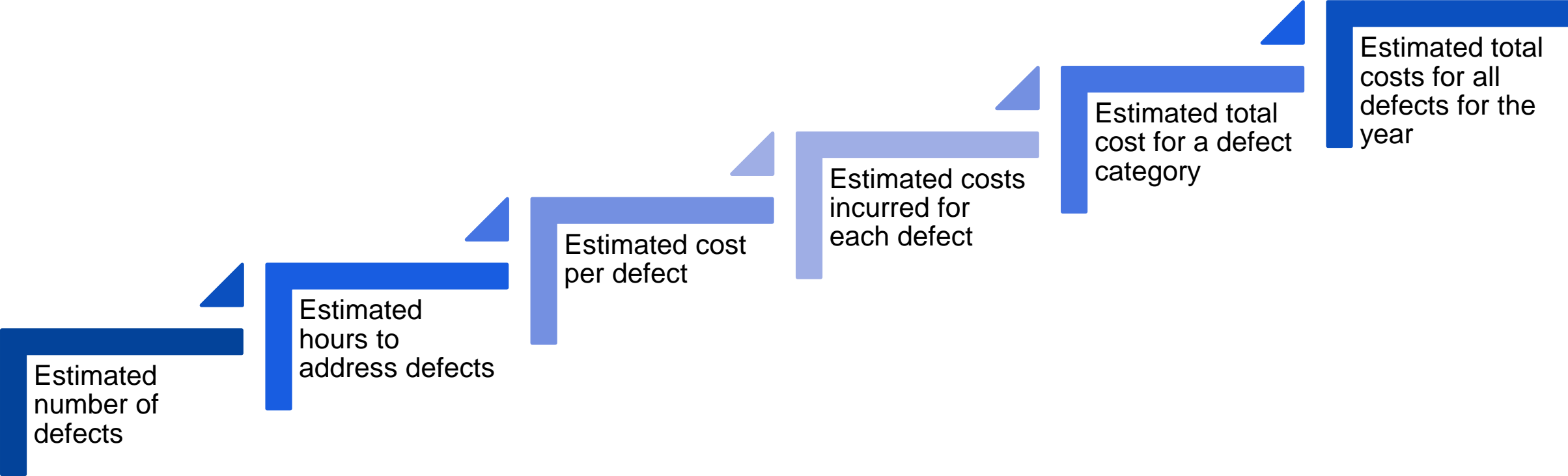


The Cost of Poor Quality: A Working Model



- With recalls grabbing the headlines, automotive manufacturers always have an eye on the cost of poor quality. These costs go beyond operational impacts to include lost goodwill, expenses incurred from replacement or rework – even the loss of business and customers.
- Enhancing trust with customers and capturing new business mean perfecting your processes and eliminating the risks and costs of faulty components. Quality can be a significant differentiator and can either help or hurt your reputation as a manufacturer.
- Why should you care about understand your COPQ?
 - Reduced COPQ leads to increased profitability
 - COPQ helps a company prioritize problems
 - Action based on COPQ promotes effective resource use
 - Tracking of COPQ incentivizes higher quality

Step 1: Identify your path for estimating COPQ



Step 2: The Defined Process Implementation Plans for a COPQ Analysis



- Identify Metrics for Failure Costs, such as Warranty % and Cost of Warranty; Labor; Rework; Scheduling
- Separate Costs by Product; Complaint Symptom, Part, Customer, Region or other Category
- Utilize Pareto for Cost Analysis and Prioritization of Corrective Actions

Step 3: Calculation The COPQ Equation



COPQ

Direct Costs

- Prevention
- Appraisal
- Internal Failure
- External Failure
- Non-Value Added
- Equipment

