

Demand & Supply Planning (S&OP)

from the perspective of a production site

Best Practice Summary

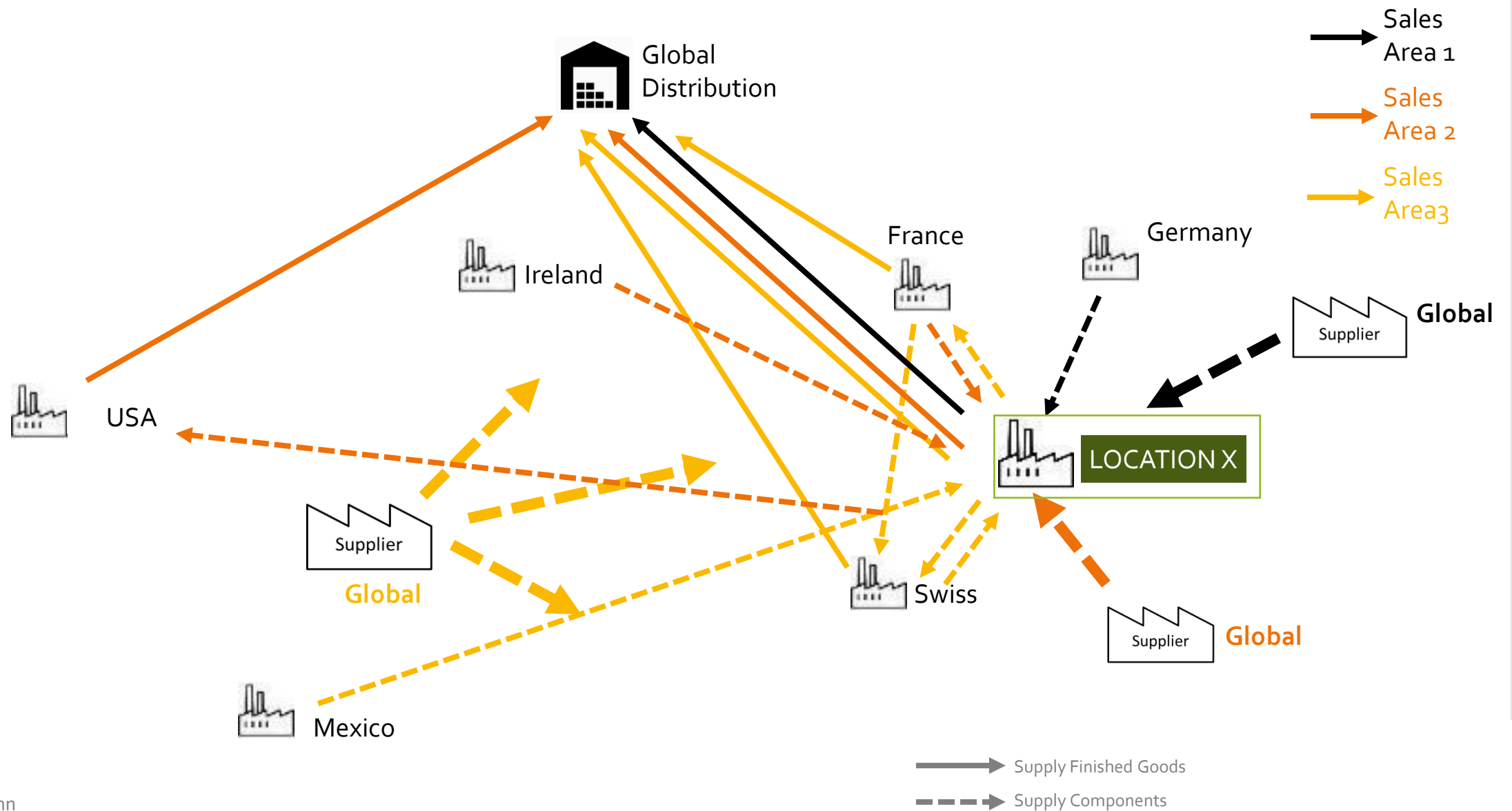
November 2019

Christian Jahn (MBA / CSCP)

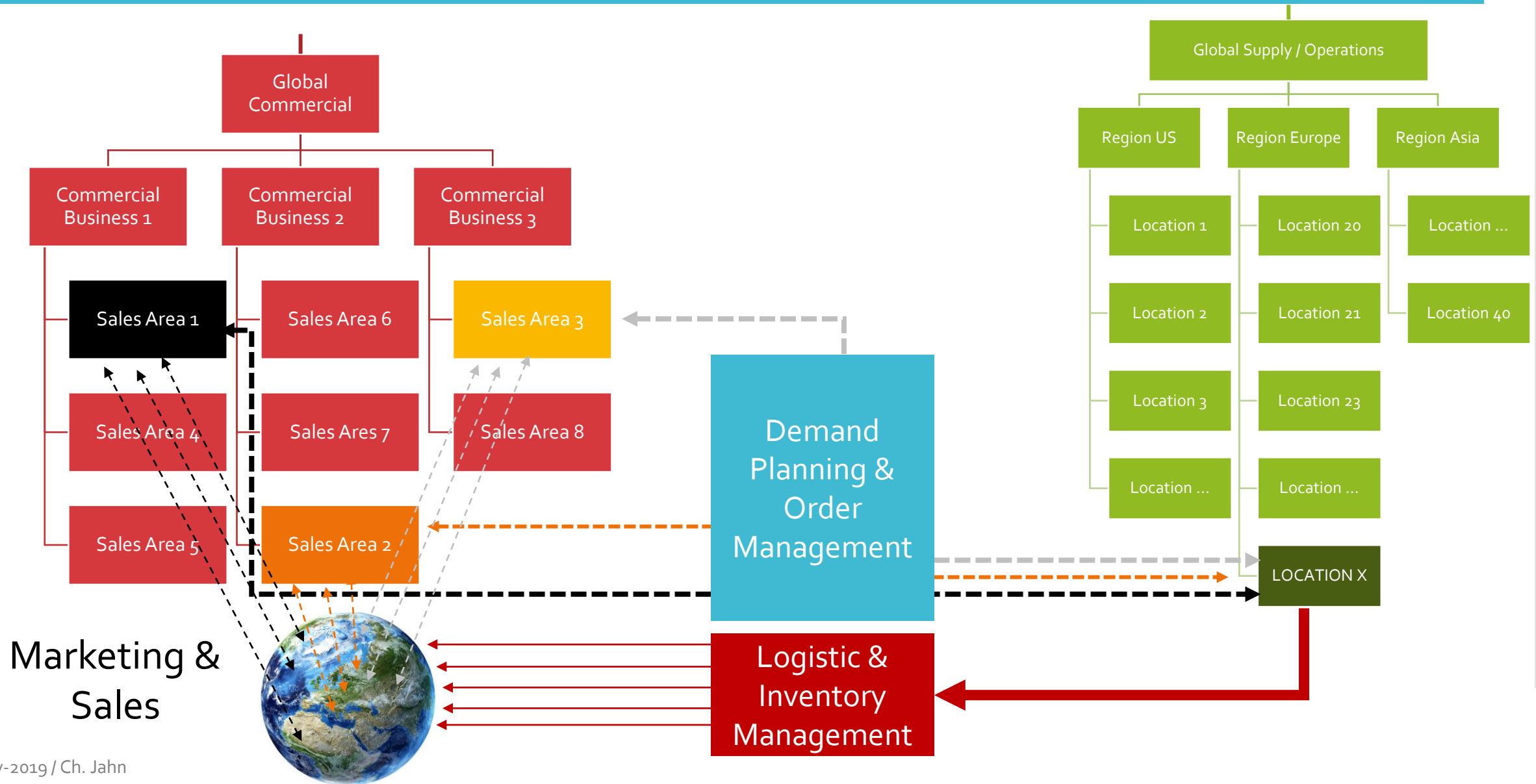
Target

Implementation and management of an integrated Demand & Supply Planning Process in a complex supply and organizational network

