Back To Basics

I sistemi di miglioramento continuo Lean & Six Sigma nell'asservimento ad un sistema integrato di Automotive Manufacturing

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TRW Automotive Profile 2014

ADVANCED THINKING / SMART THINKING / GREEN THINKING

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Company Profile

- Headquartered in Livonia, Michigan, US
- More than 65,000 employees worldwide
- Balanced global presence, with approximately 185 facilities in 24 countries, including 13 test tracks and 22 technical centers
- Serves all major vehicle manufacturers worldwide
- Leading developer and supplier of active and passive safety systems
- Ranks among the world's leading automotive suppliers

The Safety Everyone Deserves

- **TRW is all about safety**
  - Broadest portfolio of any supplier
  - Approximately 90% of TRW's business is safety
  - Committed to making technology affordable for all
  - Committed to helping to protect people
  - Committed to education about road safety – particularly in emerging markets

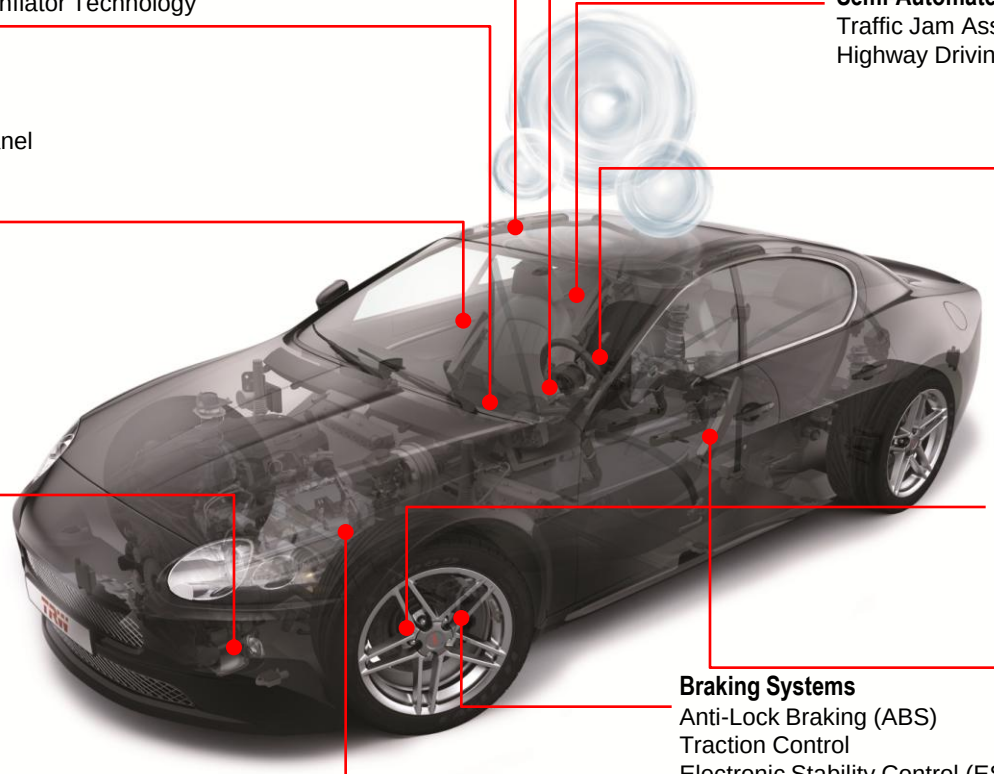
Product Portfolio – Safety Focus

Airbag Systems
Driver and Passenger Airbags
Self Adapting Vent
Active and Passive Venting
Low Risk Deployment
Knee and Side Airbags
Curtain and Rollover Airbags
Inflator Technology

Driver Assist Systems
Adaptive Cruise Control
Lane Assist Systems
Automatic Emergency Braking
Emergency Steering Assist

Body Control Systems
Efficient Climate Control
Capacitive Touch Sensors
Rain/Light Sensors
Integrated Electronic Control Panel

Semi-Automated Driving
Traffic Jam Assist
Highway Driving Assist



Steering Wheel Systems
Touch Sensor in Steering Wheel Rim
Hands Off Detection
Vibrating Steering Wheel
Illumination Technology
Contactless Horn System
Path-free use of Horn
Steering Wheel with Integrated Microphone
Electrical Connections

Seat Belt Systems
Active Control Retractor
Seat Belt Retractors
Load Limiters
Pretensioners
Active Buckle Lifter
Buckles

Linkage & Suspension Systems
Control Arms
Ball Joints
Stabilizer Links
Tie Rods
Modules

Electronics
Electronic Control Units
Airbag Control Units
Crash Sensors
Video and Radar Sensors
RKE/Passive Entry
Safety Domain ECU
Pedestrian Protection
Tire Pressure Monitoring

Braking Systems
Anti-Lock Braking (ABS)
Traction Control
Electronic Stability Control (ESC)
Slip Control Boost
Integrated Brake Control (IBC)
Electric Park Brake
Integrated Park Brake
Calipers
Actuation

