Management and Planning Tools

ME – 2110
Creative Decisions and Design

Thomas R. Kurfess, Ph.D., P.E.

HUSCO/Ramirez Distinguished Chair in Fluid Power and Motion Control

Woodruff School of Mechanical Engineering

Georgia Institute of Technology

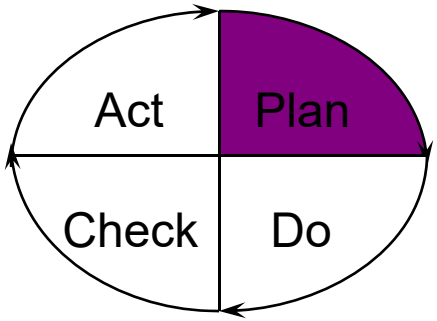
Atlanta, Georgia USA

8 Management & Planning Tools

- Gantt Chart (1)
- Affinity Diagram (2)
- Interrelationship Digraph (3)
- Tree Diagram (4)
- Prioritization Matrix (5)
- Matrix Diagram (6)
- Process Decision Program Chart (PDPC) (7)
- Activity Network Diagram (8)

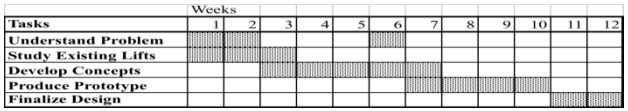
Continuous Quality Improvement (CQI)

- Management goal = CQI
- The 8 MP tools are part of the “plan” segment of CQI.
  - Tools encourage the participation and input from more people.
- Tools organize the non-quantitative information from “a chaotic situation [into] an implementable action plan” (p. 7, MJP).

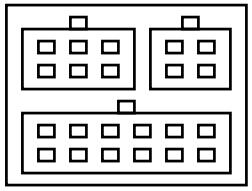


Demming Cycle

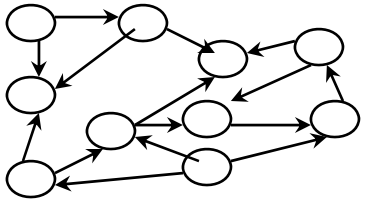
8 Management & Planning Tools



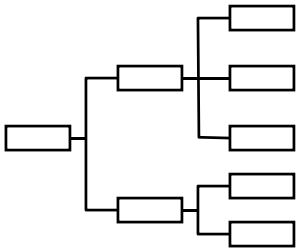
Gantt Chart (1)



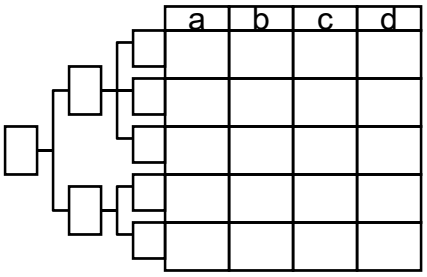
Affinity Diagram (2)



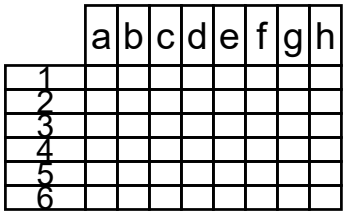
Interrelationship Digraph (3)



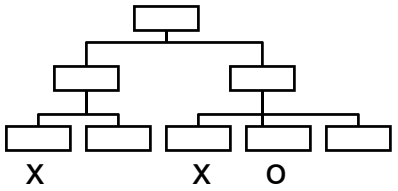
Tree Diagram (4)



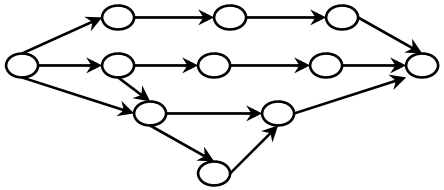
Prioritization Matrices (5)



Matrix Diagram (6)

