GrayMatter's
Manufacturing Analytics (MA+) Solution

Agenda

- Company Profile

- Why BI for Manufacturing?

- What is MA+?

- Why MA+?

- MA+ Solution Outline

- Indicative Use Case

- Case Studies

- Product Screenshots

GrayMatter Snapshot

Gray Matter
Empowering Intuition

COMPANY

- Founded 2006
- HQ in Bangalore, India
- Global offices
  US (Dallas), UK (London), Europe (Budapest, Helsinki),
  Asia (KL, Singapore) , UAE (Abu Dhabi)
- Global R & D centre in Finland
- ~200+ Associates @ work
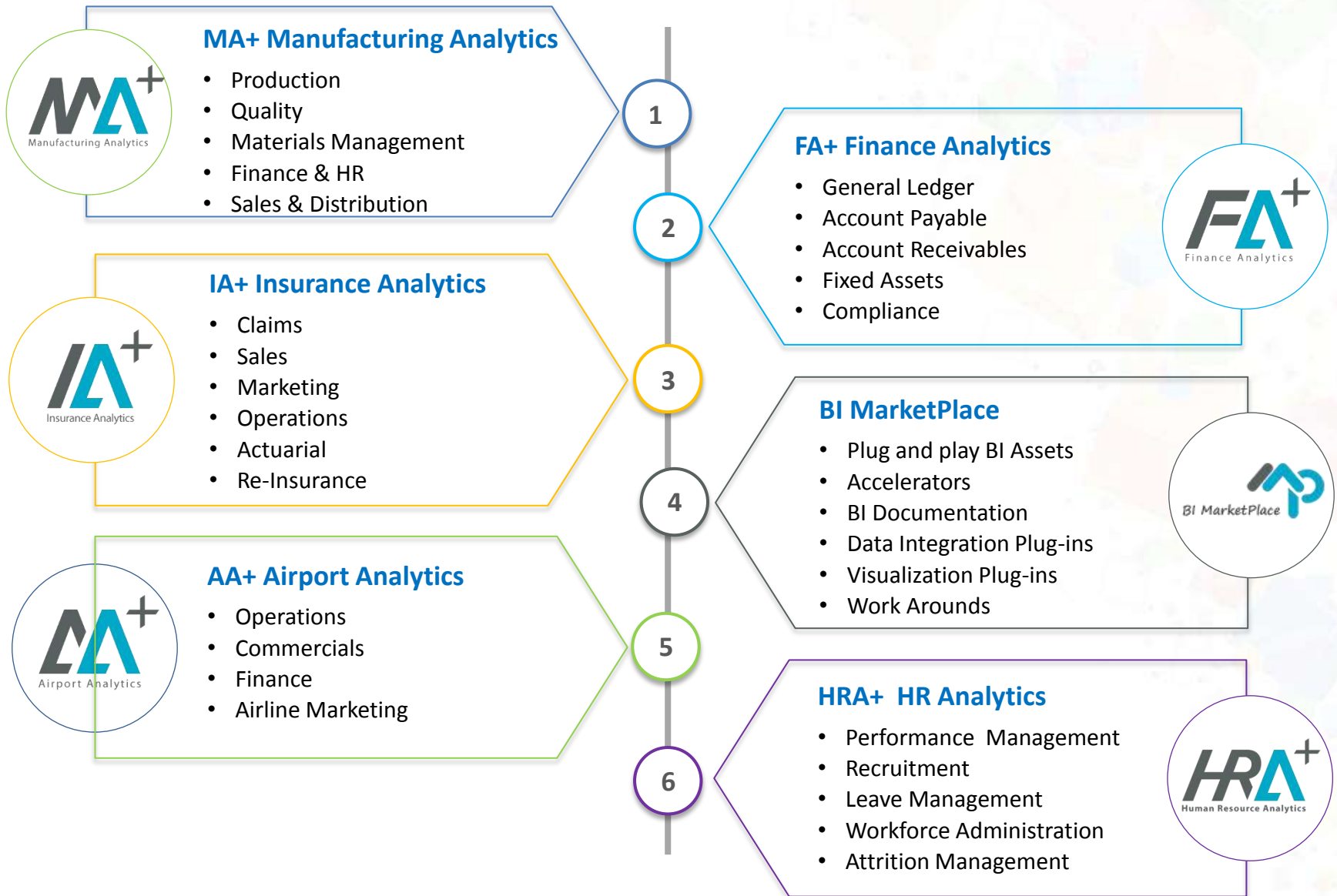
ACHIEVEMENTS

- 170+ BI & Analytics implementations worldwide
- Among top 50 Big Data Companies
- Industry specific BI solutions in Airports, Insurance , Manufacturing, Retail, QSR, Ground Handling, HR and Finance.
- Tekes funding of Euro 10 million plus for product R&D in Finland
- Winner of NASSCOM Emerge Top 50 Companies in India

DIFFERENTIATORS

- Mature Delivery Process
- Technology Expertise – BI, Data Sciences, Java & multiple platforms
- Zero Delivery failure across 170+ BI and Analytics projects
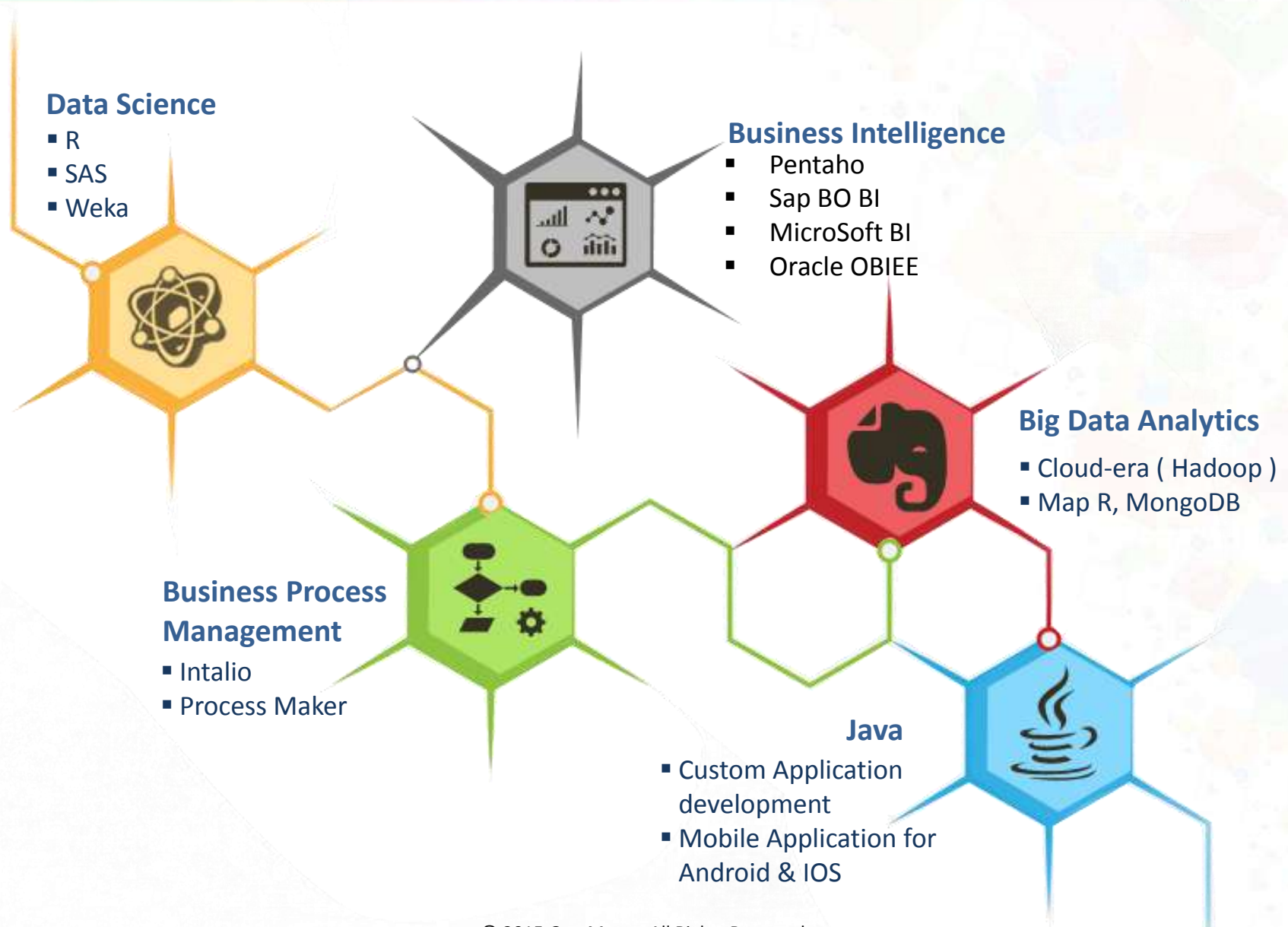- Lowest TCO and visible ROI within 3 months

Vertical & Horizontal Specific-Analytics Solutions

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MA+ Manufacturing Analytics

- Production
- Quality
- Materials Management
- Finance & HR
- Sales & Distribution

1

FA+ Finance Analytics

- General Ledger
- Account Payable
- Account Receivables
- Fixed Assets
- Compliance

2

IA+ Insurance Analytics

- Claims
- Sales
- Marketing
- Operations
- Actuarial
- Re-Insurance

3

BI MarketPlace

- Plug and play BI Assets
- Accelerators
- BI Documentation
- Data Integration Plug-ins
- Visualization Plug-ins
- Work Arounds

4

AA+ Airport Analytics

- Operations
- Commercials
- Finance
- Airline Marketing

5

HRA+ HR Analytics

- Performance Management
- Recruitment
- Leave Management
- Workforce Administration
- Attrition Management

