Quality-Based Requirements Definition

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Data-Oriented Quality Solutions

Session Plan

- Present a requirements process that emphasizes the application and use of quality improvement tools.
- Show examples of requirement statements generated by a team actually using this process.
- Illustrate a technique for building participant buy-in to the requirements process and its deliverables.
- Provide an agenda for running an initial large-team requirements session built around this process.
- Provide the review process and criteria used during the verification step of the process and agenda.
- Provide satisfaction metrics that can be used to manage the requirements process to completion.

The Problem

- Software engineers often participate in quality improvement programs using quality tools and techniques to identify, quantify, plan, and implement process changes in their working environments.
- Why don't these software professionals then apply these same techniques to their day-to-day project activities?
- The same techniques that most organizations easily adopt in the continuous improvement efforts to redefine organizational processes are rarely adapted for use on-the-job in defining system requirements for new business processes.

This presentation offers a path to such an adaptation…..

Quality-Based Requirements Process

Events in the Business Cycle

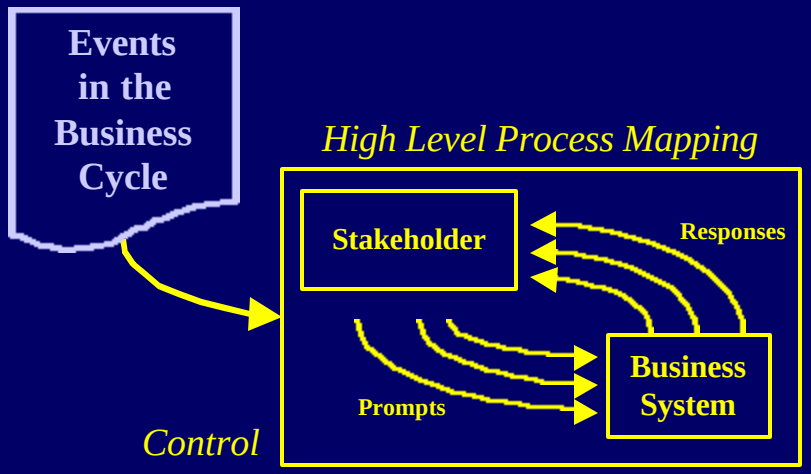
<u>Some Example Events</u>
Request for Quote
Payment Received
Product Sample Taken
Employee Terminated
Order Shipped
Customer Birthday
Contract Expires
New Prices Assigned
Budgets Established
Order Modified
Flight Departs
Product Returned
Work Shift Begins

<u>*Common Techniques*</u>
Brainstorming
Nominal Group Technique

<u>Set Scope Using Events</u>

- Scope out the general areas for analysis by treating the business process as a black-box, focusing on events that cross system boundaries.
- List the relevant events to help define the scope of the business system, in the *broadest* terms.
  - Prevents focus from shifting to the current processes too early!

Quality-Based Requirements Process



One map per stakeholder - about 6-10 per project.

