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Developing A Checklist For Safely Responding To And Returning From Emergency Incidents

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Certification Statement

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

Signed: _____

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Abstract

The problem was the Atlantic City Fire Department (ACFD) had unresolved safety concerns related to safely responding to and returning from emergency incidents. The purpose of this applied research project was to develop and produce a checklist to reduce safety concerns related to responding to and returning from emergency incidents. Action research methodology was used to produce a Pre-Response, Pre-Returning and Pre-Station Entry checklists. The following research questions were used as a guide: (a) What organizational systems and decision-making processes do (task oriented) or (safety) checklists address? (b) What are the structural and content requirements for a (task oriented) or (safety) checklist? (c) What are the key safety components for safe emergency vehicle responses? (d) What are the safety components that ACFD should address to reduce safety concerns? A literature review was carried out that included a search of systems and processes. Interviews were conducted and articles and studies were reviewed. Two survey were conducted, one within the ACFD and one of non-ACFD personnel, to gain insight into the problem and help in the development of the initial checklists. A test group was formed to implement the initial checklists for a period of two months. The test group's findings were reviewed and the checklists were revised accordingly. The results indicated that the checklists provided a positive solution to the problem. Recommendations were made to issue the revised checklists throughout the entire department and explore other area were checklists could have produce positive results. A number of additional recommendations were suggested to allow the Atlantic City Fire Department to capitalize on its strengths and improve on its deficiencies; these included increased training, creating and maintaining standard operating procedures.

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Developing A Checklist For Safely Responding To And Returning From Emergency Incidents

Accidents with emergency vehicle have plagued the fire service since the inception of motorized apparatus. According to the U. S. Fire Administration records between 1981 and 2011 sixty-nine career firefighters were killed while responding to or returning from an emergency incident (United States Fire Administration [USFA], 2013). They site operating, driving or riding fire apparatus as accounting for 6.2% of firefighter injuries (United States Fire Administration [USFA], 2011). While the Atlantic City Fire Department (ACFD) has fortunately not contributed to those fatalities, the same cannot be said for the injuries or the high cost associated with these accidents.

Checklists provide a strategy for ensuring critical items are not inadvertently overlooked that may result in costly errors or mistakes. The aviation industry has utilized checklists since the 1930's with a great deal of success. More recently the medical industry has begun to adopt the practice with similar success.

The problem was the Atlantic City Fire Department had unresolved safety concerns related to safely responding to and returning from emergency incidents. Checklists may offer a practical solution to this problem.

The purpose of this Applied Research Project was to develop and produce a checklist to reduce safety concerns related to responding to and returning from emergency incidents. This study used action research methodology to produce Pre-Response, Pre-Returning and Pre-Station Entry checklists. The following questions were used to guide the research: (a) What organizational systems and decision-making processes do (task oriented) or (safety) checklists address? (b) What are the structural and content requirements for a (task oriented) or (safety)

checklist? (c) What are the key safety components for safe emergency vehicle responses? (d) What are the safety components that ACFD should address to reduce safety concerns?

Background and Significance

The City of Atlantic City is located on the southern coast of New Jersey. It is situated on the northern end of Absecon Island, a barrier island shared with the neighboring communities of Ventnor, Margate and Longport. Directly north and south of Absecon Island are the barrier islands of Brigantine and Ocean City. While the surrounding communities are predominantly residential with both year-round and summer populations, Atlantic City is more urbanized and caters to a large transient population of tourists and casino workers (Rush, DeMaio, & Palamaro, 2010).

Known as the "World's Playground" in the late 1800's and early 1900's, Atlantic City's image began to rapidly deteriorate in the late 1940's. The decline reached its pinnacle when the city hosted the 1964 Democratic Convention. The event was meant as a new beginning but instead broadcast embarrassing images of a run-down and nearly bankrupt city to an entire nation (Johnson, 2002, p. 160). The decay continued until 1976, when the State of New Jersey passed a gambling referendum legalizing casino gaming in Atlantic City (New Jersey Casino Control Act, 1977).

Legalized gambling has revitalized Atlantic City's economy over the past thirty-five years. The forty-eight block, approximately 1.8 by 3.5 miles, city has a static population of 40,000 and sees 70,000 employees go to work in its twelve casinos on a daily basis (Rush et al., 2010). With the 2012 completion of the Revel Casino, the city is home to four of the six tallest buildings in the state. Atlantic City is often characterized as a small city with large city problems and challenges.

The origins of the Atlantic City Fire Department can be traced back to December 3, 1874 with the creation of the United States Fire Company No. 1. For the next thirty years the city's

fire protection was left in the hands of nine volunteer fire companies. On November 23, 1903, City Council passed Ordinance 144 (City of Atlantic City, 1903) appointing Louis H. Donnelly, Hugh P. Genoe and William Fowden, fire commissioners with the authority to create a paid fire department. Paid members were to assume control of the City's nine volunteer fire stations on January 1, 1904, although the actual change did not take place until April 4, 1904 due to legal technicalities (Kemp, 1972).

Controversies ensued over the appointment of a paid fire chief and the legality of a paid fire department. As these issues worked their way through the courts, the status of a paid fire department remained uncertain for the next five years. To make matters worse frustrations arose over the City's acquisition of the volunteer's property and equipment (Kemp, 1972). "It would not be until May 25, 1909 that the Atlantic City Fire Department, as we know it today, became legal…" (Kemp, 1972, p. 259).

The rebirth of Atlantic City with its slowly improving infrastructure has done little to improve the city's emergency services. Prior to casino gaming the ACFD had in excess of 320 members, nine fire stations and operated with one deputy chief, two battalion chiefs, nine engine companies and four ladder companies for an on-duty strength of fifty-five. The department reached an all-time staffing low in October 2010 when the layoff of thirty firefighters brought the ACFD total size to 215 members. Today the ACFD has 251 members, six fire stations and operates with two battalion chiefs, seven engine companies, two ladder companies and one rescue company for an on-duty strength of forty-two.

Over the past three decades the ACFD has experienced several mass retirements. These mass exoduses have contributed to an increasingly inexperienced fire department at every level of the organization. The department's table-of-organization has changed as frequently the city's

political climate, often with little or no thought given to the organizational impact. The ACFD's rules and regulations manual, established on September 13, 1979 by Ordinance No. 61 (City of Atlantic City, 1979), has remained outdated and unchanged for well over thirty years. The fire department's standard operating procedures and guidelines are in grave need of revision. There is no standard for communicating with members or disseminating information.

The result of these management issues has created dysfunction that reached its apex in October 2012 when the overwhelming majority ACPFF Local #198 members voted, "no confidence in their two top commanders for a lack of leadership and safety concerns before, during and after Hurricane Sandy" (Cohen & Landau, 2012, p. C1). The no confidence vote alleged Fire Chief Dennis Brooks and Deputy Chief Vincent Granese's "disregard for the safety of fire department personnel" (Cohen & Landau, p. C1). The issues brought to light have caused the current Director of Public Safety, William Glass, to take a closer look at all ACFD operations and address its many dysfunctions (Atlantic City Fire Fighters Local #198 Safety Committee, 2012).

One of the management issues the ACFD has failed to address is the safe operation of fire apparatus. All apparatus accidents are investigated by the Atlantic City Police Department for insurance purposes only (Atlantic City Fire Department, 2003, p. 7). The ACFD requests statements from all members involved in accidents but no accident review board exists, no formal cause and determinations are identified and rarely is discipline issued even when justified.

During his tenure as training officers, Executive Fire Officer graduate and Battalion Chief Robert Palamaro, instituted a formal drivers training program by sending several officers to the Volunteer Firemen's Insurance Services, Inc. (VFIS) Emergency Vehicle Driver Training-Instructor's course. The program ran successfully until Palamaro was promoted and transferred.

The Executive Fire Officers Program's Executive Leadership (National Fire Academy [NFA], 2012) course goal is to "develop the ability to conceptualize and employ the key processes and interpersonal skills used by effective executive-level managers" (National Fire Academy [NFA], 2012, pp. 1-7). The course aims "to provide a framework of executive-level competencies by focusing on personal effectiveness" (NFA, pp. 1-7). The Practice of Adaptive Leadership (Heifetz, Grashow, & Linsky, 2009) suggests this involves the processes of diagnosis and action. Diagnosis begins with problem identification. It continues as data is collected and analyzed. Action involves the development and implementation of possible solutions. It is a repetitive tool that must be applied to the organization or social system as well as to yourself (Heifetz, Grashow, & Linsky, 2009, pp. 6-7).

