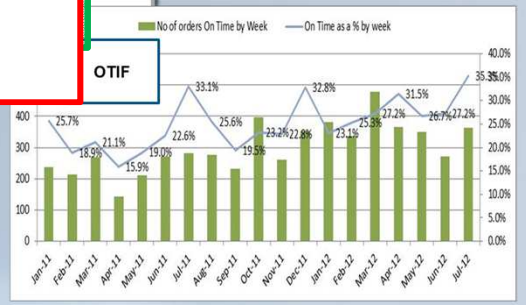




How will changes to status quo (eg. increased material cost) effect the whole system?







Productivity Analysis

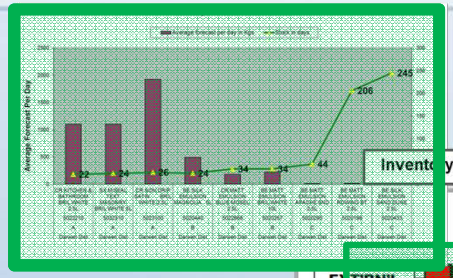
Productivity Analysis	2011 Actual £000's	Sell Price changes	Material Cost changes in £ 000's	2011 Ratio of Costs to Sales	Volume change between 2011 and 2012 in 000's	2011 + 'Volume Change' with 2011 Cost Ratio in 000's	Productivity or difference between 2012 with 2011 Cost to Sales Ratio and Budget 2012 in 000's	Difference between 2012 with 2011 Cost Ratio vs 2012 Budget in %	Budget/Forecast 2012 in £ 000's
Sales	957,865	0			255,510	1,213,375			1,213,375
Movement in Semi Finished Goods / WIP	(28,577)								0
Material Cost	(453,220)		(51,000)	(0.473)	(120,896)	(574,416)	(107,454)	-18.72%	(681,870)
Commission	(935)			(0.001)	(249)	(1,184)	0		0
Throughput	475,133			0.496	126,741	601,874	(70,369)	11.69%	531,505
Non-Production Income (1)	18,989			0.020	5,065	24,054	(4,487)	18.65%	19,567
Purchased Services / Other	(39,287)			(0.041)	(10,480)	(49,767)	(13,269)	-26.66%	(63,036)
Inter-Company Service Fees incl IT	(55,437)			(0.058)	(14,788)	(70,225)	10,181	14.50%	(60,044)
Freight & Other	(20,485)			(0.021)	(5,464)	(25,949)	7,504	28.92%	(18,445)
Labour (Manufacture)	(93,874)			(0.098)	(25,041)	(118,915)	18,802	15.81%	(100,113)
Maintenance	(16,201)			(0.017)	(4,322)	(20,523)	3,217	15.67%	(17,306)
Energy & Fuel	(12,716)			(0.013)	(3,392)	(16,108)	3,307	20.53%	(12,801)
Depreciation	(20,842)			(0.022)	(5,560)	(26,402)	5,798	21.96%	(20,604)
Staff (2)/(3)	(126,378)			(0.132)	(33,711)	(160,089)	21,165	13.22%	(138,924)
Operating Profit/(Loss)	108,902				29,050	137,952	(18,153)		119,799
Operating Ratio	1.128276497				1.128276497	1.128276497			1.109547942
PRODUCTIVITY									-1.6599%

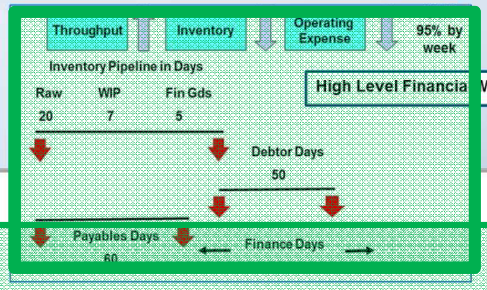
The Productivity Analysis compares 2 accounting periods with each other (P&L statements), assuming the same **ratio** between sales and the different cost factors stays identical for the time periods compared.

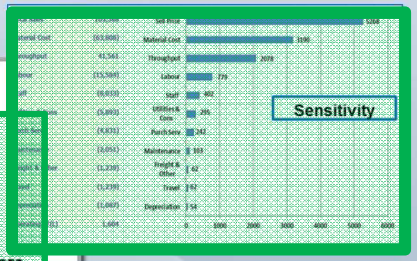
It can be used to understand

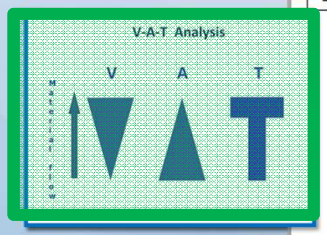
- How changes (external + internal) effect the organisation
- How realistic budget expectations are
- Monitor CI activities and where to initiate them to achieve budget