Common Techniques
Brainstorming
Nominal Group Technique

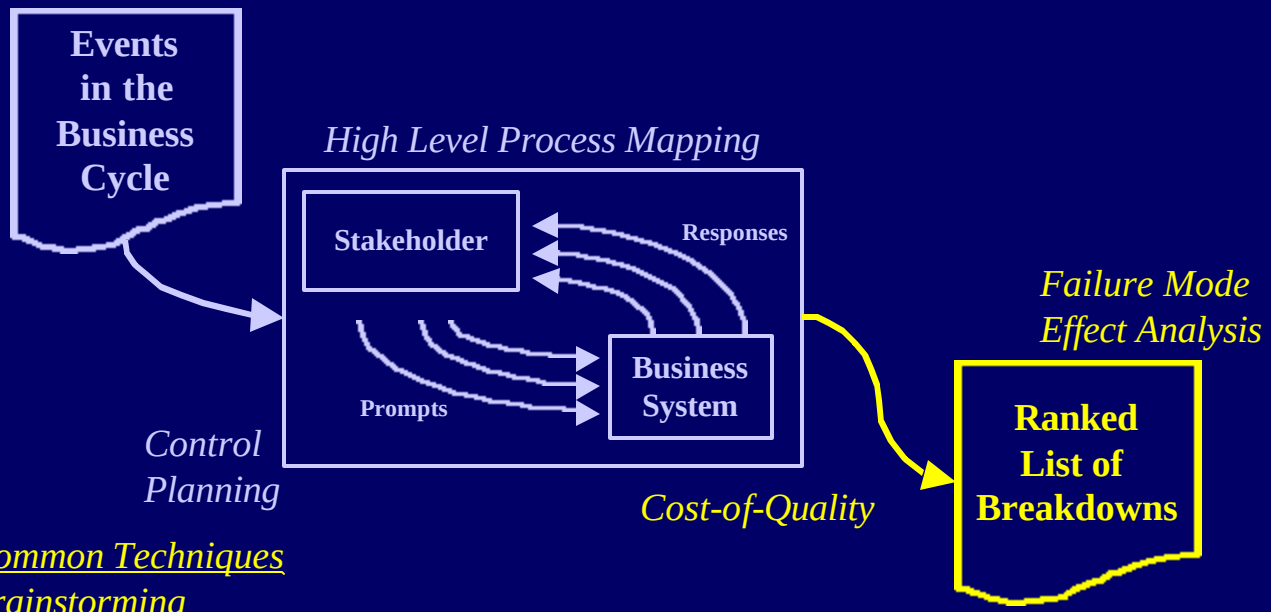
Some Example Mappings

Order Received :
Shipment of Goods (Deferred)
Payment Received :
Booked to Account (Immediate)
Application Received :
Policy Issued (Deferred)
Reservation Received:
Room Nights Provided (Deferred)

Identify System Interactions

- Identify all business and system prompts, the source of events that initiate those prompts, and the approximate responses to each.
- Prompt-response loops can be mapped to requirement-conformance loops that are:
  - Immediate - The system doesn't need to interact with another stakeholder in order to fully conform to requirements.
  - Deferred - The system must interact with another stakeholder in order to fully conform to requirements. [V-O-T-C]
- The *ratio* of immediate-to-deferred event relationships is a high-level indicator of the *complexity* of the business system.

