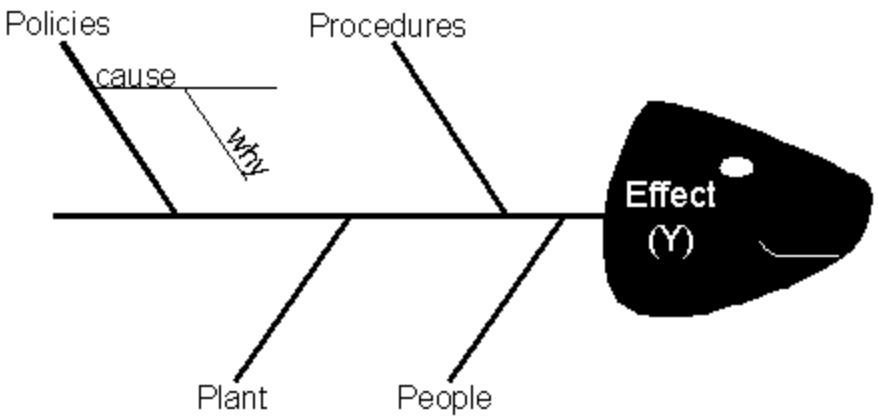

Cause & Effect Analysis

a.k.a.

Ishikawa Diagram

Six Sigma Roadmap: DMAIC

Projektmanagement

Phase	Ziel	Hauptaufgaben	Werkzeuge	Ergebnisse
Define	- Verbesserungsprojekt definieren	- Ausgangssituation beschreiben - Prozessüberblick schaffen - Kunden und deren Forderungen ermitteln - Projekt definieren	SIPOC-Modell (S I P O C) Projektplan (Maßnahme, Termin; DEFINE, MEASURE, ANALYZE, IMPROVE, CONTROL)	- Überblick über die zu verbessernde Situation - klar definierte Kundenanforderung - unterzeichneter Projektauftrag
Measure	- Ist-Zustand ermitteln	- Prozess detaillieren - Eignung des Prüfsystems sicherstellen - vorhandene Daten interpretieren - Daten erfassen und auswerten - Prozessleistung ermitteln	Messsystemfähigkeitsanalyse (USG, OSG, Sollwert) Pareto-Analyse Prozessfähigkeitsuntersuchung (USG, OSG)	- auf Fakten basierendes Verständnis für die zu verbessernde Situation
Analyze	- relevante Ursachen identifizieren	- mögliche Haupteinflussgrößen identifizieren - Ursachen-Wirkungs-Zusammenhänge ermitteln und darstellen	Ursachen-Wirkungs-Analyse Korrelation und Regression Statistische Versuchsplanung	- nachgewiesene Zusammenhänge zwischen Ursachen und Wirkungen
Improve	- Lösung entwickeln und erproben	- Lösungsvarianten entwickeln - Lösungen bewerten und Lösung auswählen - ausgewählte Lösung erproben und Wirksamkeit nachweisen - Implementierung planen	Robustes Design Kreativitätstechniken FMEA (B, A, E, RPZ, Maßnahmen)	- optimierte und erprobte Lösung - Freigabe für die Implementierung
Control	- optimierte Lösung implementieren und nachhaltig absichern	- Lösung organisatorisch verankern - Verbesserung nachhaltig absichern - Projekt abschließen	Prozessablauf Statistische Prozessregelung Schulung	- verbesserter Zustand nachhaltig abgesichert und vom Prozesseigner übernommen - bewertete Verbesserungen und Einsparungen - formaler Projektabschluss