Fastening Systems & Components
Wire Harness and Pipe Fasteners
Trim Fasteners
Hole Plugs
Air Registers
Pressure Relief Valves
Grab Handles
Brackets

Steering Systems
Speed Proportional Hydraulic Steering
Electrically Powered Hydraulic Steering
Electrically Powered Steering Column Drive
Electrically Powered Steering Rack Drive

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Strategic Priorities

- **Strategic Priorities are ingrained into TRW's daily business activities and are used as navigation points to guide the allocation of resources to support research and development, manufacturing investments and growth initiatives**

Best Quality

- Drive quality in everything we do – products, launches, engineering
- Ensure we make the product right the first time and deliver only quality products on time to our customers

Global Reach

- Position businesses globally to service key customers and grow with new markets
- Pursue opportunities to diversify customer base

Innovative Technology

- Offer leading-edge systems & products that add value for our customers
- Leverage leadership in active and passive safety systems to develop integrated product solutions

Lowest Cost

- Relentlessly drive down costs to offer customers superior value
- Utilize manufacturing programs (Six Sigma and Operational Excellence) to manage costs to optimal levels

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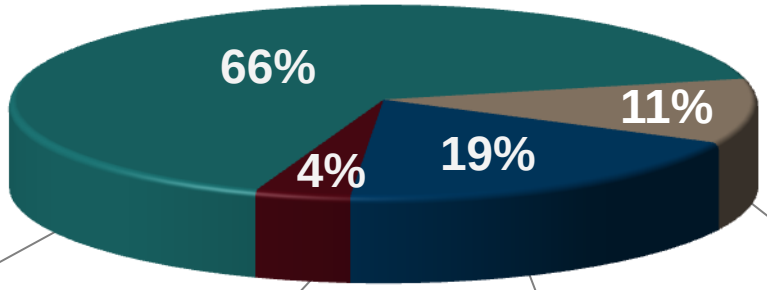
Global Leadership in Safety – Segments

2013 Full Year Sales of $17.4 Billion



89% of sales derived from safety-related products

Chassis Systems
"Active Safety"

- $11.5 billion in sales

Primary products:
- Steering systems
- Foundation brakes
- Slip control
- Actuation
- Suspension
- Chassis aftermarket

Electronics
"Active & Passive Safety"

- $0.7 billion in sales

Primary products:
- Safety electronics
- Driver assist systems
- Chassis electronics
- RF electronics
- Powertrain electronics

Occupant Safety Systems
"Passive Safety"

- $3.3 billion in sales

Primary products:
- Airbags
- Seat belts
- Steering wheels

Automotive Components

- $1.9 billion in sales

Primary products:
- Body controls
- Engine valves
- Fasteners

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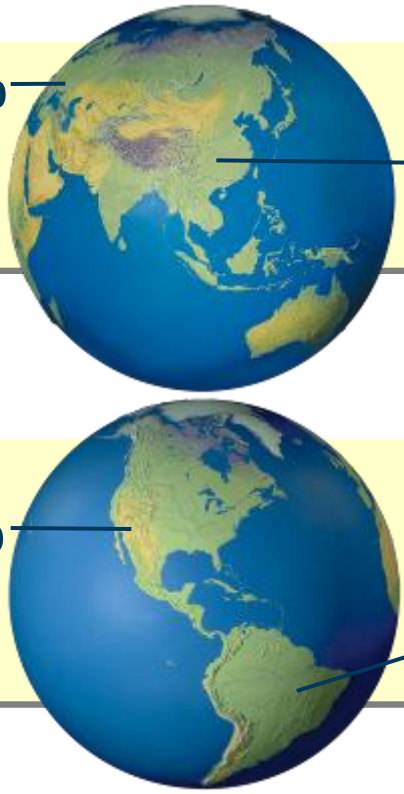
Supporting Customers Globally

Europe

- 2013 Sales of $7.1B
- All products and aftermarket

41%



19%

Asia Pacific

- 2013 Sales of $3.3B
- All products and aftermarket

North America

- 2013 Sales of $6.3B
- All products and aftermarket

36%

4%

RoW(1)

- 2013 Sales of $0.7B
- Primarily Chassis and aftermarket

TRW operations cover every major vehicle producing region and are aligned to match the future needs of our customers

(1) Primarily South America

TRW Automotive Global Capabilities

AMERICAS

Arizona
- Mesa

Georgia
- Flowery Branch

Illinois
- Marshall

Indiana
- Garrett
- Lafayette

Massachusetts
- Westminster

Michigan
- Brimley
- Farmington Hills
- Fenton
- Fowlerville
- Livonia
- Portland
- Romeo
- Washington
- Williamston
- Wixom

Minnesota
- Winona

New York
- Auburn

Ohio
- Fayette
- Mogadore
- Valley View
- Warrensville Heights

Tennessee
- Lebanon
- Rogersville
- Sevierville

Texas
- Pharr

Virginia
- Atkins

Wisconsin
- Galesville

Canada (Ontario)
- Midland
- St. Catharines
- Tillsonburg
- Windsor
- Woodstock

Mexico
- Aguascalientes
- Chihuahua
- Cienega de Flores
- El Marques
- Querétaro
- Reynosa
- Toluca