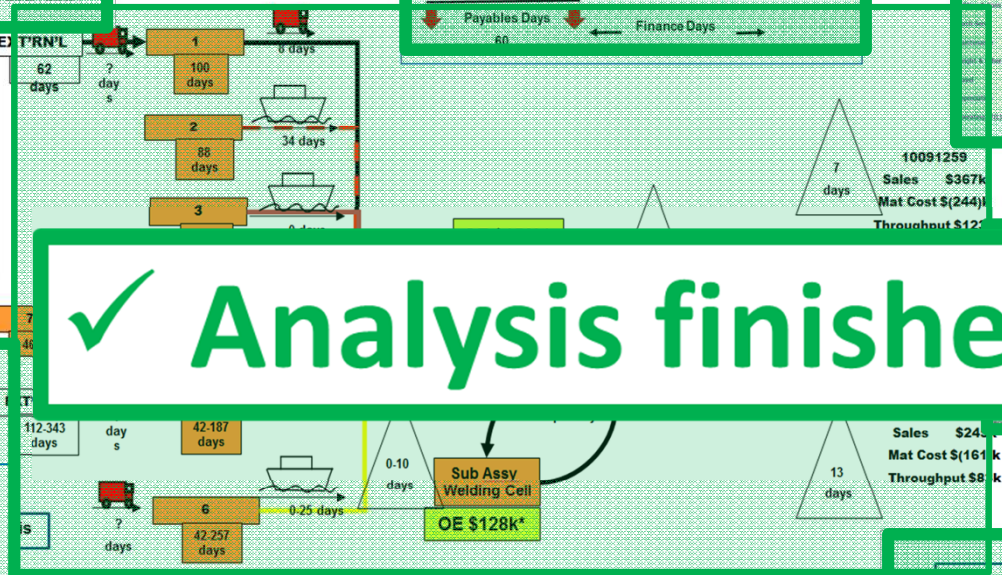
Flow Accounting Assessment



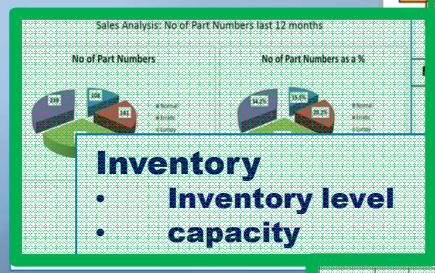


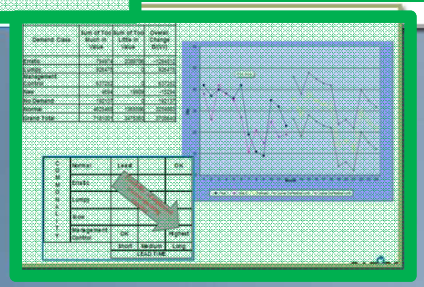


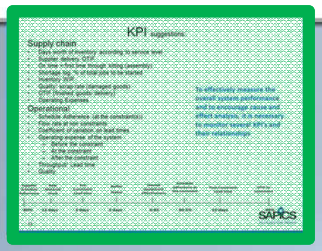


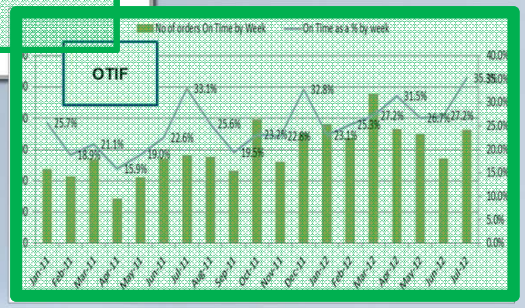


✓ Analysis finished









Key points from the Flow Accounting Assessment / BPFM:

The Current State Analysis:

- Shows the amount of inventory in the system in days worth, which, together with TH & OE shows the “weakest link” in the analysed unit and, combined with the demand analysis, indicates ideal inventory levels, hence how much the inventory (£/$) could be reduced.

- It provides further an understanding of cash flow (high level map), the driving cost factors (sensitivity analysis) and a more detailed appreciation of the systems capabilities (OTIF, productivity analysis).

- All the results combined inform the development of the Future State.

Summary Flow Accounting Assessment

- Companies make profit by the difference between total revenues and total costs
- The BPFM establishes an analysis which considers the different aspects influencing the overall performance.
- This analysis provides data to take informed decisions whether to change the status quo or not and provides methods to establish and weigh different scenarios and their impact on the bottom line.
- The target is to clarify the different influencing factors as the aim will always be to choose the best possible trade-offs to run a business as successfully as possible. And this choice will always be specific to the individual company.
- Overall the Flow Accounting Assessment is a method to analyse and interpret accountancy data in an alternative way to the standard cost accounting approach, which can result in a different understanding of the business and clear identified improvement opportunities.