This research meets the following United States Fire Administration's (United States Fire Administration [USFA], 2010) goals and operational objectives: (a) Reduce risk at the local level through prevention and mitigation; (b) Improve local planning and preparedness; (c) Improve the fire and emergency services' capability for response to and recovery from all hazards; (d) Improve the fire and emergency services' professional status; (e) Lead the Nation's Fire and Emergency Services by Establishing and Sustaining USFA as a Dynamic Organization (USFA, pp. 18-23).

Literature Review

In his text entitled, *The systems bible: The beginner's guide to systems large and small*, Gall (2002) illustrates how systems are intertwined with every aspect of our lives. According to Gall humans create systems with little or no effort, but expend little time trying to understand about how they work. His text is full of no non-sense anecdotal truisms aimed at helping us control systems so they do not control us. He characterizes it as, "the very first book of Systems-

Axioms, the very first attempt to deal with the cussedness of Systems in a fundamental, logical way, by getting at the basic rules of their behavior" (Gall, 2002, p. 8). Gall is an author and retired pediatrician.

In his text entitled, *What's your problem? Identifying and solving the five types of process problems,* Castaneda-Mendez (2013) argues that there are only five types of process problems: delay-caused defects, error-caused defects, suboptimality-caused defects, unpredictability-caused defects and personal reason-caused defects (p. xix). He identifies how to solve them using a three-step approach. The premise of his method is a combination of Lean and Six Sigma methodologies (Castaneda-Mendez, 2013, p. xiii). He simplifies an approach for learning, applying, teaching and mentoring skills aimed at process improvement.

In his text entitled, *The logic of failure: Recognizing and avoiding error in complex situations,* Dorner (1996) identifies how simple and sensible misjudgments can lead to catastrophic events. He uses both real-life incidents and computer simulations to help demonstrate how logical errors can be recognized and avoided throughout the planning process. Dorner theorizes that in our complex world it is necessary to think in terms of systems. Dorner is a professor emeritus for General and Theoretic Psychology at the Institute of Theoretical Psychology at the Otto-Friedrich University in Bamberg, Germany. He is an authority on cognitive behavior whose specialties include logic and the theory of action.

In his text entitled, *The checklist manifesto: How to get things right,* Gawande (2009) reasons that we live in an increasingly complex world. Our knowledge, experience and training have risen to meet the many challenges we continually face, but despite our many advances our failures are still far to frequent. Gawande reasons that much of our failure can be attributed to not

applying those skills correctly. He makes a compelling argument for the adoption of checklists as a strategy for addressing these failures.

Boorman (2011) created *The checklist builders* as a short instructional booklet. It is based on his experience working with checklists and designed as a guide or reference. It is an unpublished work. It is not proprietary to Boeing because Boorman developed it while working with Gawande (2010) and his research team. This quick reference guide gives the user a basic understanding of checklists purposes, types and components.

The Evaluation Center at the Western Michigan University's purpose "is to improve the quality and consistency of evaluations and enhance evaluation capacity through the promotion and use of high-quality checklists targeted to specific evaluation tasks and approaches" (Western Michigan University, 2010, p. 1). The website publishes Daniel Stufflebeam's *Guidelines for developing evaluation checklists: The checklists development checklist (CDC).* This instructional booklet is a basic guide to, "developing and applying evaluation checklists" (Western Michigan University, 2000, p. 1). The website also publishes Michael Scriven's *The logic and methodology of checklists*. This instructional booklet, "covers some of the basic features of checklists and their application in evaluation…" (Western Michigan University, 2007, p. 1).

Several articles in fire and emergency service publications address checklists. In an article entitled, *R.E.A.D.Y. checks and the rule of air management,* published in Fire Engineering, Gagliane, Phillips, Jose and Bernocco (2005) argue that the "buddy checks" are insufficient prior to entering hazardous atmospheres and purpose a READY check be used before entering IDLH (Immediately Dangerous to Life or Health) environments. In an article entitled, *The letter: Checklists are for…well, checking things,* published in EMS World, Dick (2011) uses a hypothetical situation to illustrate the importance of pre-response emergency

vehicle checks. In an article entitled, *Flyboys and Fire Trucks*, published in Fire Engineering, Halton (2010) describes how costly mishaps can be caught, prevented and avoided by the use of a simple checklist. In an article entitled, Checklists & balances, published in FireRescue Magazine, LeDuc (2012) identifies how incident commanders (ICs) can benefit from the use of checklists during emergency incidents.

Two interviews were conducted with Daniel Boorman (personal communication, March 28, 2013; personal communication, April 16, 2013). He was selected based on his extensive knowledge and experience with developing safety checklists. Boorman has helped develop hundreds of checklists for the aviation industry and has provided guidance to others. The transcripts of Boorman's interviews can be found in Appendices A & B.

The findings and observations of others help influence the project in a number of ways. The literature provided a solid foundation of knowledge about systems and processes, their various inherent problems and organized approaches towards addressing and solving those problems. A rudimentary understanding of which is essential in clarifying how checklists can be used to anticipate and solve system and process problems.

Procedures

This applied research paper submits that the Atlantic City Fire Department has unresolved safety concerns related to safely responding to and returning from emergency incidents. These unresolved safety concerns have often carried over to non-emergency operations of fire apparatus.

A survey (Appendices C & D) was conducted between December 2, 2012 and December 31, 2012 on www.surveymonke.com. Requests for responses were sent by email to 50 officers on the ACFD. The selection encompassed all officers assigned to the ACFD's fire suppression

division. By rank the total included forty fire captains, eight battalion chiefs and two deputy chiefs. A total of fourteen responses (28%) were returned. The survey consisted of ten questions directed towards gaining a better understanding of the types, categories and causes of fire apparatus accidents as well as the ACFD's efforts towards their reduction. Additionally, questions were aimed towards gaining a general consensus as to key considerations that should be included in the development of the preliminary checklists. The survey cover letter with the corresponding results can be found in Appendices C and D.

A second survey (Appendices E & F) was conducted between December 3, 2012 and December 31, 2012 on www.surveymonkey.com. Requests for responses were sent by email to 113 fire officers throughout the United States. The selection was based on education, rank and an understanding of research methodology. A total of forty-five responses (39.82%) were returned. The survey consisted of ten questions directed towards gaining a better understanding of the types, categories and causes of fire apparatus accidents. Additionally, questions were aimed towards gaining a general consensus as to key considerations that should be included in the development of the preliminary checklists. Two questions were added to assess the respondents' open-mindedness to the use of checklists and their willingness to test a checklist. The survey cover letter with the corresponding results can be found in Appendices E and F.

The two surveys were conducted so an analysis could be made of the ACFD and other fire department with regards to the types, categories and causes of fire apparatus accidents as well as gaining a general consensus as to key considerations that should be included in the development of the preliminary checklists. There was one notable difference between the surveys. The notable difference was that the ACFD survey (Appendix D) questioned the adequacy of the department's SOP/SOG's and emergency vehicle operations training which was

useful in developing a potential solution; the Non-ACFD survey (Appendix F) questioned the respondent's initial reaction to the proposed solution and their willingness to take a greater part in the research.

The key considerations the ACFD survey respondents thought should be included in the development of the preliminary checklists (Appendix G) and the Non-ACFD survey respondents thought should be included in the development of the preliminary checklists (Appendix H) were reviewed. The wording was refined, revised and reduced until preliminary versions of three checklists (Appendix I) were produced for testing. All three checklists were limited to a single column each and fit on one side of an 8 ½ x 11 laminated sheet of paper. The first checklist covered safety considerations to be made prior to an emergency response. The second checklist covered safety considerations to be made while responding to an emergency incident. The third checklist covered safety considerations to be made while returning to the fire station from the emergency incident.