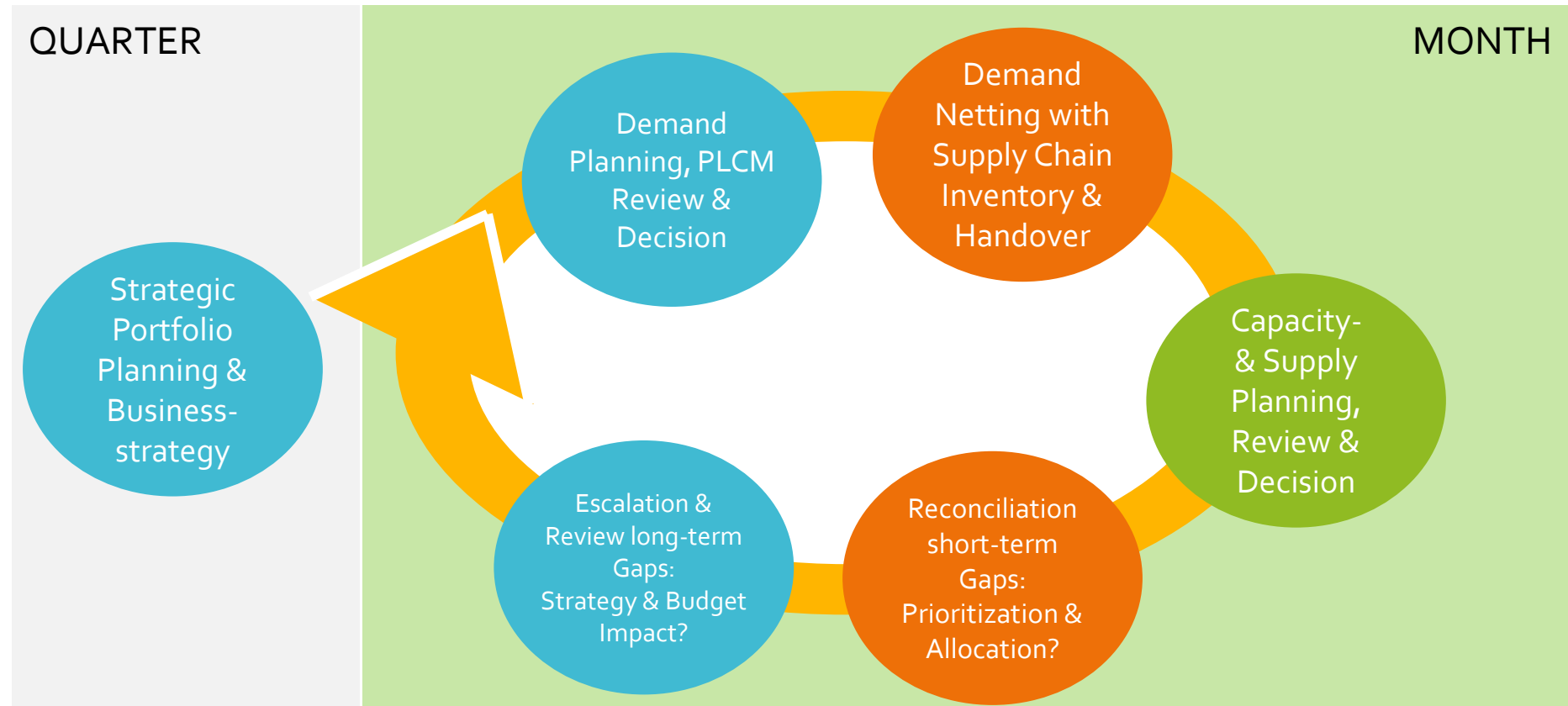
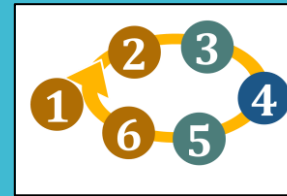
Complexity within Supply (illustrative)



Complexity within Organisation (illustrativ)



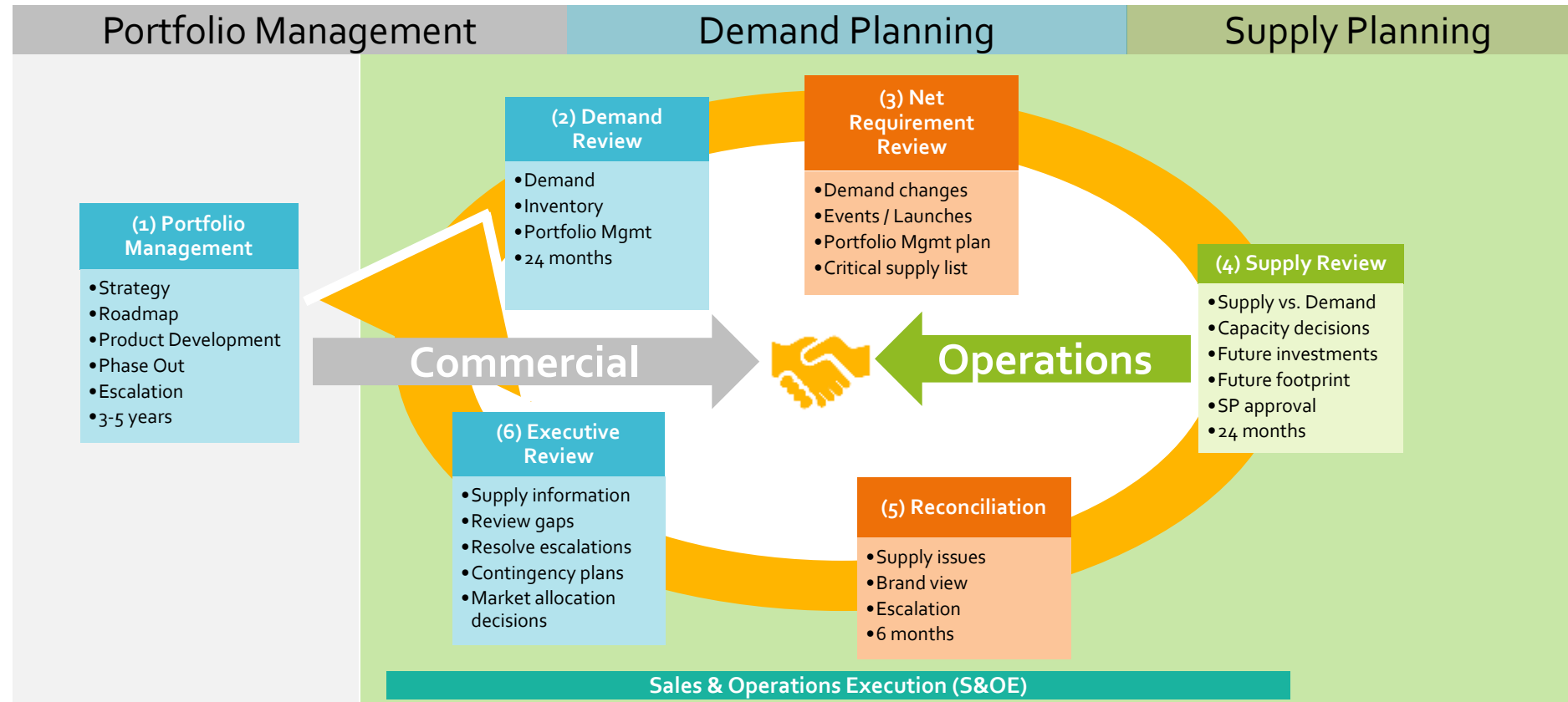
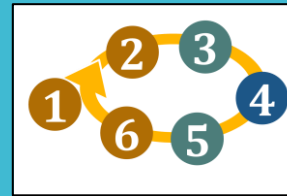
The **integrated** S&OP Cycle – in general