Quality-Based Requirements Process



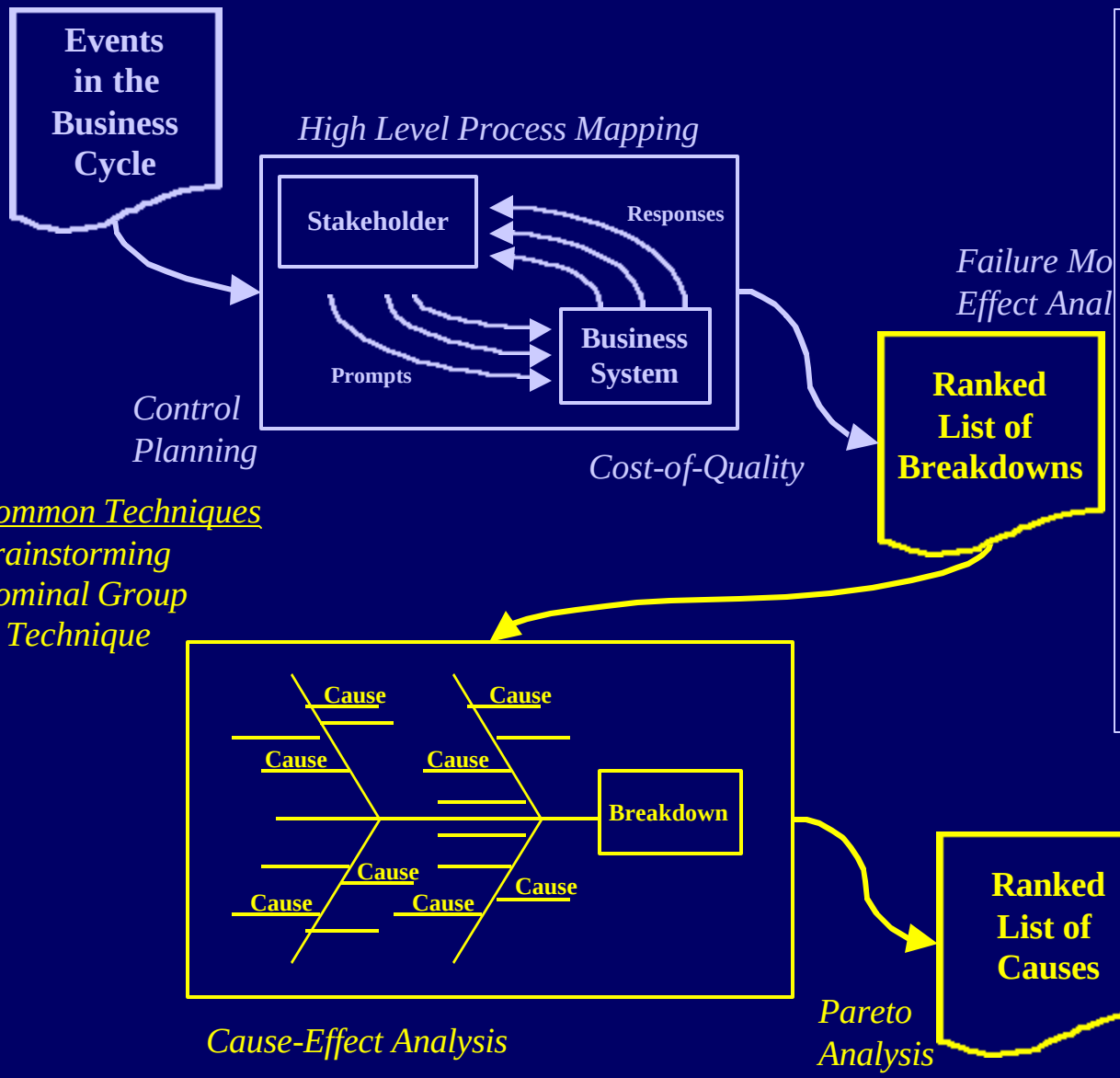
Some Typical Breakdowns
Unacceptable error rate
Unacceptable lead or lag time
Unacceptably high cost
Workload exceeds capacity
Missed service commitments
Customer complaints

Common Techniques
Brainstorming
Nominal Group Technique

Identify & Prioritize Breakdowns

- Focus quickly on exceptions to prevent the entire effort from being spent on an exhaustive traditional exploration.
- List current problems to focus attention on the current processing exceptions; usually the justification for the effort.
- Avoid the need for large systems development effort when immediate solutions appear within existing processes.