Brazil
- Diadema
- Engenheiro
- Lavras
- Limeira
- Santo André
- Taubate
- Três Coracões

Venezuela
- Valencia

EUROPE

Czech Republic
- Benesov
- Dacice
- Frydlant
- Horni Pocernice-Prague
- Jablonec
- Mlada Boleslav
- Stara Boleslav

France
- Bouzonville
- Bonneval
- Dijon
- Ingwiller
- Orléans
- Paris – La Défense
- Plouzane (Brest)
- Schirmeck

Germany
- Alfdorf
- Aschaffenburg
- Aschau
- Barsinghausen
- Beckedorf
- Blumberg
- Duesseldorf
- Emmerke
- Enkenbach-Alsenborn
- Eschborn
- Gelsenkirchen
- Koblenz
- Krefeld
- Laage
- Neuwied
- Radolfzell
- Selb

Italy
- Bricherasio
- Cinisello Balsamo
- Gardone
- Livorno
- Moncalieri
- Nichelino
- Ostellato
- Pralormo

Poland
- Bielsko-Biała
- Czechowice-Dziedzice
- Częstochowa
- Gliwice
- Pruszków

Portugal
- Ponte de Lima
- Sao Domingos de Rana
- Vila Nova de Cerveira

Romania
- Roman
- Timisoara

Tunisia
- Ben Arous

Mauritius
- Ebene

South Africa
- Atlantis

Slovakia
- Bytca
- Nove Mesto

Spain
- Alfaro
- Barcelona
- Corella
- Egues
- Las Plamas
- Madrid
- Mutliva Baja
- Olvega
- Pamplona
- Porriño
- Valladolid
- Vigo

Sweden – Arvidsjaur

United Arab Emirates – Dubai

Turkey
- Cerkezkoy
- Atasehir-Istanbul

UK
- Birmingham
- Burnley
- Chlemsford
- Cirencester
- Houghton le-Spring
- Nuneaton
- Peterlee
- Pontypool
- Shirley
- Wrexham

ASIA PACIFIC

India
- Bangalore
- Chennai
- Gurgaon
- Pune

Thailand
- Bangkok
- Chonburi
- Rayong

Malaysia
- Bukit Beruntung
- Johor
- Rawang, Selangor
- Sham Alam

Korea
- Ansan City
- Incheon
- Seosan City
- Seoul
- Ulsan

Singapore
- Singapore City

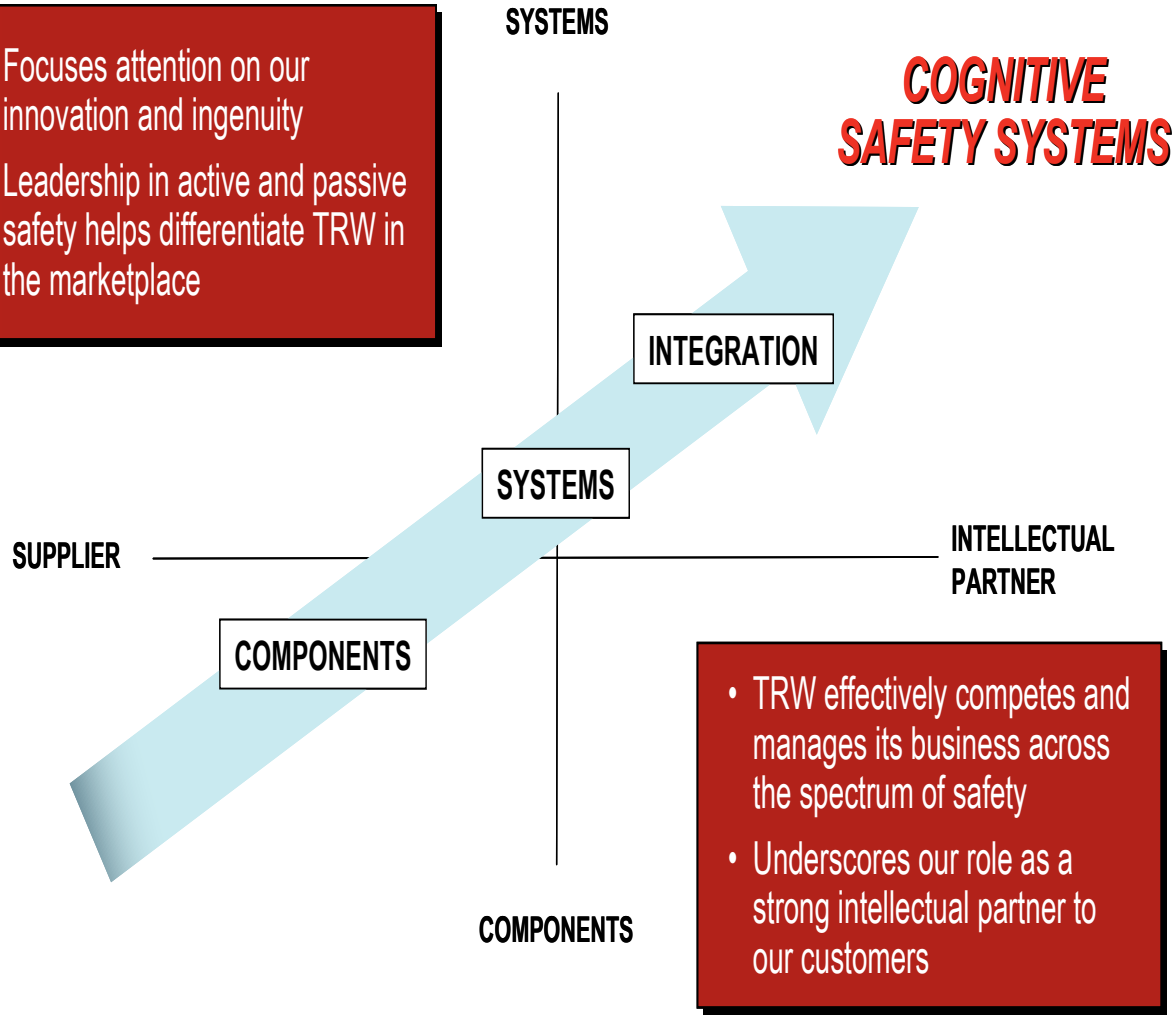
Japan
- Ebina
- Hiroshima
- Kasugai City
- Miyoshi City
- Tokyo
- Toyota City
- Utsunomiya
- Yokohama