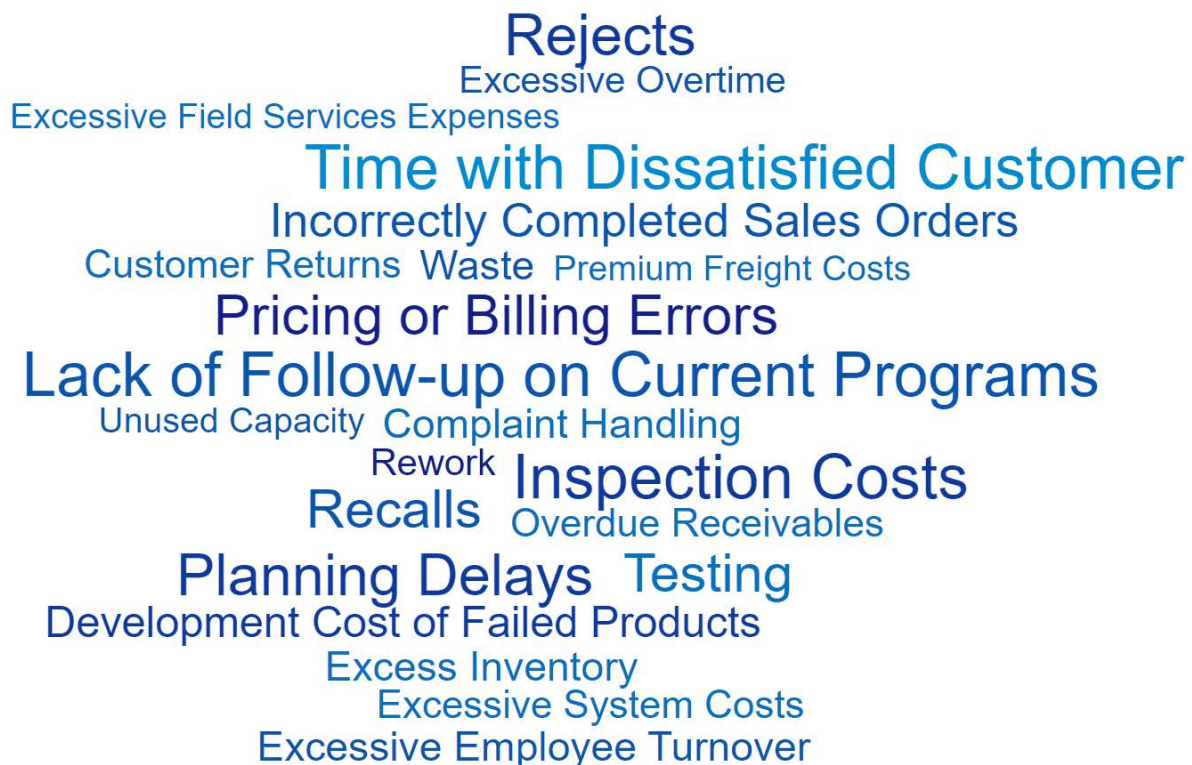
Indirect Costs

- Customer-Incurred Costs
- Customer Dissatisfaction
- Loss of Reputation
- Lost Income
- Loss of Opportunity
- Socioeconomic Costs

Research has found invisible or hidden COPQ may be 3-4x visible costs.

Step 3: Calculation

COPQ Elements to Consider



- Popularized by H. James Harrington, IBM Quality Expert, in 1987 book Poor Quality Costs
- Translating COPQ into monetary terms is useful in overcoming a communication gap between the quality department and upper management
- COPQ creates an economic common denominator for discussion of investments in quality improvements and comparison to other improvements that may have profit enhancement
- Aligned with other manufacturing initiatives, such as Lean and Six Sigma
- “Defects” are considered one of the 7 Categories of Waste/non-value adding activities

Step 3: Calculation

Costs to Consider to Create a COPQ



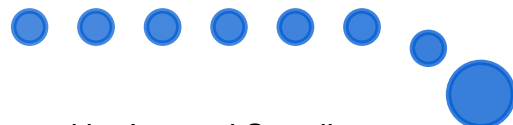
Prevention Costs	Appraisal Costs	Internal Failure Costs	External Failure Costs	Manufacturer Indirect Costs
<ul style="list-style-type: none">• Quality Planning• Process Control• Design & Development of Quality Information Equipment• Quality Training & Workforce Development• Product-design Verification• Systems Development & Management• Other Prevention Costs	<ul style="list-style-type: none">• Tests & Inspections of Purchased Materials• Laboratory-acceptance Testing• Laboratory or other Measurement Services• Inspection• Testing• Checking Labor• Set-up for Test of Inspection• Quality Equipment• Quality Audits• Outside Endorsements• Maintenance & Calibration of Quality Equipment• Product-engineering Review• Field Testing• Certifications & Sign-offs• Joint Quality Planning	<ul style="list-style-type: none">• Scrap• Rework• Material Procurement Costs• Materials Shortages• Re-engineering• Delayed Work Schedules• Equipment Downtime• Discounts Due to Delays• Downgraded Goods• Weaknesses in Quality Resolution	<ul style="list-style-type: none">• Complaints in Warranty• Complaints Out of Warranty• Product Service• Product Liability• Product Recall• Complaint Handling• Customer Returns• Replacements• Field Repairs• Poor Quality Penalties• Customer Communication• Crisis Communications	<ul style="list-style-type: none">• Extra Manufacturing Operations• Unnecessary Design Features• Less Labor• Less Material• Less Equipment• Rejected Materials to be Disposed or Recycled• Overstock/Excess Inventory• Downtime• Loss of Reputation• Lost Opportunity• Lost Revenue• Customer Dissatisfaction• Customer Defections