Quality-Based Requirements Process

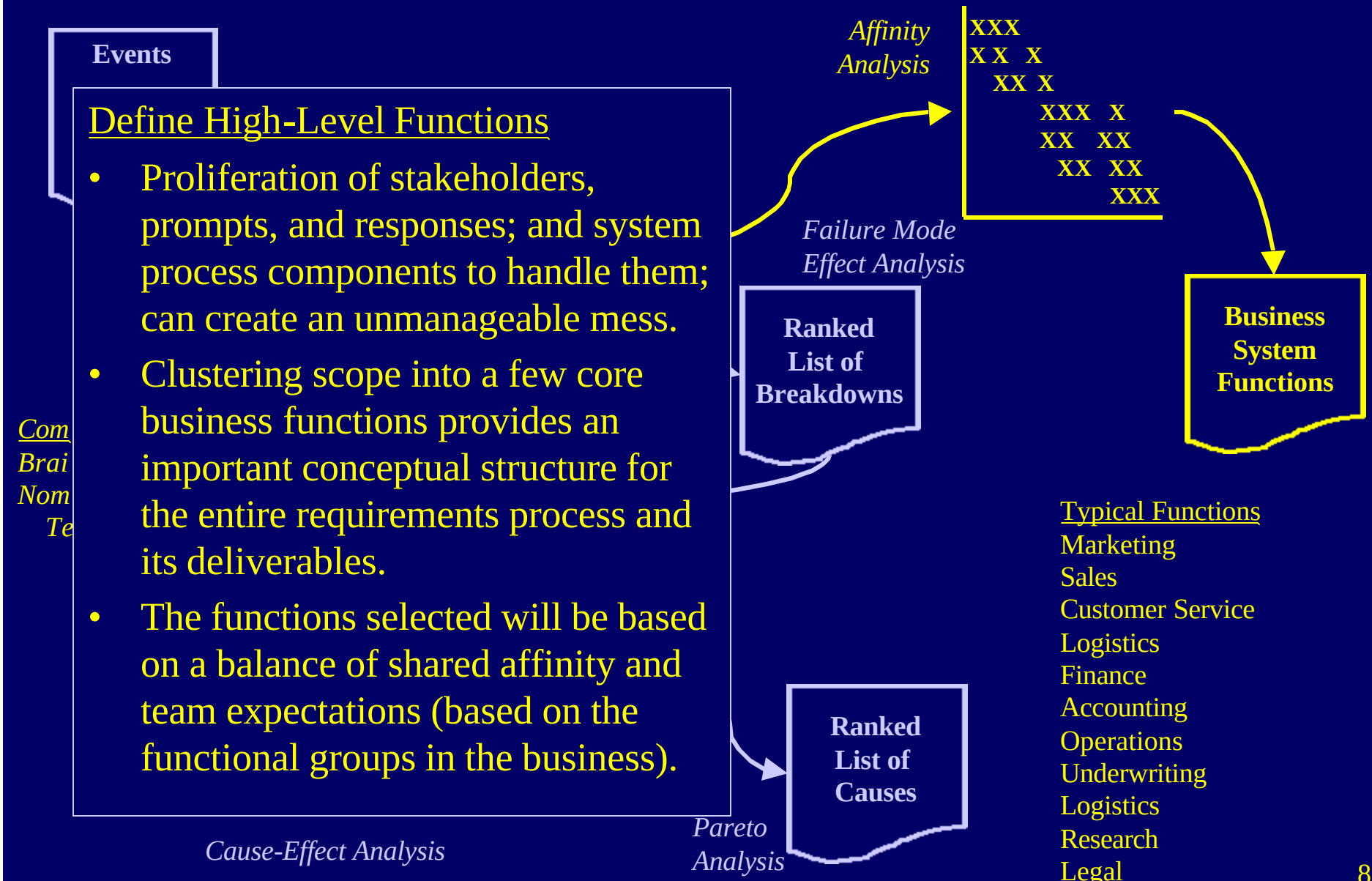


Identify & Rank Causes

- Analyze each breakdown for the root cause or causes.
- Know if the causes of the problems are within scope of the project.
- If out of scope, a cost-of-nonconformance effort is needed to mitigate any damage.

Typical Cause Categories
Management Policies
Organizational Design
Process Errors/Inconsistencies
Inadequate Training/Support
Poor Communication

Quality-Based Requirements Process



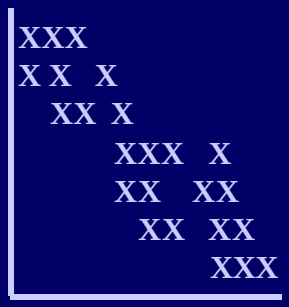
Quality-Based Requirements Process

Events

Define High-Level Requirements

- The reality of the requirements process will be rooted in the feasibility of correcting many of the identified defects.
- Potential corrective actions mapped back to the ranked breakdowns will quickly imply a workable scope.
- Solutions that don't exist can't be implemented!
- The 80:20 rule applies here. Look for those few subtle changes to the business environment that can reduce or eliminate the impact of the miscellaneous monsters.