China
- Anting
- Beijing
- Changchun
- Chengdu
- Chongqing
- Heihe
- Langfang
- Nanjing
- Ningbo
- Qingdao
- Shanghai
- Suzhou
- Wuhan
- Xi'an

Manufacturing sites, technical centers, test tracks and joint venture facilities ***(As of February 2014)***

Cognitive Safety Systems

- Focuses attention on our innovation and ingenuity
- Leadership in active and passive safety helps differentiate TRW in the marketplace



- TRW effectively competes and manages its business across the spectrum of safety
- Underscores our role as a strong intellectual partner to our customers

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Focus on Three Global Megatrends

Global Trends

Focus on Safety

- Increasingly stringent New Car Assessment Program testing/regulation in many markets
- Push for advanced active safety technologies

Affordability

- Making advanced safety affordable → penetrate beyond premium cars
- Growth in emerging markets → low cost safety products required
- Smaller vehicles → packaging and cost constraints

Emissions/Fuel Efficiency

- CO_2 / fuel economy regs → weight, drag, accessory load reduction
- Powertrain electrification → non-standard solutions for compatibility

TRW Approach

Advanced Thinking

- Broadest portfolio and deepest expertise of active and passive systems in the industry

Smart Thinking

- Adding content through integration
- Low cost, scalable solutions
- Investment in footprint in emerging market (Brazil/ India/China)

Green Thinking

- Efficiency solutions beyond powertrain
- Hybrid enabling braking and steering systems
- Smaller, lighter and 'green' products

Advanced Thinking

Our Cognitive Safety Systems are always there and always aware. Our systems are raising the intelligence of safety: smarter cars are safer cars.

Passive Safety:
- Self-adaptive vent airbags
- Seat belt energy management solutions
- New bag shapes and locations

Active Safety:
- Video and radar sensors with data fusion to enable advanced driver assist functionality such as lane keeping leading to semi-automated functions
- Automatic emergency braking (higher speeds) collision mitigation braking (city driving)

Active / Passive Safety Integration:
- Pre-crash functionality
- Collision avoidance and mitigation
- Safety Domain ECU

Radar-based driver assist systems can enhance the driving experience and, when combined with advanced electronic stability control brake systems, they can enable collision avoidance and mitigation.

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Smart Thinking

Smart thinking is all about value: TRW is delivering enhanced value to make safety affordable for all – whether that's through modularity, integration or cost optimization.

Making Advanced Safety Affordable:
- Affordable mid range 24 GHz radar applications
- EBC460 modular ESC family
- Scalable, modular electric power steering
- Scalable camera
- Electronics integration

Low Cost & Small Vehicle Solutions:
- SPR4 retractor pretensioner
- Electric park brake
- Roof airbag

Emerging Markets Solutions:
- Scalable BRIC ACU
- Modular airbag and inflator kits
- Value line ABS

TRW's Active Control Retractor 2 basic system will allow this advanced pre-crash technology to be used more widely in established and emerging markets.

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Green Thinking

Improved fuel efficiency and reduced emissions are global targets: TRW offers a range of technologies to meet these goals.

Technology Highlights:

- Hybrid enabling braking systems, such as Integrated Brake Control (IBC)
- Electric steering (EPS / EPHS)
- Tire pressure monitoring systems
- Lightweight, low drag caliper
- Reduced-weight airbag modules
- Use of innovative bio materials for airbags

TRW offers a range of solutions, including electric steering, that help enable and support fuel efficient driving.