Step 3: Calculation

Consequences of COPQ for Manufacturing



Caused by Manufacturing Department



Caused by Internal Suppliers



Caused by External Suppliers



Caused by Unplanned Disruptions

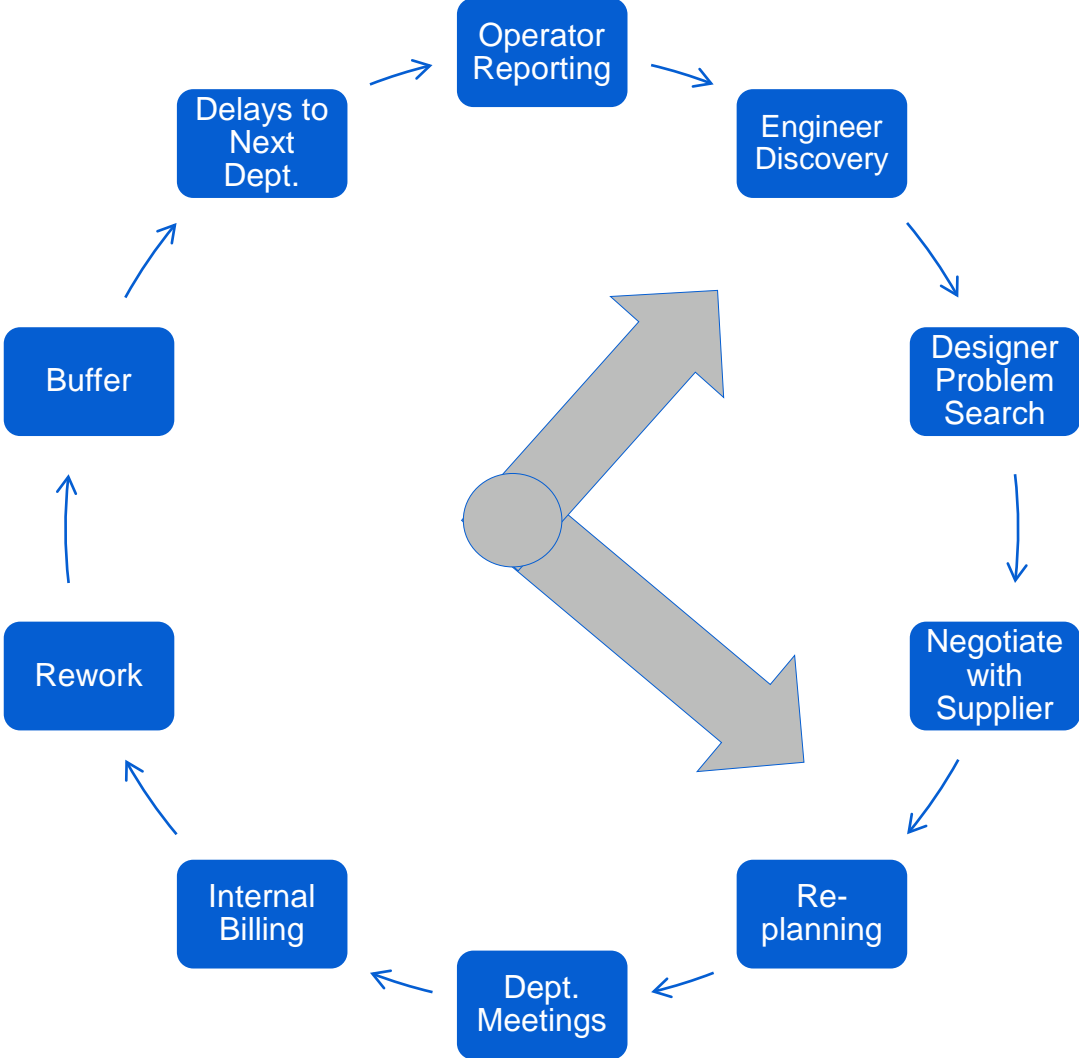


Stop in
Production

- Scrap/Rework
- Waiting Time
- Identification of Problem
- Re-planning
- Unnecessary Meetings
- Delay/Overtime
- Start-up Time
- Unnecessary Administration
- Unnecessary Controls
- Time for Contacting Other Departments
- Problem Investigated by Other Internal Department

Step 3: Calculation

Outlining Time Factors in COPQ



