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## **Strategies and Tools for Planning, Design and Use of Emergency Communications Systems**

Presentation at the 2011 NFPA Conference & Expo  
Session S40, Sunday, 12 June 2011, 11:00 AM – 12:00 PM

### **Abstract:**

Emergency Communications Systems (ECSs), which include Mass Notification Systems (MNSs) continue to rely on the use of voice as the primary messaging and communication strategy. However, there are other communications channels that can be effectively used during stages of an event and to target different audiences. There has been a tremendous advancement and evolution of communications needs, strategies, codes, standards and delivery platforms. The changes have been rapid and have permeated disciplines and industries that previously had little or limited need, knowledge or contact with emergency communications and ECSs. It's no wonder that planners, designers, authorities, installers and users are struggling to understand and apply the changes. This presentation focuses on tools, options and strategies, including those in the 2010 edition of NFPA 72, National Fire Alarm and Signaling Code, that planners, designers, authorities and users can use to affect the implementation of a quality and compliant ECS. A structured quality process for planning, design, installation and use is emphasized as a means to ensure effective performance of the systems when they are called upon.

### **Presenter:**

#### **Robert P. Schifiliti, P.E., FSFPE**

President, R.P. Schifiliti Associates, Inc.  
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Date: Sunday 12 June 2011  
Event: NFPA Conference & Expo, Session S40  
Time: 1.0 hour – 11:00 AM – 12:00 PM  
Format: Lecture



## Strategies and Tools for Planning, Design and Use of Emergency Communications Systems



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(NFPA 72 and NFPA 720)

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## Agenda

- Overview of some problems and challenges
- Strategies & tools for a quality process
- How to effectively communicate



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## The Problem

- Emerging technologies
- Back-loaded designs
- Rapid system deployment
- E-Plan needed before comm plan
- We are still in the “learning & training” feedback phase.
- A failure to effectively communicate.



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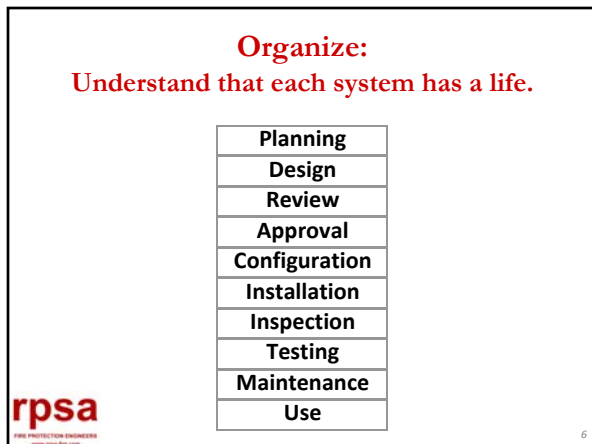
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**Organize:  
Get all the players involved.**

	Corp & Admin	Government	Community	Utility / Infrastructure	SAFETY Units, Agencies, Fire & EMS	Telecommunications/IT	Human Resources	Architects	Engineers - Other	Engineers - Fire Protection	Technicians - Installing	Manufacturers	Distributors	Technicians - TM	Command/OP /Pumper Station	AMI - Inspector	Utility Agencies	Insurance Companies
Planning	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Design	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Review	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Approval	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Configuration	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Installation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Inspection	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Testing	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Maintenance	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Use	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

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**Mission Statement**

- Purpose
- Commitment & authority
- Organizational structure

To provide a layered, robust and fault tolerant communications infrastructure to support the organization's emergency plan.

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**Analyze / Anticipate**

- The E-Plan comes first
- Communications are only one part of a comprehensive E-Plan
- Hazard identification and risk assessments

continued...



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### Analyze / Anticipate

continued...

- Understand the stages of each emergency
- Profile hazard events scenarios
- Identify communications needs

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### What are the hazards?

- Tsunami
- Tornado
- Mud/Landslide
- Technological
- Terrorism
- Industry Hardship
- Hurricane
- Tropical Storm
- Chemical
- Biological
- Extreme Temps
- Flooding
- Virus Threat
- Drought
- Dam/Levee Break
- Wildfire
- Earthquake
- Severe Storm
- Coastal Storm
- Typhoon
- Winter Storm
- Fire
- Volcano
- Nuclear

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### What are the risks?