Lean & Six Sigma Implementation

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Continuous Improvement Strategic Plan

The end goal is to achieve Business Excellence.

The methods used in transforming the organization are:

1. **Lean**
2. **Six Sigma**

They are creating the necessary on-going ability to reduce waste / variation and to apply lessons learned.

They are part of the Company DNA.

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Lean Production in TRW

Kickoff: Giugno 2000

Eliminare lo spreco, *"Working smarter, not harder",* attraverso il miglioramento di:

- *Efficacia*
- *Efficienza*

Operation Excellence è il programma che introduce in maniera sistematica la Lean production in TRW.

Il Goal di TRW all'Eccellenza Operativa è quindi di sviluppare:

1. **Una *Vision* TRW Automotive per l'Eccellenza Operativa.**
2. **Uno *scopo*, una *direzione* ed un *linguaggio comuni* per tutte le Operations/Business Units in tutto il mondo.**
3. **Un programma completo di *formazione e addestramento* per i direttori di stabilimento e le loro funzioni di supporto.**
4. **Un *processo ed una metodologia* omogenei per il miglioramento verso l'obiettivo comune.**
5. **Un insieme di *misure e target* condiviso e comune a tutti.**

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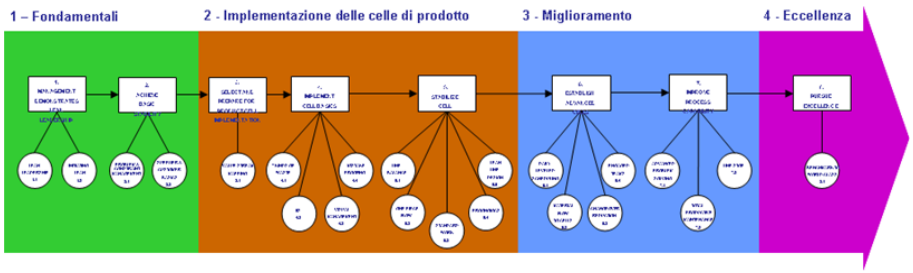
Operation Excellence – cont.

1. La **Vision** di Operation Excellence della TRW parte dai principi fondamentali della Produzione Efficiente e della riduzione degli sprechi, focalizzata alle esigenze del cliente e si basa su 4 pilastri fondamentali:
    1. **Sicurezza e Personale**
    2. **Qualità per i Clienti**
    3. **Performance nelle consegne al Cliente**
    4. **Costo**

2. Lo **scopo**, la **direzione** ed il **linguaggio comune** per tutte le Operations/Business Units in tutto il mondo, lo fornisce una "***Roadmap***" verso l'Eccellenza Operativa.

   La Roadmap è stata prodotta in TRW, non da consulenti esterni, parte integrante del DNA aziendale e del know how di anni di esperienza nella produzione "snella".



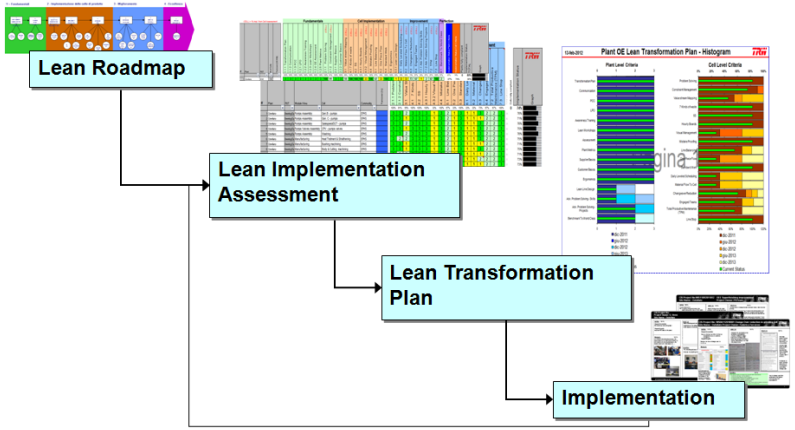
Operation Excellence – cont.

3. Formazione e addestramento

Diversi livelli di training formale:

- "**Lean 100**" -> 5 giorni (Plant Managers, Production Managers & LPOs)
- **Lean Awareness Simulation** -> 1 day (Tutto lo staff direttamente coinvolto e ogni altro Team leader o Operatore parte integrante dei core teams)
- **Lean Workshops** -> "Learning by doing"

