

The Application of FMECA and other Quality Management Tools in the Development of Family and Personal Contingency Plans

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“Knowing is not enough, we must apply.
Willing is not enough, we must do.”

-Johann Wolfgang von Goethe

Objectives

- Understand the benefits of family/household contingency planning.
- Identify important elements of a contingency plan.
- Use several quality management tools to develop your own family/household contingency plans.

- Much citizen preparedness literature focuses on physical survival, go-kits and the like.
- Less focus on organizational infrastructure in support of information flow, financial activities and similar processes.
- COOP is an effort to continue capability of essential functions across a wide range of emergencies for 30 days.

Contingency/COOP goals

- Ensure continued operation of essential functions during an emergency.
- Protect essential facilities, equipment, records and other assets.
- Reduce or mitigate disruptions to operations.
- Minimize injury, loss of life and property damage.
- Timely and orderly recovery from an emergency and resumption of normal routine.

Plan considerations

- Plans must be in place before the emergency.
- Rapid implementation with or without warning.
- Extended sustainability.

COOP PLAN OUTLINE

1. Necessity and Principles of COOP
2. Essential Functions
3. Human Capital Mgmt. and Key Personnel
4. Delegations of Authority/Orders of Succession
5. Vital Records, Databases, Systems and Equipment
6. Alternate Facilities
7. Interoperable Communications

COOP PLAN OUTLINE

(Continued)

8. Devolution & Reconstitution
9. Test, training and Exercises

CONTINGENCY PLAN OUTLINE

1. COOP Plan information (metadata)
2. Essential Functions
3. Human Capital Mgmt. and Key Social Networks
4. Delegations of Authority/Orders of Succession
5. Vital Records, Databases, Systems and equipment

CONTINGENCY PLAN OUTLINE (Continued)

6. Evacuation Plans

7. Alternate Facilities

8. Interoperable Communications

9. Devolution and Reconstitution

10. Test, Training and Exercises

Prioritize Planning Efforts

- Each component of a contingency plan may take a significant amount of time and effort.
- Prioritize efforts using a [project evaluation tool](#) (see slide 27) , such as that provided.
- Compare scores of each potential project, which might align with the contingency plan outline and select highest scores to work on first.

- Essential function usu. defined as one that can't be suspended for 30 days. How long can one go without recovering a function before there are adverse effects.
- Critical processes-Must be recovered quickly for essential functions to operate normally.

When to use FMEA/FMECA

- Identify improvement opportunities
- Identify when a product, process or service might fail and develop countermeasures targeted at specific failures.
- Anticipate and prevent failure for an extreme situation, like a disaster.

FMEA elements

- OCC- Probability of occurrence, how often cause will occur.
- SEV-Severity rating is the impact on a process or essential function.
- SEV-May be a scale with sub-factors incorporating monetary recovery cost, time to recover, effects on other sys functions or processes.
- DET-Detectability

FMEA

- Product of SEV,OCC,DET gives a risk priority number (RPN).
- RPN related to time criticality of actions taken and used to construct precedence relationships for use in activity network diagrams.
- If RPN is higher, time criticality is higher and recovery time objective (RTO) is lower.

FMEA (Continued)

- Component of FMEA is to list actions recommended to reduce the RPN; in this case, we wish to reduce the cost and time to recover a process, system or resource.
- Information for conducting a FMEA is obtained from a current state SIPOC diagram. (Suppliers-Inputs, Process-Outputs-Customer).
- [SIPOC Example](#) (see slide 28) - Paying bills during an emergency.

Use SIPOC data for FMEA

- [FMEA example](#) (See slide 29) - Paying bills during an emergency.
- In order to reduce SEV or OCC scores and in turn, the RPN, there may be modifications to information in the SIPOC.
- Modify bank supplier under recommended actions-Choose bank w/nationwide branches.
- Modify format of a record, the statement-Choose electronic format vs. paper format.

Using SIPOC data for FMEA (Continued)

- Failure modes might be related to inputs including vital records, equipment, systems, social contacts.
- Look at characteristics/attributes of the above to determine what can be changed.
- FMEA can help with worksheets 1, 2 and 3.
- Use FMEA causes and apply Pareto principle to prioritize corrective actions.

FMEA

- Some causes may appear across several essential functions or several sections of the contingency plan.
- Pareto analysis allows highlights the vital few factors that cause most of the failures.

QFD/House of Quality

- Reduce the risk of non-recoverability by selecting restoration and recovery services based on a matrix of customer (us) requirements and technical requirements.
- HOQ matrix also viewed as what we desire in a prod/svc. compared to prod/svc. Characteristics.
- Can be applied to information collected in Worksheets 10, 11, 20 and 22.
- Examples of QFD use in contingency planning include selection of alternate housing, insurance coverage and evacuation routes.

QFD/House of Quality

- Note: Matrix diagrams often used to link strategic objectives to requirements.
- [HOQ Example 1](#) (See Slide 30) - Alternate facilities
- [HOQ Example 2](#) (See Slide 31) - Evacuation routes
- Human Capital & Social Network Analysis
 - Helps to identify social contacts that support essential functions or other contingency activities during emergencies.

- After establishing an extensive matrix of social contact crossed with product/service, one may use the Pareto principle by selecting social contacts that can assist during or after an emergency. These people might be included into your communication and recovery plans.

Summary

- Quality management tools can be adapted to contingency plans.
- Quality management tools help to quantify and prioritize contingency planning efforts.
- In the words of Goethe, QM tools help us apply what most of us already know.

Any questions?