A test group was then formed to implement the preliminary checklists for a trial period. The test group consisted of nine fire officers who had taken part in the earlier surveys (Appendices D & F). The selection was based on survey respondents who were willing to volunteer after reading the implementation guidelines (Appendix J). Two of the officers were captains on the ACFD and the other seven were members of fire department throughout New Jersey and the United States. The test group implemented the preliminary checklists for a period of two months beginning on February 1, 2013 and commencing on March 31, 2013. The test group request cover letter, implementation instructions and the names, ranks and fire departments of the test group members can be found in Appendices K, J and L.

Two interviews were conducted with Daniel Boorman (personal communication, March 28, 2013; personal communication, April 16, 2013). He was selected as an interviewee because he is the leading authority on checklists.

The first Boorman interview was conducted on March 28, 2013, prior to the conclusion of the test group's implementation of the checklists. The interview focused on gaining a better understanding of checklists from an expert in their development. The questions were directed towards checklist construction, types and uses as well as policy and procedural considerations. The transcript of Boorman's first interview can be found in Appendix A.

At the end of the implementation period the test group members were asked to complete a post implementation survey consisting of 20 questions (Appendix M & N). The survey was constructed with the assistance of Daniel Boorman. The survey questions critiqued the usage of the checklist and explored possible improvements. Additional questions were added to gain insight as to whether test group members considered checklist usage was a substitute for training and experience and if checklist implementation within the fire service would require a cultural change. The survey results were use to refine the original checklists and develop a second edition of the checklists (Appendix O). The test group survey cover letter with the corresponding results can be found in the Appendices M and N.

A second interview was conducted with Boorman on April 16, 2013, after the conclusion of both the test group implementation period and the test group survey. The interview served as both a follow-up to the first interview and a review of the test group post checklist implementation survey. Boorman clarified and expanded upon information given from his first interview, helped analyze the test group survey results and provided input into the refinement of

the original checklists. The transcript of Boorman's second interview can be found in Appendix B.

A second edition of the checklists (Appendix O) was produced and reviewed by Boorman. Boorman responded positively to the changes and offered a few final suggestions (personal communication, May 29, 2013) (Appendix P). Boorman suggested his rudimentary understanding of fire service operations should be a consideration in the acceptance or ejection of this final feedback. His suggestions were reviewed and most were valid and incorporated into the third and final edition of the checklists (Appendix Q). Boorman's email correspondence, the second edition of the checklists and the third and final edition of the checklists can be found in Appendices P, O and Q.

There were several limitations to the research. Most notably the fire service library search yielded few results that associated checklists to the fire or emergency services. Further library and Internet searches yielded few results that were not repetitive in nature and based on the same limited data. Gawande's research assistant (A. Karlage, personal communication, October 11, 2012) (Appendix R) suggested the research start with a clearer understanding of systems and processes as they applied to the development of checklists. This approach did not eliminate, but helped lessen the impact of this limitation. Several limitations are inherent with any survey as the data collected is only as reliable as the individuals from which it is shared. The research relied on truthful and accurate responses to the three surveys conducted. The researcher sought to reduce the impact of this limitation in a number of ways. First, the ACFD survey targeted all fire officers assigned to fire suppression not a select few. A continual effort was made to get as many responses as possible. The 28% response rate was lower than expected, but unwilling participants may have resulted in less truthful responses. Second, a similar survey targeted fire

officers throughout the United States. The survey sought to expand the number of total responses, highlight any disparity within the data collected from the ACFD survey and identified any isolated problems unique to the ACFD. The research was limited by both the number of test group participants willing to test the preliminary checklists and the length of implementation period. If time permitted it would have been preferable to expand the length of time the preliminary checklists were implemented, refine the checklists and procedure then implement the final version for another test cycle. This part of the research was further limited by the researcher's inability to directly observe the test group's participation. In order to lesser this limitation the test group was asked to be candid about the percentage of time the checklists were used during the implementation period. Finally, the research was further limited by the lack of cooperation from both the ACFD's Fire Chief and Administrative Deputy Chief.

Results

The first research question asked: What organizational systems and decision-making processes do (task oriented) or (safety) checklists address? Ami Karlage (personal communication, October 11, 2012), research assistant to Atul Gawande, suggests it is useful to have an elementary understanding of systems research and thinking. According to Karlage, checklists are a product of this "broader arena" (personal communication, October 11, 2012) (Appendix R).

Gall (2002) defines a system as, "A set of parts coordinated to accomplish a set of goals" (2002, p. 240). Gall categorizes systems as simple or complex. He suggests that, "any System with more than two elements should probably be regarded as complex, at least for purposes of human interaction" (Gall, p. 69). Dorner (1996) defines a system as "a network of many variables in causal relationship to one another" (p. 73). Castaneda-Mendez (2013) defines a

process as, “a set of actions resulting in an output whose purpose is to repeatedly satisfy specified requirements” (p. xv). He categorizes processes into single unit processes and multiple unit processes (Castaneda-Mendez, 2013, p. xv).

Gawande (2009) cites Professors Brenda Zimmerman of York University and Sholom Glouberman of the University of Toronto on the science of complexity. They, “have proposed a distinction among three different kinds of problems in the world: the simple, the complicated, and the complex.” Simple problems are straightforward, “Sometimes there are a few basic techniques to learn.” Complicated problems “can sometimes be broken down into a series of simple problems.” But, “Unanticipated difficulties are frequent. Timing and coordination become serious concerns.” With complex problems each situation presents unique variables, “their outcomes remain highly uncertain.” “Expertise is valuable but most certainly not sufficient” (Gawande, 2009, p. 49).

Dorner (1996) argues that humans are shortsighted in our approach to problem solving. We tend to deal with the problem at hand; giving little or no thought to the potential problems the solution may create. Historically, “The need to see a problem embedded in the context of other problems rarely arose” (Dorner, 1996, p. 6). We now live in a complex world made of many connected subsystems requiring us to take cause and effect relationships into consideration during the decision making process (Dorner, 1996, pp. 4-6). Our emotions, values and motivations influence our thoughts and goals. Rarely do we annualize complex situations and when we do the results are often unreliable. According to Dorner, mistakes are cognitive in nature, “Our brains are not fundamentally flawed; we have simply developed bad habits” (Dorner, 1996, p. 7). Failure is predictable, “it develop gradually according to its own logic” (Dorner, 1996, p. 10). Once set in motion it continually encourages poor decision-making.

Boorman (2011) explains that checklists are intended to be an instrument that helps you successfully accomplish important tasks. Humans are not without error; we are all subject to memory lapses, interruptions and distractions. Regardless of the level of knowledge, skill and assiduousness someone possesses, at times critical actions will still be overlooked. He says that checklists are not teaching tools or a substitution for our judgment; they are not intended to inhibit our decision-making or change the way we do things. According to Boorman, checklists are used essentially anywhere it is imperative that things get done correctly every time (p. 1).

Boorman stated that, "Checklists fit into a very complex system, or multiple systems. The airplane is a complex system. Conducting a flight is a complex endeavor in a complex environment of weather, air traffic control, regulations, company procedures and pressures" (personal communication, March 28, 2013). But he says, "I don't think we have been deliberate in looking at it from a system perspective" (personal communication, March 28, 2013). He explains that the airline industry's methods "have evolved over many decades into something we have found…very effective but without necessarily having a good theoretical background" (personal communication, April 16, 2013).

LeDuc (2012) suggests checklists can play an important role within the Incident Management System (IMS) and aid in the decision-making process of the IC. He stresses the importance of training, but says it is often difficult to adequately simulate realistic emergency situations. According to LeDuc, "many professionals have come to rely on the value of prepared checklists for complex operations and rapidly evolving conditions" (p. 96). He says, "Fire service ICs are responsible for many tasks that must be accomplished simultaneously and rapidly to ensure successful mitigation of the threat and safety of civilians and firefighters" (LeDuc, 2012, p. 96).

Gagliano et al (2005) say, “Although firefighters confront a multitude of variables in emergencies, it’s the ones they can control and quickly attend to that will dramatically enhance their overall safety…” (p. 91). They site air management systems as an area within the fire service that would benefit from the use of checklists. According to them a simple checklist prior to entering hazardous atmospheres ensures quicker and safer response.