6

4

Services & Technology Stack

Data Science
- R
- SAS
- Weka

Business Intelligence
- Pentaho
- Sap BO BI
- MicroSoft BI
- Oracle OBIEE

Big Data Analytics
- Cloud-era (Hadoop)
- Map R, MongoDB

Business Process Management
- Intalio
- Process Maker

Java
- Custom Application development
- Mobile Application for Android & IOS

Technology Partners
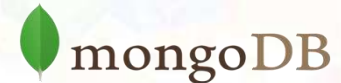
Global Customer List - Partial

Customers By Region (partial)

Customers By Industry (partial)

Retail

Transport & Logistics

Governments

Communications

Manufacturing

E- commerce

Other Key Customers

Multi-entity Groups

Customer Speak

"The GMR group strongly believes in harnessing the 'Power of Information' across all its businesses. By deploying Airport Analytics solution AA+ on SAP BO platform, GMR Airports has taken a quantum leap forward. The analytic solution enables GMR's Airport Management team to take quick, timely and informed decisions on various aspects of the airport business across all GMR Airports"

P S Nair – CEO, Corporate Airport Sector, GMR Airports

I've had the opportunity to work closely with GrayMatter on a number of enterprise implementations of Pentaho. Their technical expertise, attention to detail and commitment to customer satisfaction puts them an elite group of Pentaho systems integrators who can tackle complex projects of any size

Dave Henry, Sr. VP (Services) - Pentaho

"Thanks to **GrayMatter's** collaboration with us, our clients have gained back more than 50% of their time, formerly spent on reporting related tasks. Streamlined reporting and dashboards have enabled them to understand evolving trends, assess the impact of change. This has given us the edge required to position ourselves as a system integrator of choice in our market."

Muhamad Abdul Karim Ismail, **Director - Silverline Dynamics Sdn Bhd**

"In our Retail SBU – In & Out stores business thrives on the software, services and maintenance support provided by GrayMatter. We are also glad that we implemented the suggested dashboards and reporting tools based on GrayMatter's expertise in Pentaho, which has resulted in capabilities like drill-down, slice and dice enabling a comprehensive analysis on the latest Enterprise "

Dr. U.V. Girish Kumar, **GM –IT&BI, BPCL**

Business Intelligence for Manufacturing - Challenges

8/10 Manufacturing BI implementation fails to deliver due to

i. Lack of clarity on business requirement across multiple departments

ii. Complex IT systems (normally 8-10 different systems) that holds various data elements in each factory and multiple corporate system due to acquisition led growth

iii. Complex supply chain processes and systems both on sales and procurement side

iv. Huge volume of machine generated data during production processes

v. Complex and varied requirements of analytics across factories and corporate, almost no standardization of KPI and metrics

What is MA+?

- MA+ is a pre-built, enterprise-wide analytics solution for manufacturing business

- 'Out of the box ' full range of dashboards, reports and analytics designed specifically to promote best practices in an manufacturing organization across departments
  - ✓ Production / Factory
  - ✓ Sales & Distribution
  - ✓ Supply Chain Management (Downstream and Upstream)
  - ✓ Warehouse Management
  - ✓ Finance
  - ✓ Human Resources

- 'Out of box ' complete manufacturing BI data model

- 'Out of Box' data integration approach with all major manufacturing systems

- Single unified architecture: covering all the elements of BI system like Reporting, Dash boarding, Adhoc Analytics, OLAP/Cube Multidimensional analytics, ETL Tools, Data Mining, Pre-built data model and pre-built BI contents

Why GrayMatter's Manufacturing Analytics (MA+) Solution?
Key Business Benefits

Drives enhanced customer satisfaction and hence sales growth

Improve manufacturing quality while shortening product development cycles

Maximize productivity and reduce costs with streamlined operations

Faster go-to-market for new products

Faster, strategic decision support for key executives on the go

Tightly integrated across functions with strong financial controlling leading to enhanced margins and profitability
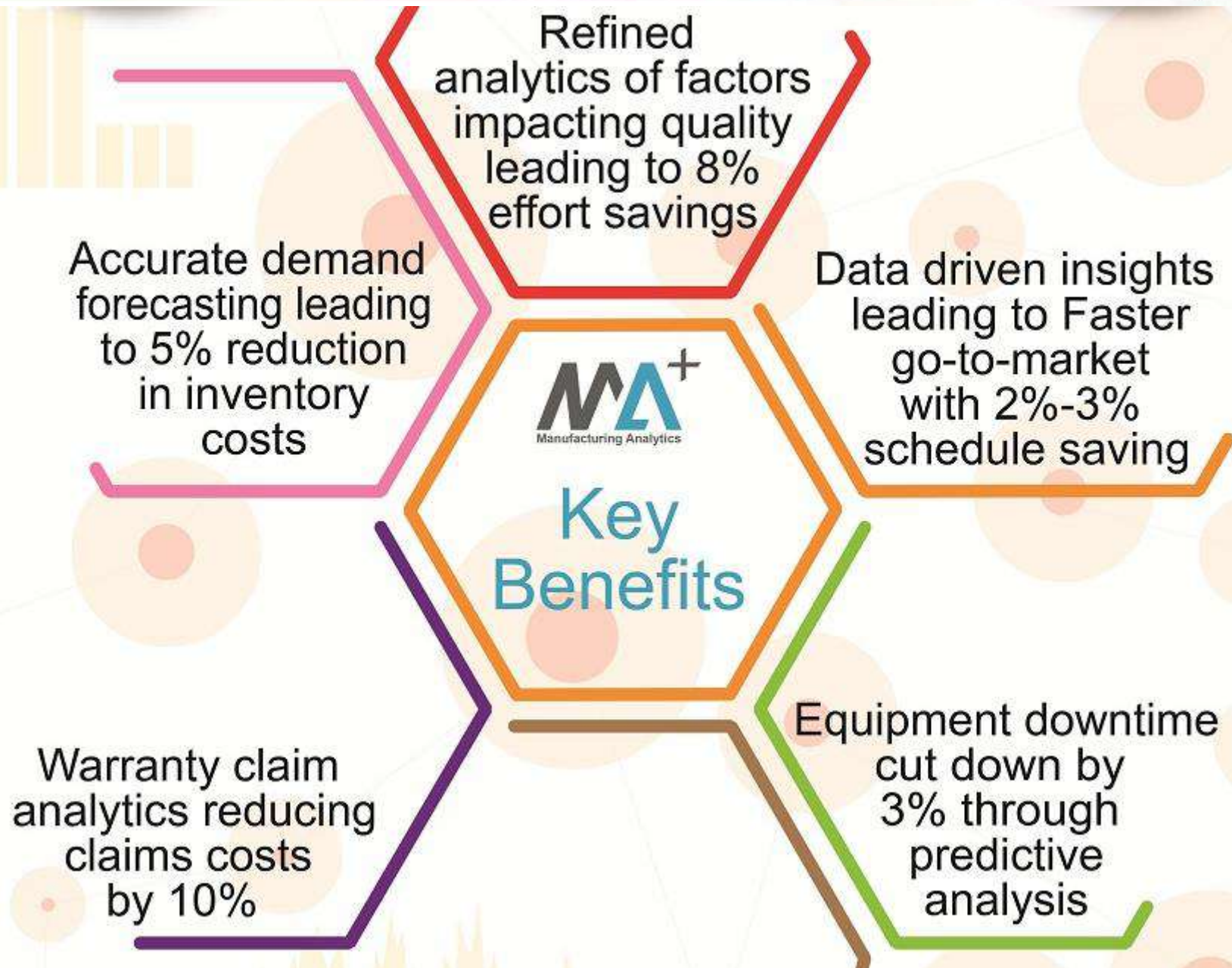
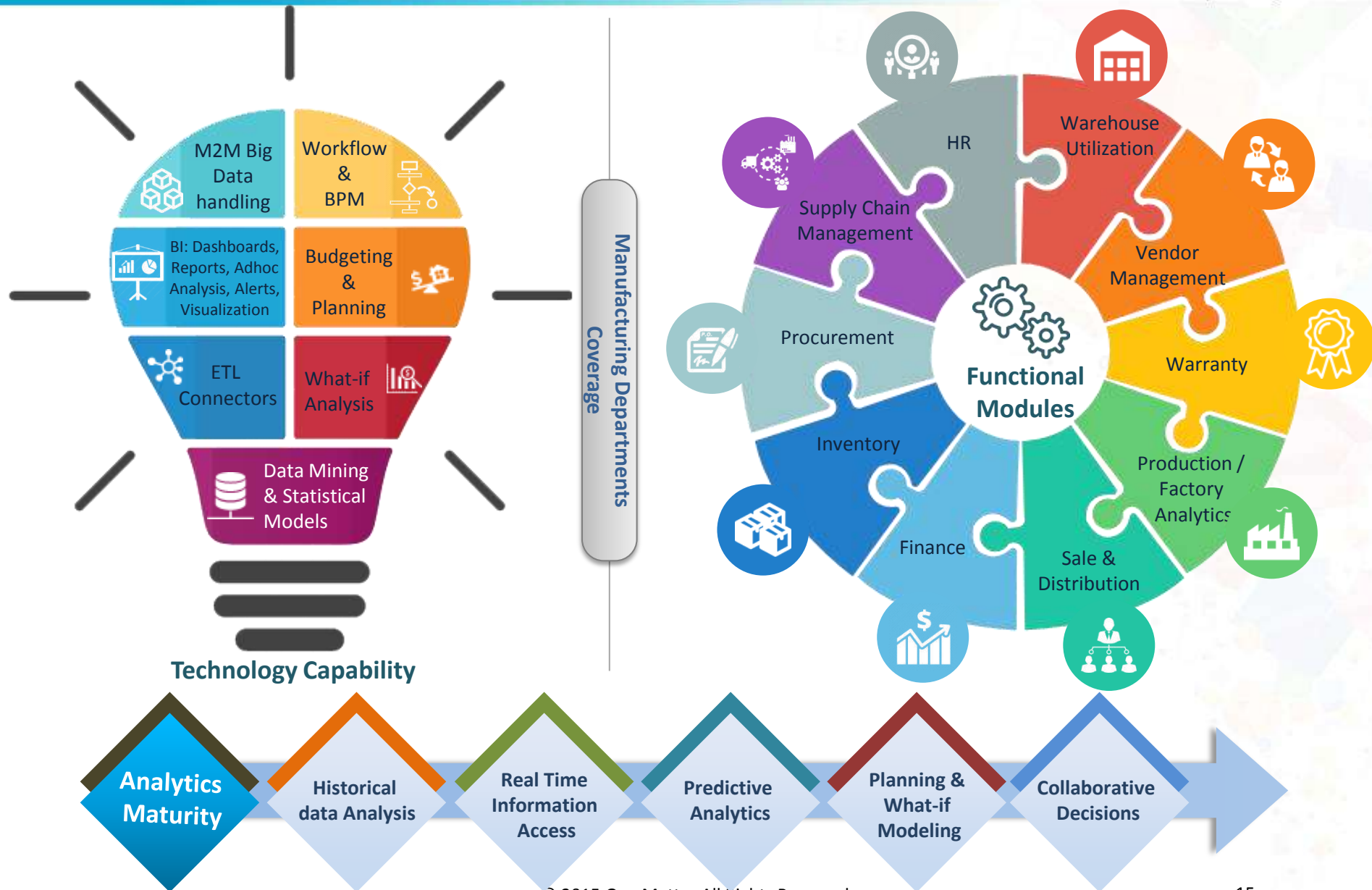Provides easy way to track KPIs on daily/weekly/monthly

