Implementing TOC in MTO Environment – My Experience

Arun Raychaudhuri

Agenda

- My organization in Brief
- Introducing the Implementation Environment
- Challenges in Selling the Concept
- Implementation Summary
- Results Achieved
- Q&A

About My Organization

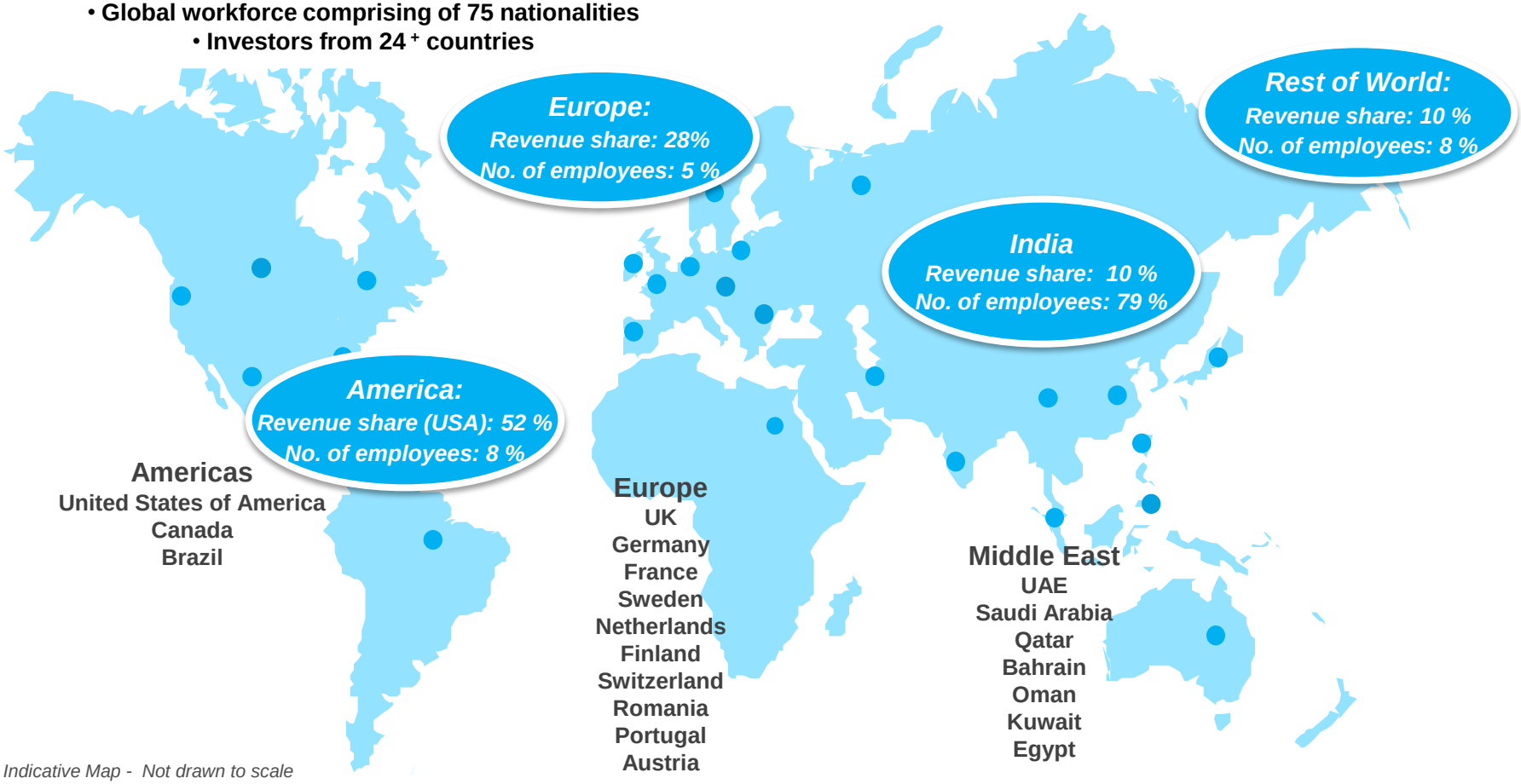
Fifth International TOCPA Conference

6-7 April, 2013, Pune, India

WIPRO – Today…

Global Leader in ADM, BPO Services, Consulting, & IT

- Presence in 57 countries
- Global workforce comprising of 75 nationalities
- Investors from 24 + countries



Indicative Map - Not drawn to scale

Our Exciting Journey

1945
Incorporation of Western India Vegetable products ltd

1980
Wipro enters the IT hardware business

1984
Wipro enters the IT software Business

2000-01
Wipro listed in the NYSE and enters the BPO business

2011-12
$7.37 billion* organization serving customers across the globe

*IFRS figures (2011-12)

Our Business Units

IT Products & Services IT, BPO, R&D Services, Consulting Services	Consumer & Institutional Products	Infrastructure Engineering
Wipro Technologies US, Europe, Japan, Australia, Africa & South-East Asia **Wipro Infotech** India & Middle East	**Wipro Consumer Care & Lighting** Personal Care, Baby Care & Wellness Products; Lighting; Furniture & Switches	**Wipro Infrastructure Engineering** Hydraulic Cylinders, Tipping Solutions, Pumps and Valves
Revenue Contribution – 88%	**Revenue Contribution – 9%**	**Revenue Contribution – 3%**

Wipro GE Healthcare - JV with General Electric. Healthcare Equipment and Solutions Leader in South Asia. Global COE for Engineering & Manufacturing for GE Healthcare

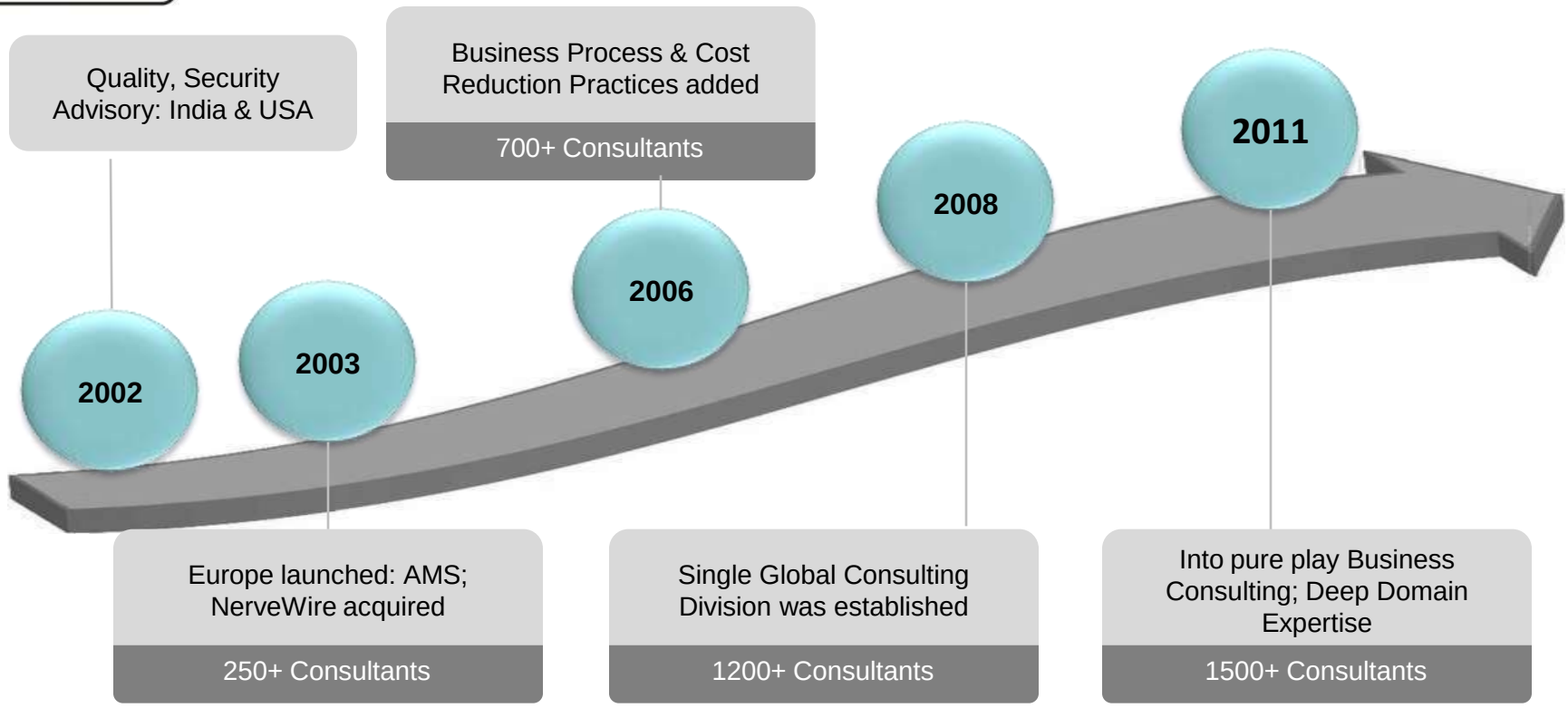
* Revenues not consolidated in Wipro Ltd revenues