Both Halton (2010) and Dick (2011) use fire apparatus as an examples of systems within the fire service that would benefit from the use of checklists. Halton’s attention is directed towards safely exiting the fire station while Dick’s attention is directed towards a pre-shift apparatus mechanical systems check. Both fire service professionals illustrate how simple checklist can help prevent preventable and avoidable mistakes that can be costly in terms of money and lives (Halton, 2010; Dick, 2011).

Most test group members indicated that the checklists worked appropriately in a team environment (44.4% - Worked Well, 44.4% - Worked Somewhat Well). Of the nine test group members, 77.7% implemented the checklist 75% or more of the time (4 – 100% of the time, 3 – 75% of the time). Seven of the nine test group members (87.5%, one member did not respond) indicated that implementation of checklists would require a cultural change within the fire service. Six of the nine test group members (75%, one member did not respond) indicated checklists usage had a place in the fire service during both emergency and non-emergency operations; one member (12.5%) indicated checklists usage had a place in the fire service during emergency operations only; and one member (12.5%) indicated checklist usage had a place in the fire service during non-emergency operations only.

The second research question asked: What are the structural and content requirements for a (task oriented) or (safety) checklist? Castaneda-Mendez (2013) applies a simple three-step

procedure to solve process problems: Identify the type of problem by cause, find the root cause and then address the root cause (p. 2).

Scriven defines a checklist as, “a list of factors, properties, aspects, components, criteria, tasks, or dimensions, the presence, referent, or amount of which are to be considered separately, in order to perform a certain task” (Western Michigan University, 2007, p. 1). He categorizes checklists into six basic types: laundry list, strongly sequential, weakly sequential, iterative, diagnostic and criteria of merit (Western Michigan University, 2007, pp. 1-3). Scriven gives a lot of attention to the criteria of merit checklists (COMlists) noting that they “reduce the influence of the Rorschach effect, i.e., the tendency to see what one wants to see in a mass of data” (Western Michigan University, p. 4). He says COMlists should meet the following requirements:

1. The checklist should refer to criteria and not mere indicators
2. The list should be complete
3. The items should be contiguous
4. The criteria should be commensurable
5. The criteria should be clear
6. The list should be concise; i.e., it should contain no superfluous criteria
7. The criteria should be confirmable (Western Michigan University, pp. 4-5).

Stufflebeam says that checklists are valuable evaluating tools if constructed, tested and implemented properly. He states the “A sound evaluation checklist clarifies the criteria that at least should be considered when evaluating something in a particular area; aids the evaluator not to forget important criteria; and enhances the assessment’s objectivity, credibility, and reproducibility” (Western Michigan University, 2000, p. 1). Stufflebeam divides his Checklists Development Checklist (CDC) into twelve steps as follows:

1. Focus the checklist task
2. Make a candidate list of checkpoints
3. Classify and sort the checkpoints
4. Define and flesh out the categories
5. Determine the order of categories
6. Obtain initial reviews of the checklist
7. Revise the checklist content
8. Delineate and format the checklist to serve the intended uses
9. Evaluate the checklist
10. Finalize the checklist
11. Apply and disseminate the checklist
12. Periodically review and revise the checklist (Western Michigan University, 2010, pp. 2-3).

These twelve steps are divided further with more specific explanations. His entire guide can be found at www.wmich.edu/evalctr/archive_checklists/guidelines_cdc.pdf.

Boorman (2011) categorizes checklists as either “Normal” or “Non-normal.” He defines normal checklists as ones that cover “the actions that you intend to do (or at least consider) every time in a process” and non-normal checklists as ones that cover “contingency actions that may be needed occasionally, or even very rarely” (Boorman, 2011). According to Boorman, checklists can be categorized further as either “Do and Confirm” or “Read and Do.” With do-and-confirm checklists, all normal procedures are carried out. At a predetermined time, referred to as a “pause point,” confirmation is made that all critical actions have been completed. If a critical

action was missed it can then be completed before proceeding. With read-and-do checklists, the critical actions are read out loud and completed in real time (Boorman, 2011).

Boorman (2011) divides the checklists development process into six steps:

1. Operational Concept
2. Critical Items
3. Pause Points
4. Reduce and Phrase
5. Format
6. Test and Improve (p. 2).

A full explanation of each step is included in the *The checklist builder*, which can be found in its entirety in Appendix S.

Boorman (personal communication, March 28, 2013) does not feel that checklists impact the decision making process to a great degree. He says, “Normal checklists are designed to cover actions that happen every time you do a process, so usually there are no decisions. Non-normal checklists often have decision points, where the checklist branches off in multiple procedural paths.” Boorman (personal communication, March 28, 2013) explains that these procedural paths “are major sources of error in checklist accomplishment.” So great care is given in minimizing the number of decisions and the clarity of the decisions (personal communication, March 28, 2013).

Boorman (personal communication, March 28, 2013) explains that there is a great bit of difference between developing a normal checklist and non-normal checklist. “Normal checklists are used on every flight, so they are highly trained and practiced.” There are only ten normal checklists within the airline industry. He says they are kept short and contain only “the highest

priority items. Normal checklists are accomplished in a do-then-confirm flow." There are hundreds of non-normal checklists throughout the industry. "Some contain memory items and are highly practiced, but most are never seen by a given pilot…" (personal communication, March 28, 2013).

Boorman and Gawande (2010) also stress that considerable care should also be given to the physical construction of checklists. These include the use of simple sentences using basic wording in an "uncluttered, and logical format" (p. 1). Checklists should be limited to one page, one color with an easy to read font in "Upper and lower case text" (p. 1). It is important to be able to complete the checklist in a "reasonably brief period of time" (p. 1). All checklists should be reviewed and revised periodically. A full explanation of each important physical component is included in *A checklist for checklists*, which can be found in its entirety in Appendix T.

The survey indicated that none of the test group members read the checklists aloud all the time (66.7% - Sometimes Read Aloud, 33.3% - Never Read Aloud). All nine test group members indicated that the checklist's flow was appropriate (44.4% - Flowed Well, 55.6% - Flowed Somewhat Well); response times were not slowed do to the implementation of the checklists; and it was easy to know when to initiate the checklists (55.6% - Very Clear, 44.4% - Somewhat Clear).

All nine test group members indicated the font size was readable in all lighting and environmental conditions (33.3% - Always, 66.7% Most Times). Seven of the nine test group members indicated that the checklists were constructed allowing enough time for completion (22.2% - Always, 55.6% - Mostly, 22.2% - Rarely) and the physical form of the checklists was usable (55.6% - Very Usable, 22.2% - Somewhat Usable, 22.2% - Not Very Usable). Five of the nine test group members (62.5%, one member did not respond) indicated that they did not have

to modify the checklists to fit their department's practices. Three of the nine test group members (37.5%, one member did not respond) indicated that they did have to modify the checklists to fit their personal preferences. Seven of the nine test group members (87.5%, one member did not respond) indicated that the checklist was not a substitute for either training or experience.

The third research question asked: What are the key safety components for safe emergency vehicle responses? Boorman (2010) says checklists are intended for processes that are critical, complex or have a history of errors. He explains critical processes are ones that have a significant safety impact, substantial cost or impact continued operations. Accordingly, complex processes are ones that involve multiple or difficult steps taking place in stressful or team environments and may be subject to interruptions or distractions (pp. 1-2).

Components included in normal checklists "ensure that critical safety actions are accomplished prior to moving on to the next phase of flight." Boorman (personal communication, March 28, 2013) says they "are used to prevent errors that would reduce safety margin, or directly cause an accident or incident." Components included in non-normal checklists "assure continued safe flight and landing…" they are included to correct or compensate "for airplane system failure or non-normal operating conditions."

LeDuc (2012) proposes a decision-making checklist for IC that focuses on "an adequate initial response force…" (p. 96). He say an IC must not only ensure "that they're matching response force with the risk faced" but that proper tactics are employed as well as the necessary command staff positions filled (LeDuc, p. 96). Ideally a checklist confirms, "all your critical tasks and responsibilities are addressed efficiently and in a timely manner" (LeDuc, p. 96).