Affinity Analysis

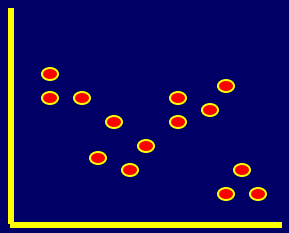


Failure Mode Effect Analysis

Ranked List of Breakdowns

Business System Functions

Correlation Analysis



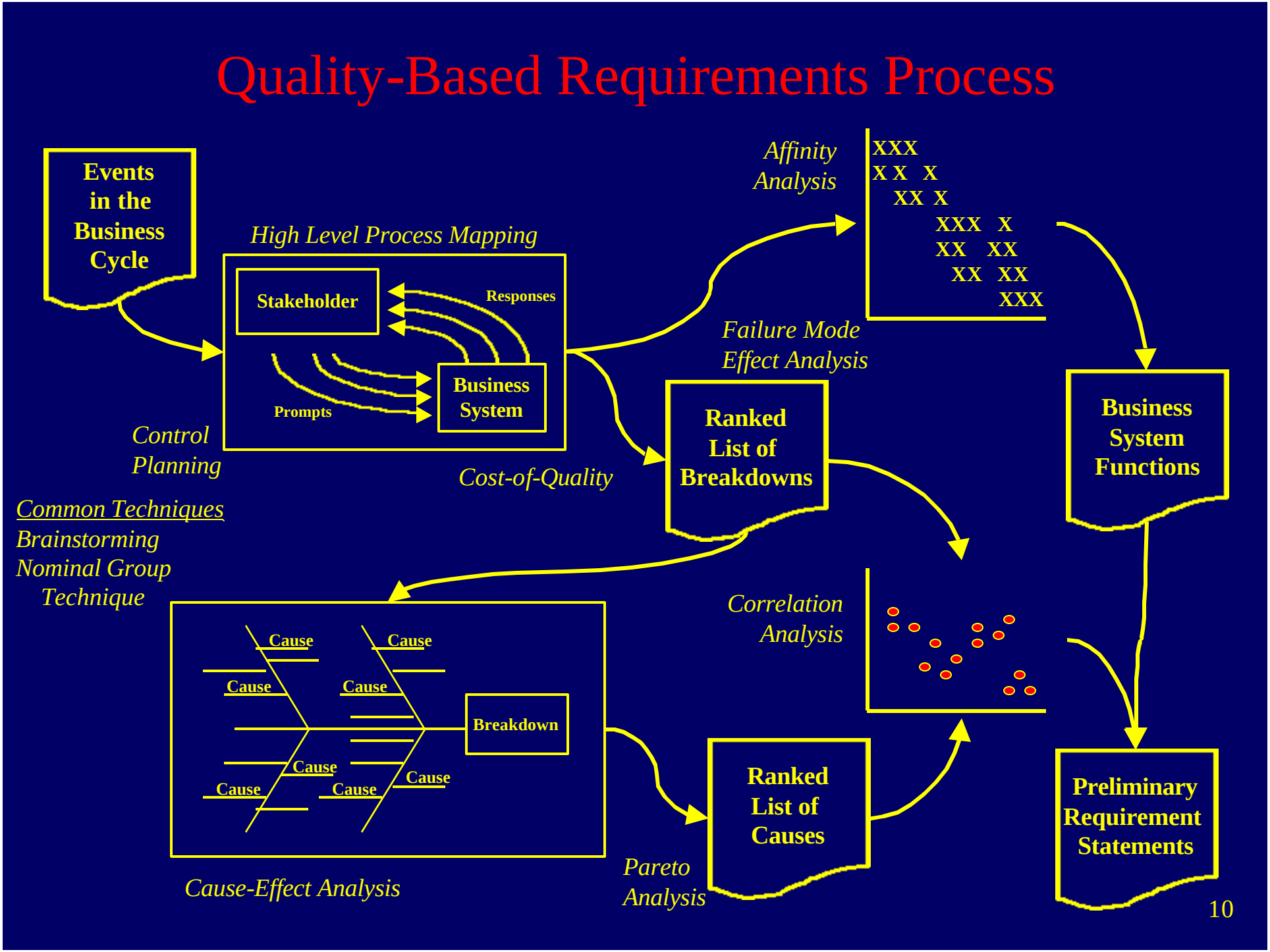
Ranked List of Causes

Preliminary Requirement Statements

Cause-Effect Analysis

Pareto Analysis

Quality-Based Requirements Process



Preliminary Requirement Statements

Examples for Level of Detail

MKT.1 Provide strict policies and controls to assure privacy of all customer data. Management policy and system restrictions need to combine to ensure customer data security. The system will include system-user security and processes for authorization.