Wipro Infotech Business Units

Industries

- Banking & Financial services
- Telecom
- Retail
- Manufacturing
- Healthcare
- Govt, Defence & Education
- Energy & Utilities
- Engineering, Construction, Transportation & Infrastructure

Wipro Consulting Services (WCS)

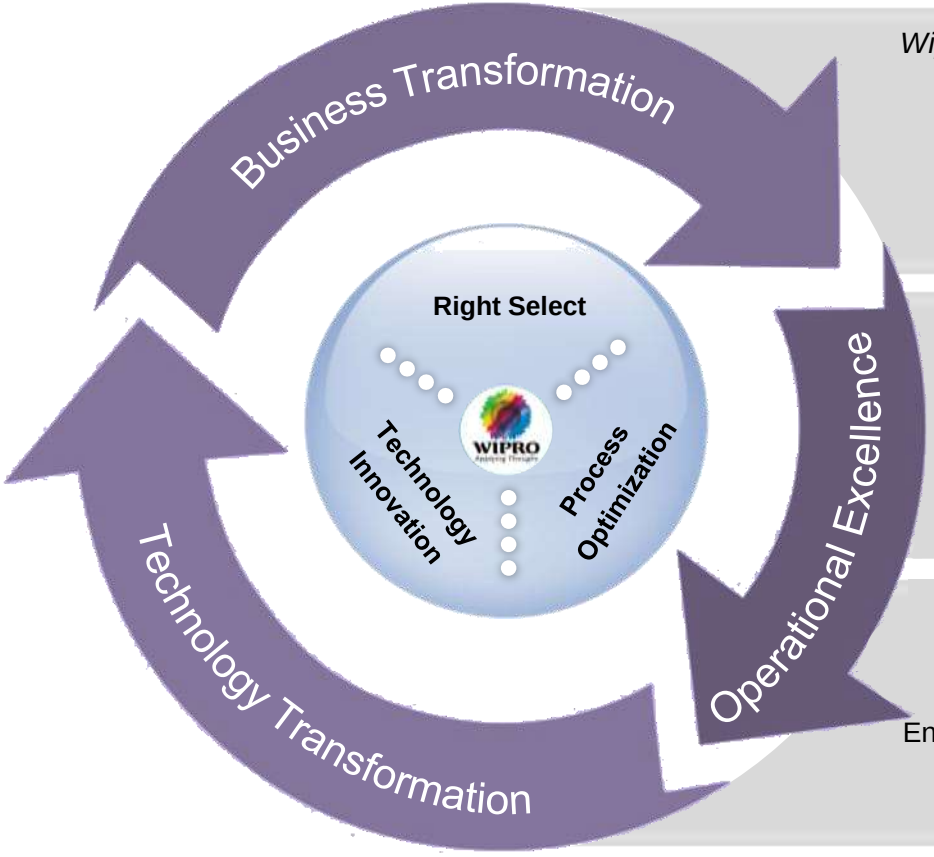


Year over Year Growth 113%

1500+ **No. of WCS Employees**

Growth in WCS Employees Over the Past 3 Years 30%

WCS Service Lines



Wipro partners with emerging businesses to help transform them into a modern organization resulting in sustainable cost reductions and increased growth

Business Operating Model Design ■ Cost and Productivity Optimization ■ Product Strategy and Design ■ Pre & Post M&A Services

Business Transformation

Wipro works with customers to increase stakeholder value by improving business lifecycle across strategy, people, process and technology

Supply Chain Management ■ Customer Relationship Management ■ Financial Management ■ Human Capital Management ■ Organization Change Management

Operational Excellence

By helping companies align their IT operations with business strategy, Wipro provides clients with increased operational efficiency, reduced costs and managed risks

Enterprise Architecture ■ Governance, Risk & Compliance ■ Process Excellence ■ Business Intelligence ■ Business Continuity Management

Technology Transformation

Business Transformation Practice

Business Transformation Practice of Wipro Consulting Services (WCS) offers consulting services to help customers to improve ***operational effectiveness***, successfully execute ***marketing & sales strategies*** and optimize ***supply chain efficiencies*** while ***leveraging new market opportunities***

Our Value Proposition

Sustained Growth
Bring specialized interventions to ensure sustained momentum of growth over a period of time

Effective Transformation
Transform the operating model to keep up with the changing needs of business landscape

Enhanced Customer Experience
Design and implement strategies to positively shape customer experience to improve revenue

Product Strategy
Maximize market opportunities by identifying the optimal products, markets, and execution strategies

About the Implementation Environment

Wipro Infrastructure Engineering

- World's largest independent hydraulic cylinder manufacturer
- Cross - continental manufacturing and design facilities
- Products : Hydraulic Cylinders, Tipping Solutions, Pumps and Valves
- Application Segment :
  - Construction & Earthmoving Equipment, Mining, Forestry, Truck Hydraulics, Material & Cargo Handling and Aerospace & Defence

Fifth International TOCPA Conference

6-7 April, 2013, Pune, India

TOCPA
Theory Of Constraints Practitioners Alliance
SHARING EXPERIENCE

WIPRO
Applying Thought

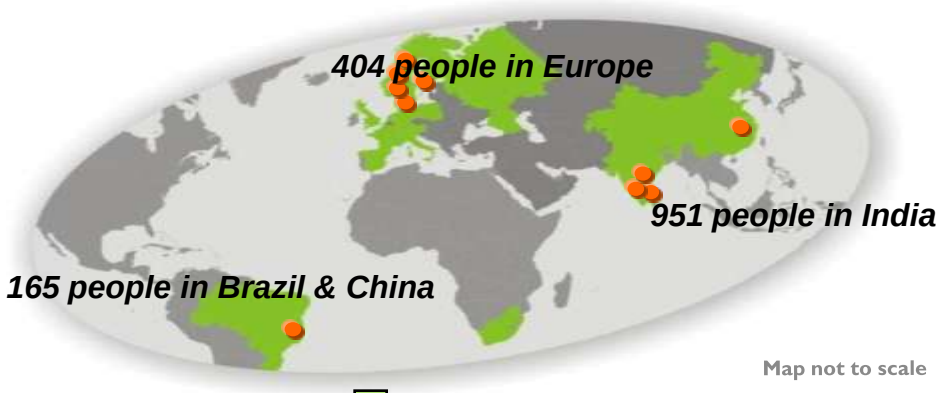
Global Presence & Partnership

AGCO Your Agriculture Company · Ashok Leyland · Atlas Copco · CARRARO · CASE · CATERPILLAR · CNH · EIMCO ELECON · HIAB · JCB · JOAB · JOHN DEERE · KALMAR · KOBELCO · KOMATSU · KRANEKS · Kubota · Mahindra · MULTILIFT · SANDVIK · SCHWING Stetter · TATA · Telcon · TEREX · Tractors India · TOYOTA INDUSTRIAL EQUIPMENT BT · VE COMMERCIAL VEHICLES A VOLVO GROUP AND EICHER MOTORS JOINT VENTURE · VOLVO

Cross Continental Presence

Manufacturing Facilities:
3 in India
1 in Finland
4 in Sweden
1 in China
1 in Brazil

Engineering - Sweden & India



Our Scope of Work – India Manufacturing

- Mostly repetitive orders – new parts not introduced very frequently
- Huge market shares in Back Hoe and Excavator, moderate in truck tipping
- Total 5 plants in scope: Small Cylinders (SCP), Medium Cylinders (MCP), Large Cylinders (LCP), Dumper Cylinders (DCP) and Piston Rods (PRP)
- Four basic categories of material get assembled into a typical cylinder – (i) Tube (ii) Piston rod (iii) Bought out items and (iv) RTA/RTU items
- About 350-400 RM items and about1280 to 1420 bought out items
- About 50 sub-contractors to take care of all outsourced job operations – lot of inward and outward movement of materials
- Competitive edge: Engineering ability to support the customer, Service Capability, Quality consistency
- Some customers want delivery in a regular fashion – MTA part of the business
- Some customer places orders occasionally and accepts a longer lead time – MTO part

Top management keen to transform the business

Challenges in Selling the Concept

Why is MTO More Difficult?