Reference: Sales & Operations Planning – T. F. Wallace / R. A. Stahl

The S&OP Result

“Handshake Demand & Supply”



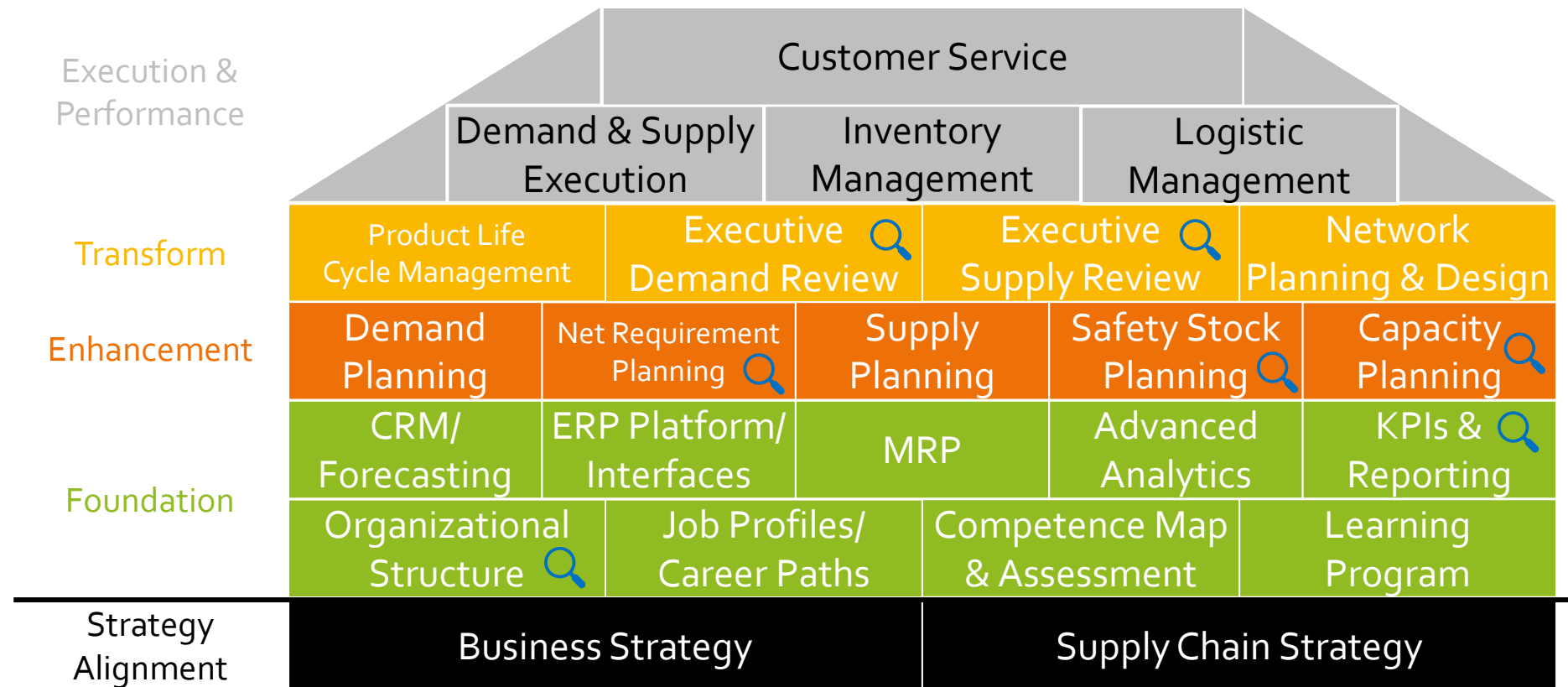
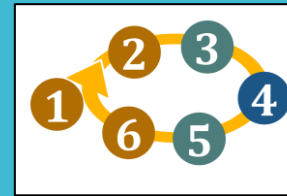
Reference: Sales & Operations Planning – T. F. Wallace / R. A. Stahl

Best Practice Approach

- Framework
- Organizational set up
- Capabilities
- Transparency via KPIs

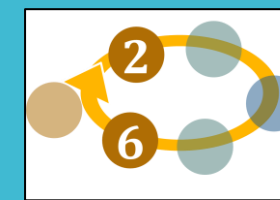
The S&OP Framework

Capabilities, Processes & Tools





The Executive Demand Review ...



Demand Error Trend by Region

L2 MONTHLY ERROR TREND

Act Orders Total L2 DF Final Total L2 Stat Total Err L2 Stat Final Total Abs Var L2 DF Total Err

Month Top 10

Product Groups

Month Top 10

Product Groups

Month Top 10

Product Groups

Agenda / Purpose

EDR

- Demand Planning Metrics / Trends
- Division Strategic Plan Summary
- Demand (NRP) Trends by Regions / Brands
- PLCM Launch Planning / Execution

EIBP

- EIBP Review & Reconciliation
 - Supply Response summary from IBPR
 - PLCM Phase Out Planning / Execution
 - Major Topics & Projects



Gain alignment on demand topics

- Demand Trends / NRP vs. Strategy
- Events, Tenders and Launches
- Reconciliation strategies between regions

L2 MONTHLY ERROR TREND

Act Orders Total L2 DF Final Total L2 Stat Total Err L2 Stat Final Total Abs Var L2 DF Total Err