Gagiano et al (2005) reduced their simple R.E.A.D.Y. checklist for air management to four steps. They explain,

> It focuses on four key areas of safety that can be disastrous if overlooked: Radio are on and switched to the correct channel, and team members know how to use them correctly and effectively and know to whom they are reporting; Equipment is in place, functioning, and appropriate for the assignment; Air available is known by each member; Duties are known and understood; and Yes! If each of the above is answered affirmatively, you are ready to proceed. If not, address the area of deficiency prior to entering the IDLH environment. (p. 92)

The fourth research question asked: What are the safety components that ACFD should address to reduce safety concerns? Halton provide a possible checklist for safely existing the fire station. He says, "You don't write long 'everything' lists – just the deadly or mission-ending ones" (Halton, 2010, p. 8). His example is as follows:

1. Officer: All emergency equipment (lights, siren, brakes) working? Driver confirms
2. Driver: Address verified and route selected? Officer confirms
3. Officer: All compartment doors closed and station door open? Driver confirms
4. Driver: Everyone seat belted and all cabin tools secure? All confirm. (p. 8)

At this point the fire apparatus would be cleared to leave the fire station.

The survey results indicated that 71.43% of the ACFD respondents and 93.34% of the non-ACFD respondents have experienced accidents under their supervision. Both groups surveyed indicated that the major a cause of those accidents were avoidable (ACFD – 71.43%, Non-ACFD – 77.78%). Both groups surveyed indicated that the operation or task being performed when the accident occurred was simple in nature (ACFD – 42.86 %, Non-ACFD – 82.22%). Both group identified inattentiveness and complacency as the leading root causes of the accident (ACFD – Inattentiveness 70%, Complacency 60%, Non-ACFD – Inattentiveness

40.48%, Complacency 35.71%). Three of the 9 test group members (33.3%) indicated that an error was caught during the implementation period as a result of the checklists use. All 3 errors were categorized as a "Minor Accident or Mishap." One officer indicated that operations were stopped because a guide was not in place while the apparatus was backing up. The most notable error caught was a "driver forgot to check whether all the compartments doors were closed prior to moving the vehicle. By utilizing the checklist the error was corrected before any damage was done" (See Appendix N).

The ACFD survey indicated that the department's emergency vehicle operation training was not adequate (Adequate – 35.71%, Not adequate – 64.29%). The ACFD survey did however indicate that the department's SOP/SOG's for emergency vehicle operations were adequate (Adequate – 71.43%, Not adequate – 28.57%).

The respondents of both surveys listed components they felt each of the three checklists should address. The questions and responses are listed in Appendices G and H. This initial list was reduced and refined to produce the preliminary checklists implemented by the test group (See Appendix I).

According to Boorman (personal communication, April 16, 2013) checklist components should emphasize critical errors. Asking questions such as, "What kinds of mistakes have been made? What does the safety record and effectiveness record show?" help identify those critical errors. "If you're backing the (fire) engine out, getting in a traffic accident or taking out part of the door, why did it happen, what did somebody not do? Did they not post someone on the sidewalk: did they not make sure the door was completely open? Those become your critical errors." Boorman's review of the checklists developed and implemented from the initial survey yield several suggestions. He suggested that a number of items related in nature be combined and

the wording reduced. Boorman as suggested that some items were considered training or policy and procedures and should not be included. This included the elimination of the second checklist and the splitting to the third checklist into two separate checklists. A full explanation of the revisions can be found in questions 8-17 of Boorman's 2nd interview (See Appendix B).

The 3rd and final editions of the Emergency Response Checklist can be found in Appendix Q. The Emergency Response Checklist is intended to be printed on an 8 ½ x 11 laminated sheet.

Discussion and Implications

Gall (2002), Castaneda-Mendez (2013) and Dorner (1996) offer very similar definitions or explanations of organizational systems and processes; a specific goal or requirement is set and there is an expectation that it will be reached or satisfied through repetitive and structure efforts. They similarly suggest that large or complex organizational systems and processes are merely multiple small or simple systems. Consequently the various authors approach to understanding organizational systems and processes may differ slightly but all involve breaking the whole down into parts. According to Boorman (personal communication, April 16, 2013), the airline industry's approach to developing checklists may not have formally followed this theory, but they have certainly evolved accordingly. "We very distinctly split out normal checklists and what we'll generically call non-normal checklists." Part of the logic for separating normal checklists and non-normal checklists is the complexity and frequency of task or procedure being performed. Normal checklists cover highly critical tasks performed on every flight whereas non-normal-normal checklists address situations or circumstances that are infrequent (D. Boorman, personal communication, March 28, 2013).

Boorman's explanation (personal communication, March 28, 2013; personal communication, April 16, 2013) would imply that normal checklists cover simple systems and non-normal checklists cover complex systems. It further implies that normal checklists fit into complex systems insomuch as they address critical items that must be addressed or completed before moving onto the next simple (or complex) system. It can also be argued that the use of "pause points" can serve as a separation between the multiple simple systems among a complex system. Castaneda-Mendez (2013) confirms this thought process stating, "Solving chronic process problems involves more than just looking at single units" (p. 63). He says when solving problems at the multiple unit level it becomes necessary to develop an understanding of "the various causal relationships specific to processes" (Castaneda-Mendez, 2013, p. 79). Dorner (1996) suggest that this interrelationship has increased in contemporary times. He says, "we face an array of closely – though often subtly – linked problems. The modern world is made up of innumerable interrelated subsystems, and we need to think in terms of these interrelations" (Dorner, 1996, p. 5). It no longer suffices to think in singular terms; we must continually analyze how each decision or component impact the whole. "In solving problems that involve complex dynamic realities…we must think about problems we may not have at the moment but that may emerge as side effects of our actions" (Dorner, pp. 189-190).

Numerous parallels can be drawn between Castaneda-Mendez's (2013) five categories process problems and Boorman's checklists components. Delay-caused process problems can be identified by focusing "exclusively on the 'thing' that is going through the process" (Castaneda-Mendez, 2013, p. 3). Once identified, he says value is created, "through a value stream or process. To create more value, you should reduce as many non-value – added actions as possible" (Castaneda-Mendez, p. 8). Boorman (personal communication, March 28, 2013) says,

normal checklists “are kept short…and cover the highest priority items.” He (D. Boorman, personal communication, April 16, 2013) states, “…when you move into trying to build a checklist that maps out an entire scenario…it can be problematic…you don’t write an effective checklist.” Items have been reduced to the most critical, creating value within those items. Error-caused defects can be identified by retracing the process, “Start from where the error is noticed and then retrace to the origination of the information. While retracing, note all the touch points, actions in the process that manipulate the item or information” He says, “Only those actions that manipulate or use the information can have errors” (Castaneda-Mendez, p. 20). Boorman (personal communication, April 16, 2013) says a checklist is effective because it looks at “What kinds of mistakes have been made?” “What does the safety record and effectiveness record show?” “Those become your critical errors.” Essentially focusing on critical errors and identifying error-caused defects are one and the same. Suboptimality-caused defects are, “Problems of fit, form and function.” The basis of this process problem assumes, “that all processes have variation” (Castaneda-Mendez, 2013, p. 27). Unpredictability-caused defects defer from suboptimality-caused defects in that their variations are, “uncontrollable factors. The defect in the prediction is not ever accurate to the level desired or accurate frequently enough to the level desired” (Castaneda-Mendez, 2013, p. 39). Non-normal checklists specifically target unexpected variation or operating conditions whether they are predictable or unpredictable. “They reduce the impact of a non-normal or emergency situation” (D. Boorman, personal communication, March 28, 2013). Boorman (2011) says, “A non-normal checklists covers contingency actions that may be needed occasionally, or even very rarely” (p. 3). Normal checklists ensure that processes are not varied from specifically when it comes to critical items (D. Boorman, personal communication, March 28, 2013). Boorman says, “A normal checklist

covers the actions that you intend to do (or at least consider) every time in a process" (Boorman, 2011, p. 3). Personal reason-caused defects may be, "caused by personal reasons…" such as "forgetfulness or lack of knowledge" (Castaneda-Mendez, 2013, p. 47). Boorman (2011) says, "No matter what your level of expertise, experience and diligence, critical actions will still occasionally be missed. Everyone, in any job, is subject to unexpected interruptions and distractions, and human memory is not perfect" (Boorman, 2011, p. 1). Boorman (personal communication, March 28, 2013) explains that procedures are done from "training and memory" the checklist ensures that they are completed "before continuing to the next phase of your process.