**Risk = Hazard x Probability**

		RISK TABLE		
		Hazard		
		Low	Med	High
Probability	Low			
	Med			
	High			

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### Risk Assessment & Scenario Development

- For each hazard develop narrative scenarios
- Consider
  - Health & safety of persons in the impact area
  - Health & safety of persons responding
  - Continuity of operations
  - Impact on property & infrastructure

continued...

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### Risk Assessment & Scenario Development

continued...

- Delivery of services
- Supply chain
- Environment
- Economic & financial impact
- Regulatory & contract obligations
- Reputation with your clients & the public

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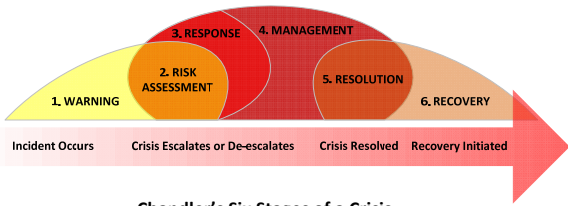
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### What are the evolutionary stages common to most crises?



The diagram illustrates Chandler's Six Stages of a Crisis as a horizontal arrow pointing right, divided into six colored segments. Above the arrow, the stages are labeled: 1. WARNING (yellow), 2. RISK ASSESSMENT (orange), 3. RESPONSE (red), 4. MANAGEMENT (dark red), 5. RESOLUTION (brown), and 6. RECOVERY (light brown). Below the arrow, corresponding descriptions are provided: Incident Occurs, Crisis Escalates or De-escalates, Crisis Resolved, and Recovery Initiated.

Chandler's Six Stages of a Crisis

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### Intelligent Communications: ECSs can not be fully automated.



- There are too many possible threats/hazards.
- Information and instructions change with time.
- Pre-recorded messages can become “noise” and lose credibility.
- Information gathering is as important as information/instruction dissemination.



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### Communications Users & Audiences

- Persons in the immediate impact area
- Persons near the impact area
- Persons outside the impact area
- Emergency Management Team
- Emergency Responders
- Resource providers
- Special experts



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### Planning

- Identify assets needed to meet communications needs
- Inventory existing communications platforms
- Redraft plans, integrating new & existing assets



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### Planning Communications Needs

- For each stage, of each event, for each target audience, what communications channels are needed?



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### Strategies: Communications Channel Asset Inventory

- |                    |                      |  |
|--------------------|----------------------|--|
| • Building voice   | • E-mail             | • Posters                              |
| • Giant voice      | • Text (SMS)         | • Radio                                |
| • Bullhorns        | • IRC                | • Television                           |
| • Call Boxes       | • IM                 | • Cable capture                        |
| • Digital displays | • Intercoms          | • Web pages                            |
| • Pop-up messages  | • Telephone (push)   | • Blogs                                |
| • Talking lights   | • 800 numbers (pull) | • Social networks: Twitter, F.B., etc. |
| • RFID             | • Near field comm.   |  |
|                    | • Directional voice  |  |



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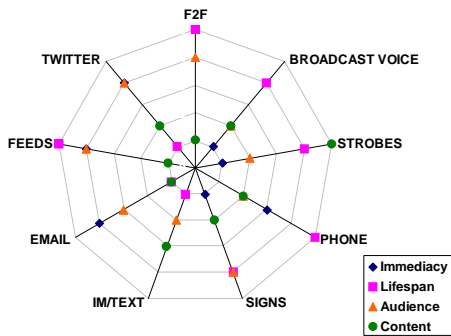
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### Rating Communications Channels



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### Planning & Implementation: NFPA 72 – The Toolbox

- 24.4.2.2 Risk Analysis for Mass Notification Systems
- 24.4.2.3\* Emergency Response Plan Elements
  - NFPA 1600, *Standard on Disaster/Emergency Management and Business Continuity Programs*
- 24.7\* Performance-Based Design of Mass Notification Systems
- 24.7.8\* Design Brief