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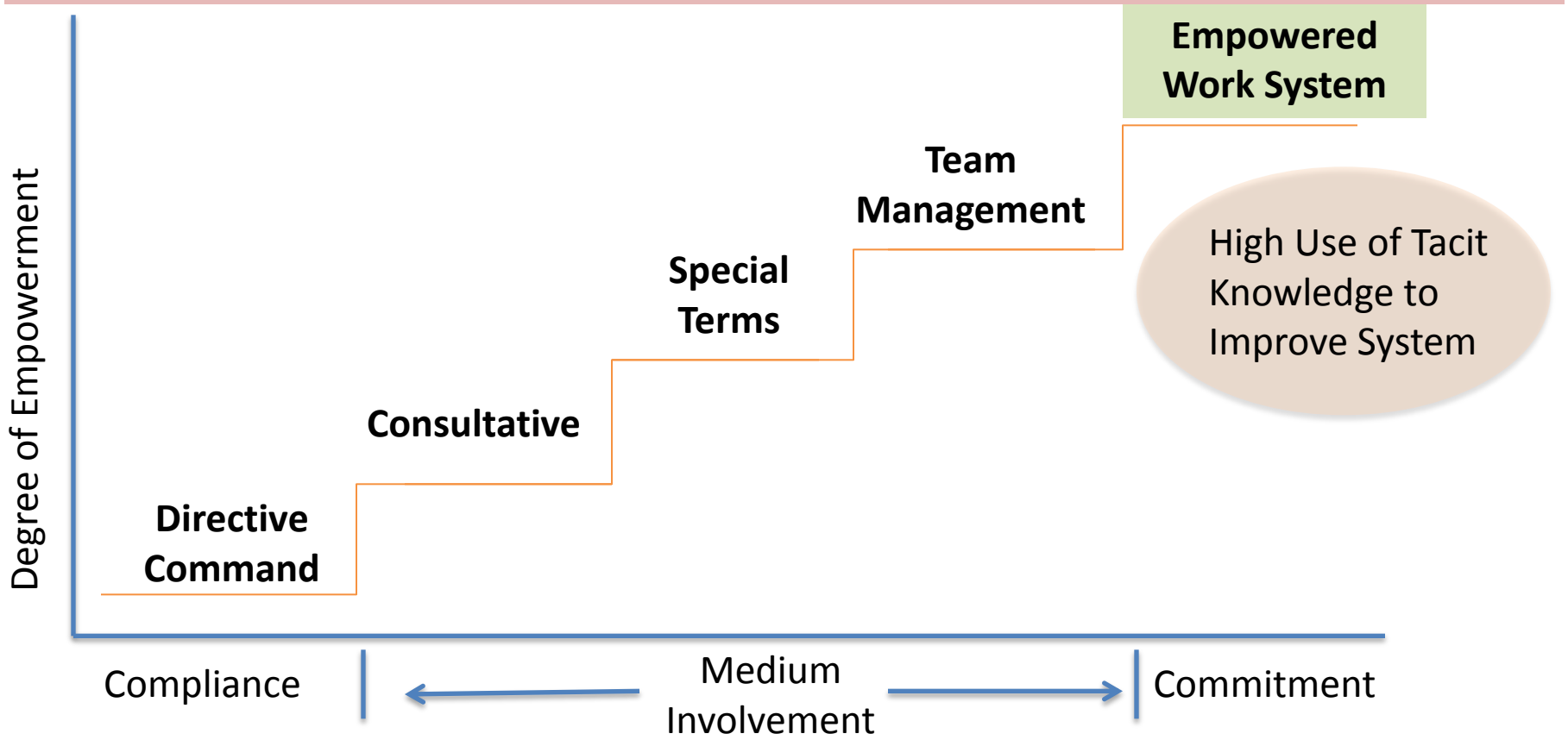
Commitment and Empowerment

"As Involvement and Commitment increase, so, too, does employee commitment to the team, its work, and the long-term goals of the organization."

– Juran's Quality Handbook, Fifth Edition, 1979



– Juran's Quality Handbook, Fifth Edition, 1979

NEW Staffing Grid

DMAIC - *Define, Measure, Analyze, Improve, Control*

NEW Action Plan Form

Staffing to Demand

Waste Walk

5S (Sorting, Straightening, Sweeping/Shining, Standardizing, Sustaining)

Poka Yoke *(mistake proofing)*

SIPOC

Rapid Cycle Testing

Cause & Effect "Fishbone" Analysis

Pareto Tool (Excel)

5-Why Analysis

Process Flow Mapping

Contingency Planning Presentation

Control Planning

Cause-Effect (Fishbone) Diagram

- Developed by Kaoru Ishikawa
- Organizes/displays various theories of root cause of a problem
- Team can clarify its thinking about potential causes
- Tool allows team to narrow focus on true cause(s)