Helps increasing efficiency and effectiveness

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Refined analytics of factors impacting quality leading to 8% effort savings

Accurate demand forecasting leading to 5% reduction in inventory costs

MA+
Manufacturing Analytics

Key Benefits

Data driven insights leading to Faster go-to-market with 2%-3% schedule saving

Warranty claim analytics reducing claims costs by 10%

Equipment downtime cut down by 3% through predictive analysis

GrayMatter's Manufacturing Analytics (MA+) Solution
What does it consist of?

Gray Matter
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Technology Capability

M2M Big Data handling

Workflow & BPM

BI: Dashboards, Reports, Adhoc Analysis, Alerts, Visualization

Budgeting & Planning

ETL Connectors

What-if Analysis

Data Mining & Statistical Models

Manufacturing Departments Coverage

Functional Modules

HR

Warehouse Utilization

Supply Chain Management

Vendor Management

Procurement

Warranty

Inventory

Production / Factory Analytics

Finance

Sale & Distribution

Analytics Maturity

Historical data Analysis

Real Time Information Access

Predictive Analytics

Planning & What-if Modeling

Collaborative Decisions

Product Coverage

- ❖ **FACTORY / PRODUCTION**
    - ▪ Field Quality Engineering
        - ✓ Warranty Analytics
        - ✓ Failure / Repair Diagnostics
        - ✓ Pattern Recognition of failures
    - ▪ Production Quality
        - ✓ Measurement Data Analytics
        - ✓ Traceability
        - ✓ Isochronal analysis
    - ▪ DPMO/PPM analysis
    - ▪ Operations & Planning
    - ▪ Plant Maintenance
    - ▪ Environment & Safety
    - ▪ SPC Analysis
        - ✓ Gage related analysis
        - ✓ SPC Control Charts
        - ✓ Measurement Data advanced analytics
- ❖ **SALES & DISTRIBUTION**

Product Coverage

❖ **SUPPLY CHAIN MANAGEMENT**
- Vendor Management
- Procurement & Spend
- Inventory Management

❖ **WAREHOUSE MANAGEMENT**
- Inbound analysis
- Warehouse analysis
- Outbound analysis

Product Coverage

❖ **HUMAN RESOURCES**
- Recruitment
- Time & Attendance
- Workforce Management
- Performance Management
- Policies

❖ **FINANCE**
- Revenue per employee
- Manufacturing cost per unit
- Net Operating Profit
- Return on Assets
- Margins Analysis
- EBITDA

GrayMatter's Manufacturing Analytics (MA+) Solution
Enterprise-wide, integrated solution proposition
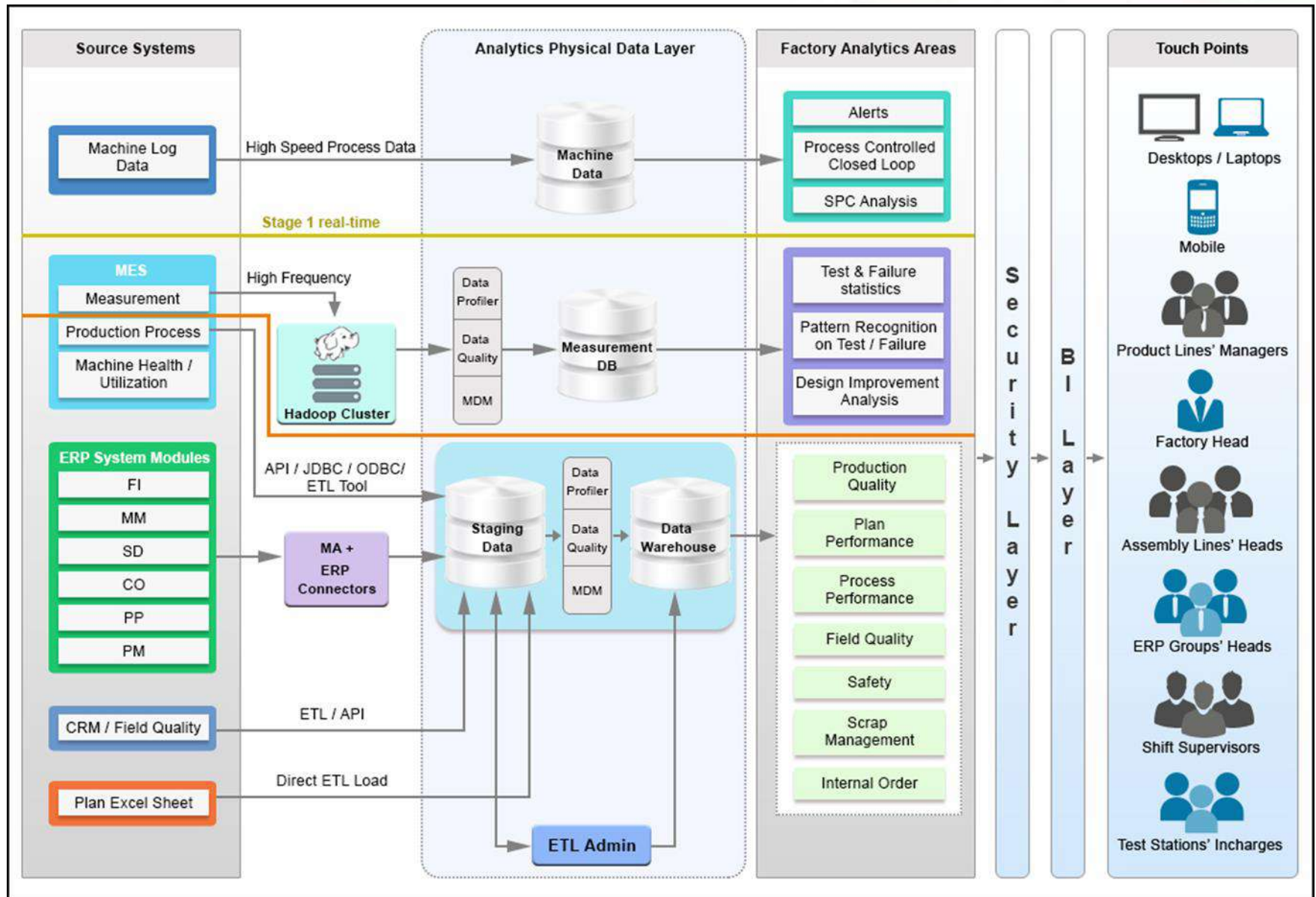
Why MA+ - Other Benefits

Easy to consume analytics without complex reports, yet very powerful and comprehensive

Allows business users to Analyze and synthesize data together

Empowers business users to do all advance analytics in the most easy way possible

System informs business users as soon as their KPIs are not performing triggering timely corrective actions

Drastically reduces the wait time in getting detail level data for your high level problems.

Why MA+
Technical Advantages

Simple, risk-free deployment
- ✓ The 'pre-built' proposition of the product radically alters the traditional deployment lifecycle for BI and hence make it more predictable and risk free

Faster time to deployment
- ✓ Maximum 4-6 months to deploy, In comparison, any alternative approach will take an extensive effort of 12-18 months, to reach even a fraction of MA+ business value

Dramatically lower TCO
- ✓ Customers no longer need to appoint multiple external vendors – management consultants, SI organizations and tool-technology vendors - and put together elaborate project management investments to manage the 'define-design-customize-deploy-maintain' lifecycle

Superior User Experience
- ✓ Device agnostic delivery of simple, intuitive and role-based insights

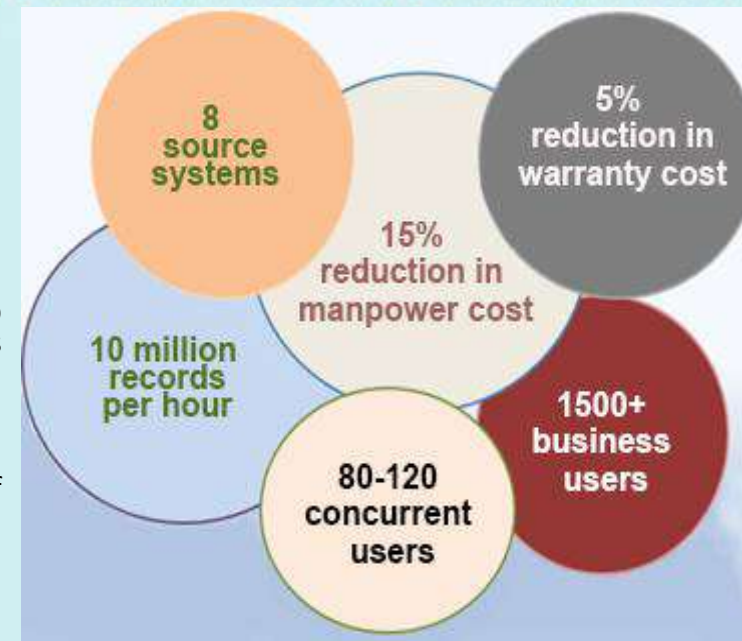# Sample Story Board Theme: Warranty Cost Reduction

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Identify Top N Programs/ Regions → Perform Symptom Analysis → Perform Repair diagnostic analysis

Detailed Analysis to Co-relate Mfg data, Material Traceability, FPY → Identify Supplier batch - Affected Serial No's → Pareto & Trend charts on Test data

Corrective Action → Communicate to Procurement / Notify Sales, Finance, QC / Notify Shop Floor → Monitor Corrective Action using PRR & Isochronal Charts

Schneider Electric adopts integrated and unified BI with GrayMatter

Schneider Electric SE is a European multi-national corporation that specializes in Electricity distribution, automation management and produces installation components for energy management across globe.