4. Un **processo ed una metodologia** omogenei per il miglioramento verso l'obiettivo comune.

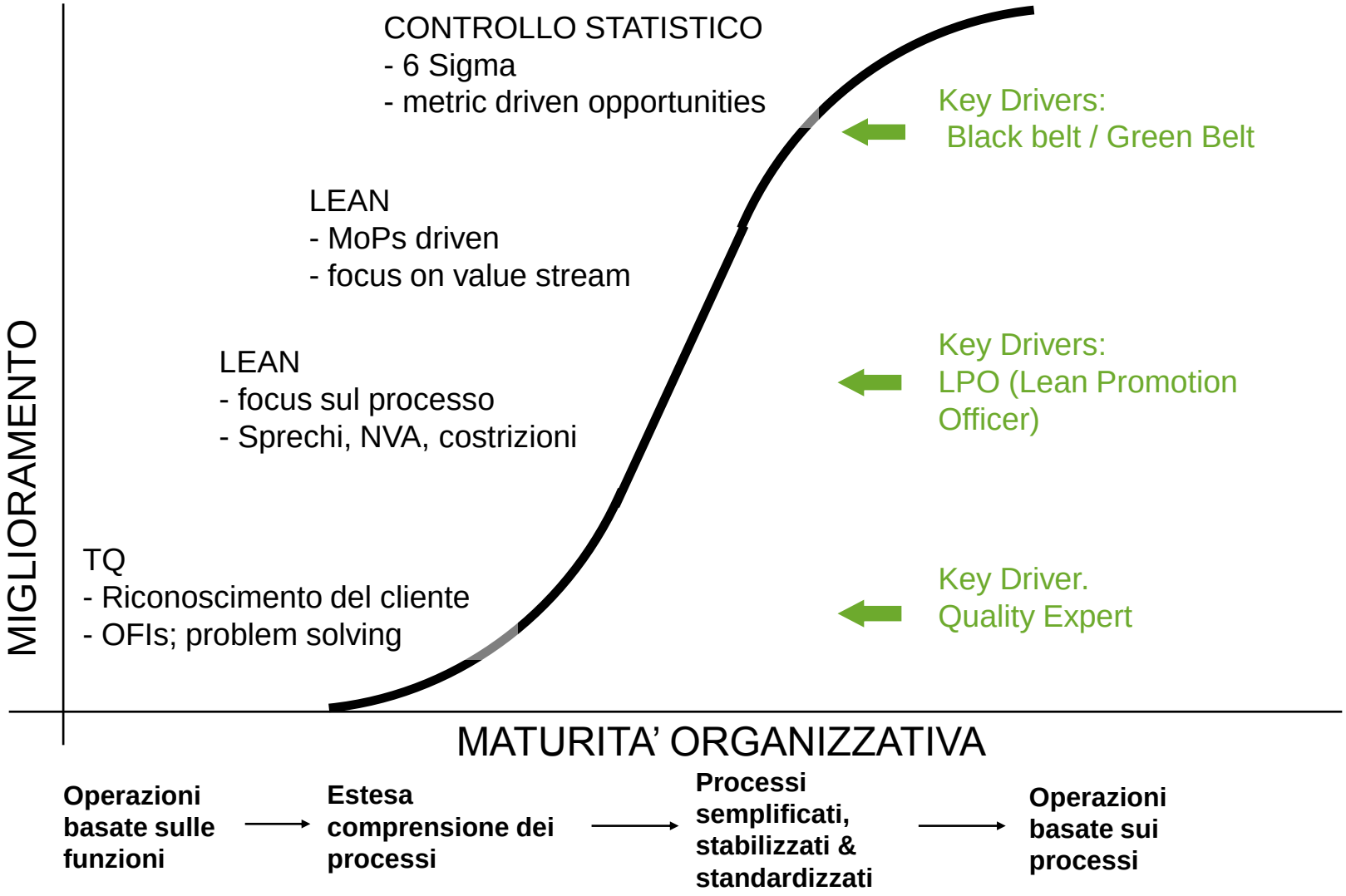


5. Misure e Target

Sia a livello globale, che nelle BU che all'interno degli stabilimenti esiste una dashboard definita di misure

Integrazione Lean & Six Sigma

Queste non sono iniziative separate. Sono costruite una sull'altra.



Six Sigma in TRW

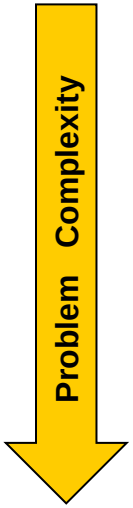
Why Six Sigma?

Kickoff: late 2001

It is the TRW Continuous Improvement Advanced Problem Solving program to generate

- *Results*
- *Competitive advantage*
- *Business growth*
- *Improved Quality*
- *Profit & Shareholder value*

Six Sigma in TRW



Types of Problem Solving in European Steering

- Personal Experience / Common Sense
- Logical approach / “Just do it”
- PDCA / Kaizen activities
- Basic Problem Solving
- PSD / 8D
- **Six Sigma Green Belt**
- Statistical Engineering
- **Six Sigma Black Belt**

Problem Solvers trained in European Steering

> 1000 Green Belts (50 to 90% of the plant staff); *>10.000 in TRW.*

> 110 Black Belts; 15 active, (One or + per plant) others embed in the business; *approx. 900 in TRW.*

1 Money Belt in each Plant

> 18.000 Six Sigma projects validated globally

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Back To Basics

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Forewords

Lean & **Six Sigma** made TRW one of the top performer company in Wall Street, consolidating its known customer satisfaction with solid profitability results.

TRW Stock price:

- approx. 2 $ in 2008
- 104.79 $ today

What boosted them ?