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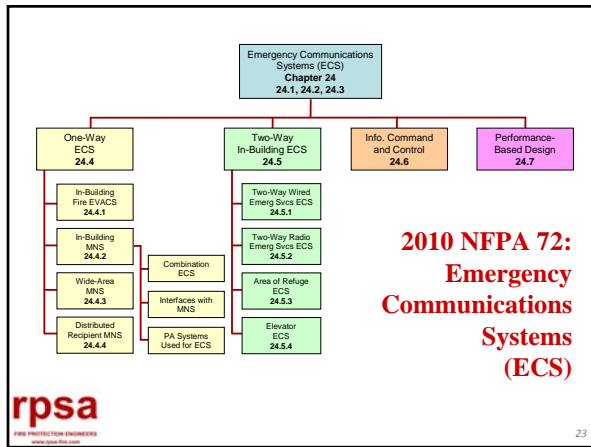
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### Effective Communications

- Convey relevant information
- When needed (time)
- In a manner that triggers desired response

Mission Reliability  
versus  
Operational Reliability

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### Effective Emergency Communications

- Message Format: Use layered message channels
  - Text
    - Voice
    - Visual
  - Graphics
    - Pictures
    - Drawings
    - GIS
    - Models
    - Real time video

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### Understanding “Communications”

- Communication
  - Alert
  - Notify
  - Inform
  - Affect behavior

Hear/ Notice   Understand   Believe   Personalize   Confirm   Respond

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### Understanding “Communications”

**27/9/3**

- **27 WORDS**
- **9 SECONDS**
- **3 MESSAGES**

- Communications noise
  - Environmental
  - System
  - Physiological impairment
  - Cognitive impairment
  - Semantics
  - Syntactical
  - Psychological
  - Organizational
  - Cultural

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### Effective Emergency Communications

- Message content
  - A description of the event or hazard:  
What is happening.
  - Location **27/9/3**
  - What to do **•27 WORDS**
  - When to do it **•9 SECONDS**
  - Why you should do it **•3 MESSAGES**
  - Source of information / authority



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### Effective Emergency Communications

- Message design (style)
    - Simple language
    - Accurate information
    - Precise instructions
    - Authoritative
- 27/9/3**  
**•27 WORDS**  
**•9 SECONDS**  
**•3 MESSAGES**



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### Create Preplanned Messages and Message Templates

- For each stage,  
of each event,  
for each communications channel,  
for each target audience,  
for each desired action.

Example:  
6 x 5 x 3 = 90 possible messages for one event



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**Create Preplanned Messages and Message Templates**

- Avoid over- and under-loaded messages
- Start with the 27/9/3 rule
- CCO: Compassion, conviction, optimism
- AGL-4: Write for < 6<sup>th</sup> grade reading level
- Primacy / Recency
- Use graphics

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**A panda walks into a café...**



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Panda: Eats, shoots and leaves.

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**Lessons Learned**

- 25 March 2010 stabbing on a college campus at about 9:03 PM.
- Reported immediately
- Suspect flees
- Text message and phone audio message:  
"WE HAD A FELONIOUS ASSAULT BY THE RECREATION CENTER SUSPECT AT LARGE TUNE INTO LOCAL MEDIA FOR MORE."
- Sent 1.5 hours after incident
- 4600 of 21,000 messages not delivered, others delayed

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## Message Mapping

Stakeholder Question or Concern [EVENT, STAGE]		
Key Message #1 9 words (average)	Key Message #2 9 words (average)	Key Message #3 9 words (average)
Supporting Info. 1.1	Supporting Info. 2.1	Supporting Info. 3.1
Supporting Info. 1.2	Supporting Info. 2.2	Supporting Info. 3.2
Supporting Info. 1.3	Supporting Info. 2.3	Supporting Info. 3.3

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### Chlorine Gas Leak, No Evacuation Message Map #1

**Audience/Stakeholder:** General Public

**Stage of Crisis:** \_\_\_ Warning \_\_\_ Risk Assessment  Response \_\_\_ Management \_\_\_ Resolution \_\_\_ Recovery

**Questions:** What do you want people to do now about the chlorine gas release?

**Communications Channel(s):** Web Page; Digital Message Boards; CCTV

**The chlorine gas release has been stopped.**

- Damage to the chlorine canisters was not extensive.
- The chlorine gas released was easy to track because of the color and odor.
- Our best information available indicates that the chlorine gas has dispersed to insignificant levels.

**The chlorine release affected only a small portion of the community [use map to show boundaries].**

- The affected population has been advised to stay inside.
- Emergency response personnel continue to advise residents.
- The gas release will have no lasting effects on the impacted area.