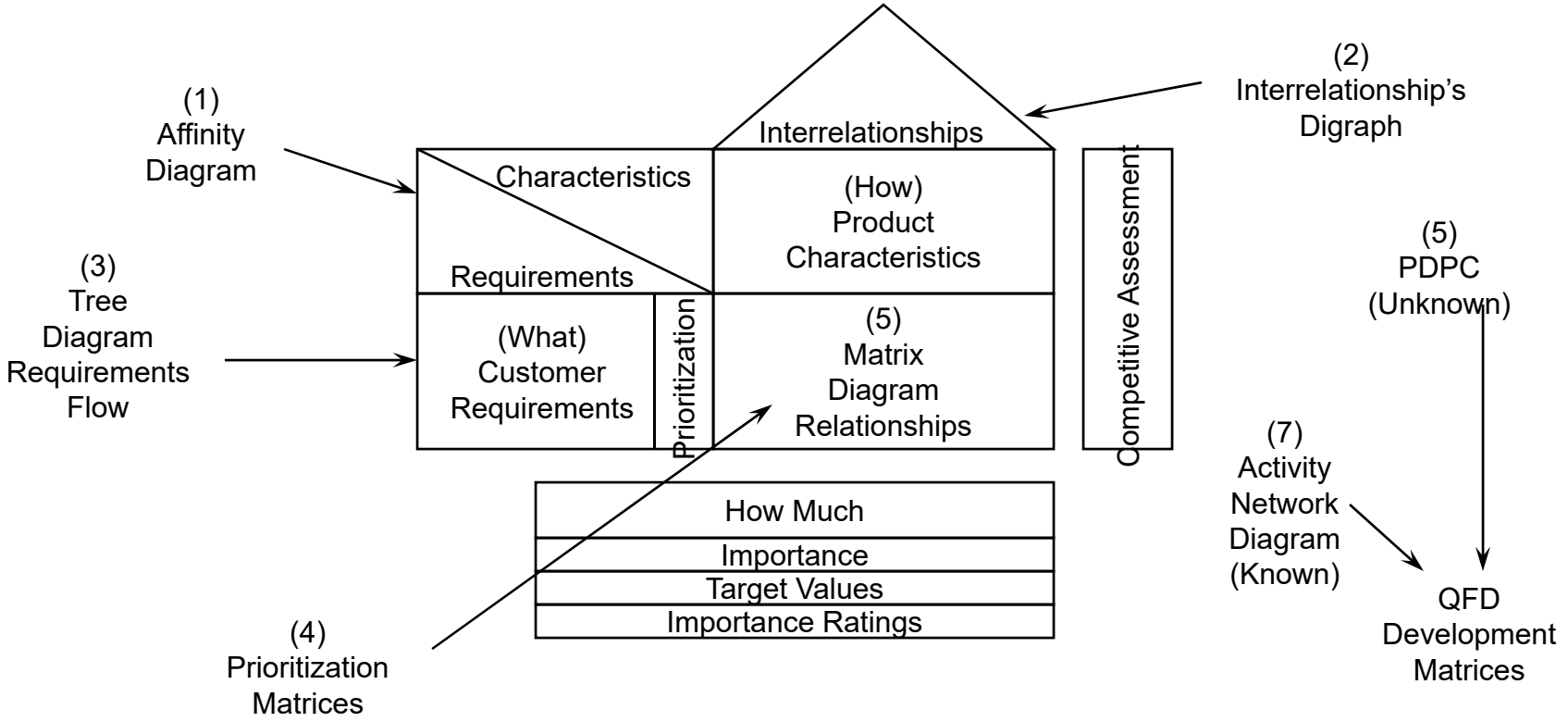


Process Decision Program Chart (7)



Activity Network Diagram (8)