Month Top 10

Product Groups

Month Top 10

Product Groups

Month Top 10

Product Groups

Month Top 10	Act Orders Total	L2 DF Final Total	L2 Stat Total Err	L2 Stat Final Total Abs Var	L2 DF Total Err	L2 DF ABS Var
Product Groups	76,589	77,015	100%	14,254	100%	14,254
	57,211	61,813	20%	12,813	20%	12,813
	47,752	57,338	31%	14,790	31%	14,790
	27,432	27,498	4%	5,105	4%	5,105
	6,239	7,145	33%	2,076	33%	2,076
	6,029	7,038	30%	1,909	30%	1,909
	2,863	2,476	19%	445	19%	445
	1,500	1,500	100%	1,500	100%	1,500
	1,074	1,199	62%	670	62%	670
	821	832	23%	187	23%	187

Month Top 10	Act Orders Total	L2 DF Final Total	L2 Stat Total Err	L2 Stat Final Total Abs Var	L2 DF Total Err	L2 DF ABS Var
Product Groups	14,625	10,407	100%	15,107	100%	15,107
	12,683	13,995	100%	12,710	102%	12,990
	5,466	6,113	40%	2,539	51%	2,814
	4,880	5,462	72%	3,533	82%	4,008
	508	850	179%	910	179%	907
	455	580	100%	435	104%	825
	218	289	81%	177	106%	252
	184	156	129%	212	112%	183
	128	133	89%	114	83%	108
	83	427	353%	241	623%	385

Month Top 10	Act Orders Total	L2 DF Final Total	L2 Stat Total Err	L2 Stat Final Total Abs Var	L2 DF Total Err	L2 DF ABS Var
Product Groups	2,337	2,018	33%	777	43%	1,014
	1,804	1,609	69%	1,236	53%	952
	1,553	1,982	76%	1,188	76%	1,188
	570	634	30%	169	30%	169
	186	267	51%	95	45%	80
	88	107	294%	259	113%	100
	63	43	39%	25	34%	22
	14	11	79%	11	64%	9
	15	37	174%	23	197%	26
	6	6	511%	19	2%	15

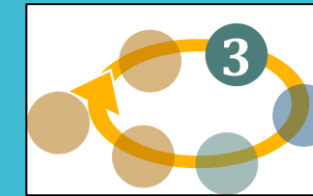
August 16, 2019

EDR / EIBPCMF

3

... is done with **Commercial** Leadership Team!

Planungs-Review und -Handshake

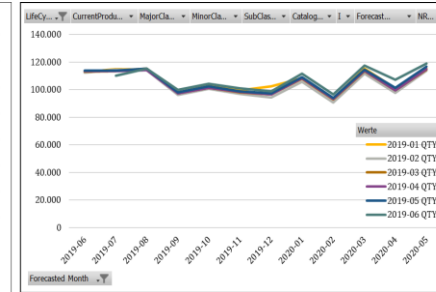
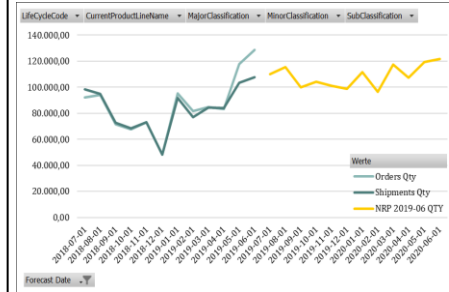


Net Requirement Review

NRP Review Selling Division (NR Group)

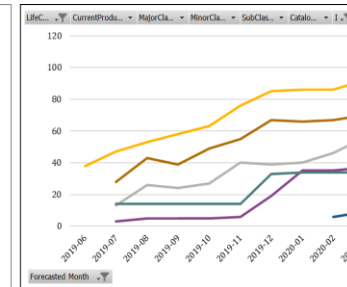
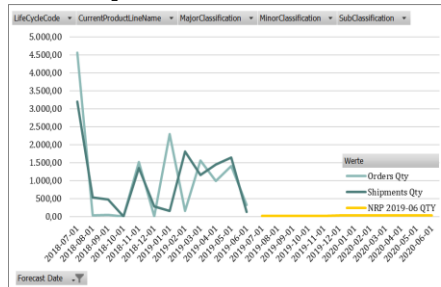
Region 1

Total



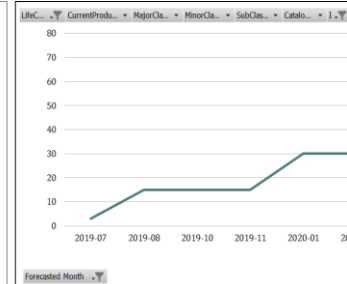
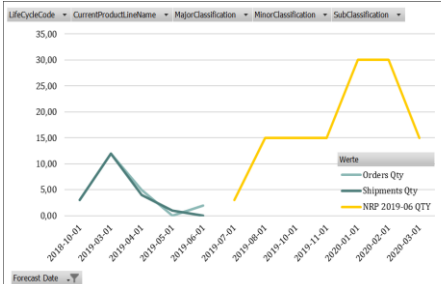
Product Group 1

No NRP Data in last Cycle?



Product Group 2

Confirm NRP increase



Supply Plan Handover

Capacity Planning												
Cell	Capacity Group	Aug. 19	Sep. 19	Oct. 19	Nov. 19	Dec. 19	Jan. 20	Feb. 20	Mrz. 20	Apr. 20	Mai. 20	Jun. 20
Plates Group 1		775	775	853	775	620	775	775	853	775	698	775
Plates Group 2		13.960	13.960	15.355	13.262	10.609	13.262	13.262	14.588	13.262	11.935	13.262
Plates Group 3		7.067	7.067	7.773	8.063	6.451	8.063	8.063	8.870	8.063	7.257	8.063
Plates Group 4		8.189	8.189	9.008	8.826	7.061	8.826	8.826	9.709	8.826	7.944	8.826
Plates Group 5		16.842	16.842	18.526	17.421	13.937	17.421	19.163	17.421	15.679	17.421	19.163
Plates Group 6		621	621	683	786	629	786	865	786	708	786	865
Plates Group 7		606	606	667	1.139	911	1.139	1.139	1.252	1.139	1.025	1.139
Plates Group 8		651	651	716	751	600	751	826	751	676	751	826
Plates Group 9		800	800	800	800	800	800	800	800	800	800	800
Plates Group 10		106	106	117	106	85	106	106	117	106	96	106
500_CMF Total		49.511	49.511	54.382	51.823	41.618	51.823	51.823	56.925	51.823	46.721	56.925
500_TRM Total		36.432	38.432	42.075	41.432	33.945	41.432	41.432	45.175	41.432	38.688	42.432

Demand Plan (Units)												
Cell	Capacity Group	Aug. 19	Sep. 19	Oct. 19	Nov. 19	Dec. 19	Jan. 20	Feb. 20	Mrz. 20	Apr. 20	Mai. 20	Jun. 20
Plates Group 1		770	610	716	616	621	666	636	719	666	776	696
Plates Group 2		15.073	12.422	14.984	13.255	13.275	14.297	13.141	15.253	14.967	14.663	16.081
Plates Group 3		7.258	6.607	6.870	6.750	7.194	8.141	6.458	7.272	8.756	7.728	8.957
Plates Group 4		9.386	7.652	8.444	7.810	8.274	9.215	8.490	9.052	9.608	9.329	10.862
Plates Group 5		16.193	15.769	14.817	15.262	13.174	16.481	15.645	17.620	17.540	16.662	20.382
Plates Group 6		502	392	364	360	394	148	141	128	195	129	118
Plates Group 7		2	0	5	0	0	0	0	0	0	5	0
Plates Group 8		785	708	658	584	556	620	576	629	669	690	813
Plates Group 9		699	777	777	777	777	777	777	777	777	777	777
Plates Group 10		85	21	9	5	38	16	14	46	33	67	39
500_CMF Total		50.668	44.937	47.635	45.414	44.265	50.345	45.864	51.450	53.178	50.849	54.999
500_TRM Total		29.841	26.319	32.214	40.858	29.645	33.753	42.936	33.662	32.895	33.674	31.553