Seeing the problem in MTA environment

- 'The POS is not having the material when it is required'
- 'See what is not there in your stock – that's an indication of potential sales loss'
- 'Can you sell more if I can reduce stock out to ZERO?'

Can we see it easily in MTO environment?

- 'I am already utilizing my plant more than 100%, you want more?'
- 'Yes, I miss some of the due dates, so what?'
- 'My DDP is close to 100% - you want to improve it?'

You can see the *stock* (or absence of it) easily, visualizing *time* is not so easy!!

I am Extremely Confident – So What?

- I have done it many places
- Why don't you give it a try?
- Let's start with a pilot
- Pay me at the end, not now
- My payment is linked to your success

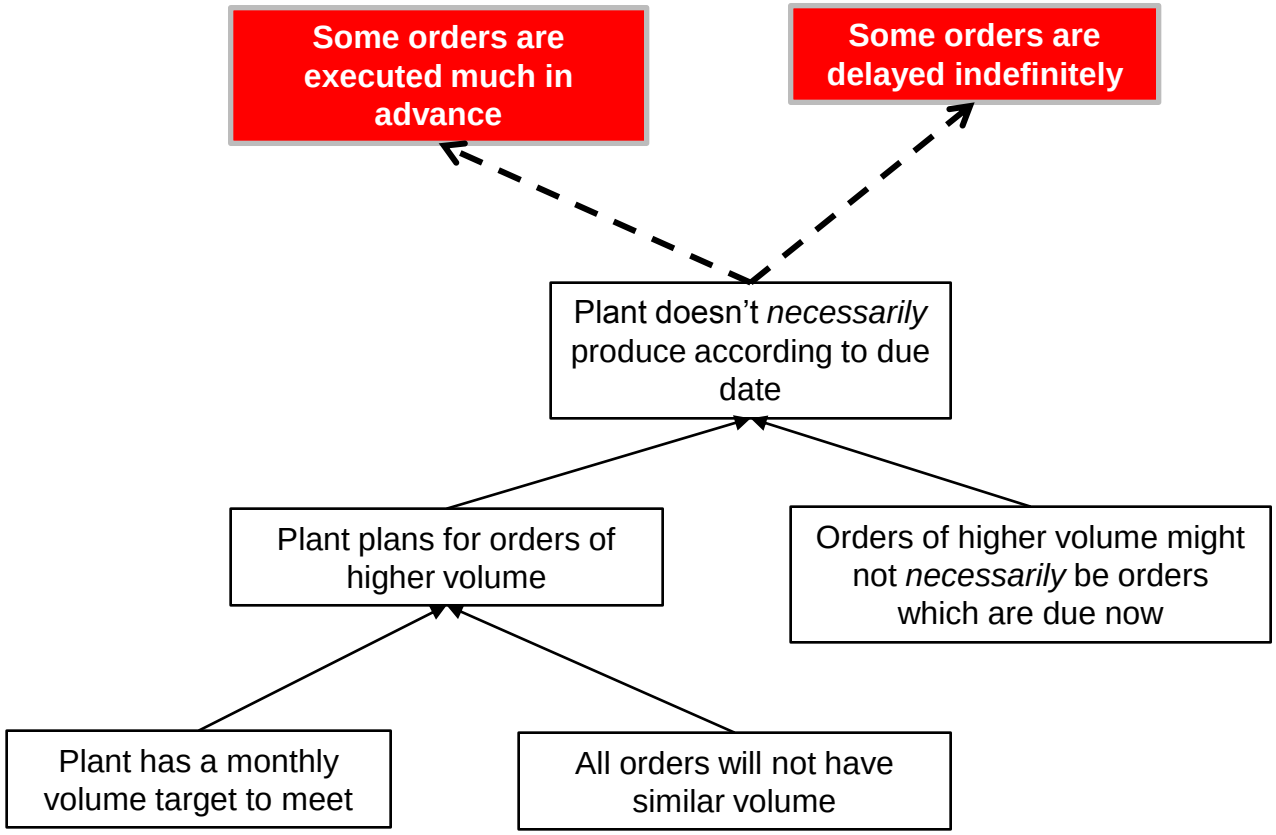
The consultant seeing the potential is *necessary but not sufficient* for the concept selling.

The client needs to see the potential equally well!

Making the Client Confident

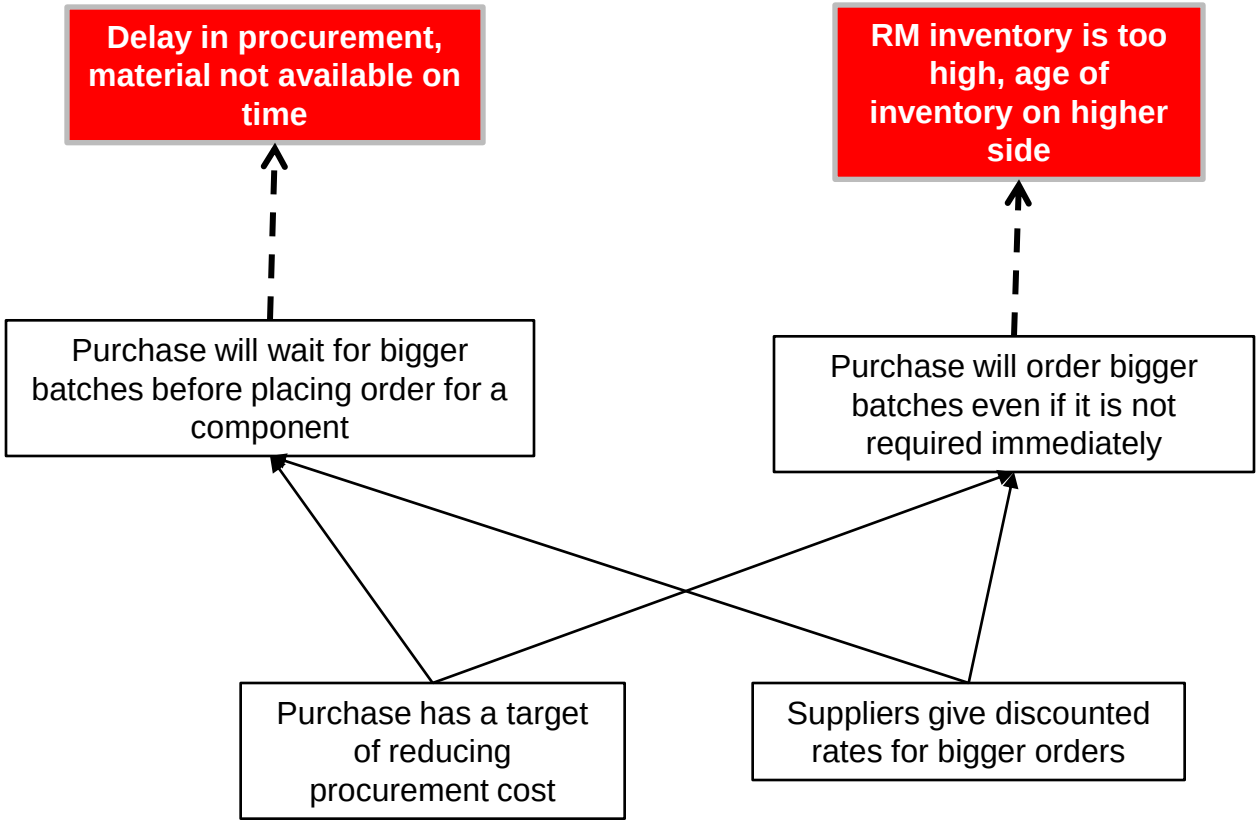
- How many open orders have missed the due date as on today?
- How many orders did you ship in the last month?
- Out of all the orders shipped in the last month, how many were shipped *significantly* in advance?
- Can we free up more capacity if we stop producing in advance?
- Can I see a lot of FG inventory? In an MTO environment?!
- Why are we not shipping the FG to the client?