MKT. 2 Provide the ability to integrate marketing efforts across all lines of business. The system needs to provide information showing marketing by business line to assist in optimum promotion of all products and services.

LOG.1 Provide the ability to obtain workflow history for all logistics-related customer data. The system needs to provide the content and author of all customer order changes in order to track service representative activities in logistics, and other system user-related activity against customer records.

LOG.2 Provide the ability to track individual customer compliments, complaints and resolutions. The system needs to provide information regarding complaints and compliments, as well as a record of all activity conducted to reach resolution.

SVC.1 Provide the ability to record and service customer's temporary or alternate addresses. The system shall support processing against such address flexibility without requiring any additional changes or resetting of options for products and services continuing to use the primary address.

SVC.2 Provide the ability to process post office returns in a timely manner. The system needs to have the ability to process post office returns, capture corrected address data, and inform all departments originating mailings to that customer household.

Preliminary Requirement Statements

Examples for Level of Detail

FIN.1 Provide the ability to verify credit or debit card validity prior to posting. The system needs to have the ability to interface with online credit/debit verification services to allow for validation of funds at the time of each transaction.

FIN.2 Provide the ability to handle partial pay customers by adjusting product terms or benefits based on money received. The system needs to be able to locate partial payment customer files and adjust product contract benefits or length to correspond with the payment made.

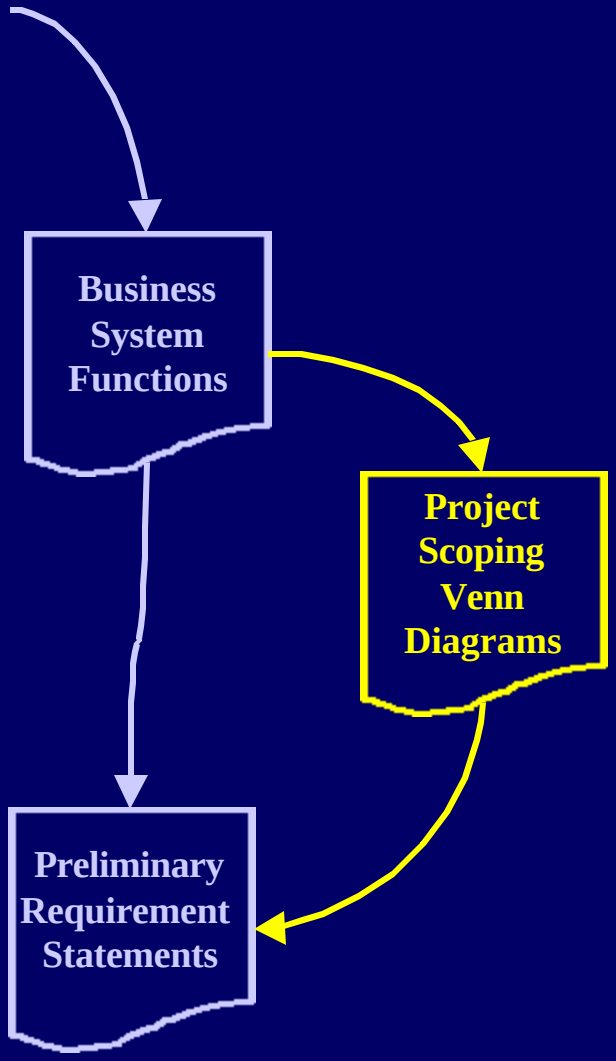
FIN.3 Provide the ability to balance every point of sale transaction (in house and branch office closeout at end of the day). The system needs to be able to electronically validate branch deposits from banks so that accounting has all information necessary to balance and close out at the end of each business day.