Supply Plan - unconstrained (Units) = Capacity Required												
Cell	Capacity Group	Aug. 19	Sep. 19	Oct. 19	Nov. 19	Dec. 19	Jan. 20	Feb. 20	Mrz. 20	Apr. 20	Mai. 20	Jun. 20
Plates Group 1		1.171	902	801	680	622	750	715	740	685	777	855
Plates Group 2		29.572	27.723	27.542	24.352	23.639	26.969	26.369	26.829	26.439	27.626	32.185
Plates Group 3		10.781	10.693	9.848	10.781	10.693	9.848	10.781	10.693	9.848	10.781	10.693
Plates Group 4		18.548	17.479	17.011	18.548	17.479	17.011	18.548	17.479	17.011	18.548	17.479
Plates Group 5		25.568	24.704	22.14	25.568	24.704	22.14	25.568	24.704	22.14	25.568	24.704
Plates Group 6		1.151	952	582	1.151	952	582	1.151	952	582	1.151	952
Plates Group 7		1.264	1.261	1.259	1.264	1.261	1.259	1.264	1.261	1.259	1.264	1.261
Plates Group 8		1.238	1.235	1.22	1.238	1.235	1.22	1.238	1.235	1.22	1.238	1.235
Plates Group 9		2.201	2.341	2.16	2.201	2.341	2.16	2.201	2.341	2.16	2.201	2.341
Plates Group 10		357	369	376	357	369	376	357	369	376	357	369
500_CMF Total		91.495	87.290	82.57	91.495	87.290	82.57	91.495	87.290	82.57	91.495	87.290
500_TRM Total		39.426	41.526	43.23	39.426	41.526	43.23	39.426	41.526	43.23	39.426	41.526

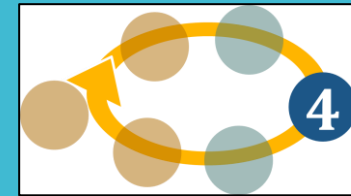
Demonstrated Capacity							
Avg. Capacity	Max. Capacity	Feb. 19	Mrz. 19	Apr. 19	Mai. 19	Jun. 19	Jul. 19
600	951	585	601	470	951	476	516
13.960	15.848	15.700	13.171	13.194	11.607	14.237	15.848
7.067	9.060	5.798	7.199	6.044	5.612	8.686	9.060
8.189	9.464	9.318	9.464	7.094	7.455	7.781	8.021
16.842	18.000	12.275	16.335	16.309	15.206	16.566	24.362
621	951	726	610	626	951	512	303
606	1.671	1.671	789	414	207	185	371
651	850	382	643	534	724	599	1.025
473	1.215	297	1.215	633	0	0	693
51	161	0	45	20	161	0	82
49.009	58.010	46.752	50.027	45.318	42.713	49.042	60.199
31.735	43.840	37.360	32.230	31.863	34.756	26.435	27.767

Inventory (Units)											
Aug. 19	Sep. 19	Oct. 19	Nov. 19	Dec. 19	Jan. 20	Feb. 20	Mrz. 20	Apr. 20	Mai. 20	Jun. 20	Jul. 20
578	778	791	862	775	773	846	848	864	738	769	764
9.226	11.795	13.308	13.990	11.609	11.043	12.660	12.776	11.252	8.068	6.292	6.079
6.398	7.470	9.000	10.071	10.214	10.029	10.608	10.284	10.346	10.164	9.868	10.166
5.757	6.915	9.006	11.175	10.686	11.506	13.363	14.842	15.282	14.575	13.563	15.129
7.458	9.071	13.998	16.149	15.811	16.969	16.376	16.076	16.547	16.101	16.104	15.946
906	1.224	1.398	1.364	1.425	1.421	1.414	1.430	1.415	1.430	1.405	1.421
2.532	2.542	2.591	4.637	4.637	4.637	4.637	4.637	4.637	4.637	4.637	4.637
148	110	167	378	412	602	696	657	658	668	680	715
11	184	357	230	353	276	449	322	495	418	591	464
524	502	493	488	450	434	420	374	341	274	239	217
33.014	40.089	50.616	58.856	55.922	56.356	61.049	61.872	61.496	56.799	53.909	55.321
25.736	30.757	32.816	24.274	26.753	29.948	22.716	25.726	27.058	28.884	31.396	34.153

Supply Plan - constrained (Units)												
Aug. 19	Sep. 19	Okt. 19	Nov. 19	Dec. 19	Jan. 20	Feb. 20	Mrz. 20	Apr. 20	Mai. 20	Jun. 20	Jul. 20	
903	810	729	687	534	664	709	721	682	650	749	691	
14.283	14.991	16.497	13.937	10.894	13.731	14.758	15.369	13.443	11.479	14.305	15.543	
							6.948	8.818	7.546	8.661	9.248	
							10.531	10.048	8.622	9.850	10.652	
							17.320	18.011	16.306	16.665	20.224	
							144	180	144	104	134	
							0	0	5	0	1	
							590	670	700	825	810	
							650	950	700	950	650	
							0	0	0	5	0	
							52.273	52.802	46.152	52.109	57.953	
							36.672	34.227	35.500	34.065	35.679	

- Same Data, but 2 Views
- (1) Product- / Demand-Planning Groups
 - (2) Capacity- / Supply-Planning Groups

The Executive Supply Review ...



Objectives of the Executive Supply Review

- **Review & looking forward** – *deliver visibility on supply* – accept or modify the provide requests and/or suggestions
- **Make decisions** by the decision makers , based on *delivered scenarios*, about each product family or brand where required
- **Authorize changes** in production or procurement rates, where significant costs or other consequences are involved, *orchestrated by supply planning*
- **“Break the ties”** for areas where the supply planning team was unable to reach consensus – discussions and *deep dives are based on exceptions*
- **Confirm supply plan** and decide to address adjustments of the supply plan in or the business plan of the division, if needed – agree and commit to action items by the different stakeholders
- **Review performance & issues** regarding service, product launches, capacity constraints, special projects and other issues
- **Review and change** where appropriate existing policies and strategies with regard to balancing demand and supply

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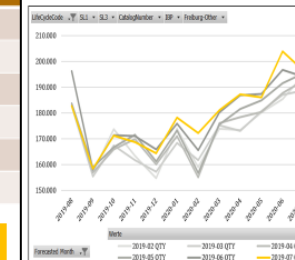
<Franchise> Executive Summary of KPIs