Events

- **The Friday Management meeting**
- **The “2000 era”; *we have Computerized Systems***
- ***“Who is he?”***
- **The Company / Division / Plant Jeopardy**

Why ”Back To Basics”?

- **In December 2007 John Plant and Steve Lunn announced that 2008 must be the year of going “Back to Basics”.**

- **There is too much variation amongst the Business Units in both implementation and status of**
  - lean,
  - quality,
  - profitability,
  - cash flow and
  - Inventory

- **Roadmap congestion / distraction? Also, not pulled through into operational performance, culture or corporate identity.**

- **We must focus on the basic tools and metrics to improve our business performance. Businesses/Operations that perform the basics well are our top performers.**

Back to Basics Necessities

Must know where you are today:

- **Are you a Great, Good, or Poor Performing Plant?**
- **How do you know?**
- **Once you know, what is your plan to become great?**

Back to Basics Necessities

- **Metrics and Processes**
- **Lean Leadership**
- **People Practices on the shop floor**
- **Communication**
- **Infrastructure/Ability to see what is happening in real time**

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What makes it a Top Performing Plant ?

Quality	High Production **Quality**
Delivery	Achieve On Time **Delivery**
Customer Satisfaction	High **Customer Satisfaction**
Cost	Low **Cost**
CAPEX	Achieve **CAPEX** Entitlement
Inventory	Maintain Low **Inventory** Levels
People – High Morale – High Training Efficiency	High performing & committed **People** – **High Morale** – **High Training Efficiency**
Healthy & Safe	**Healthy & Safe** Environment for All Employees
Launch	Issue-Free **Launch**
Productivity	Increase **Productivity**
Flexibility	**Flexibility** to Change Over
Improvement Rate	Deliver **Improvement Rate**

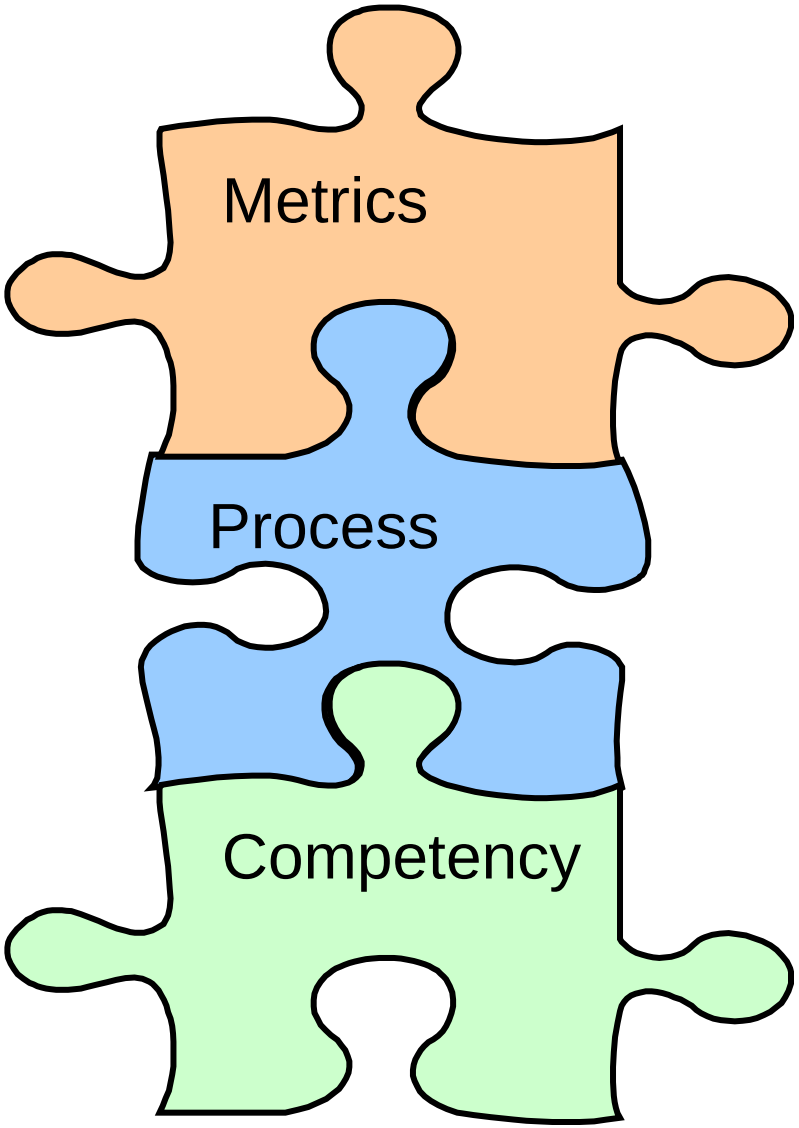
Performing Plant - Key Focus Areas

- **Quality** – issues, production stops, reputation damages, warranty, field campaigns – Q auditing, line walks, 11 colors, poka yoke, LPA, HSE Audits
- **Productivity** – sales per employee, margins, cost reductions, profit
- **Profitability** – cash flow, inventory, capex
- **Customer Satisfaction**
- **Inventory**
- **CapEx**