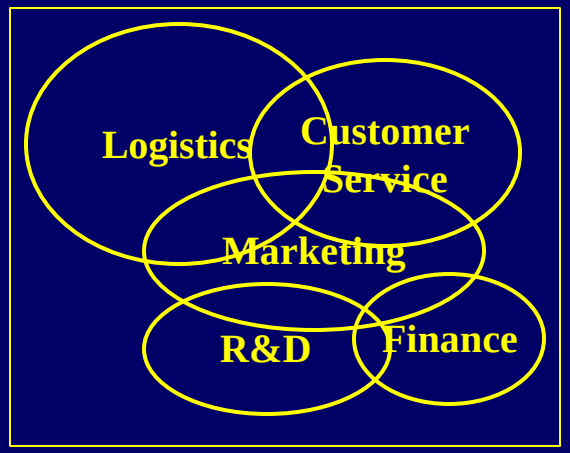
REG.1 Collect and file all applicable state and local sales and use taxes on all transactions. Each state, county, and municipality in which the company operates has specific rules and regulations regarding the charging of such taxes and their filing and payment. The system needs to support geographically appropriate collection, filing, and payment of such taxes in compliance with these regulations.

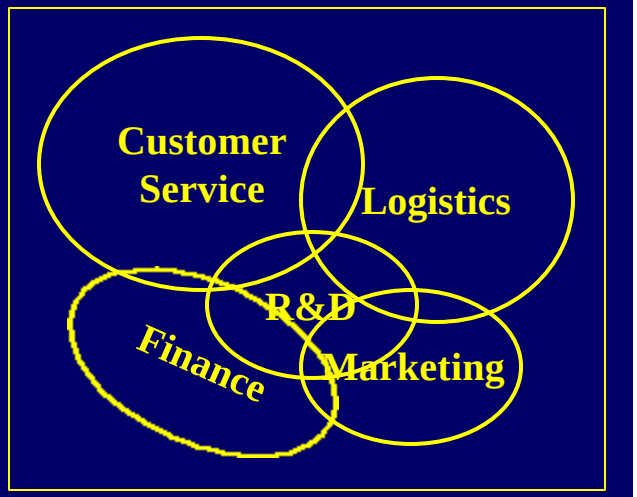
REG.2 Adhere to all applicable state and local sales solicitation and privacy regulations. The system needs to implement appropriate controls, by legislative jurisdiction, to ensure compliance with these restrictions and regulations.

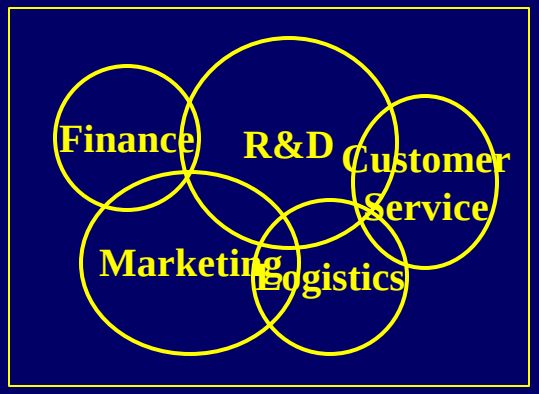
An additional step
to secure team buy-in…

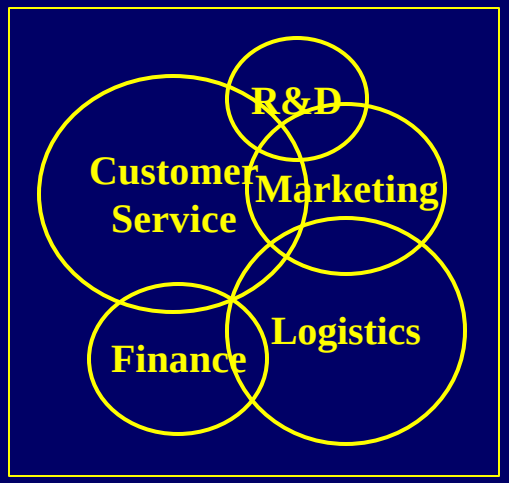
Project Perspectives











Relative size and overlap of scope.