Area / Plant / Powerbrand	Product availability YTD / MTD	Back Order Value COGS \$ YTD / MTD	Supply Plan Attainment	Safety Stock Health	Capacity Utilization	Comment
Total Network	99,1% / 98,2%	750k / 400k	80%	92%	80%	---
<Location>						
<Location>						
<Location>						
<Location>						

- Comment A
- Comment B
- Comment C

August 14, 2019

<Franchise> Key Demand Changes versus last ESR



Power Brand	Key Changes next 3 months	Key Changes Next 12 months	Demand Trend Changes FY from Last ESR
Brand A	Volume up 10% - 3'500 units	Volume up by 4% (3'500 units), 15% growth total	2% 4% 2% 2% 0% -2m -1m Cur. m
Brand B	Volume up 7% - 3'000 units	Volume up by 6% (10'000 units), 18% growth total	10% 3% 3% 0% 0% -2m -1m Cur. m

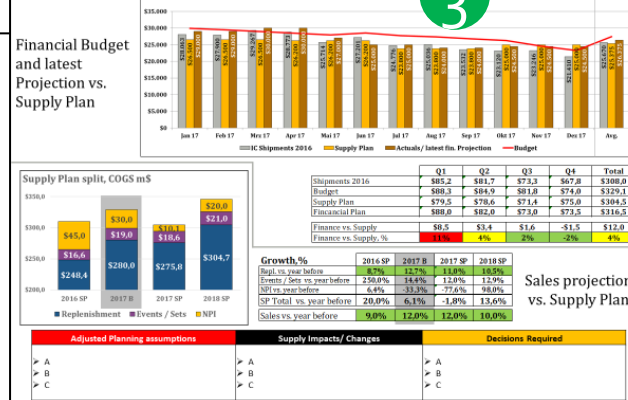
Key Implications

Comments, Root Causes to major changes

August 14, 2019

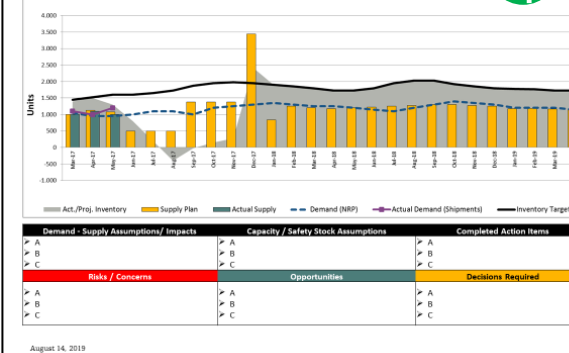
13

<Vt.Org.> – Financial alignment



Sales projection vs. Supply Plan

<Location>: <Issue summary, decision ask>



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Decisions Review – check step

Franchise	Plant / Supplier	Decision Required	Owner	Due Date	Validation Required at EIBPR Y/N
CMF	Freiburg	Decision Request Summary - APPROVED	Name	DD-MM-YY	Y
T&E	Stetten	Decision Request Summary - REJECTED	Name	DD-MM-YY	N

August 14, 2019

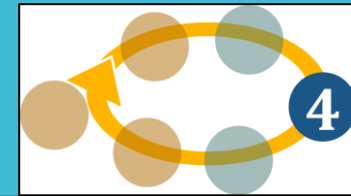
Approved, decision made Not approved, follow up needed

21

- (1) KPI Summary
- (2) Forecast Trend / Veränderung
- (3) Financial Alignment
- (4) Gaps, Diskussion, Entscheidung
- (5) Dokumentation & Tracking

... is done with **Operations** Leadership Team!

Capacity Planning (3-6 months)



Plant Capacity : Value Stream Overview

1

VtOrg2 Screws



Annual Volume	xxxxxx
Annual COGs (\$m)	\$ XXm
% Plant COGs	xx%

Power Brands:

- A
- B
- C

VtOrg2 Plates



Annual Volume	xxxxx
Annual COGs (\$m)	\$ XXm
% Plant COGs	xx%

Power Brands:

- A
- B
- C

VtOrg1 Instruments



Annual Volume	xxx
Annual COGs (\$m)	\$ Xm
% Plant COGs	x%

Power Brands:

- A
- B
- C

VtOrg3 Procurement



Annual Volume	xxx
Annual COGs (\$m)	\$ Xm
% Plant COGs	

Power Brands:

- A
- B

Value Stream Name: Capacity & Inventory Strategy

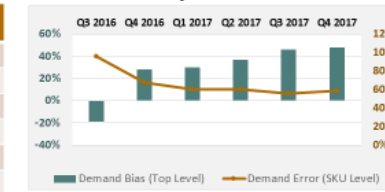
2

Growth Rates

Year	Actual Growth Rate	IBP Forecasted growth rate	Capacity Planning assumed growth
2016	Xx%		
2017	Xx%		
2018		Xx%	Xx%
2019		Xx%	Xx%
2020			Xx%
2021			Xx%

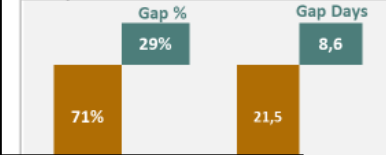
• Comment

Demand Reliability over time

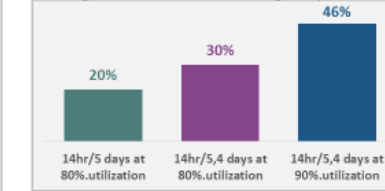


• Comment

Safety Stock Health



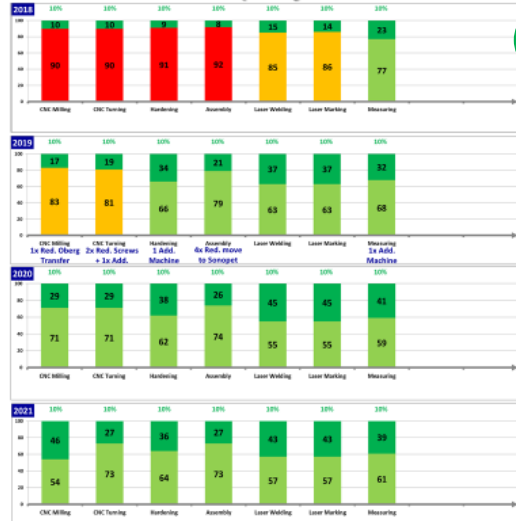
Sales growth scenarios V's capacity utilization



Targeting a 2 shifts/5 days strategy at 80% utilization to support 20% demands growth. Currently operating in a 14hrs/5 days modus.