- **Entitlement** – right expectation, achieving designed cycle times & maximizing utilization
- **Leadership** expectations – lines measured effectively, OEE, visual factory, hourly output, targets, capability, capacity
- **Consistency** – standardization

" I don't need to know every cell's performance across every TRW plant. But I need to know that someone knows – and is reacting to it." ***Steve Lunn***

Back To Basics - Approach

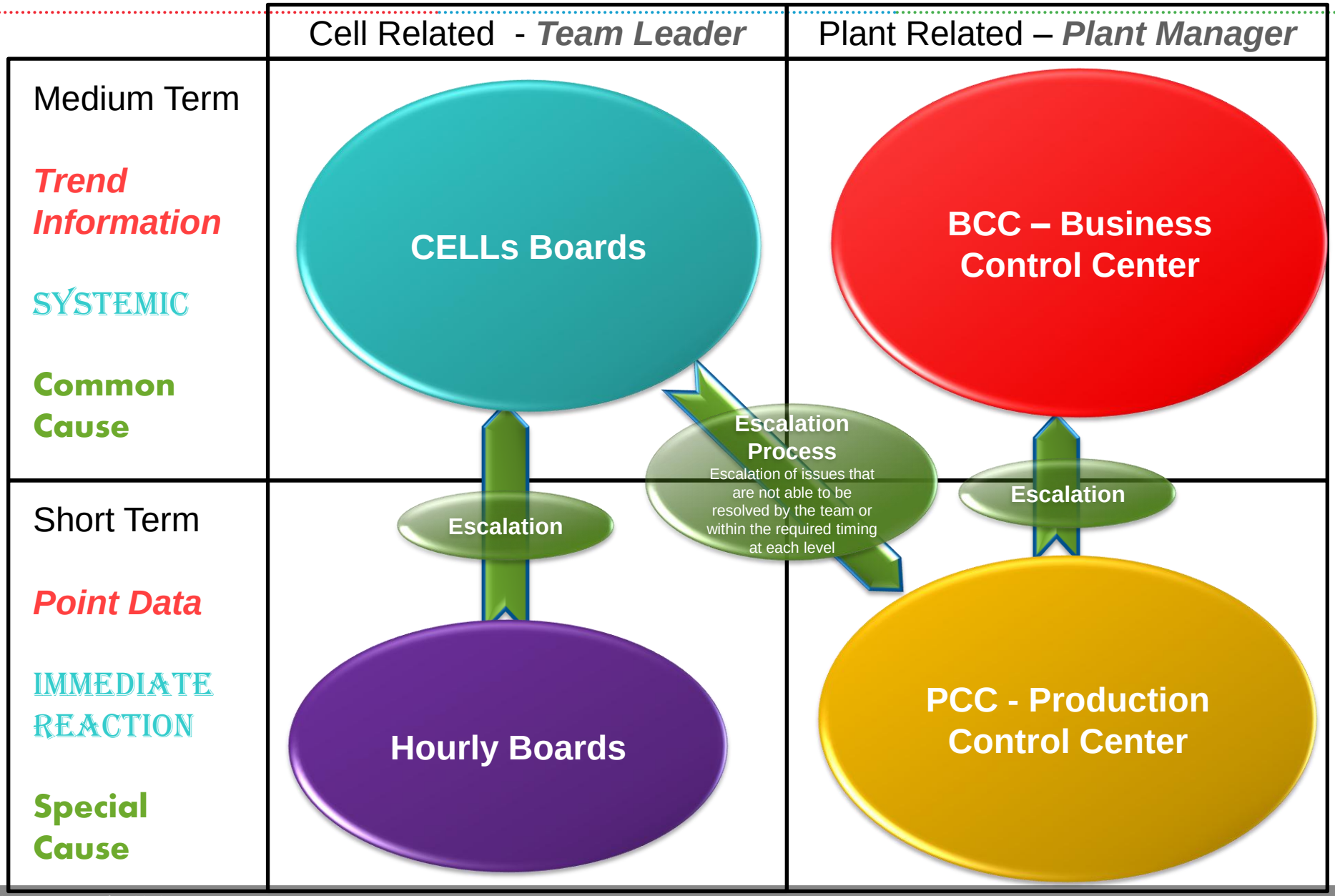


1) **Metrics** – minimum standard at cell, plant and division level

2) **Process** – focus Lean Manufacturing / Operations Excellence, Layered Process Audits (LPA), Quality and Leadership

3) **Competencies** – Plant Manager Development Plan, full time LPOs with appropriate training

Back To Basics Relationships



Back To Basics Relationships

Lean & Six Sigma are therefore no more Programs that are driven by medium-long terms objectives and goal throught Roadmaps or projects “management/customer driven”.

They are now a key Continuous Improvement data driven tools fully integrated with a Manufacturing Production system, to act where is needed when is needed.

- **Lean Workshops**
- **Six Sigma Projects**

B2B management is now timely PULLING the Organization methods across ALL the key cells

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End

Questions?

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