Challenges

- Integration with multiple source systems such as iTAC, MES Suites Oracle ERP, Sales Force, BFO & few in-house applications

- Customized insights needed to serve multiple business units and departments like manufacturing, sales & warranty

- High volume of data, an average of 10 million record per hour

Solution

- Integrated multiple source system and built data warehouse solutions using Informatica Power Center

- Dashboards, KPI's, Drill down, Drill up and Ad hoc analysis catering to needs across business areas and departments

- Robust and scalable solution capable of handling high data volumes

8 source systems

5% reduction in warranty cost

15% reduction in manpower cost

10 million records per hour

1500+ business users

80-120 concurrent users

Benefits

- Single source of Truth for management reporting & analysis enabling consistent and accurate decision making

- Quick access to key KPIs leading to business critical insights and hence better decision making

- The program resulted in 5% reduction in warranty cost

Synthite is the world's largest producer of value added spices. Equipped with a global presence, its offerings include industrial products & services as well as consumer products

Business Challenges

Integration of sales, inventory data across different geographies
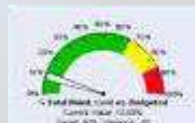
Ability to evaluate on basis of Key Performance Indicators (KPIs)

Data accuracy across disparate data sources

GrayMatter's Solution

Developed 10+ dashboards providing geo-wide insights for sales and inventory

Developed COO cockpit view for Top Management that provides metrics driven insights

Single version of truth integrating multiple functional areas

1
Single Version of Truth

15%
Reduced Data Consolidation Efforts

3
Functional Areas

10+
Dashboards

30+
KPIs

Nestle streamlines EPOS Data Integration and Reporting

Organization
Nestle Middle East

Headquarters
Dubai, UAE

Industry
Food & Beverage

Revenue (ME Region)
US $ 2.4 BN (2014)

Employees (ME)
11,000

Website
http://www.nestle-me.com/en

Key Challenges

- Lack of standardization in EPOS data received from retailers across the region
- Manual reconciliation of EPOS data consumes time and efforts
- Lack of KPI driven reporting across countries, retailers, brands, categories
- Lack of simple insightful user experience for BI consumers

Resolution

- One-time standardization of EPOS data followed by monthly updates to incorporate changes in stores, brands, SKUs
- Implemented KPI driven management dashboards providing analyses and trends across countries, stores, brands, categories and SKUs. All these insights can be analyzed across time dimension (annual, quarterly, monthly, weekly, etc.)
- Mobile responsive dashboards with intuitive and interactive interfaces

Benefits

- Manpower saving due to automated data integration
- Data integration and standardization coupled with incremental updates ensure reliable decision support
- KPI driven reporting with slice and dice across countries, stores, brands, categories etc. ensure more informed and accurate decision making
- Intuitive interfaces facilitating fast and easy actionable insights
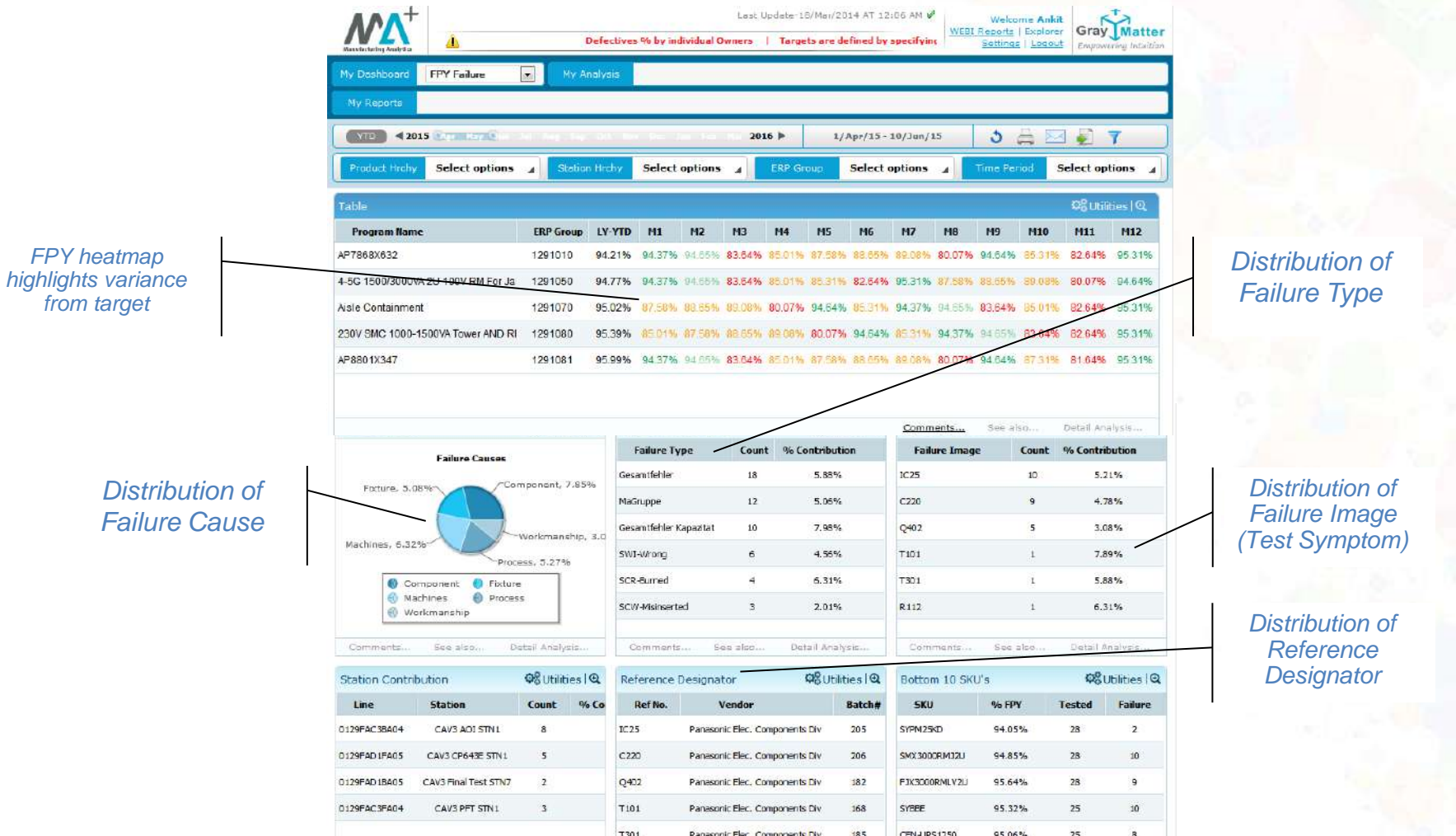
SAMPLE DASHBOARDS

Factory Head Overview

Mfg Quality Dashboard refreshed every 8 hours makes operations transparent - FPY

Mfg Quality Metrics

- First Pass Yield, Manufacturing Defect Rate

KPI drill down by Product Hierarchy

KPI by Test Operation (ERP Group)

KPI drill down by Factory

KPI trend

- Helps in analyzing FPY / PY / RY / MDR to identify the top contributors by Line of Business / Product Division / Program / SKU
- Also identifies the top contributing Assembly Lines and ERP Groups to FPY
- Enables correlation between Product Dimension and Station Dimension

Manufacturing Quality – FPY Analysis vs. Target RCA

FPY heatmap highlights variance from target

Distribution of Failure Type

Distribution of Failure Cause

Distribution of Failure Image (Test Symptom)

Distribution of Reference Designator

- Heat Grid shows the FPY per month per Program per ERP Group, with color coding showcasing variances from Target
- Drill-down from a particular cell in Heat Grid helps in identifying Root Cause for deviation – whether it is any Failure Cause or Failure Type or Stations or a part of IC

Structured DPMO(i) analytics to track and drive improvements in PCBA mfg

DPMO Index with drill down by Mfg facility, factory, Line

DPMO trend

Failure distribution by detection station

Failure Type distribution

Failure distribution by Origin Station

• DPMO(i) combines all Defects per Million Opportunities (DPMO) into one. All failure causes, except due to Fixtures are included in this calculation
• Dashboard not only helps identifying contributing Factories, Lines, SKUs to DPMO(i); but also showcases trend of all DPMOs vs. DPMO(i) – to identify peak months of differences in DPMOs