Driving Behavior – Sample 1



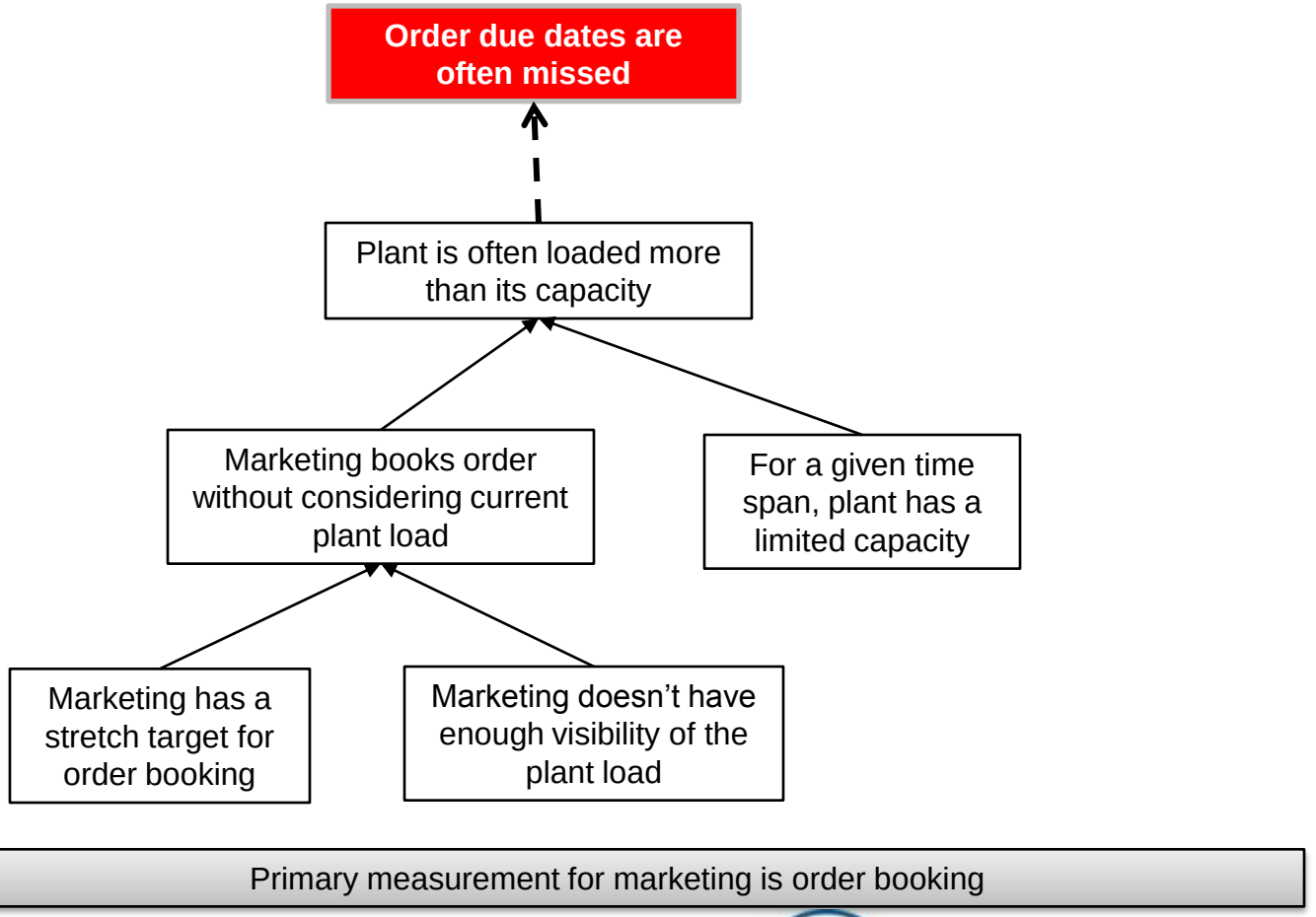
Primary measurement for plant is value produced in a month

Driving Behavior – Sample 2

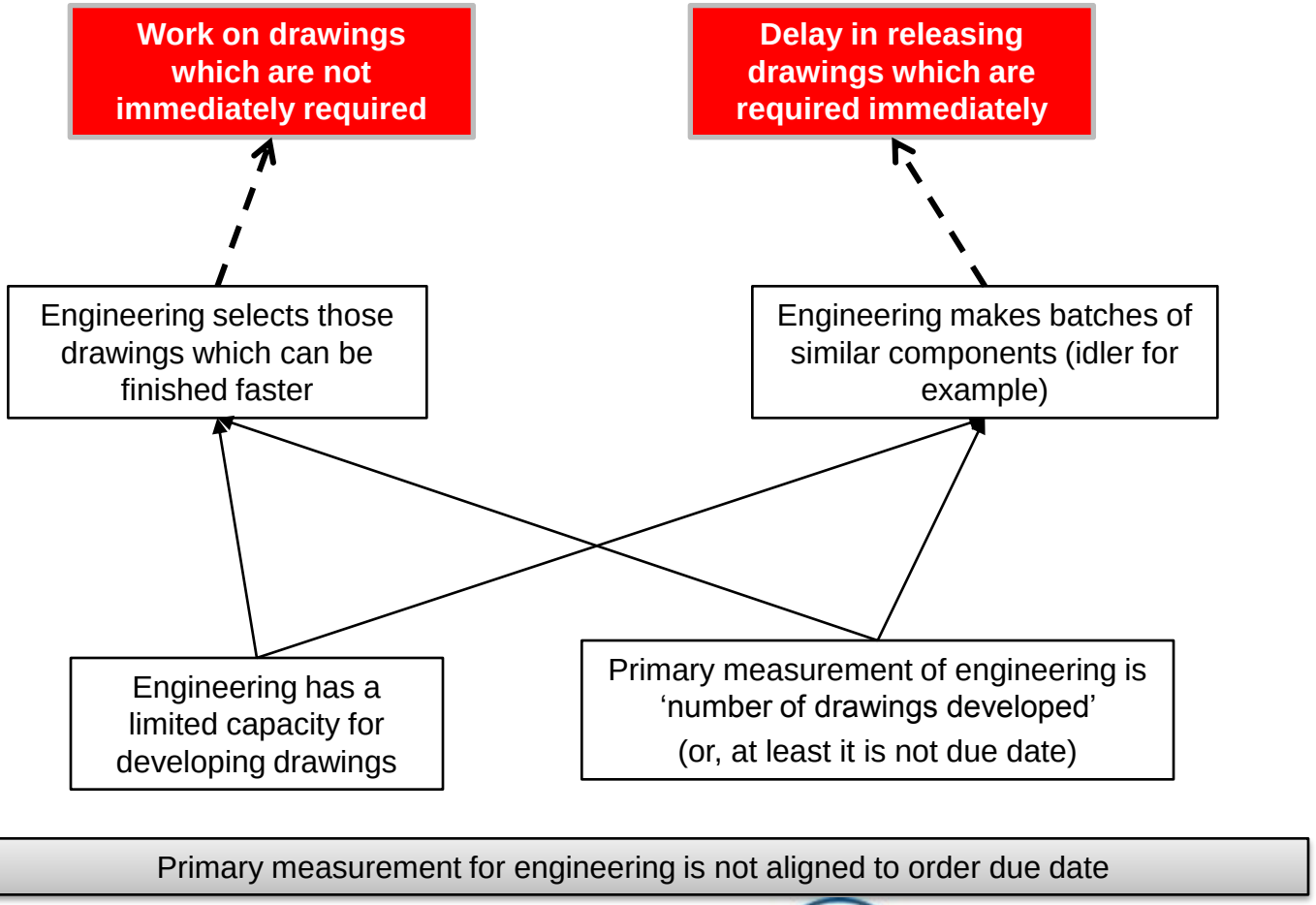


Primary measurement for purchase is cost driven

Driving Behavior – Sample 3



Driving Behavior – Sample 4



Can We See a Pattern?

In all the examples given above – we have seen the impact of local measurements on the business as a whole. The measurements are:

- Production value/volume per month
- RM cost/ procurement cost
- Order booking
- Number of drawings released in a week

etc

All these are efficiency related measurements (maximizing utilization of resources) and they are creating problems!