Value Stream Name: Capacity Utilization

3



Legend: Spare/Spurge Capacity, < 80% Utilization, 80% - 90% Utilization, >= 90% Utilization, CER Approved, 2 shifts

Value Stream Name: Financial Summary and SPOR

4

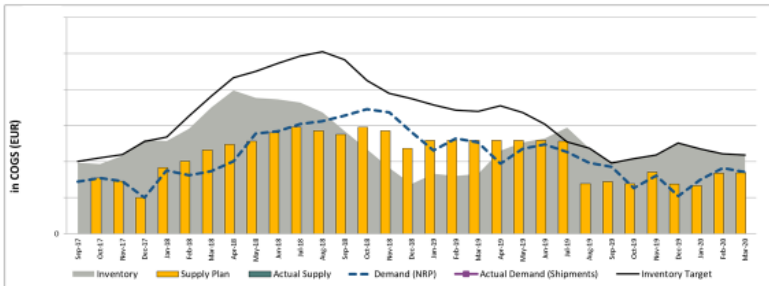
Recommendation for Approval

- Investment strategy based on X shifts / X days week
- Inventory target: X weeks stock on hand
- Targeting xx% maximum capacity utilization on 14/5
- CERs approved:
 - 2018: CNC Turning, Measuring Equipment
 - 2019: Hardening Equipment
- CERs required:
 - 2019: CNC Turning, Measuring Equipment

Financial Summary (USD Millions)

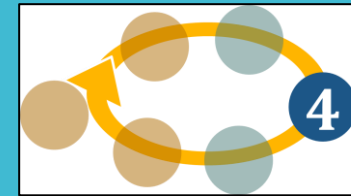
Current Year	Annual Growth	x%	Depreciation Cycle (Years)	10
COGs (\$M)	\$xx			
YEAR	2018	2019	2020	2021
CERs Approved	\$x,x	\$x,x		
CERs In Progress				
CERs Required		\$x,x		
Total CER (\$M)	\$x,x	\$x,x	\$x,x	\$x,x
COGs Estimate ***	\$xx	\$xx	\$xx	\$xx
CER COGs Impact (%)	0,5%	0,2%	0,0%	0,0%

*** COGs estimate based on scenario of flat COGs-to-COGs with applied % growth



- (1) Value Stream based
- (2) 3+ Years into the future
- (3) Bottleneck management and Investment planning
- (4) Business Plan/ Budget Input and Management Approval

Safety Stock Review (6 months)



- (1) ABC / XYZ Segmentation and Service Level Targets
- (2) PLC / Forecast Parameter
- (3) Standardized Calculation
- (4) Management Approval

1

Description	ABC-XYZ	Service level target (%)
(A) 80% GOGs: (X) High Predictable	AX	98
(Y) Moderate Predictable	AY	98
(Z) Low Predictable	AZ	98
(B) 16% GOGs: (X) High Predictable	BX	98
(Y) Moderate Predictable	BY	98
(Z) Low Predictable	BZ	98
(C) 4% GOGs: (X) High Predictable	CX	98
(Y) Moderate Predictable	CY	98
(Z) Low Predictable	CZ	98

Weighted SL target % (units) 98,0

Previous safety stock value \$
New safety stock value \$
Change in Safety Stock \$

Demand Variability	CoV <0.25	CoV .25 to .75	CoV >0.75
Monthly Spend	X	Y	Z
80% COGs \$	AX 80% COGs High Predictable	AY 80% COGs Medium Predictable	AZ 80% COGs Low Predictable
16% COGs \$	BX 16% COGs High Predictable	BY 16% COGs Medium Predictable	BZ 16% COGs Low Predictable
4% COGs \$	CX 4% COGs High Predictable	CY 4% COGs Medium Predictable	CZ 4% COGs Low Predictable

CoV of Forecast Error = Std Dev of Monthly Fc Error / Average Monthly Demand

- (X) CoV of Forecast Error < 0,25
- (Y) CoV of Forecast error is 0,25 to 0,75
- (Z) CoV of Forecast Error > 0,75

2

Active (Y/N) :

YES

YES

NO

Segment Name :

Product Life Cycle

Forecast Bias

Seasonality

Capital item

2

Correction Factor	List setting	Correction Factor	List setting	Correction Factor	List setting	Correction Factor	List setting				
Low <- Part criticality -> High	1,1	HIGH	High <- Part cost -> Low	1,1	HIGH	LOW <- Seasonality -> HIGH	1,1	HIGH	LOW <- Capital item -> HIGH	1,1	HIGH
	1	MEDIUM		1	MEDIUM		1	MEDIUM		1	MEDIUM
	0,9	LOW		0,9	LOW		0,9	LOW		0,9	LOW

Segment listing

Please Select

Product Life Cycle

Forecast Bias

Market Info

Seasonality

Capital item

What is the MIN allowable safety stock target per sku (in weeks of forecast)

4

4.3 wks is 1 month

What is the MAX allowable safety stock target per sku (in weeks of forecast)

26

52 wks is 1 year

What additional inventory is required to cover planning or scheduling uncertainty (in WEEKS of forecast)

1

4.3 wks is 1 month

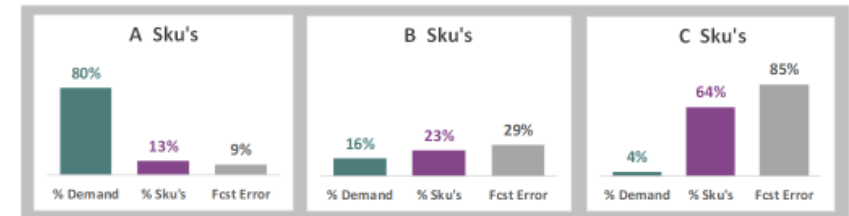
Segment listing
Please Select
Product Life Cycle
Forecast Bias
Market Info
Seasonality
Capital item

What is the MIN allowable safety stock target per sku (in weeks of forecast) 4
4.3 wks is 1 month
What is the MAX allowable safety stock target per sku (in weeks of forecast) 26
52 wks is 1 year
What additional inventory is required to cover planning or scheduling uncertainty (in WEEKS of forecast) 1
4.3 wks is 1 month

<Location> Summary

Inventory Correction (\$M)	\$0,91	Weighted % Service Level	98%	Min Wks (floor)	4	SKU summary (change in SS)		
Safety Stock Delta (\$M)	\$0,82	Forecast % Error (MAPE):	18%	Max Wks (ceiling)	26	1444	950	978
Override Value (\$M)	\$0,00							

Segmentation		Expected = Safety + Cycle		\$ Value (Millions)			Weeks of Demand (forecast)		
ABC	Nbr of Parts	\$M Current Available Inventory	\$M New Expected Inventory	Current Safety Stock \$	New Safety Stock \$	Cycle Stock Value (Lot/2)	Current SS as wks of sales	New SS as wks of sales	Cycle Stock as wks of sales
A 80% COGs	433	\$ 2,17	\$ 3,62	\$ 2,85	\$ 3,24	\$ 0,38	4,7	5,3	0,6
B 16% COGs	786	\$ 0,94	\$ 1,27	\$ 0,69	\$ 0,96	\$ 0,31	5,7	7,9	2,6
C 4% COGs	2.153	\$ 1,63	\$ 0,76	\$ 0,22	\$ 0,38	\$ 0,38	7,2	12,6	12,4
Totals	3.372	\$ 4,73	\$ 5,65	\$ 3,76	\$ 4,58	\$ 1,07	5,0	6,0	1,4