Manufacturing Quality – DPMO (p)
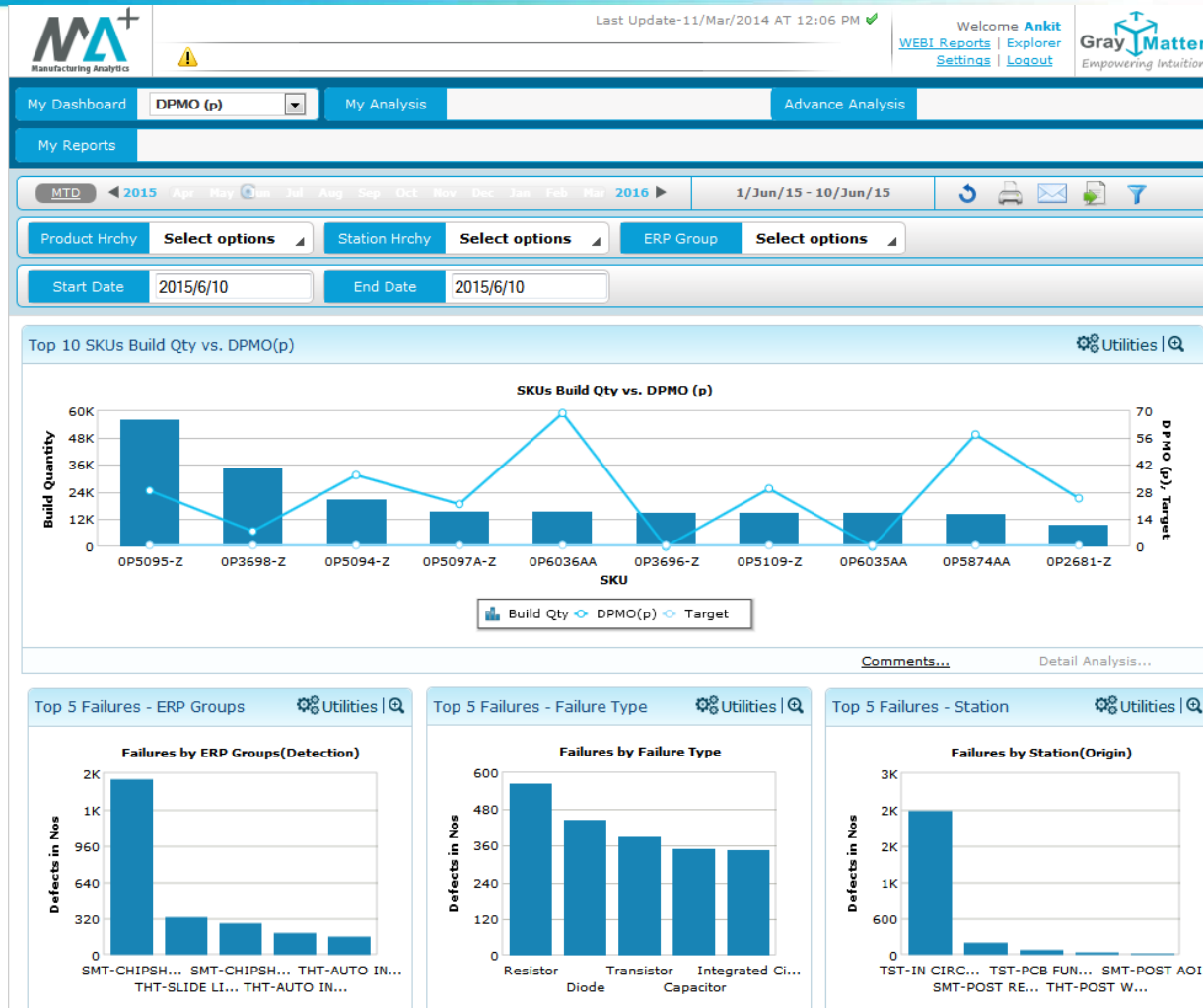
•DPMO(p) is one of the several other DPMOs, and is connected with Machine Failure
•Build Quantity vs. DPMO(p) Pareto showcases the strong vs. weak SKUs
•The Top failure ERP Groups and Failure Types for Machine Failures helps identifying if the failures are predominantly coming from a select few ERP Groups and Failure Types

# Manufacturing Quality – Isochronal Analysis

BackUPS ES (BE500Y-IN) isochronal failure rate
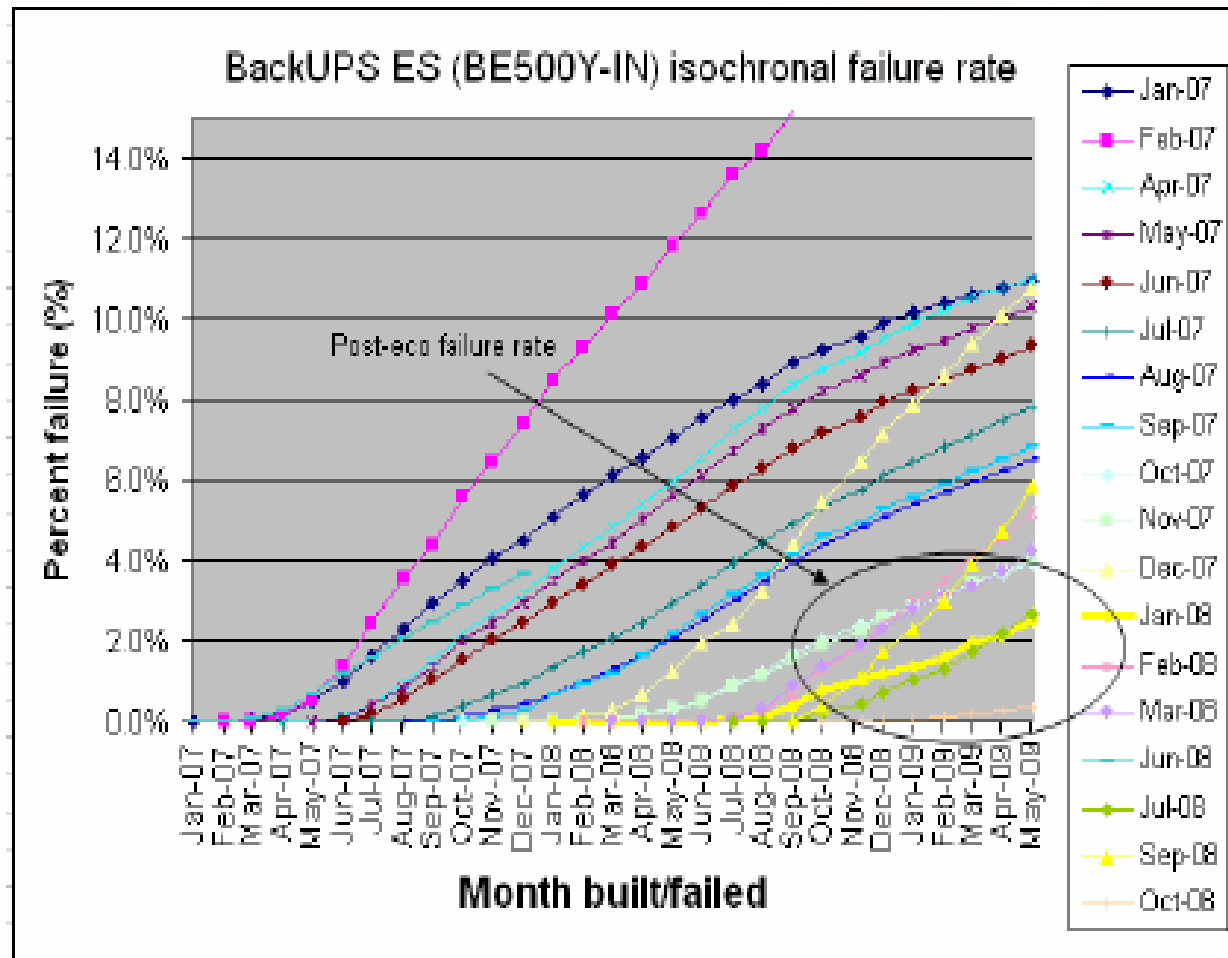
- Isochronal Chart plots the cumulative Failure % monthly trend with respect to Unit Built / Produced month
- The above enables identification of the Failure Rate dropping, post implementation of an Engineering Change Order (ECO)

Measurement System Analysis – Gage Studies
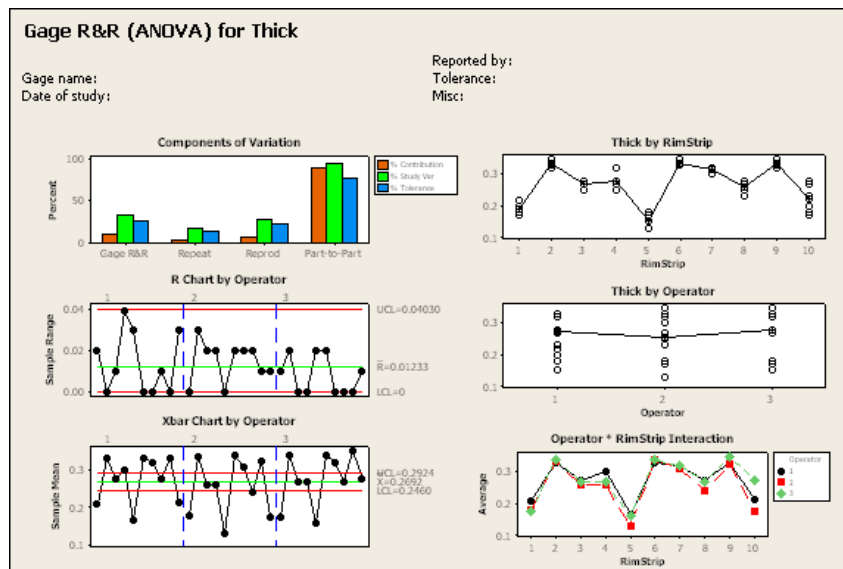
- Gage studies for continuous data - Gage R&R (Crossed) graphs for:
  - assessing measurement system variation; variance components and associated graphs
  - gage R&R study (crossed); gage R&R study (nested – for destructive measurements)
  - gage linearity and bias studies to measure stability of measurement system over time using
  - calculate statistics to assess linearity and bias of measurement system