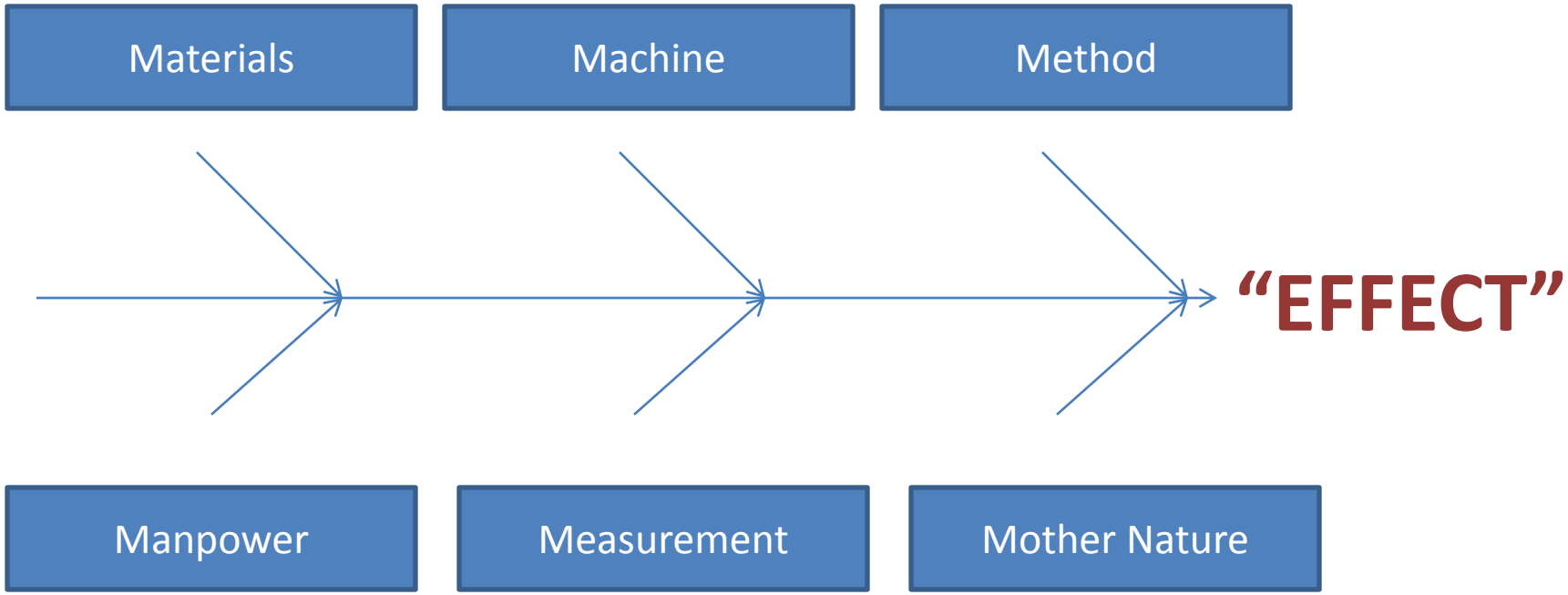
Reference: Juan Quality Handbook, 1979, Fifth Edition
Breyfogle, Implementing Six Sigma, 2003, Second Edition

Construction off C&E

- Causes = sources of the problem (Effect)
- Causes = input variables that could affect the output variable (Effect)
- Keep asking “Why”
- Always engage the “tribe” – process experts
- If diagram becomes lopsided or cramped, reorganize diagram with different bones
- It’s possible to brain storm “why’s” and create affinities afterward.