Relationship of 8 MP Tools to QFD



Gantt Chart

Timeline of
Required Tasks:
Design an Aerial Lift

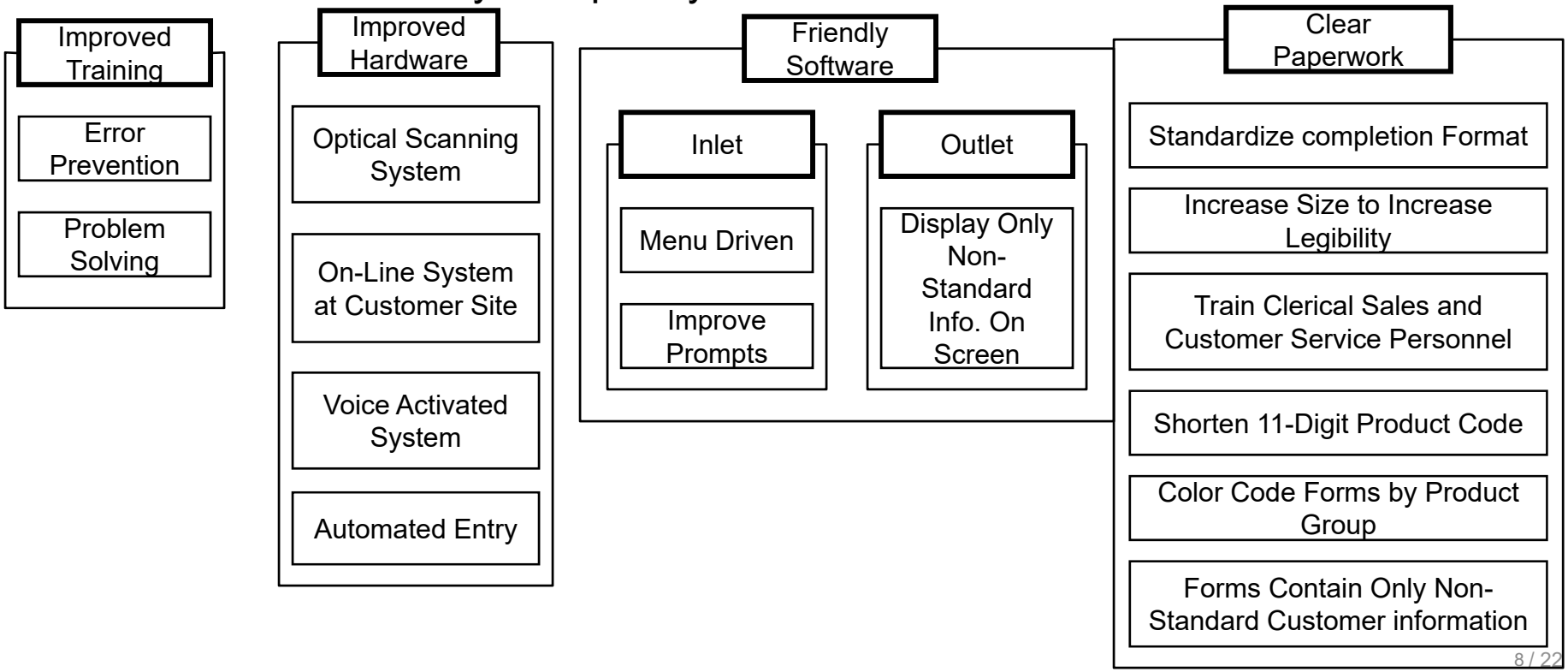
	Weeks											
Tasks	1	2	3	4	5	6	7	8	9	10	11	12
Understand Problem	▒	▒				▒						
Study Existing Lifts	▒	▒	▒									
Develop Concepts			▒	▒	▒	▒	▒					
Produce Prototype							▒	▒	▒	▒		
Finalize Design											▒	▒

Affinity Diagram

- Purpose:
  - Creative process (generate ideas)
  - Gathers language data
- Start with:
  - What is issue under discussion?
- Then:
  - Brainstorm ideas
- Then:
  - Gather ideas under affinity headings