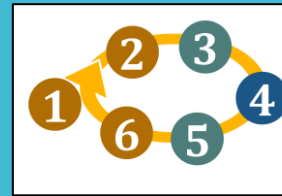


4

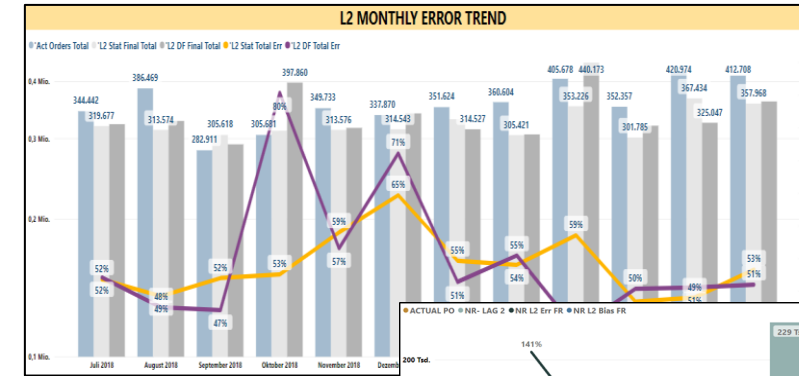
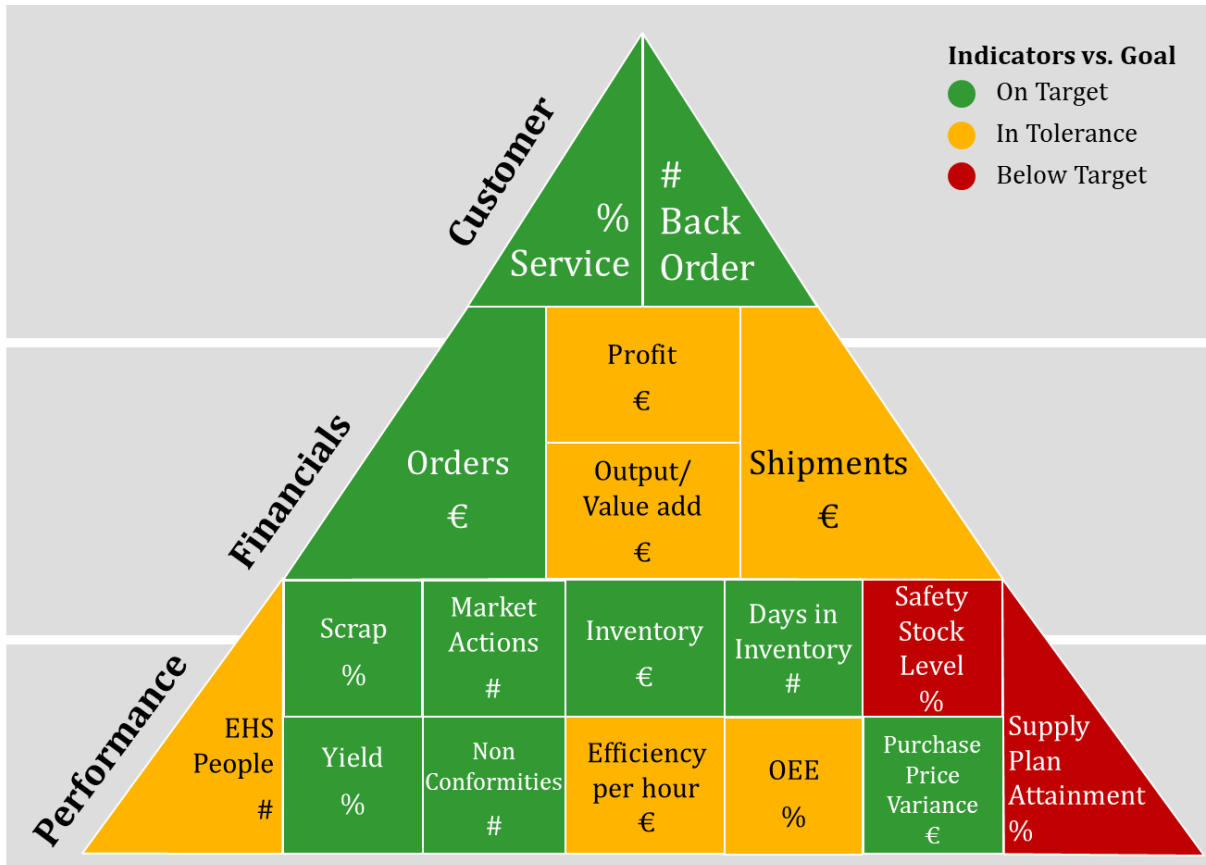
3

ADD DATA		CLEAR DATA from																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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KPIs & Reporting ...



Business Performance



Demand Planning Accuracy

NRP Accuracy

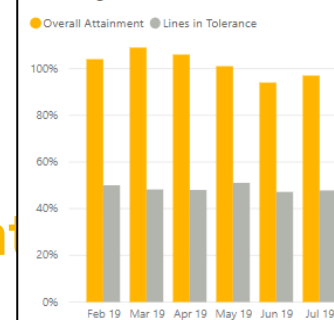
Supply Plan Attainment

Franchise	Overall Attainment	Lines in Tolerance
	100%	47%
	99%	44%
	97%	69%
	97%	58%
	96%	57%
	95%	26%
	93%	53%
	88%	42%
	87%	

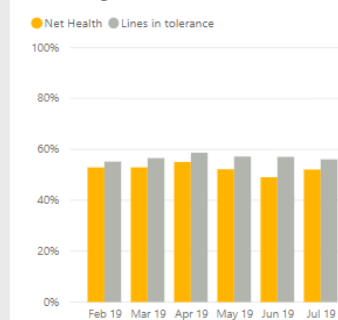
Safety Stock Health

Franchise	Below Target	Net Health	Lines in Tolerance
	41%	68%	59%
	24%	60%	29%
	6%	58%	65%
	12%	57%	45%
	13%	55%	74%
	48%	54%	40%
	27%	44%	57%
	13%	43%	58%
	51%	28%	26%

SPA by Month



SSH by Month

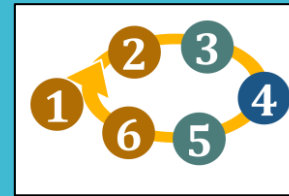


Execution Performance

... supports the Supply Chain **Transparency**,
Management **Decisions** and **Change Management**

Demand & Supply Planning (S&OP)

Summary



- A true S&OP Cycle is a real **value add**
- Alignment with **Company Strategy** and **Customer Focus** is key for success
- Long term **Change Management** for the whole organization
- Senior Management support is **decisive for success**
- Development of the „House of Capabilities & Tools“ **suitable** to the company
- Integration in or **Replacement** of existing Decision-making processes is needed

Author

Introduction summary

Christian Jahn

Diplom-Betriebswirt (BBA) – DHBW Lörrach

MBA (Business Integration) – Julius-Maximilians-University Würzburg

Certified Supply Chain Professional (CSCP) – APCIS

Chief Technology Manager (CTM) – WZL RWTH Aachen & Fraunhofer IPT

SAP Certified Business Associate (ERP 6.o)

Professional Background

- Supply Chain Management, Planning & Execution
- Operations & Plant Management
- Business Process Development, Implementation & Validation
- ERP & IT Solutions
- Quality Management
- 20+ years in Metal Processing & Medical Device Industry

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