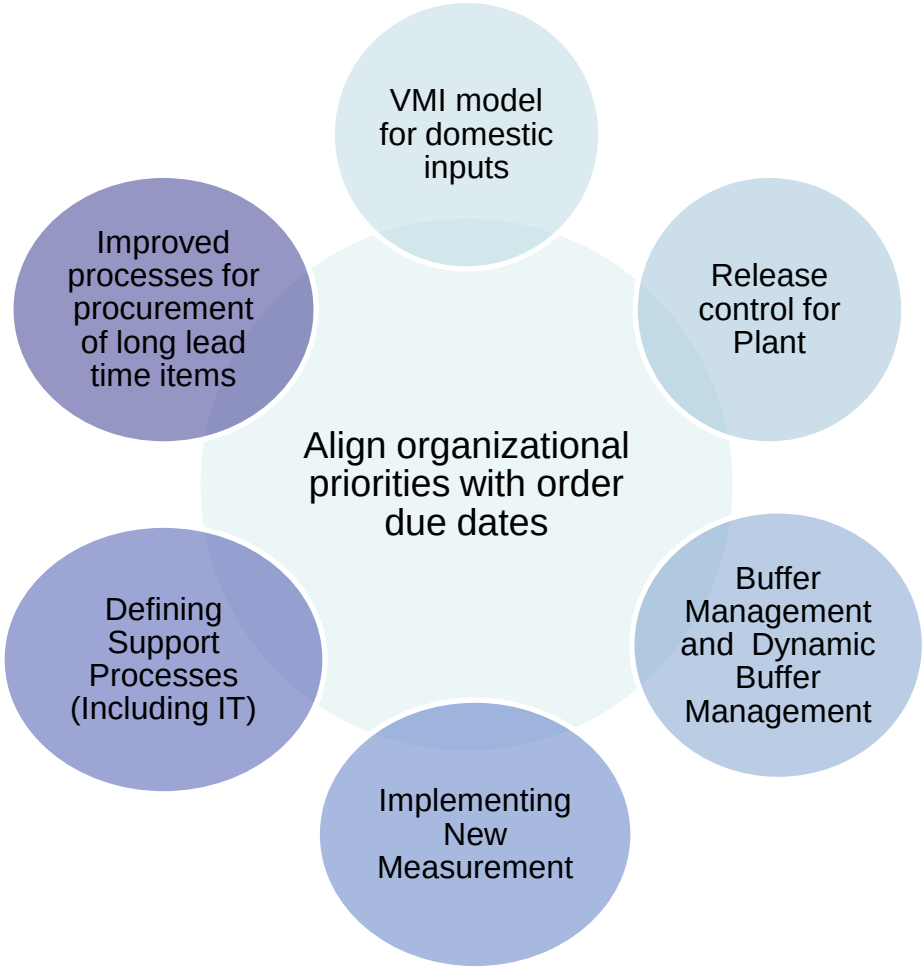
Our Simplistic Solution

1. Establish DDP as the primary measurement across the supply chain

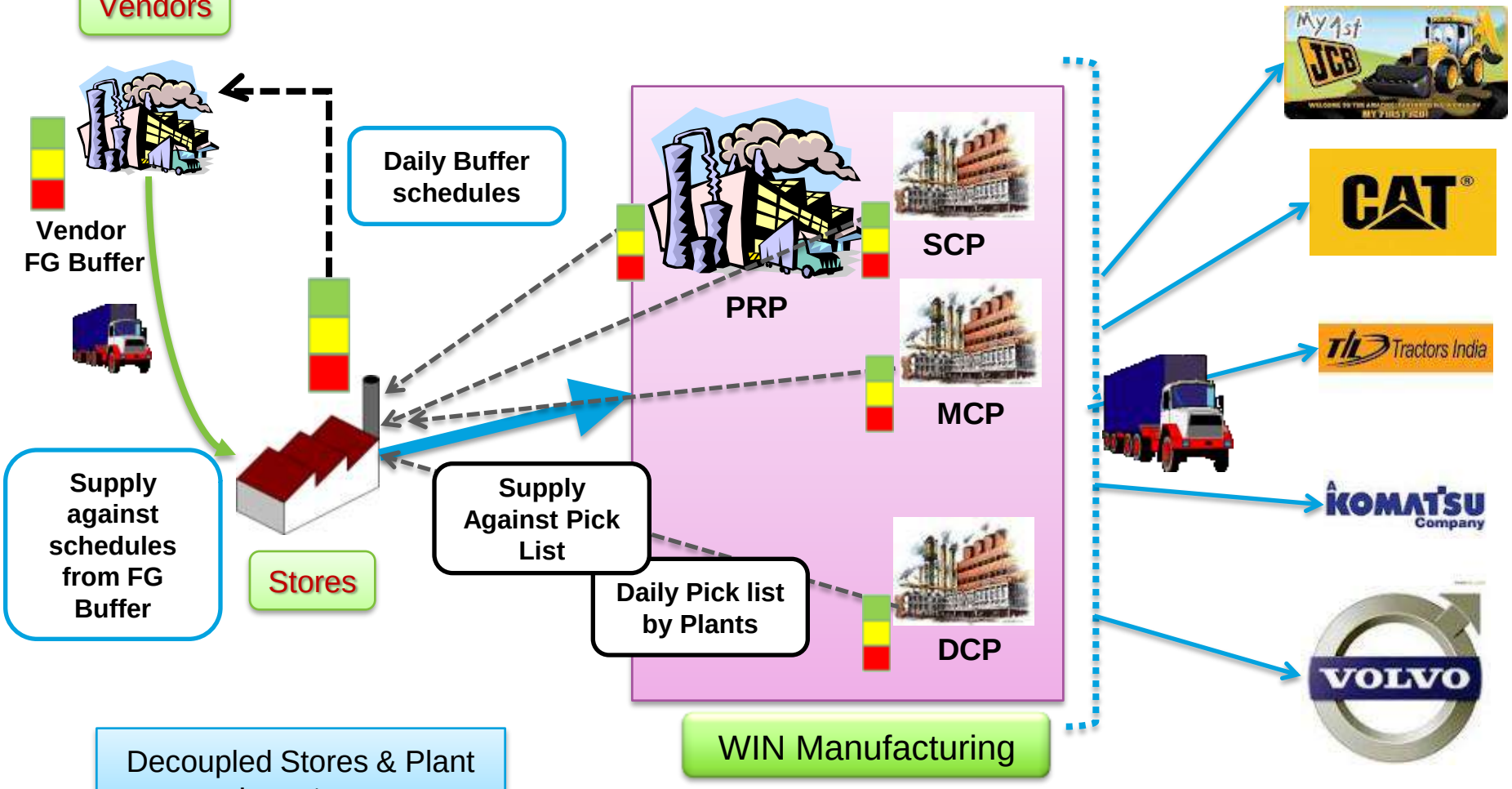
2. Ensure all possible support across all functions to implement item 1

Implementation Summary

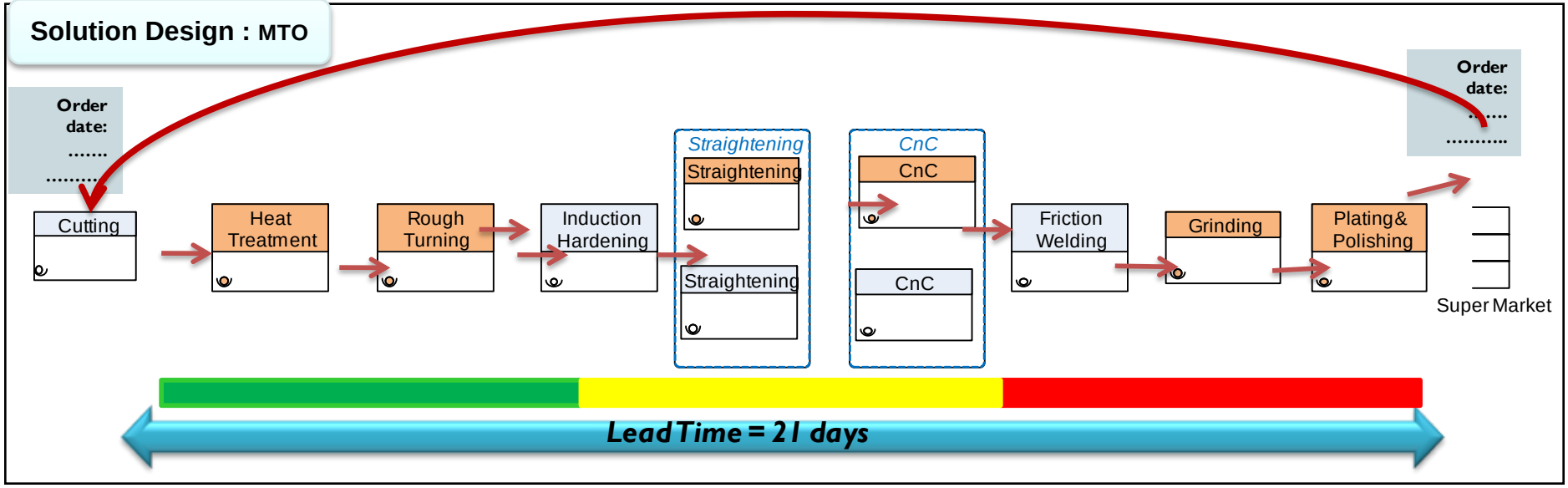
The Essential Solution Components



RM Implementation



SDBR Design



- Implementation for 180 MTO parts
- Prioritization of orders based on :
  - Order due date
  - Lead time for the part
  - Production Route
- MTO scheduler – Scheduling done on real time basis, reducing the current updation time from about 3-4 hours (2 resources) to less than 10 mins.