Measurement System Analysis – Gage Linearity


Gage Linearity and Bias Study for Flatness
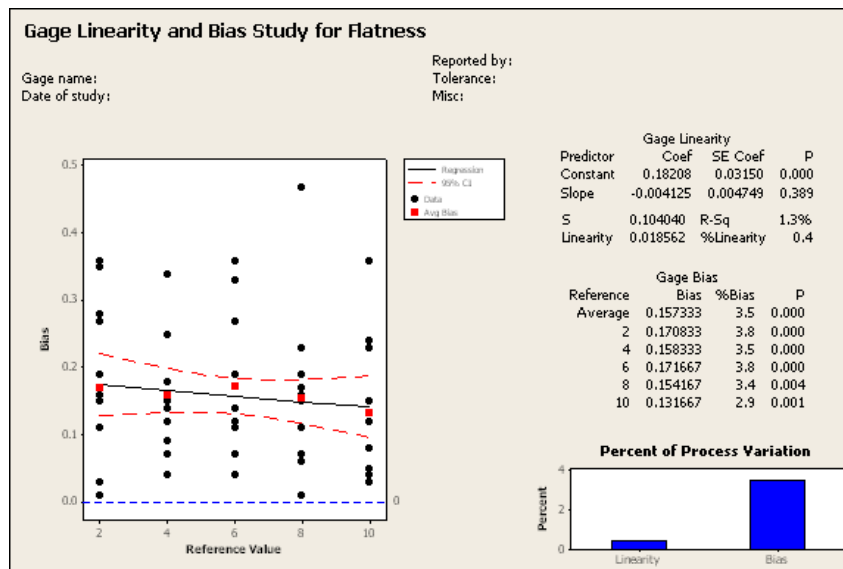
- Attribute Agreement Analysis, using binary, nominal and ordinal measurements:
  - graphic and statistical assessment of measurement system; kappa statistic; Kendall's coefficient of concordance
  - Attribute Gage Study (Analytic Method) – AIAG long method

Measurement System Analysis – Gage Run
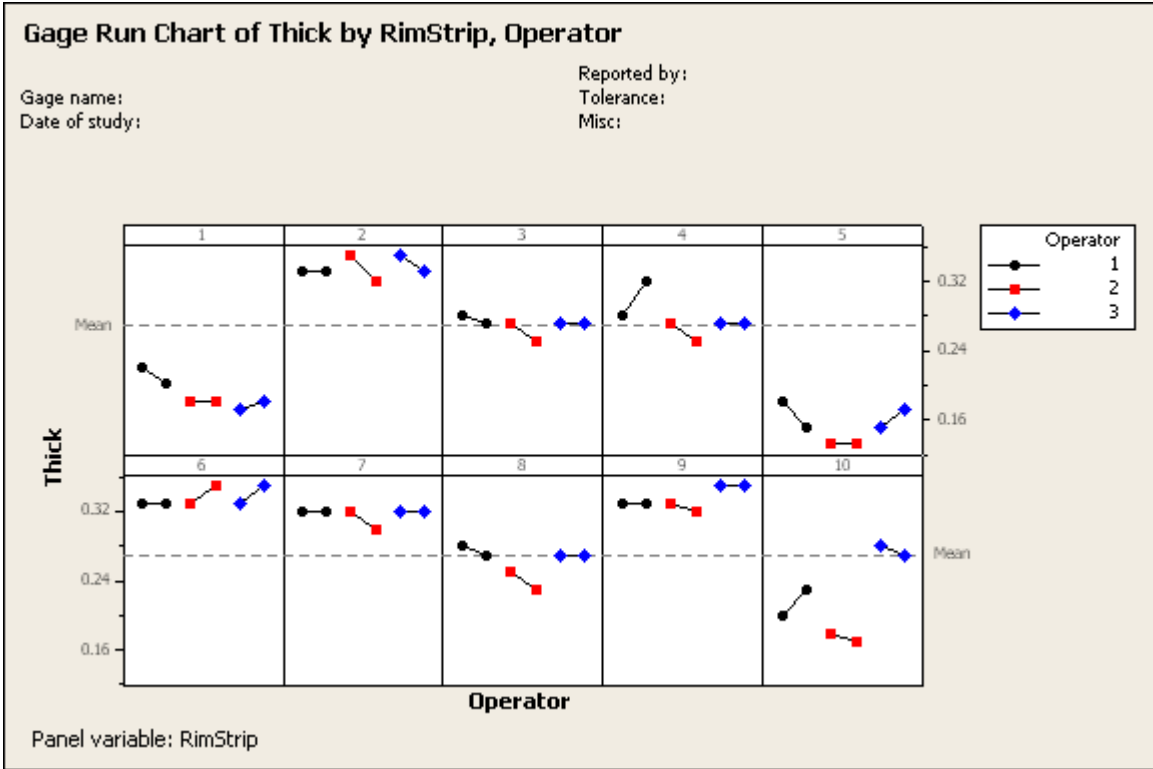
•Gage Run of Panel Variable – RinStrip (Thickness) vs. Operator

Control Charts - SPC

Xbar-S Chart of Shrinkage by Change
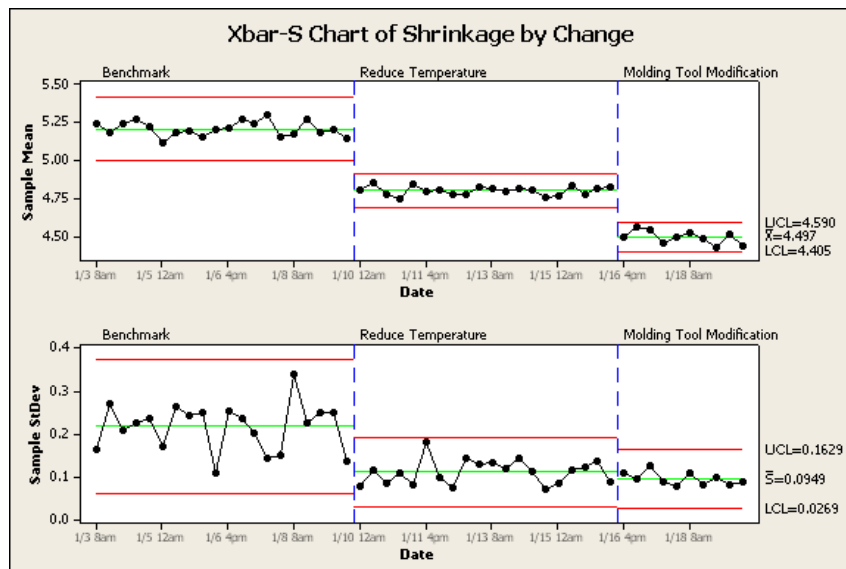
- Xbar-S chart with stages
- special cause variation; tests for special causes;
- charts for continuous data:
  - X-bar, R charts;
  - X-bar and s charts;
  - I-MR charts;
- charts for attributes data:
  - nonconforming units vs counts of nonconformities;
  - p and np charts; u and c charts;
  - binomial distribution (for proportions); Poisson distribution (for counts)

Capability Analysis

Process Capability Sixpack of Hardness
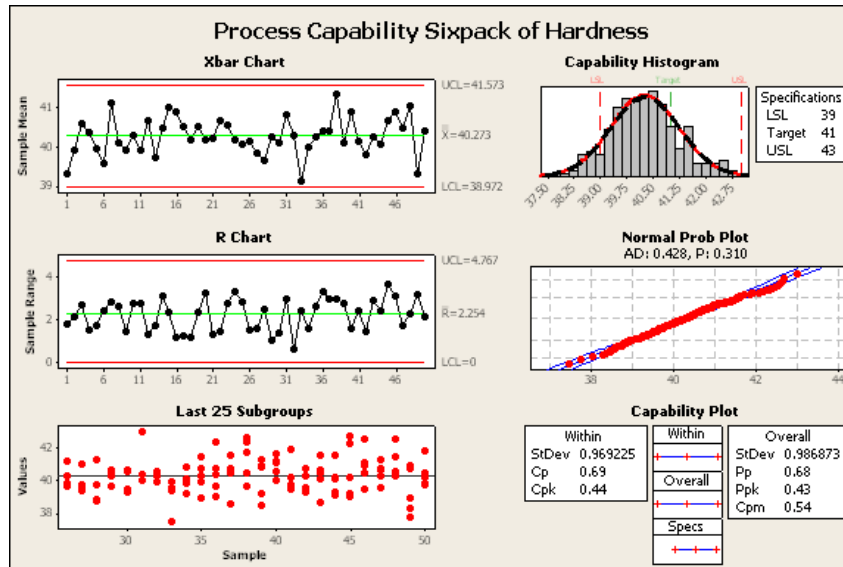
- Process Capability Sixpack
- For continuous data:
    - Capability Sixpack and Analysis (Normal)
    - Cp, CPL, CPU, Cpk, CCpk, Pp, PPU, PPL, Ppk, Cpm
    - confidence intervals for capability indices
    - capability analysis with non-Normal data
    - individual distribution identification; Box-Cox transformation; Johnson transformation
- capability analysis for attributes data:
    - binomial capability analysis
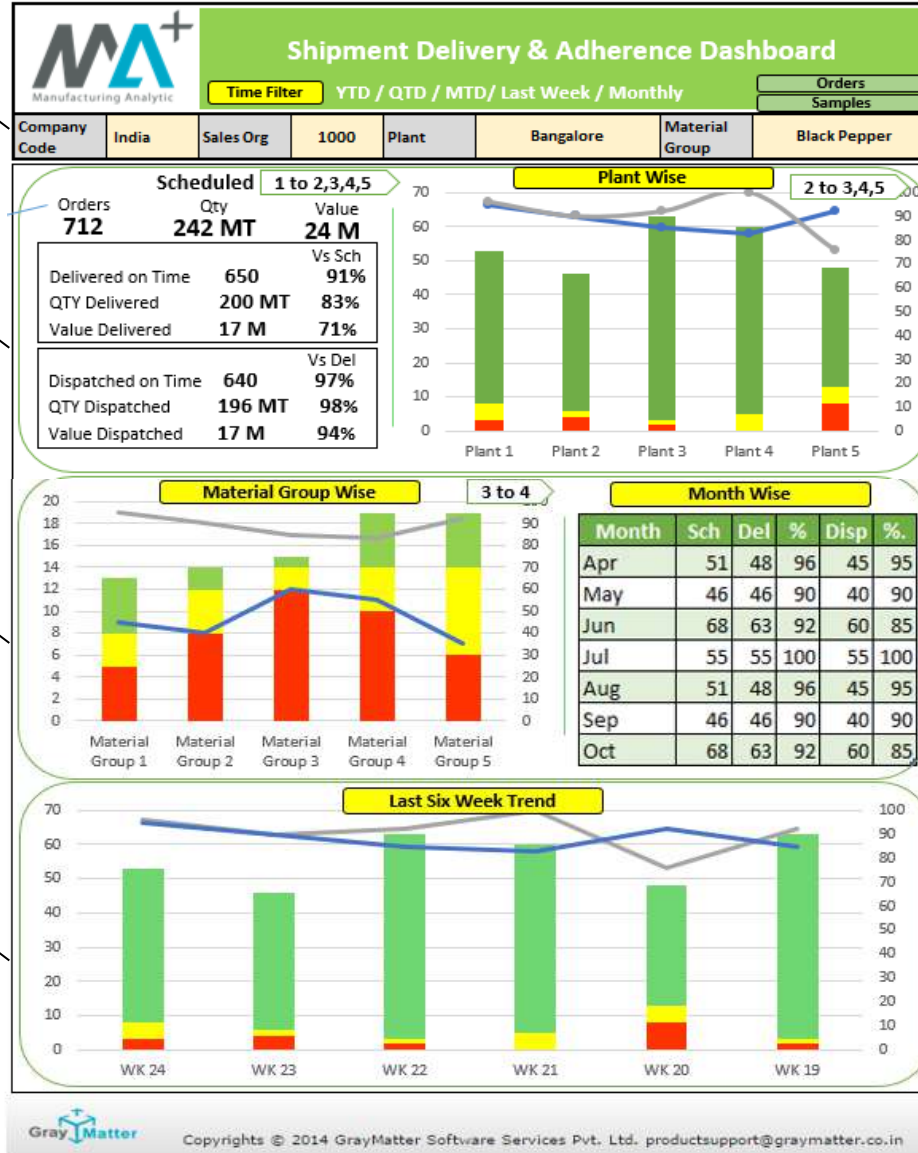   - Poisson capability analysis