Scriven (Western Michigan University, 2007), Stufflebeam (Western Michigan University, 2000) and Boorman's (2011) steps and requirements for developing checklists reflex many similarities but do vary to a degree. All three authors suggest that a checklist should focus on a specific task or criteria and that its intended use should be clear. All three suggest the checklist components should be clear, concise and orderly.

Stufflebeam (Western Michigan University, 2000) and Boorman (2011) emphasize that checklists should reduced or fleshed in size and formatted in accordance with its intended use. Boorman (personal communication, March 28, 2013) states, "we work hard to: reduce the number of decisions in checklists, make the decision clear, make the checklist navigation visually clear, to reduce errors." Both stress that checklists should be test and periodically reviewed and revised. Boorman (2011) stands alone in the meticulous details of the physical checklist. Sentence structure, wordiness, font size and type, limited color, readability and revision date as well as a clear procedure for implementation are among is ordinary standards (Boorman, 2011; Boorman & Gawande, 2010).

Boorman (2011) and Scriven (Western Michigan University, 2007) refer to checklist items as being confirmable. Both differentiate between basic types of checklists. Scriven list six types: laundry list, sequential (either strongly sequential or weakly sequential), iterative, diagnostic and criteria of merit (Western Michigan University, pp. 1-3). Although Scriven's (Western Michigan University, 2007) are by no mean difficult to understand, Boorman's (2011) fit into a much simpler grouping of normal checklists and non-normal checklists. His normal checklists tend to be do-and-confirm; items are done by memory and then confirmed as completed. His non-normal checklists tend to be read-and-do; items are done as they are read off a list (D. Boorman, personal communication, March 28, 2013; Boorman, 2011).

Gawande's (2009) relied heavily on Boorman's experience and input in developing his medical checklists. The time sensitivity of aviation checklists, coupled with their focus on reducing life threatening and costly errors, easily parallel those of the medical industry (Gawande, 2009). Gagliano et al. (2005), Halton (2010), LeDuc (2012) and Dick (2011) demonstrate how Boorman's methodology can be implemented in the fire service as well.

Gagliano et al. (2005) and Halton's (2010) checklists contain only four critical items that have a potentially high safety or costs impact. Their checklists are designed for use in stressful situation can be completed within a very short timeframe (Gagliano et al., 2005, pp. 91-92; Halton, 2010, p. 8). Both these authors' checklists are very much in line with Boorman's methodology; they are short, contain only critical items and are listed in a do-and-confirm fashion. Both checklists would fall into Boorman's normal checklist category (D. Boorman, personal communication, March 28, 2013; April 16, 2013; Boorman, 2011).

LeDuc (2012) and Dick (2011) illustrate how checklists can be use within the fire service to reduce high-risk oversights both on and off an emergency incident (LeDuc, 2012, p. 96; Dick,

2011, p. 22). LeDuc notes that an incident command checklist can serve as “a fail-safe mechanism to ensure all your critical tasks and responsibilities are addressed efficiently and in a timely manner” (LeDuc, 2012, p. 96). Both author’s reasoning falls well within Boorman’s normal and non-normal checklist categories (D. Boorman, personal communication, March 28, 2013; April 16, 2013; Boorman, 2011).

Both surveys (Appendices D & F) indicated that there were a large number of accidents with related to emergency apparatus, with the ACFD survey listing 10 or 71.43% (50.00% related to emergency incidents and 21.43% related to non-emergency incidents) and the Non-ACFD survey listing 42 or 93.34% (46.67% related to emergency incidents and 46.67% related to non-emergency incidents). Both surveys indicated that the accidents were avoidable, with the ACFD survey listing 10 or 71.43% and the Non-ACFD survey listing 35 or 77.78%. Both surveys indicated that the operation or task being performed when the accident occurred as simple, with the ACFD survey listing 6 or 42.86% and the Non-ACFD survey listing 37 or 82.22%. Finally, both surveys indicated that inattentiveness and complacency were the leading root causes contributing to the accidents. The ACFD survey listed inattentiveness at 7 or 70% and complacency at 6 or 60% and Non-ACFD survey listed inattentiveness at 17 or 40.48% and complacency at 15 or 35.71% (See Appendices D & F).

I don’t understand why these are all highlighted?

These survey results support both Gawanda (2009) and Boorman (2011) research and the basis for checklist usage. Gawanda refers to them as “inevitable human inadequacies.” He states that, “Avoidable failures are common and persistent, not to mention demoralizing and frustrating, across many field – from medicine to finance, business to government” (Gawande, 2009, p. 13). Gawande says, “We are besieged by simple problems” and argues that “Checklists

can provide protection against such elementary errors" (Gawande, 2009, p. 50). Boorman says that pilots learn early in training "that their memory and judgment are unreliable and that lives depend on their recognizing that fact" (as cited in Gawande, 2009, p. 121). He explains that checklists "provide reminders of only the most critical and important steps" (Gawande, 2009, p. 120).

The ACFD survey (Appendix D) does indicate that the department's training is not adequate. This response did not necessarily conflict with Boorman (2011) and Gawande's (2009) research. It does imply that lack of training may contribute to the problem and increased training may contribute to the solution. Gawande (2009) says that when mistakes are made, "the traditional solution in most professions has not been to punish the failure but instead to encourage more experience and training…Training in most fields is longer and more intense than ever" (p. 12). Yet failures persist. Training and experience as a corrective action have not addressed the root cause of the defect. Failures will return as less trained and experienced personnel replace existing personnel or current personnel failure to keep pace with new technologies. According to Boorman (2011) checklists target mistakes that can or have been made. The training and experience should already be there, the checklist, "only implies that you and your team are human, and that your endeavors are difficult, complex, and subject to unexpected turns" (Boorman, 2011, p. 1). Checklists provide a preventive action that drastically reduces the probability of the defect reoccurring. The test group's (Appendix N) indication that checklists are not a substitute for training or experience signals an understanding of the purpose of checklist usage, but the fact that none of the test group read the checklists aloud all the time indicates that this understanding is far from complete.

The test group (Appendix N) indicated that the checklists had a place within the fire service during both emergency and non-emergency operations. This relates positively to both Boorman (2011) and Gawande's (2009) writing and research. Aviation and medical checklists are used in both emergency and non-emergency environments. Boorman (2011) makes this distinction very clear in his distinction between the intended usage of normal and non-normal checklists (Boorman, 2011, p. 3). Gawande also makes this distinction clear citing examples of pre-surgical checklists where the actions remain the same every time, problems of extreme complexity as in the case of near drowning girl (Gawande, 2009, pp. 15-18).

The test group (Appendix N) indicated that the checklists worked appropriately in a team environment, but that implementation would require a cultural change. This related positively to Boorman and Gawande's writing and research. Boorman (personal communication, March 28, 2013) and Gawande (2009) stress the necessity of a team environment as key to the successful implementation of checklists. Gawande says that, "Traditionally, surgery has been regarded as an individual performance…" (p. 102). He notes that checklists require increased communication, and points to their implementation at select hospitals, "Their insistence that people talk to one another about each case, at least just for a minute before starting, was basically a strategy to foster teamwork – a kind of team huddle, as it were" (p. 107). Boorman suggest that the impact of the cultural change depends largely the organization. He notes that, "if the culture is characterized by teams who are open to self-examination, recognize they need to improve and will question any or all of their practices, checklist are easily adopted" (D. Boorman, personal communication, March 28, 2013). Gawande state that:

> Using the checklist involved a major cultural change, as well – a shift in authority, responsibility, and expectations about care – and the hospital needed to recognize that.

> We gambled that their staff would be far more likely to adopt the checklist if they saw their leadership accepting it from the outset. (p. 146)

The test group (Appendix N) indicated that it was easy to know when to initiate the checklists, they flowed well and their implementation did not slow response times. According to Boorman (personal communication, March 28, 2013) this may indicate that checklists are "an appropriate tool".