Scheduling With a Macro

Order book updation

Plant	P no	SM Target 1	Lead Time	Qty Plan
SCP	P1626	7-Nov-11	23	2
SCP	P1887	17-Oct-11	23	4
SCP	P1887	23-Oct-11	23	4
MCP	P3174 P3175	19-Oct-11	25	2
MCP	P3176	11-Oct-11	28	3
MCP	P3177	11-Oct-11	28	1
MCP	P3185 P3186	18-Oct-11	28	2
MCP	P3191	24-Oct-11	28	6
MCP	P3201 P3202	14-Oct-11	28	11
MCP	P3203	14-Oct-11	28	6
MCP	P3204	14-Oct-11	28	5
SCP	P3246	7-Nov-11	26	10
MCP	P3335	20-Oct-11	28	2
LCP	P3483	20-Oct-11	25	3
LCP	P3483 P3484	20-Oct-11	25	3

Inventory data & SCN download (SAP)

Material	Unrestricted
CWM002040F66-RT	15.000
CWM002040F67-RT	5.000
CWM002040F67-RT	5.000
CWM002040F67-ST	7.000
CWM002050978	55.000
CWM002050978-HT	170.000
CWM002050978-HT	8.000
CWM002050978-HT	293.000

(daily)

Run Scheduling Macros

Buffer Report

Cutting				Heat Treatment			
Part No.	SM Target Date	% Penetration	Units for Cutting	Part No.	SM Target Date	% Penetration	Units for HT
P6767	4-Oct-11	160%	2	P9122 P9123	17-Oct-11	100%	2
P8236	10-Oct-11	106%	15	P3510	18-Oct-11	104%	6
P3176	11-Oct-11	129%	1	P8948	24-Oct-11	69%	43
P3177	11-Oct-11	129%	1	P8948	26-Oct-11	65%	30
P6771	12-Oct-11	128%	14	P8948	28-Oct-11	64%	9
P6763	14-Oct-11	120%	10	P9122 P9123	10-Nov-11	12%	1
P9079	15-Oct-11	116%	5	P3033	24-Nov-11	0%	Do Not Process
P4133	15-Oct-11	115%	5	P8242	28-Nov-11	0%	Do Not Process
P4025 P6866	17-Oct-11	108%	2				
P7748	18-Oct-11	104%	11				
P6801	18-Oct-11	100%	2				
P3174 P3175	19-Oct-11	100%	1				
P7793	20-Oct-11	96%	1				
P8236	20-Oct-11	79%	18				
P8240 P8241	24-Oct-11	65%	2				
P4025 P6866	24-Oct-11	64%	18				
P6452	25-Oct-11	74%	1				
P6452	27-Oct-11	68%	18				
P8948	28-Oct-11	64%	44				
P8452	28-Oct-11	64%	5				
P8948	29-Oct-11	60%	30				
P8452	29-Oct-11	60%	22				

MTO Buffer Report - Snapshot

Cutting				Heat Treatment				Rough Turning & BP			
Part No.	SM Target Date	% Penetration	Units for Cutting	Part No.	SM Target Date	% Penetration	Units for HT	Part No.	SM Target Date	% Penetration	Units for Rough T&BP
P6767	4-Oct-11	160%	2	P9122 P9123	17-Oct-11	108%	2	P5690	14-Oct-11	118%	3
P8236	10-Oct-11	136%	15	P3510	18-Oct-11	104%	6	P7708	15-Oct-11	117%	2
P3176	11-Oct-11	129%	1	P8948	24-Oct-11	80%	4		15-Oct-11	117%	1
P3177	11-Oct-11	129%	1	P8948	26-Oct-11	72%	3		15-Oct-11	116%	2
P6771	12-Oct-11	128%	14	P8948	28-Oct-11	64%			15-Oct-11	115%	16
P6765	14-Oct-11	120%	10	P9122 P9123	10-Nov-11	12%			15-Oct-11	114%	9
P9079	15-Oct-11	116%	5	P5053	24-Nov-11	-38%	Do Not Process		17-Oct-11	108%	5
P4115	15-Oct-11	115%	5	P8242	28-Nov-11	-60%	Do Not Process	P9122 P9123	17-Oct-11	108%	5
P4025 P6866	17-Oct-11	108						P3185 P3186	18-Oct-11	104%	2
P7748	18-Oct-11	104						P3510	18-Oct-11	104%	2
P8901	19-Oct-11	100						P7914 P7915	19-Oct-11	100%	5
P3174 P3175	19-Oct-11	100						P5687	19-Oct-11	100%	2
P7793	20-Oct-11	96						P3335	20-Oct-11	96%	1
P8236	20-Oct-11	96%	16					P3605	20-Oct-11	96%	1
P8240 P8241	24-Oct-11	82%	2					P5053	22-Oct-11	88%	1
P4025 P6866	24-Oct-11	80%	18					P3191	24-Oct-11	82%	1
P8452	25-Oct-11	76%	3					P8564	24-Oct-11	81%	17
P8452	27-Oct-11	68%	18					P9370	24-Oct-11	80%	17
P8948	28-Oct-11	64%	44					P8452	24-Oct-11	80%	12
P8452	28-Oct-11	64%	5					P8452	25-Oct-11	76%	12
P8948	29-Oct-11	60%	50					P5053	26-Oct-11	73%	11
P8452	29-Oct-11	60%	22					P4017	26-Oct-11	70%	3