**Those in the area of the release should remain indoors.**

- We are asking residents in the [identify area] area to remain indoors.
- We will make an announcement when it is safe for residents in this area to go outdoors again.
- If additional information is needed, please contact the emergency hotline at [insert number].

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### High Rise Fire Evacuation Message Map #1

**Audience/Stakeholder:** Occupants of Fire Floor, Floor Above and Floor Below

**Stage of Crisis:** \_\_\_ Warning \_\_\_ Risk Assessment  Response \_\_\_ Management \_\_\_ Resolution \_\_\_ Recovery

**Questions:** What do you want people on these floors to do now?

**Communications Channel(s):** Emergency Voice Alarm Communications System to affected floors.

**There is a fire on floor number 7.**

- The fire is in an office.
- There is some smoke in the hallways and stairs.
- 

**Fire sprinklers have activated and the fire department is responding.**

- The sprinklers will control the fire to allow safe evacuation of the area.
- The fire chief will make additional announcements when more information is available.
- 

**People on floors six, seven and eight must leave using the stairs.**

- Occupants can go to other floors.
- It is not necessary to evacuate the building.
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**Fine Tune Messages**

- Adjust for communication channel
- Use Message Maps as a guide for specific templates
- Coordinate communications channels

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**Plan a Test and Test the Plan**

- Use scenario testing.
- Include all stakeholders.
- Introduce random failures and dynamic changes.
- Reassess and redefine the systems and the plans.
- Test again.

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**Summary**

- Emergency plans drive communications needs
- Messages and people, not just hardware, are a part of the *system*
- Messages must be crafted and delivered to affect behavior

**27/9/3**  
**•27 WORDS**  
**•9 SECONDS**  
**•3 MESSAGES**

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**R.P. Schifiliti Associates, Inc.** provides state of the art fire prevention and protection, consulting and engineering services. Clients are building owners; management companies; hospitals; federal, state and local governments; insurance companies; colleges and universities; lawyers; architects; engineers; and system installers. Formed in 1988, our scope of business centers on four major client needs:

- Fire investigation and failure analysis of fire protection systems.
- Analysis of existing or proposed system performance.
- Fire protection and prevention educational seminars and programs.
- Planning and design of fire prevention and protection systems and Emergency Communications Systems.

The founder, Robert P. Schifiliti, has over thirty years experience in fire protection and prevention work. For thirty years he has specialized in fire detection, alarm and signaling systems. Mr. Schifiliti has a Master of Science degree and holds a Professional Engineer's license, both in Fire Protection Engineering. Recognized as an expert in the field of fire detection and alarm systems, Mr. Schifiliti has written and published extensively on the subject and has conducted numerous seminars and training classes. In 2008 his status, service and achievements in fire protection were recognized by the Society of Fire Protection Engineers and he was elevated to the grade of Fellow.

Typical projects include:

- **Reconstruction** and analysis of system performance during fires.
- **Management** of case documents and information using LexisNexis *CaseMap*, *TextMap* and *TimeMap* along with our *IQ File*<sup>TM</sup> system.
- **Analysis** of an existing system's ability to meet specific goals or building codes.
- **Design** of fire detection, signaling and protection systems for commercial, industrial, institutional and residential occupancies.
- **Research** codes and provide detailed analysis of origin, intent and applicability.
- **Determination** of the cause and remedy of detection system false alarms.
- **Presentation** of educational programs for inspectors, plans reviewers, engineers, owners, managers and installers.
- **Measurement** of 1/3 octave band noise, voice system intelligibility and OSHA DOSE (noise) surveys. Noise analysis and designation of Acoustically Distinguishable Spaces per NFPA 72.
- **Assist** owners in developing comprehensive Emergency Plans and emergency communications strategies, including review and selection of Emergency Communications Systems.
- **Development** of performance based requirements and specifications for fire prevention and protection systems.
- **Review** plans and specifications. Provide comments on performance and code compliance.
- **Organize** and conduct independent reviews of equipment, contractors and vendors. Provide documentation of review and assist in the selection.
- **Evaluate** contractor and vendor submittals and shop drawings. Determine system's ability to meet intent of specifications, drawings and codes.
- **Set-up** and witness final tests and inspections of fire protection systems. Prepare system punch-lists and follow-up on task completions.