The “Bones” and the “Head”

- Bones labels
- “6 Ms”

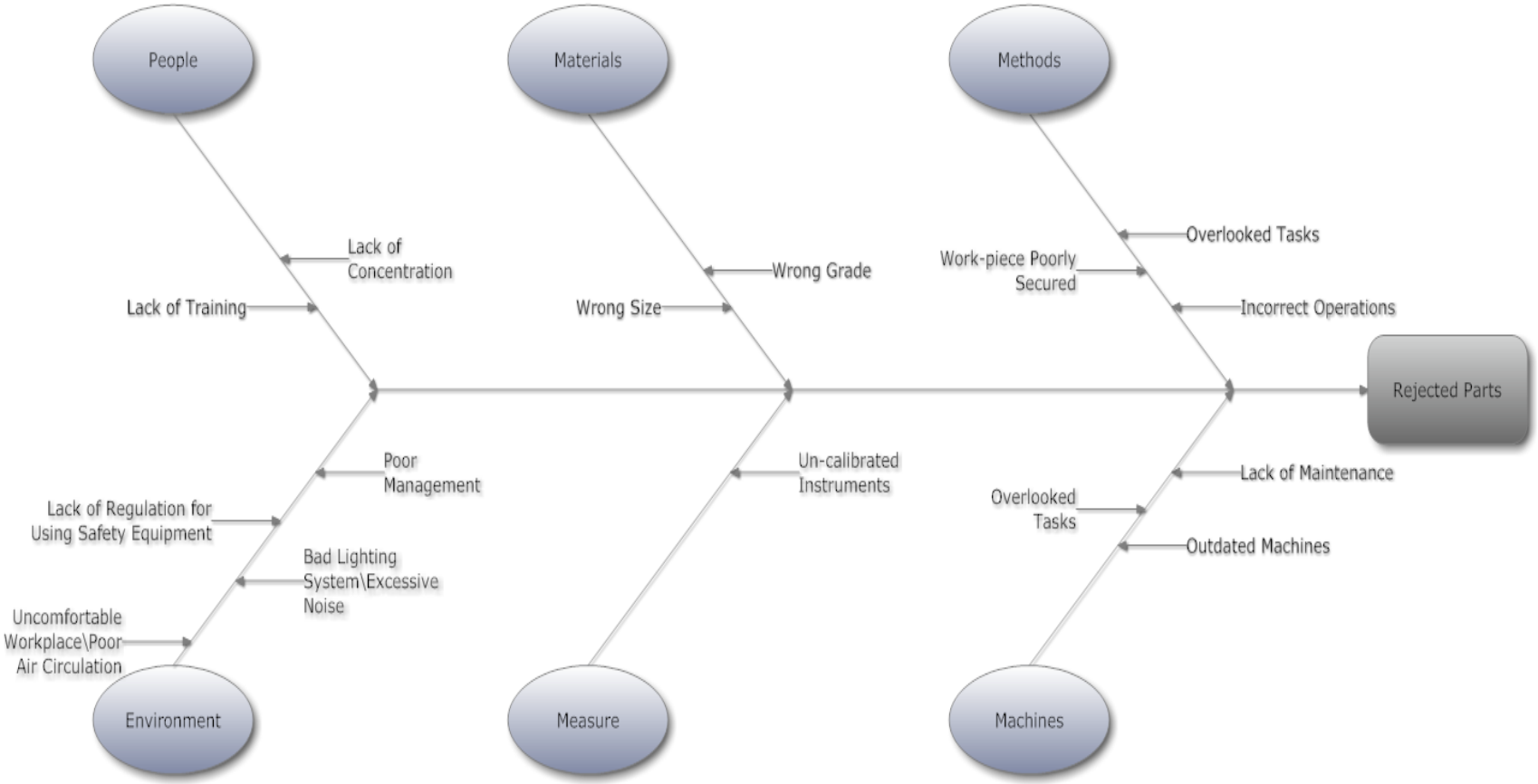


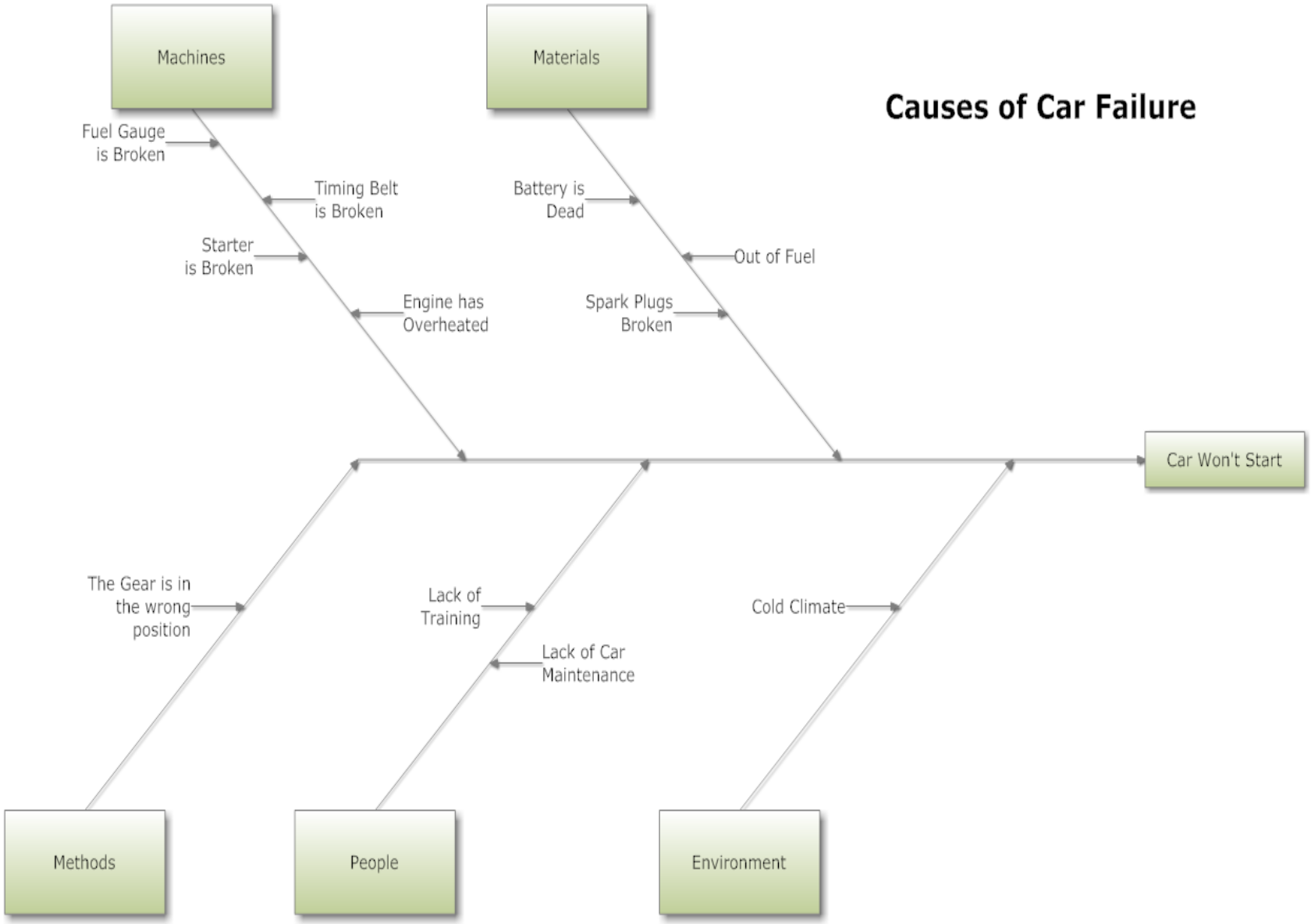