Execution priority

Order due date

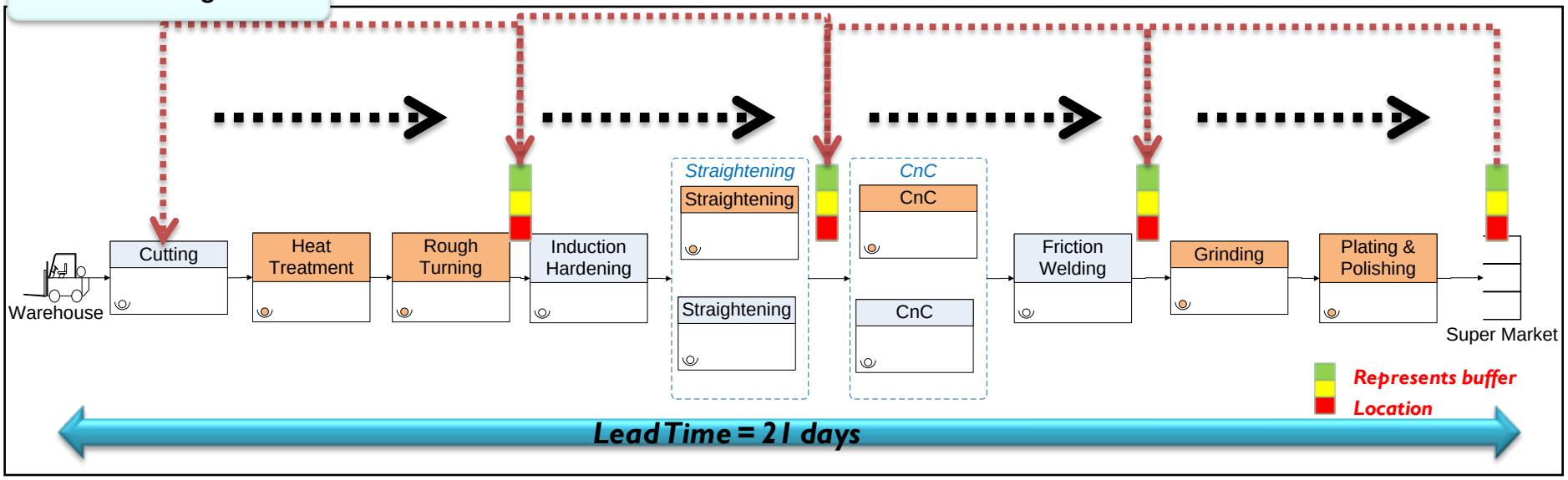
Qty to be processed

Execution Priority

Color	Priority No
	1
	2
	3
	4
	Don't Process

MTA Design in the Same Plant

Solution Design : MTA



BM for MTA

Consolidated Buffer Management Report

Units required to process at critical work centre

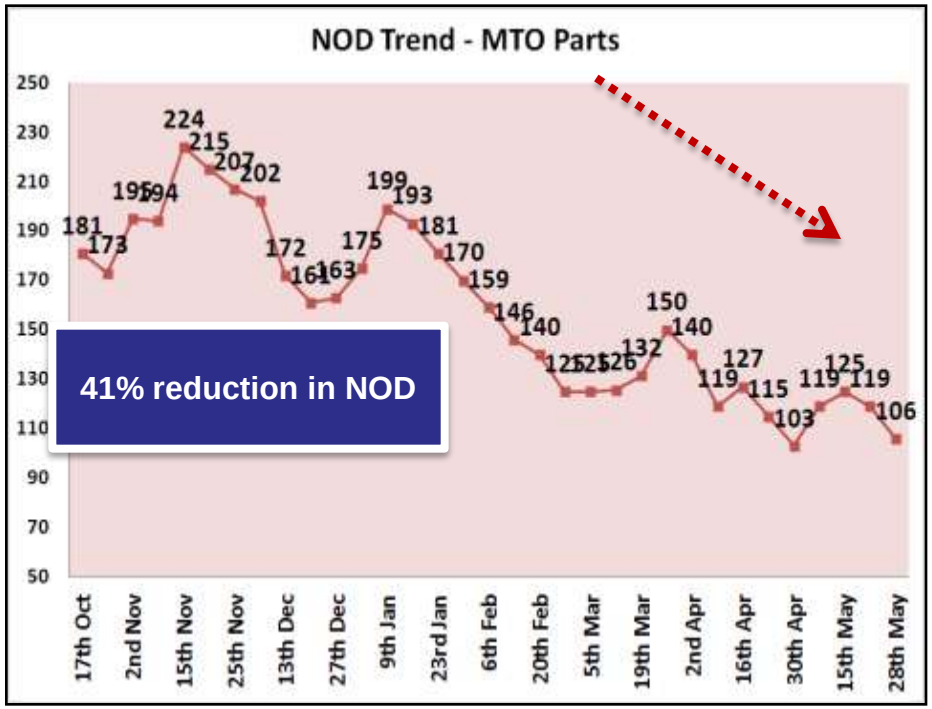
Buffer Penetration Report												Units to Process					
Date for Report	10-Sep-11	Before HT		Before - IH		Before CNC		Before Grinding		Supermarket							
Part No	Model	Actual Penetration	Virtual Penetration	Actual Penetration	Virtual Penetration	Actual Penetration	Virtual Penetration	Actual Penetration	Virtual Penetration	Actual Penetration	Virtual Penetration	Units to Cut	Units For HT	Units for RT	Units for IH	Units to Produce at CNC	Units to Produce at Grinding
P6818 P8596 P9383	P92	69%	1%	-136%	-179%	91%	91%	-25%	-46%	62%	34%	0	0	0	350	0	180
P8029 P8138	P92	-20%	-20%	96%	-82%	24%	6%	100%	90%	89%	72%	0	0	1387	0	700	820
P7772 P7773	P92	86%	71%	97%	-88%	90%	90%	-26%	-27%	99%	86%	700	0	837	700	0	940
P6819 P9031	P92	83%	-1%	-32%	-178%	-38%	-73%	69%	64%	87%	17%	0	0	0	0	250	80
P6817 P9382	P92	-73%	-78%	97%	36%	90%	40%	12%	1%	92%	86%	0	172	463	100	0	380
P7819	P92			100%	41%	41%	41%	51%	-25%	99%	71%	0	NA	1480	400	0	1020
P5356	P92			47%	-181%	56%	56%	23%	-27%	97%	91%	0	NA	269	200	0	480
P6607 P9051	P92			89%	-44%	-74%	-74%	53%	33%	99%	89%	0	NA	1036	0	250	1020
P8652	TBL-315			-242%	-246%	100%	100%	30%	30%	57%	53%	0	0	0	100	0	60
P8655	TBL-315			-8%	-134%	41%	41%	74%	67%	87%	-22%	0	0	0	0	50	0
P4394	TBL-315			-303%	-303%	70%	-53%	99%	98%	100%	94%	0	0	0	0	50	80
P8653	TBL-315			-184%	-268%	73%	73%	82%	55%	53%	68%	0	0	0	50	50	100
P8649	TBL-315			5%	-19%	38%	38%	43%	21%	100%	99%	0	1	6	0	0	80
P8651	TBL-315			-100%	-106%	24%	-101%	-5%	-5%	76%	72%	0	0	0	0	0	60
P7939	TBL-315			-11%	-241%	87%	87%	44%	23%	-20%	-20%	0	0	0	50	0	0
P8650	TBL-315			21%	-158%	89%	89%	32%	22%	100%	88%	0	0	25	50	0	60
P8654	TBL-315			100%	13%	93%	93%	100%	71%	100%	91%	0	50	55	20	20	30

- This report provides the end to end visibility of buffer health across the plant
- "Units to Process" is requirement to process at the critical operations (Cutting, Heat treatment, Rough Turning, Induction Hardening, CnC and Grinding) for each part no.
- Based on the prioritization of the requirement at the work centre, scheduling at the work centre is done