Affinity Diagram Example

- Reduce Data Entry Complexity

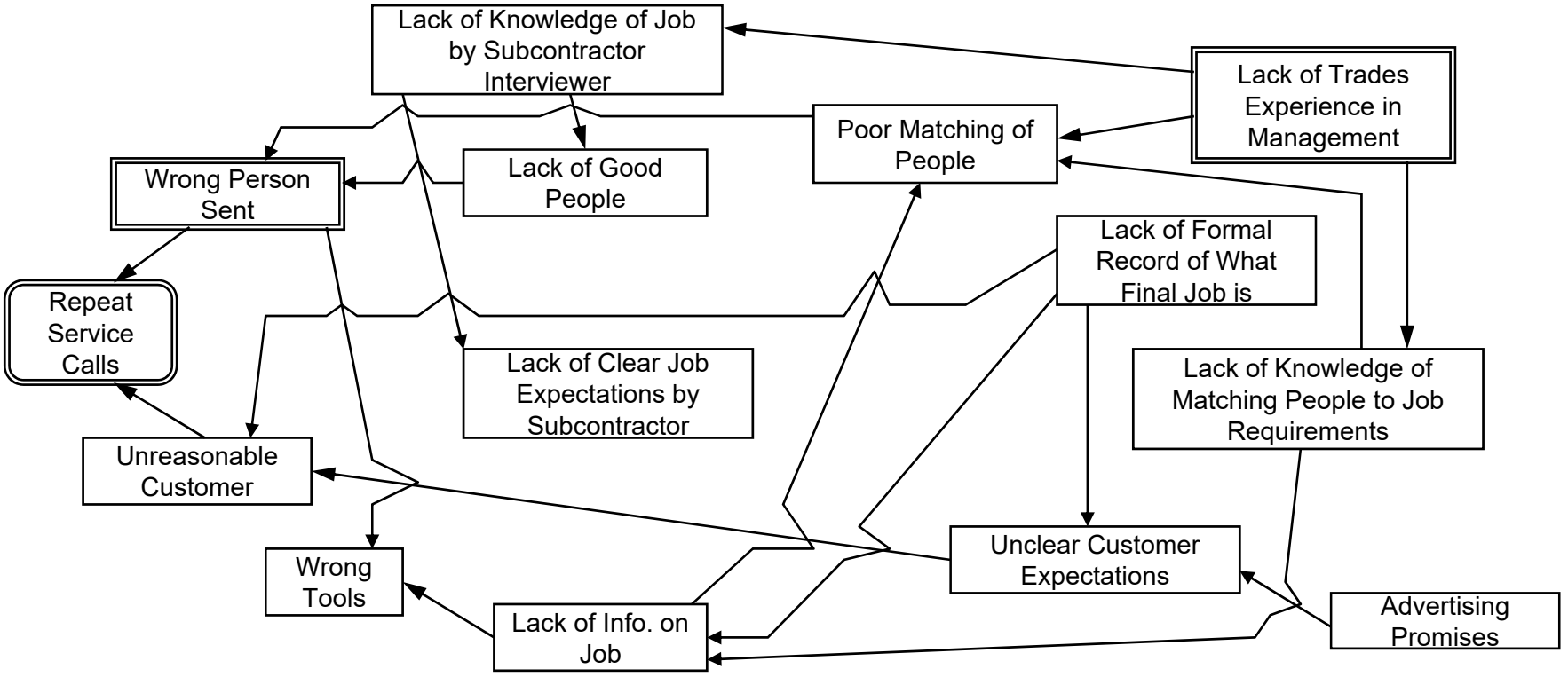


Interrelationship Digraph

- Purpose:
  - To show causality between items
  - To identify drivers and bottlenecks
  - Can be used to fill in roof of house of quality
- First:
  - Place items to be discussed
- Then:
  - Draw arrows between items
  - From → to indicates causality
- Arrows
  - Most out arrows → primary: driver
  - Most in arrows ← secondary: bottleneck