Shipment and Delivery Adherence

Inventory Analytics

Time Period & Parameters Selection

KPI score card establishes Inventory Overview

KPI drill down by Age of Inventory

KPI drill down by Material Type Wise

KPI Trend for Last Six Months

KPI drill down Material Group

KPI drill down by plant

KPI drill down by division

OEE Analytics
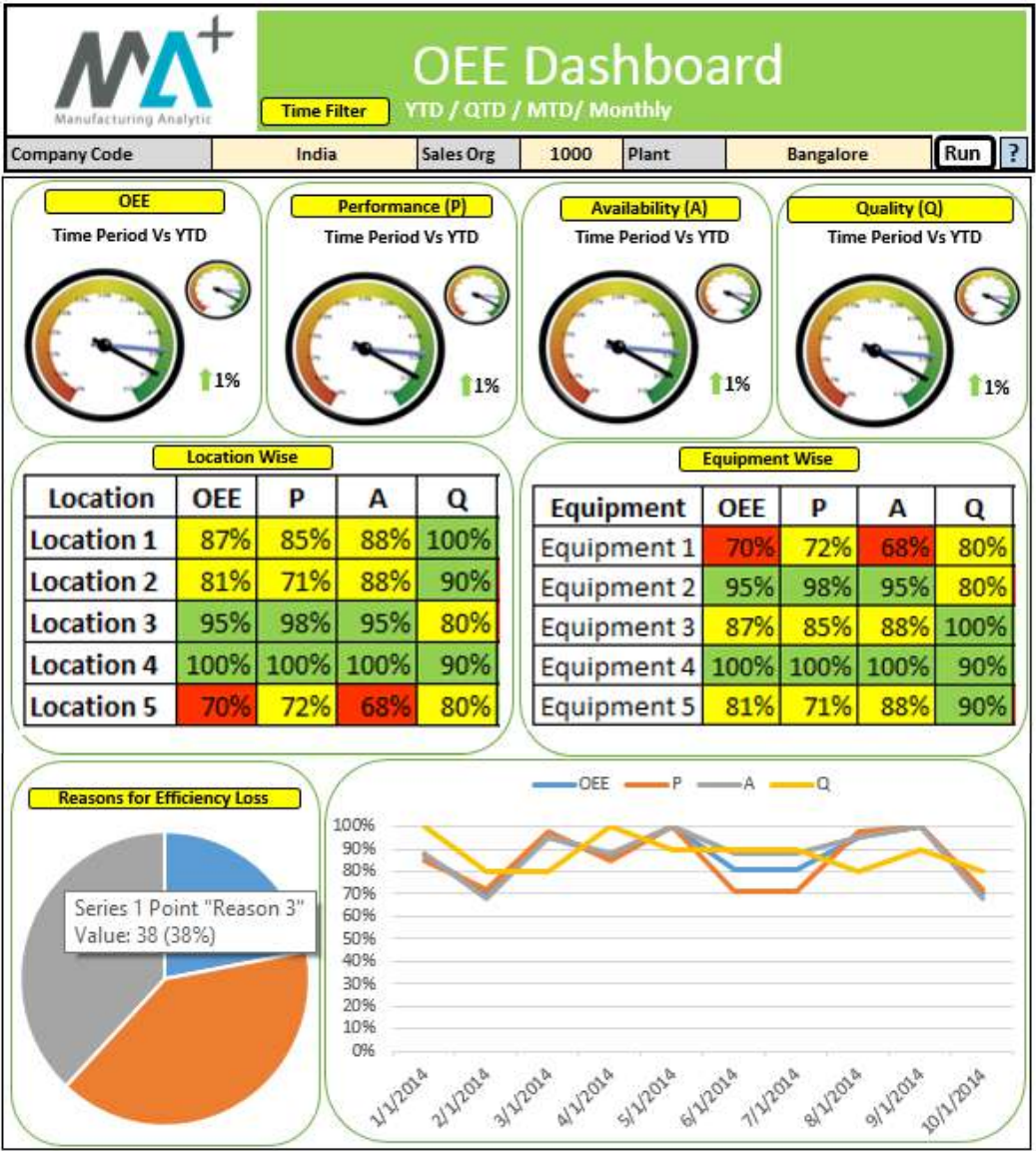

Time Period & Parameters Selection
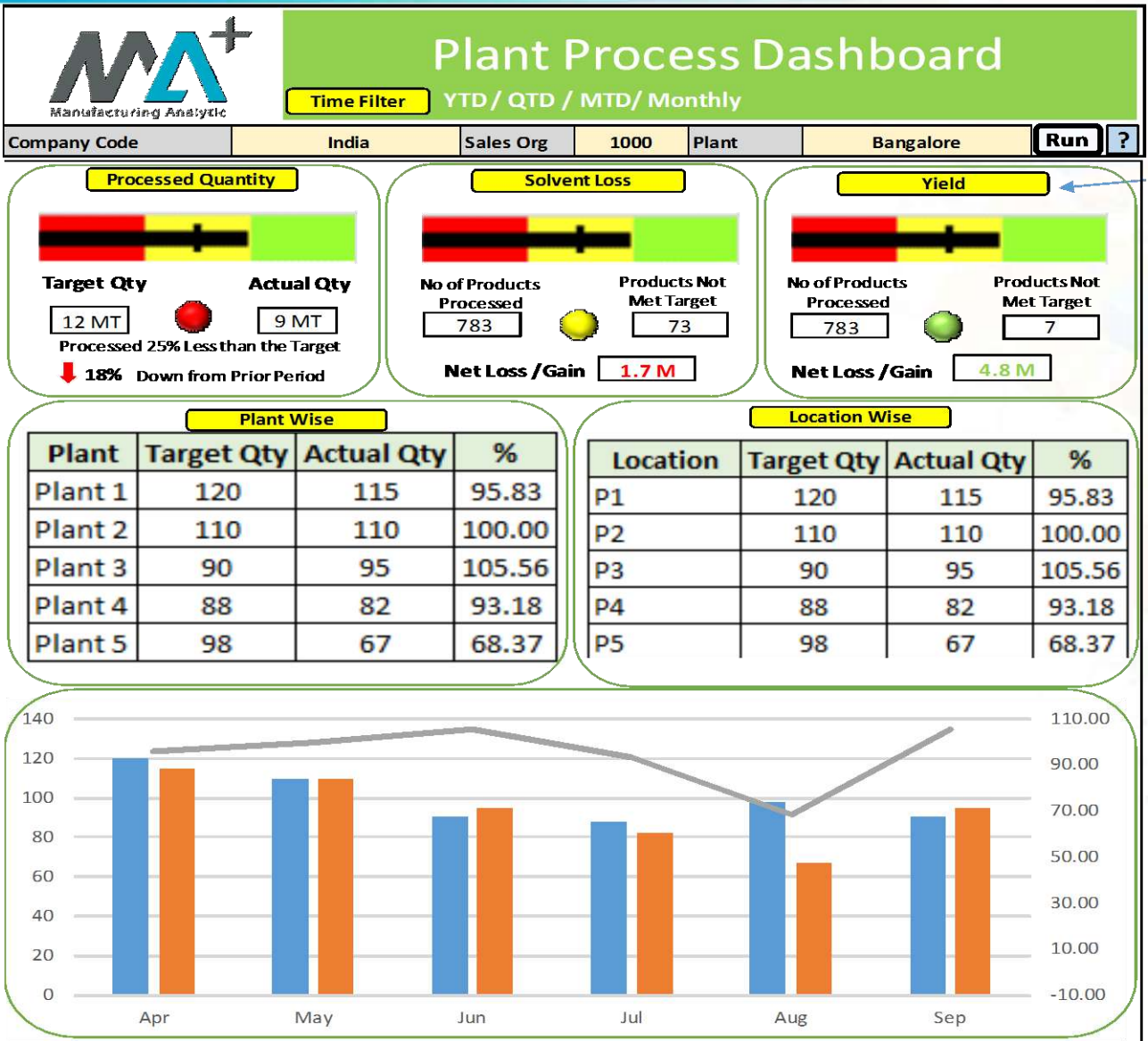
OEE KPI's Overview