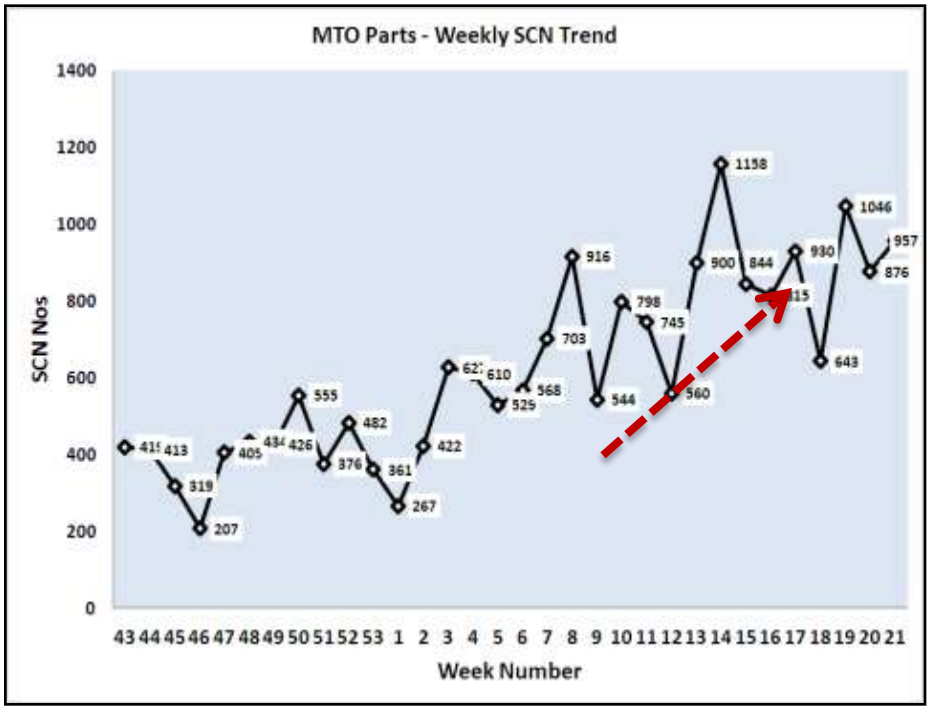
Results Achieved

Improvement Trends - MTO

NOD

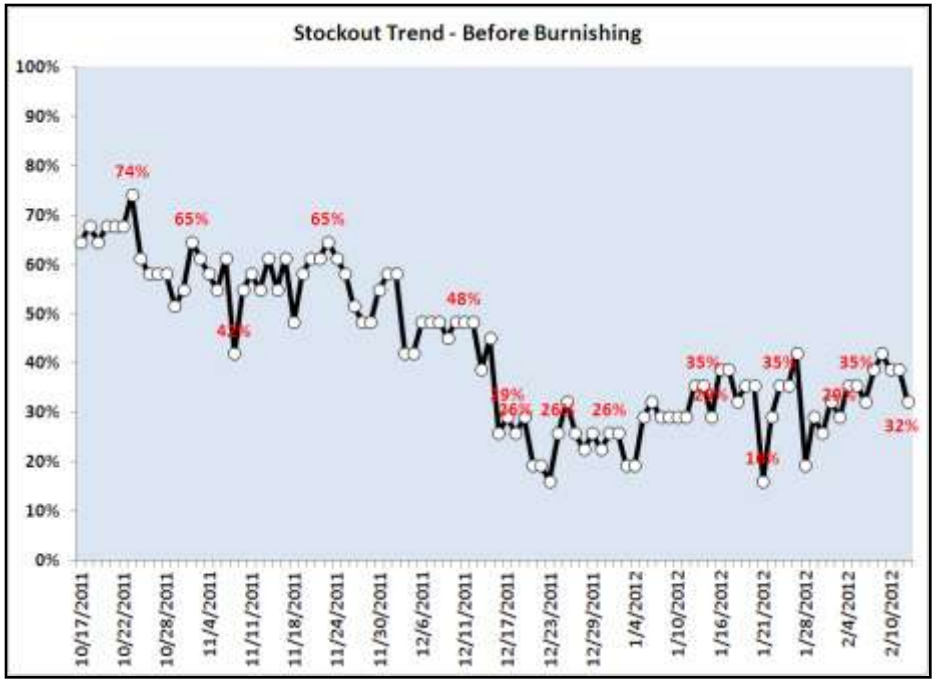


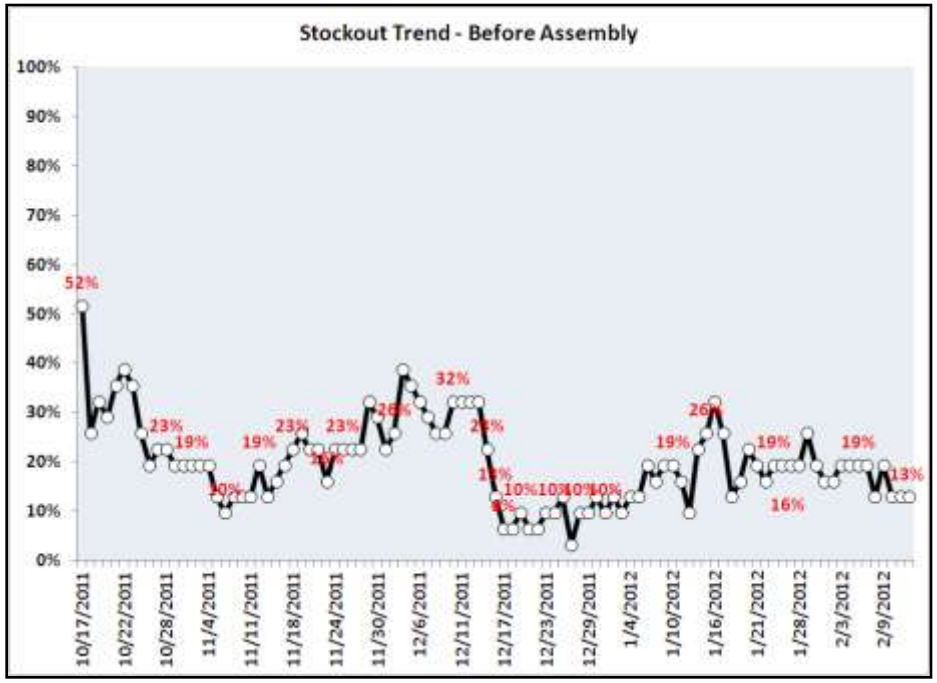
Weekly SCN Trend



- 41 % reduction in NOD from 181 to 106
- Average weekly SCN improved and sustained

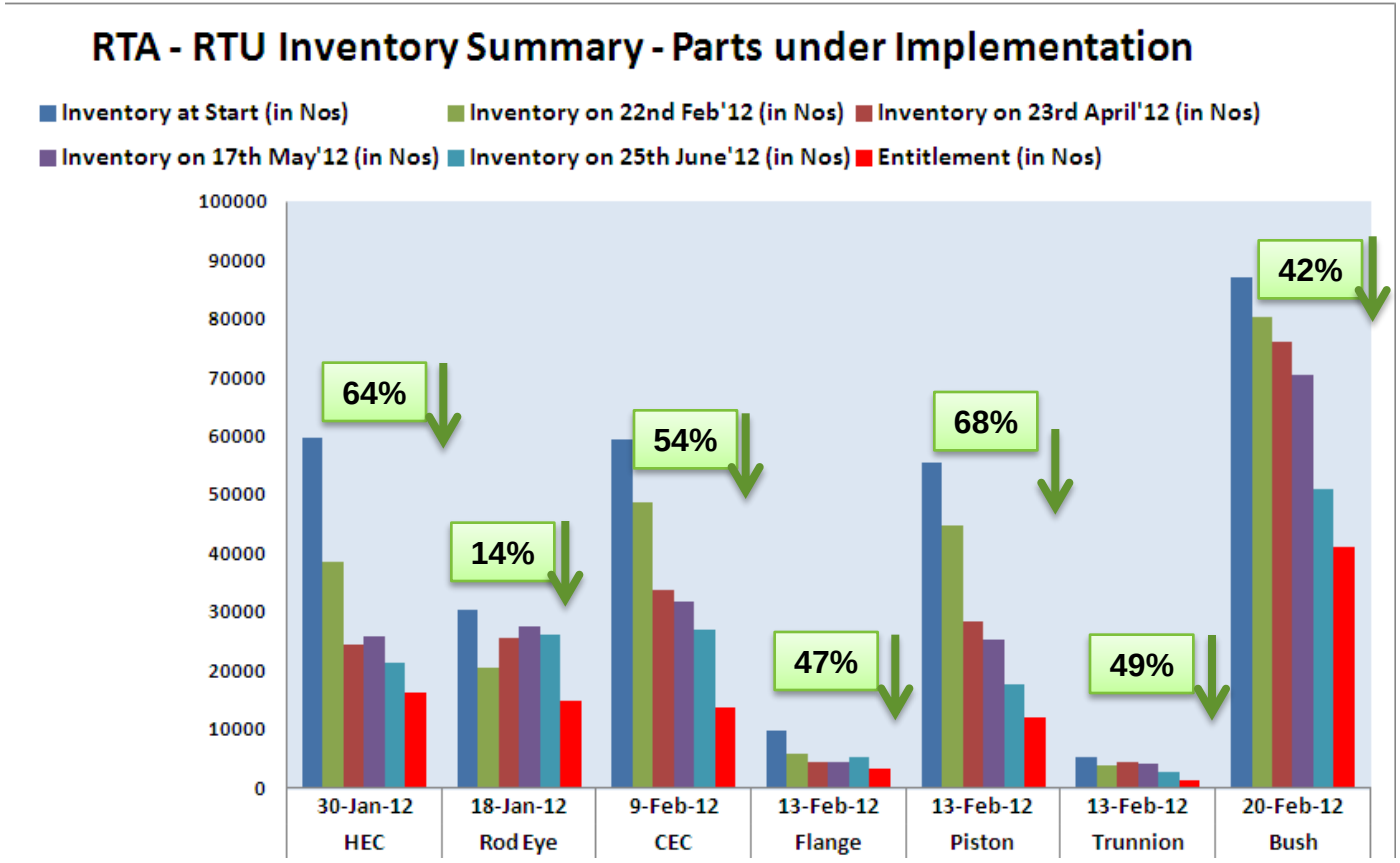
Stock Outs at Critical Points





- Buffer health has improved resulting in low stock out
- Right mix of material flow

Parts Inventory Trend



- Overall reduction of 29% by value

Questions?

Arun Raychaudhuri

A Practice Partner for the Business Transformation Practice, Wipro Consulting Services, with an overall work experience of about sixteen (16) years.

Advised companies across different industries to transform their business processes resulting in significant impact on their top line and bottom line performances. Industry experience includes Metals, Discrete Manufacturing, FMCG, Insurance, Healthcare, Textiles, Consumer Durables, Auto Parts, Agrochemicals, Edible Oil, Heavy Equipment Manufacturing, Paper, Oil & Gas, Retail etc.

Certification as TOC Application Expert and training on TOC Thinking Process by Goldratt School. Additionally, a certified Six Sigma Master Black Belt with experience in improvement philosophies like Six Sigma, Lean, TPM, 5S, BPR etc.

Holds a Post Graduate Degree in Statistics (M.STAT) with specialization in SQC & OR from Indian Statistical Institute (ISI), Kolkata.

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