Initial Requirements Session

First Day

8:00	Start-up w/ Introductions
8:30	**Project Briefing**
9:30	Requirements Process Training
10:30	**Scoping Discussion** (A-B-C-D)
12:00	*Lunch*
12:45	**Breakdown Analysis** (Group A)
1:45	Breakdown Analysis (Group B)
2:45	Breakdown Analysis (Group C)
3:45	Breakdown Analysis (Group D)
4:45	Review of Action Items & Issues
5:00	*Adjourn*

Second Day

8:00	Convene with recap and questions
8:20	Requirements Process Training
9:00	**Causal Analysis** (Group A)
10:30	Causal Analysis (Group B)
12:00	*Lunch*
12:45	Causal Analysis (Group C)
2:15	Causal Analysis (Group D)
3:45	Review of Action Items & Issues
4:00	**Project Planning**
5:00	*Adjourn*

Third Day

8:00	Convene with recap and questions
8:20	Requirements Process Training
9:00	**Requirements Definition** (Group A)
10:30	Requirements Definition (Group B)
12:00	*Lunch*
12:45	Requirements Definition (Group C)
2:45	Requirements Definition (Group D)
4:45	Review of Action Items & Issues
5:00	*Adjourn*

Fourth Day

8:00	Convene with recap and questions
8:20	Project Plan Review
9:00	**Drafted Requirements Review**
12:00	*Lunch*
12:45	**Verification & Validation Planning**
2:00	**Next Steps Planning**
2:45	Review of Action Items & Issues
3:00	*Adjourn*

Draft Requirements Review Process

Each section is reviewed in sequence:

- Participants reread the entire list of Statements.
- Each Statement is then reviewed in sequence:
  - Use Review Questions to drive a 3-5 minute discussion.
  - Select a disposition for each Requirement Statement.
  - Use Parking Lot for issues unresolved and left for Further Disposition
  - Use the Suggestion Form to add to each discussion.
- The set of Requirement Statements is then discussed:
  - Additional Requirement Statements should be suggested by participants.
  - Participants should use the Suggestion Form for other additions, changes, or concerns.

Review Questions

Does the group...

… understand what the requirement statement is trying to say?

… agree with what the requirement statement is saying?

… feel that the requirement statement belongs in this document?

… feel that the requirement statement is technically accurate?

… agree that conformance to the requirement statement is observable?

… feel that the requirement statement is described appropriately?

… feel that there is a shared rationale for the requirement statement?

Review Dispositions

Accept

Accept as revised

Merge into requirement _____

Split into _____ requirements

Eliminate as undesired

Eliminate as out-of-scope

Further revision

Satisfaction Criteria

Complete - All items that are needed for the specification of the requirements of the solution to the problem have been identified.

Correct - Each item in the specification is free from error.

Precise & Clear - Each item is exact and not vague, there is a single interpretation of each item, the meaning of each item is understood, and the specification is easy to read.

Consistent - No item in the requirements specification conflicts with another item in the specification.

Relevant - Each item in the requirements specification is pertinent to the problem and its solution.

Testable - During development and acceptance testing, it will be possible to determine whether the item in the requirements specification has been satisfied.

Satisfaction Criteria

Feasible - Each item in the requirements specification can be implemented with the techniques, tools, resources, and personnel that are available.

Free of Design Detail - The specification contains statements of the requirements that must be satisfied by the problem solution, and are not obscured by proposed solutions to the problem.

Manageable - The requirement statements are expressed in such a way that each item can be changed without excessive impact on other items.

Overall - Satisfaction with the requirements specification, within the limitations of its current scope and version.

Numerical ratings (1-10) are collected from all project participants at intervals throughout the requirements phase in order to provide metrics for managing customer attitudes and project phase status..

Recap & Close

- An exception-based process focuses the team quickly on the *important success factors* for their project.
- Talking about breakdowns and causes encourages team members to talk about *solutions* rather than *automation*.
- Use of quality tools encourages integration of TQM principles and techniques as *real-world* disciplines.
- Review process keeps team engaged and focused on *significant changes* rather than simple wordsmithing.
- Satisfaction metrics provide *tool* for management to adjust processes based on *team and customer focus*.