Most of the test group indicated that the checklists were readable in all lighting and environmental conditions, constructed allowing enough time for completion in a physical form that was usable, however there was some dissentions. According to both Stufflebeam (2000) and Boorman (2011) this responses would indicate a possible opportunity for a modification or revision and future testing. Several of the test group members modified the checklist to fit either their personal preferences or their department's practices. This is an acceptable practice according to Boorman and Gawande (Boorman, 2011; Boorman & Gawande, 2010).

The "Pre-Response" checklist produce (Appendix Q) through this ARP is very similar to Halton's (2010). Halton was not reviewed until after the third and final vision of the ARP's checklist was produced. Halton contents four critical items as opposed to this ARP's six critical items. Both cover almost the same critical items but are written just slight different. This implies that there is validity in the process Boorman (2011) advocates.

The implications of this study can most clearly be seen within the feedback provided be the test group. Three test group members (33.3%) indicated that an error was caught during the implementation period as a result of the checklists usage. All three errors were categorized as a "Minor Accident or Mishap." One officer indicated that operations were stopped because a guide was not in place while the apparatus was backing up. The most notable error caught was a

"driver forgot to check whether all the compartments doors were closed prior to moving the vehicle…By utilizing the checklist the error was corrected before any damage was done" (See Appendix N).

In a short two-month implementation period, that included a relatively small test group, three minor accidents or mishap were inverted. This clearly suggests there is potential worth in these checklists and infers that further revisions and testing among a large sampling would produce more positive results. The study results also imply other task oriented or safety procedures within the fire service would potentially yield similar positive results. Gagliano el al. (date) confirms that further research into other areas is warranted.

Recommendations

Based on the research the usefulness of checklists for responding to and returning from emergency incidents has been demonstrated. Several recommendations can be made to capitalize on this concept. A cooperative effort between the Atlantic City Fire Department's leadership, training division and fire suppression division would likely ensure its successful implementation.

The first recommendation is to reinstitute the emergency vehicle operations training program developed through VFIS on a regular basis. The survey conducted among ACFD officers indicated that the majority (64.29%) felt that the department's emergency vehicle operation training was inadequate. Several years ago the ACFD sent several officers to the VFIS Emergency Vehicle Driver Training-Instructor's course. An emergency vehicle operations training program was developed and instituted throughout the department. The program ran successfully for a short period of time, but for all practical purposes has not cease to exist. The research literature, surveys and test group all agree that checklists are not a substitute for training and experience.

The second recommendation is to ensure that the SOP/SOG's for emergency vehicle operations are continually reviewed, revised and reissued as often as necessary. It is further recommended that any plans to create, implement, review and revise checklists be under the guides of a carefully written SOP/SOG. The survey conducted among ACFD officers indicated that the majority (71.43%) felt that the department's SOP/SOG's for emergency vehicle operations were adequate. Safeguards should be put in place to ensure these and all future SOP/SOG's remain at a high standard.

The third recommendation is to educate ACFD members on checklists creation and usage. Seek input from all levels of the fire department in any and all efforts toward checklists development. Encourage a team atmosphere and positive attitudes towards instituting the necessary changes. The survey conduct among non-ACFD respondents indicated that checklist usage has a place within the fire service. The test group agreed with this assumption and indicated that checklist usage works well within a team environment. The non-ACFD respondents and the test group agreed that the implementation of checklists within the fire service would require a cultural change.

The fourth recommendation is to issue the third edition of the ARP checklists throughout the entire department for an additional implementation period. The checklists should be issued in accordance with an SOP/SOG created by the second recommendation. After the specified time period, a more thorough analysis can be completed indicating if the necessity for any additional revisions.

The fifth and final recommendation is to explore other opportunities within the operations of the ACFD where checklists can be utilized. This exploration should be in accordance with a SOP/SOG created by the second recommendation. The SOP/SOG should include the procedure

for identifying the appropriate tasks and process adaptable to checklist usage as well as tracking critical mistakes and errors that have been made during those tasks and processes.

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Appendix A

Daniel Boorman Interview

March 28, 2013

Via Email

1. How intricate of a part do “Systems” play in the development of Boeing’s checklists?

   Interesting question that we should talk about on the phone. Checklists fit into a very complex system, or multiple systems. I don’t think we have been deliberate in looking at it from a system perspective, but let’s discuss.

2. If “Systems” play an intricate part of checklist development, to what extent does it impact the checklist development process?

   See above.

3. Do Boeing’s checklists involve various types of “Systems” or just one type?

   The airplane is a complex system. Conducting a flight is a complex endeavor in a complex environment of weather, air traffic control, regulations, company procedures and pressures, etc. Developing new checklists as part of a new airplane program is being part of a very complex system.

4. How intricate of a part does the decision-making process play in the development of Boeing’s checklists?

   Normal checklists are designed to cover actions that happen every time you do a process, so usually there are no decisions. Only decisions are when to run the checklist, and on rare occasions an item may not apply. Non-normal checklists often have decision points, where the checklist branches off in multiple procedural paths. These are major sources of error in checklist accomplishment, and we work hard to:

- reduce the number of decisions in checklists

- make the decision clear

- make the checklist navigation visually clear, to reduce errors.

5. Do Boeing's checklists target a specific learning domain? Cognitive, Affective or Psychomotor?

   I think all three play a part, especially in normal checklist accomplishment, and non-normal with memory items that are drilled and trained heavily. The large majority of non-normal checklists (read-do), which don't have memory items, especially the simple ones, are dominated by the cognitive domain. In some of the long, complex and difficult non-normal checklists the affective domain comes into play. We should discuss this.

6. How intricate of a part does the learning process play in the development of Boeing's checklists?

   Most in my organization are not formally trained in learning theory, so they are not often discussed explicitly. However, I think the concepts are still considered, but with different language.

7. Does Boeing's approach to developing "normal checklists" and "non-normal checklists" differ and if so, how?

   Quite a bit different. Normal checklists are used on every flight, so they are highly trained and practiced. There are only ten. They are kept short to reduce workload. They only cover the highest priority items. Normal checklists are accomplished in a do-then-confirm flow. Non-normal checklists are numerous (hundreds). Some contain memory items and are highly practiced, but most are never seen by a given pilot, because only sample checklists are covered in training, and the airplanes are so reliable that Non

normal checklists are rarely accomplished. Non-normal checklists take the vast majority of our time to develop, validate, train and maintain. NNCs are accomplished in a read and do flow, except memory items.

8. Is there a safety component or theme to all Boeing checklists? In other words, is the objective of every Boeing checklist to prevent an accident or reduce the impact of an emergency situation or are their situations where the checklists sole purpose is how a non-critical task is performed?

   Yes, Normal checklists ensure that critical safety actions are accomplished prior to moving on to the next phase of flight. Non-normal checklists assure continued safe flight and landing, by correcting or compensating for airplane system failures or non-normal operating conditions. i.e. they reduce hazard given a hazardous non-normal condition.

9. Are “normal” checklists more likely to be used to prevent an accident or to reduce the impact of an emergency situation?

   Normal checklists are used to prevent errors that would reduce safety margin, or directly cause an accident or incident. They are only related to emergencies in the case where a normal, critical action taken on every flight, is to ensure the readiness of emergency equipment. For example, to check that the pilot’s oxygen mask is working and oxygen is flowing before each flight.

10. Are there structural and content requirements specific to “normal” checklists?

    Yes. We have detailed structural and content guidelines for our normal checklists. Some of these I’ve captured in a document called the “Checklist Builder”, primarily intended for normal checklist development outside the aviation domain. Will send to you.

11. Are “non-normal” checklists more likely to be used to prevent an accident or to reduce the impact of an emergency situation?

    They reduce the impact of a non-normal or emergency situation. Given the situation, they in some cases dramatically improve the safety margin, thus potentially preventing an accident.

12. Are there structural and content requirements specific to “non-normal” checklists?

    Yes, these are much more complex than normal checklists, so there are many structural and content standards that we use. For our specific aviation checklists, these are proprietary to Boeing.

13. Are pause points used within the actual checklist or between checklists? Or can they be used in both situations?

    They can be used in both situations, but generally you should start a new checklist, with a new reliable cue, if you are going to discontinue reading the checklist. In other words, rather than calling for the “Before Boarding checklist down to the line” then hoping you remember to continue the checklist, I generally advocate for a separate checklist “Before Leaving the Station”, because it has a separate, defined cue in it’s title. But I have seen either method work well if the pause points and checklists are well designed.