More Bone Labels

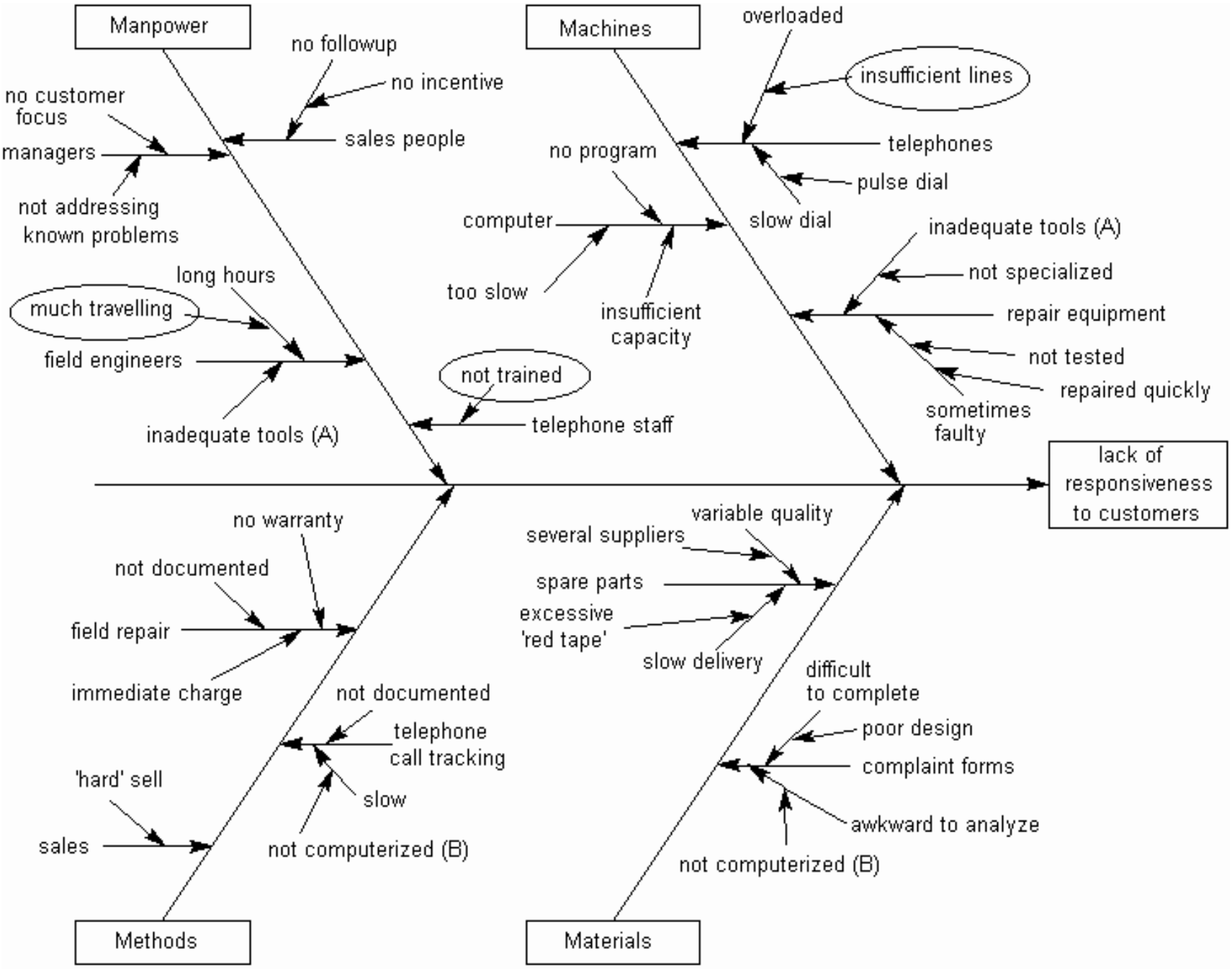
- **Production Process:** People, Processes, Plant, Parts
- **Service Process:** Policies, Procedures, Plant, People
- Supplies, Systems, Staff, Customers

- Customize the main causes ‘bones’, each representing a primary cause area.