Interrelationship Digraph Example

- Issues involved in repeated service calls

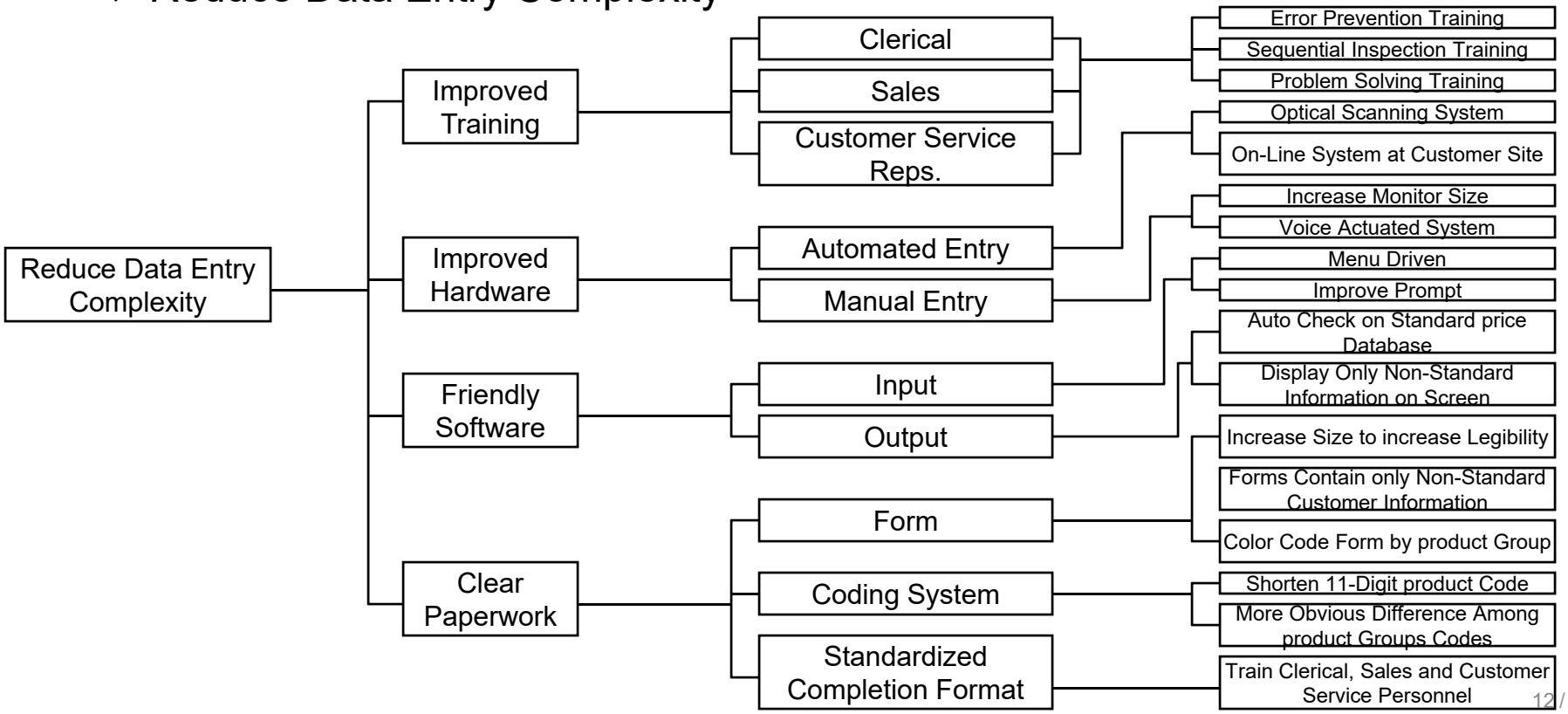


Tree Diagram

- Purpose:
  - Paths and tasks to accomplish primary goal and its related sub-goals
- First:
  - List main what (goal)
- Then:
  - List “Hows” (means)
  - These become goals (“Whats”) for next level
- Continue until you get to assignable tasks

Tree Diagram Example

- Reduce Data Entry Complexity



Prioritization Matrix

- Purpose:
  - To prioritize items by:
    - Prioritization against themselves
    - Prioritization against criteria
- This allows you to focus resources

Prioritization Matrix (Against Self)

		A	B	C	D	E			%
	A						$\Sigma R_1 / \Sigma C$		
	B						$\Sigma R_2 / \Sigma C$		
	C						$\Sigma R_3 / \Sigma C$		
	D						$\Sigma R_4 / \Sigma C$		
	E						$\Sigma R_5 / \Sigma C$		
		ΣC_1	ΣC_2	ΣC_3	ΣC_4	ΣC_5	ΣC		
								Total	

(+) = 5; (-) = 1/5

Prioritization Matrix (Coffee Example)

		A	B	C	D	E			%
Taste	A	X	-	+	+	+	$\Sigma R_1 / \Sigma C$	0.2923	29.23
Smell	B	+	X	+	+	+	$\Sigma R_2 / \Sigma C$	0.3846	38.46
Poisonous	C	-	-	X	+	-	$\Sigma R_3 / \Sigma C$	0.1077	10.77
Color	D	-	-	-	X	-	$\Sigma R_4 / \Sigma C$	0.0154	1.54
Temperature	E	-	-	+	+	X	$\Sigma R_5 / \Sigma C$	0.2000	20.00
		5.6	0.8	15.2	20	10.4	52		
		ΣC_1	ΣC_2	ΣC_3	ΣC_4	ΣC_5	ΣC	Total	100.00