Related topics

- Linking Contingency Goals, metrics and essential functions
- Structural engineering mitigation
- Activity network diagrams
- Theory of constraints

Bibliography

Contingency Plan and Quality Management Tool Literature and Resources

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6. Emergency Management Institute, Independent Study Course, IS-546 Continuity of Operations Awareness, www.fema.gov.
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Project Evaluation Tool (from slide 11)

Project name:		Date of Assessment:	
Weighted overall project score		Project number	
Comments			
Criteria	Score	Weight	Weighted score
1. Benefits	Overall benefit score	.40	
1a.Preparedness		.10	
1b. Quality Improvement		.10	
1.c.Financial benefits		.10	
1.d. RTO		.10	
2. Availability of resources		.10	
3. Deliverable		.15	
4. Time to complete		.25	
5. Team membership		.10	
TOTAL (sum of weighted score column)		1.00	

SIPOC Example (from slide 16)

Project:

Project

Completing the SIPOC

The SIPOC consists of three sections:

- **Inputs** to the process and **Suppliers** of those inputs (left)
- The **Process** itself (middle)
- **Outputs** of the process and **Customers** of those outputs (right)

Steps for Completing the SIPOC

1. In **Process**, list the major steps in the process, most importantly, the start and end points, so that the scope of the process is clear. You do not need to list every step or activity.
2. In **Outputs**, enter a **Description**, then the **Requirements**. For outputs with multiple requirements, use multiple rows.
3. In **Customers**, enter the customers. Customers can be matched with an output description or with an output requirement. You do not need to list a customer for every output.
4. In **Inputs**, enter a **Description**, then the **Requirements**. For inputs with multiple requirements, use multiple rows.
5. In **Suppliers**, enter the suppliers. Suppliers can be matched with an input description or with an input requirement. You do not need to list a supplier for every input.


Suppliers	Inputs	
	Description	Requirements
local branch,nationwide branch and online banks	banks for bank account	
dell, toshiba	computer	durable, reliable, svc. agreement
	aircard int access svc	
netzero hi speed, bellsouth broadband	internet service provider	
yahoo, hotmail, netzero	email account	internet accessible
home w/power, hotel w/wireless access	internet accessible location	accessibility, distance


Process
Svc provider/bank generates statement
Svc provider/bank sends statement
statement enters mail system
statement arrives to destination
accountholder receives statement
accountholder accesses bank information through bank
accountholder uses funds to pay bill
accountholder mails bill to svc provider/bank
payment enters mail system
payment arrives to svc

Description	Requirements	Customers
statement	accurate, on time	accountholder
credit report	positive rating	credit reporting agency
account data or information	accurate, up to date	accountholder

HOQ Example 1 (from slide 21)

Project	Maria Sirols
Product:	
Alternate facilities	

For each customer requirement, use the drop-down list to rate the customer importance on a scale of 1 (low) to 5 (high). Continue across the row to rate the requirement in relation to each item in the Planning Matrix. To add a new Customer Requirement, place your cursor to the left of the row, click  and choose **Add Row**.

For each technical requirement, use the drop-down list to rate the strength of its relationship with the customer requirement (from None to Strong). Continue down the column to rate the requirement in relation to each Benchmark item. To add a new Technical Requirement, place your cursor above the column, click  and choose **Add Column**.

After you enter the information into the matrix, use the **Technical Priorities** and **Percentage of Total** rows at the bottom of the matrix to determine which technical requirements have the greatest influence on customer requirements. Use the **Overall Weighting** and **Percentage of Total** columns at the right of the matrix to determine which customer requirements have the greatest impact.

									Planning Matrix							
		Customer Importance	facility size/max. occupancy	Internet access available/pricing	Pets allowed	Pet fee assessed	Hotel rate	location	Home	Hotel A (Jackson, MS)	Hotel B (Little Rock, AR)	Planned Rating	Improvement Factor	Sales Point	Overall Weighting	Percentage of Total
Customer Requirements	Comfort	3	Strong	None	None	None	Medium	Weak	4	3	3	3	0.9	1.0	2.4	20%
	Internet access	4	None	Strong	None	None	None	None	5	5	3	3	0.6	1.0	2.4	20%
	Pet friendly	5	None	None	Strong	Medium	None	None	5	5	3	3	0.6	1.0	3.0	25%
	Affordable Price	4	None	None	None	None	Strong	None	5	5	3	3	0.6	1.0	2.4	20%
	Within reasonable distance of home (300mi)	3	None	None	None	None	None	Strong	5	5	2	3	0.6	1.0	1.8	15%
	Technical Priorities		21.6	21.6	27.0	9.0	28.8	18.6	125.6				Total	12.0		
Percentage of Total		17%	17%	21%	7%	23%	15%									
Benchmarking	Our Product															
	Competitor A's Product															
	Competitor B's Product															
Design Targets																

HOQ Example 2 (from slide 21)

House of Quality Matrix

Project: Project Leader:

Product:

How to fill in the matrix

					Planning Matrix								
					Evacuation route 1	Evacuation route 2	Competitor B's Product	Planned Rating	Improvement Factor	Sales Point	Overall Weighting	Percentage of Total	
Customer Requirements	Technical Requirements	Customer Importance	Destination	Type of road	State established evacuation route								
Not too far from origination point		3 <input type="text"/>	Strong <input type="text"/>	None <input type="text"/>	None <input type="text"/>	3	3 <input type="text"/>	3 <input type="text"/>	3	1.0	1.0 <input type="text"/>	3.0	38%
Little traffic		5 <input type="text"/>	Medium <input type="text"/>	Medium <input type="text"/>	Strong <input type="text"/>	3	3 <input type="text"/>	3 <input type="text"/>	3	1.0	1.0 <input type="text"/>	5.0	63%
Technical Priorities			42.0	15.0	45.0	102.0				Total		8.0	
Percentage of Total			41%	15%	44%								
Benchmarking	Our Product												
	Competitor A's Product												
	Competitor B's Product												
Design Targets													