Possible causes for producing the low quality machine parts

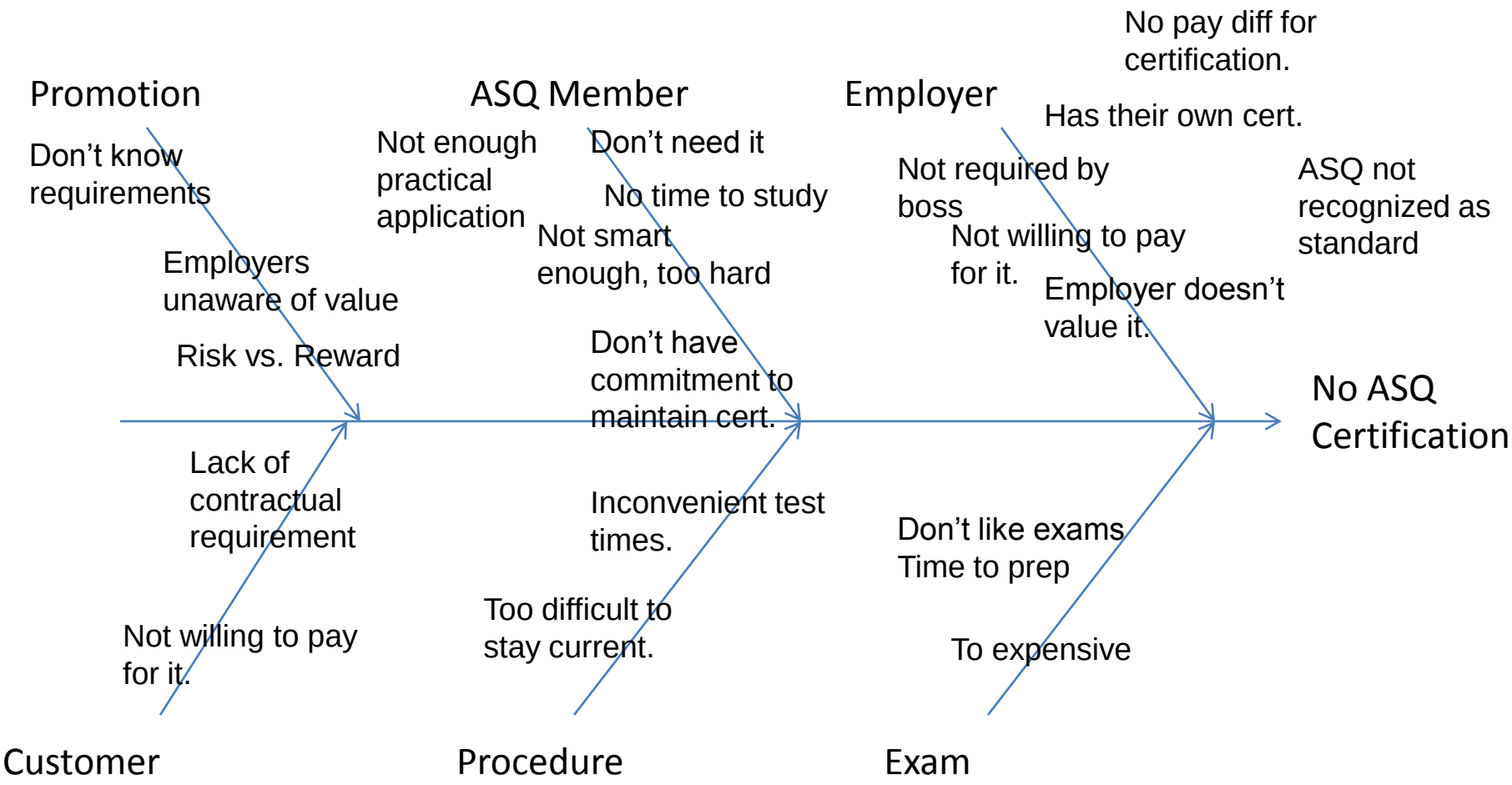
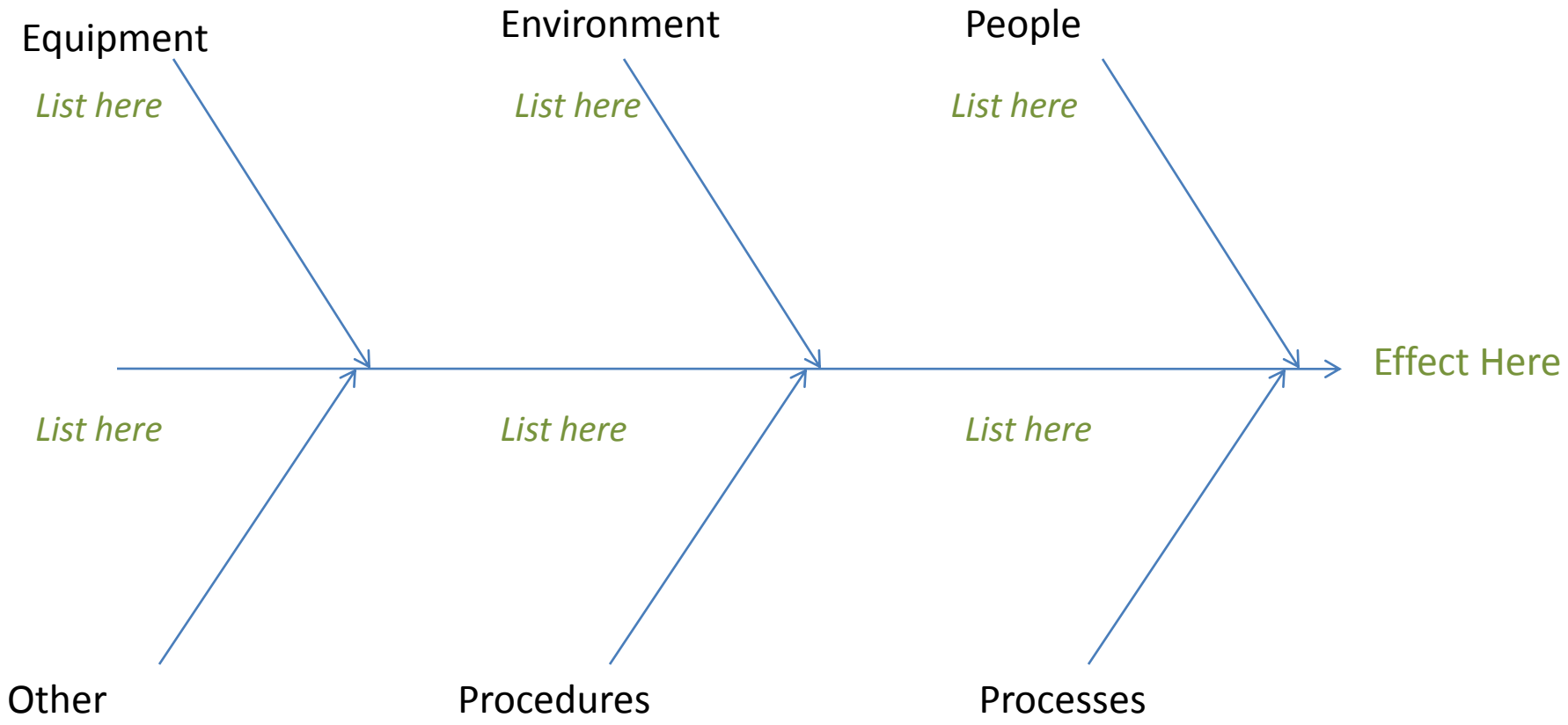