Reading Across the Rows →

(+) = 5; (-) = 1/5

Prioritization Matrix (Against Criteria)

		1 (Hi)	2 (Low)	3 (Hi)	4 (Hi)		Value
	A						
	B						
	C						
	D						

Criteria:

1 =

2 =

3 =

4 =

Prioritization Matrix (Coffee Example)

		1 (High)	2 (High)	3 (High)	4 (Target)	5 (Target)		Value
Taste	A	□	□	O	Δ	Δ		23
Smell	B	□	□	O	Δ	Δ		23
Poisonous	C	O	Δ	□	Δ	Δ		15
Color	D	O	O	Δ	□	Δ		17
Temperature	E	□	O	Δ	Δ	□		23.

Criteria:

1 = Taste Jury Rating
2 = Smell Jury Rating
3 = LD 50
4 = Color Spectrum
5 = Burn Level

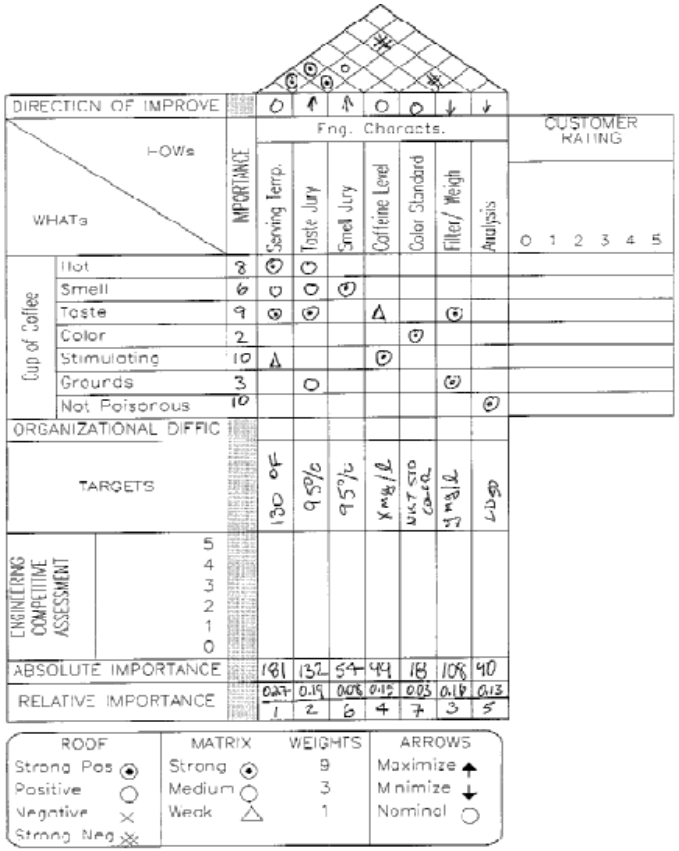
□ = Strong (9)
O = Medium (3)
Δ = Weak (1)

Matrix Diagram

- Purpose:
  - To show relations between two sets
  - To show strength of relations

- Basic types
  - QFD
  - Job responsibilities

House of Quality



Matrix Diagram

Georgia Tech

Job Responsibilities

	Person A	Person B	Person C
Job 1			
Job 2			
Job 3			
Job 4			
Job 5			
Job 6			

□ = Primary Responsibility, O = Secondary Responsibility

Δ = Needs To Know

Matrix Diagram (Interview Example)

Georgia Tech

Job Responsibilities

	Boss	Organizer	Staff person
Travel	Δ	□	□
Pick Date	O	□	Δ
Schedule	Δ	□	O
Benefits Discussion	□	O	Δ
Dinner	O	Δ	□
Follow-Up	□	O	

□ = Primary Responsibility, O = Secondary Responsibility

Δ = Needs To Know

Summary

- Management and planning tools allow you to:
  - Plan more formally
  - Organize information
  - Deal with qualitative information
  - Show relations between items and issues

Use Them!!!