Step 4: Prioritization

Compare the COGQ to COPQ



Cost of Quality = Cost of Good Quality + Cost of Poor Quality

**Cost of Attaining
Quality**

- Prevention
- Prediction & Audit

Proactive approach is
to install quality
systems and
processes

**Cost of Poor
Quality**

- Detection
- Internal & External Failure

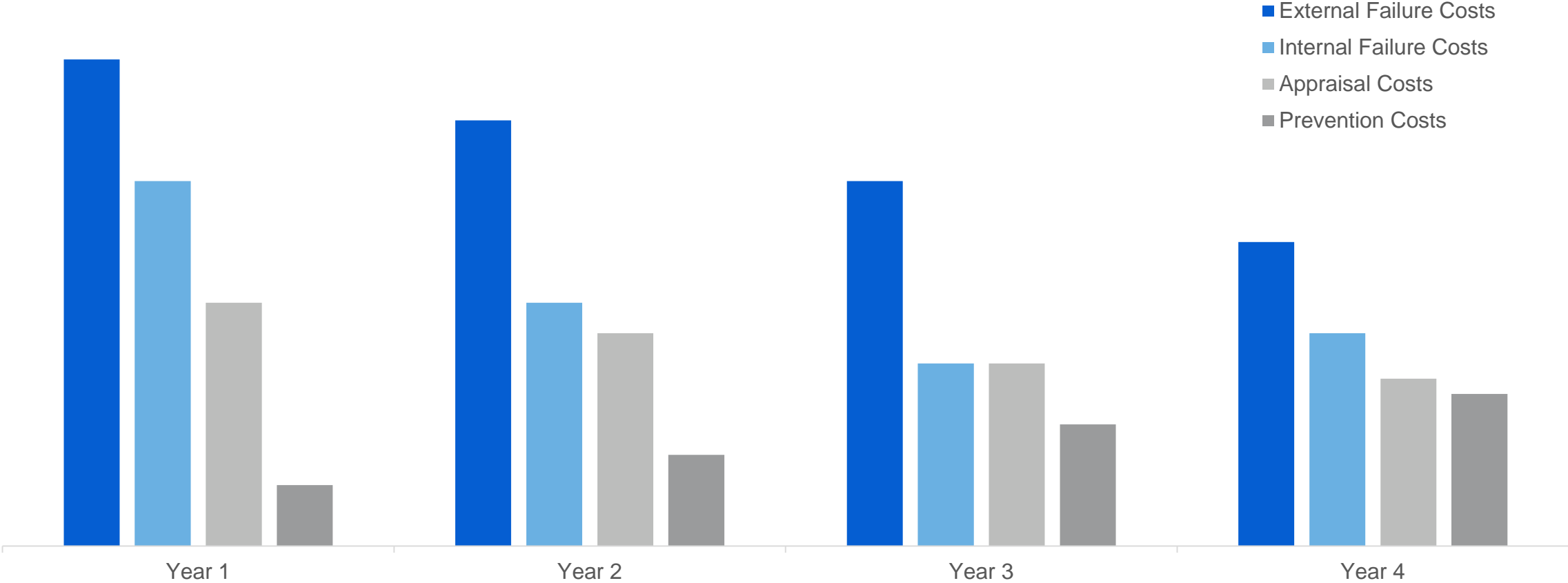
Most manufacturers
spend more
resources here after
a quality incident

Step 5: Measure & Manage

Set Baseline & Track Over Time



Example COPQ Tracking Graph



**“Defects are not free.
Somebody makes them
and gets paid for making them.”**