Causes of Car Failure
Machines
Materials
Fuel Gauge is Broken
Timing Belt is Broken
Starter is Broken
Engine has Overheated
Battery is Dead
Out of Fuel
Spark Plugs Broken
Car Won't Start
The Gear is in the wrong position
Lack of Training
Lack of Car Maintenance
Cold Climate
Methods
People
Environment


Manpower
no followup
no incentive
no customer focus
managers
sales people
not addressing known problems
long hours
much travelling
field engineers
inadequate tools (A)
not trained
telephone staff
Machines
overloaded
insufficient lines
telephones
pulse dial
slow dial
no program
computer
too slow
insufficient capacity
inadequate tools (A)
not specialized
repair equipment
not tested
repaired quickly
sometimes faulty
lack of responsiveness to customers
no warranty
not documented
field repair
immediate charge
not documented
telephone call tracking
slow
not computerized (B)
'hard' sell
sales
Methods
variable quality
several suppliers
spare parts
excessive 'red tape'
slow delivery
difficult to complete
poor design
complaint forms
awkward to analyze
not computerized (B)
Materials

Together, we will brainstorm using the Cause & Effect Analysis to understand the why ASQ members don't pursue ASQ Certifications.

Problem Statement: Less than half of the Greater Danbury ASQ Section has at least one certification.


Promotion
Don't know requirements
Employers unaware of value
Risk vs. Reward
Lack of contractual requirement
Not willing to pay for it.
Customer
ASQ Member
Not enough practical application
Don't need it
No time to study
Not smart enough, too hard
Don't have commitment to maintain cert.
Inconvenient test times.
Too difficult to stay current.
Procedure
Employer
No pay diff for certification.
Has their own cert.
Not required by boss
Not willing to pay for it.
Employer doesn't value it.
Don't like exams
Time to prep
To expensive
Exam
ASQ not recognized as standard
No ASQ Certification

Cause & Effects Analysis