KPI drill down by Location

KPI drilldown by Equipment

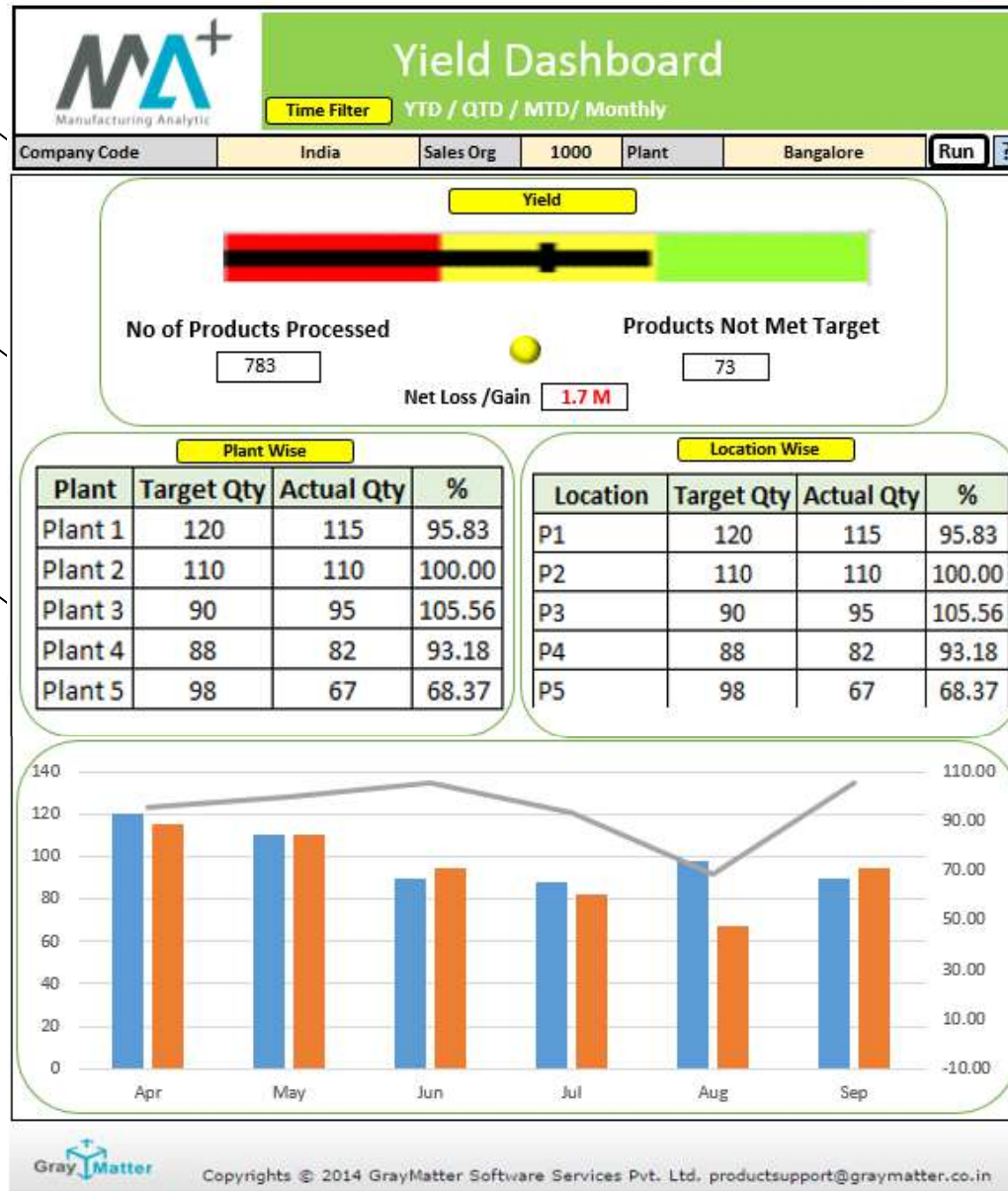*KPI drill down by Reasons for Loss of Availability*

KPI trend for Selected Time Period

Process Analytics

Plant Process Dashboard

Time Filter — YTD / QTD / MTD / Monthly

Company Code	India	Sales Org	1000	Plant	Bangalore	Run	?

Processed Quantity

Target Qty	Actual Qty
12 MT	9 MT

Processed 25% Less than the Target

▼ **18%** Down from Prior Period

Solvent Loss

No of Products Processed	Products Not Met Target
783	73

Net Loss /Gain 1.7 M

Yield

No of Products Processed	Products Not Met Target
783	7

Net Loss /Gain 4.8 M

Plant Wise

Plant	Target Qty	Actual Qty	%
Plant 1	120	115	95.83
Plant 2	110	110	100.00
Plant 3	90	95	105.56
Plant 4	88	82	93.18
Plant 5	98	67	68.37

Location Wise

Location	Target Qty	Actual Qty	%
P1	120	115	95.83
P2	110	110	100.00
P3	90	95	105.56
P4	88	82	93.18
P5	98	67	68.37

Yield Analytics

Time Period & Parameters Selection

Yield Overview

Yield drill down by Plant

Yield drilldown by Location

Yield trend for Selected Time Period

Internal Orders Analytics
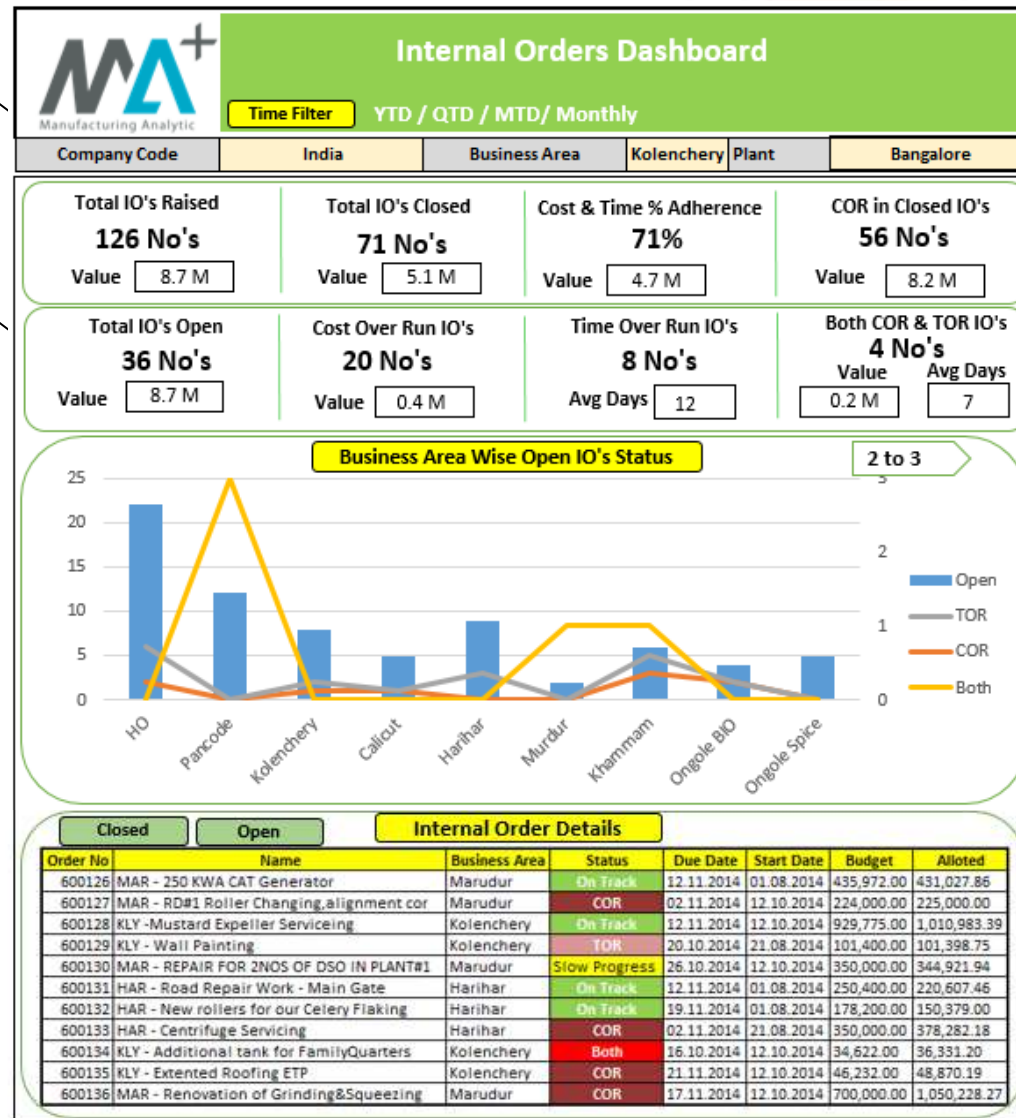
HR Overview Analytics

Time Period &
Parameters
Selection

KPI score card
establishes HR
Overview

KPI drill down
by Function

KPI drill down
by Gender

KPI drill down
by JRL

KPI drill down
by Category

KPI trend for
Selected Time
Period

Thank You