14. Is the objective of a “do-confirm” checklist to first perform all the required tasks and then confirm each was completed?

    Yes, do the procedure from training and memory, then confirm those few, critical safety actions using the checklist, before continuing to the next phase of your process.

15. Are there structural and content requirements specific to “do-confirm” checklist?

    Not really. One characteristic of do-confirm checklists is that the items may not be in the

same sequence in which they were accomplished. There are other sequences that may promote safety. Read-do checklists must of course be written in the order in which the steps will be accomplished.

16. Is the objective of a “read-do” checklist to complete each task as it is listed, check each as completed?

    The checklist is read, and each action is taken in real time as directed by the checklist.

17. Are there structural and content requirements specific to “read-do” checklists?

    Not really: Only that the sequence must match.

18. Are there any other differences between “do-confirm” and “read-do” checklists?

    Do-confirm checklists are appropriate for highly practiced and/or well-training procedures.

19. Are “do-confirm” checklists more likely to be used to prevent an accident or to reduce the impact of an emergency situation?

    Do-confirm flow is often used for normal checklists, which are intended to prevent errors in daily operations, thus preventing accidents.

20. Are “read-do” checklists more likely to be used to prevent an accident or to reduce the impact of an emergency situation?

    No correlation there. This flow may be appropriate for either purpose.

21. Is one used more often than the other in terms of accident prevention or emergency mitigation?

    No, see above.

22. Are “normal checklists” more likely to be either “do-confirm” or “read-do,” or can they be both types? If they can be both types, what considerations are taken into account in

their development?

NCs are more likely to be do-confirm, as long as the person or team is well trained in the procedure or the team members are reliable current and well practiced in the procedure. Also, sometimes there are several actions that can be summarized by one check. For example, you turn on power to a panel and open two valves, check the position of three other switches. If you do all that, pressure will show in the normal range on a gauge, and only green lights will show on the panel, no amber or red. In a do-confirm flow, all of these actions, previously taken, can be safely and appropriately confirmed with the checklist item “All lights green, pressure normal”.

23. Are “non-normal checklists” more likely to be either “do-confirm” or “read-do,” or can they be both types? If they can be both types, what considerations are taken into account in their development?

    Non-normal checklists are usually read-do, because there are many, and they are rarely accomplished. They cover critical actions, but crews may be taking other appropriate actions as well, per their training and expertise given the situation. The exception to the use of read-do for NNCs is when time is so critical that there isn’t time to access and read a checklist. In those cases, memory items are designated. Every user must commit the items to memory. This drives a substantial initial and recurrent training requirement. We try to keep memory items (both number of items, and number of checklists that contain memory items) to a minimum.

24. Considering the successes the aviation and medical industries have experienced using checklists, in your opinion would checklists be useful in the fire service?

    It depends on the specific critical processes that you need to get right every time. It

depends on the kinds of errors that you are experiencing. I suspect that checklists could be very useful if appropriately deployed. I will say that it is easy to create a bad checklist that everyone will hate and no-one will use, or that if used reduces safety, so that's why I don't answer the question with a simple "yes".

25. Does the introduction of checklists involve a cultural change within an industry or organization?

    Often it does. If the domain is already characterized by well-disciplined standard operating procedures (SOPs), initial and recurrent training to high standards of compliance, checklists fit in easily. And if the culture is characterized by teams who are open to self-examination, recognize they need to improve and will question any or all of their practices, checklists are easily adopted. But often teams are happy with their existing level of expertise and skill, they value self-determination, and they find checklists to be disruptive and even insulting. That's not because a 20 second pause to accomplish a 4-item checklist is actually disruptive – it isn't. It just feels like it to certain people. If the checklist is well designed, soon they notice it catching errors, and they are won over to the checklist as a tool that helps them do exactly what they intended to do. But it is a process. And a poorly designed checklist (long, wordy, inappropriate pause point, etc.) will never be well accepted.

26. Is there a best practice involved in the introduction of checklists within an industry or organization?

    I'll send you the Checklist Builder – see step 6. Let me know if more questions.

27. In your opinion when introducing checklists within an industry or organization would it be preferable to introduce "normal" checklists before "non-normal" checklists?

It depends on where the biggest need is in errors and safety, but generally yes, starts with a single, normal checklist. Start to shift to a checklist culture in daily business. Build on that success.

28. To what extent does Boeing seek input throughout the company in the checklist development process?

    If I understand the question, I have received requests for consulting from many parts of the Boeing Company, machine shops, hazardous materials labs, etc.

29. Are Boeing's checklists reviewed for revision at pre-determined times such as annually?

    Yes, each airplane type, 737, 747, etc. has 2 revisions per year to the Flight Crew Operations Manual. The procedures and checklists are part of the manual. Normal checklists almost never change at this point for Boeing. Non-normal checklists usually see some change flow for each model in each revision.

30. Does an accident automatically trigger a checklist review? If so, is the checklist reviewed regardless of whether the outcome is positive or negative?

    Accident investigations include crew human factors and procedural considerations. The use of procedures and checklists is supposed to be reviewed. Sometimes there is little relationship between the accident causal factors and checklists, but we always look for it.

Appendix B

Daniel Boorman Interview

April 16, 2013

Via Phone

1. How intricate of a part do “Systems” play in the development of Boeing’s checklists? I think that a very interesting question, to look at things through a systems approach. Which in a way I think we really haven’t done very well because we’ve been using checklists for so long here at Boeing. Our methods have evolved over many decades into something we have found, and the airlines have found and the industry has found very effective but without necessarily having a good theoretical background. Even by the people who are actually writing checklists. The systems filter is not necessarily costly applied.
2. So you do not put a great deal of the theory of systems into your checklists?
   I think that’s a fair statement. We very distinctly split out normal checklists and what we’ll generically call non-normal checklist. The normal checklists being the ones we’re going to accomplish each and every flight. They’re going to be accomplished before some critical phase of flight, before take off, before landing. There are ten of them on an entire flight profile. And then there’s the non-normal checklists, which are only going to be used if something fails or breaks, or some non-normal condition that you’re in. The normal checklists really are very simple tools as they have evolved. And what we’ve found is that the most effective checklists are short, simple checklists. And the way we use them is, you’re going to accomplish the procedure first and then confirm them.

They're a very simple tools and that's the key for them to be effective and have them accepted so they actually will be used.

3. Is it correct in stating that of the three checklists I developed from my original survey, checklists one and three would be "do and confirm" checklists, because the same thing is being done each time the apparatus pulls out of the station?

   Yes.

4. Do Boeing's checklists target a specific learning domain? Cognitive, Affective or Psychomotor?

   I think what we find is that if our checklist is getting into a real area that's complex we've got to figure out, are we writing a checklist that going to be useable in the physical situation that the crew is in. For example one of the ones that we've wrestled with a lot over the last several years is for smoke or fire onboard the airplane. That's obviously a very difficult situation and we use to have a simple checklist that would help if it were coming from the electrical system. There were a few simple steps you could take to possibly eliminate the source of ignition by reducing electrical load in certain parts of the airplane. Or taking away power from certain components that could be problem components, like fans. If it's coming from the air-conditioning there was a trouble shooting procedure you could do to figure out which side of the system the smoke was coming from and shut that side off. But that was about it. It just dealt with, here what you can do to the airplane. Since a couple of accidents have happen over ten years ago, there's a push to create a checklist that would manage the whole scenario. The problem is we don't really know what that scenario really going to be. You work in highly critical emergency situations and each ones probably got a personality of it's own. There just so

much going on that it's really hard to spell that out. So I think when you move into trying to build a checklist that maps out an entire scenario. I think that's were you're moving out of a sort of simple checklist that would be in the cognitive domain and you're moving into the other domains and it can be problematic. You can make a situation worse instead of better if you don't write an effective checklist.

5. Can you explain a little more about what makes a checklist effective?

   What you're looking at here is where to apply this and what items to be on the checklist is, "What kinds of mistakes have been made? What does the safety record and effectiveness record show? If you're backing the engine out, getting in a traffic accident or taking out part of the door, why did it happen, what did somebody not do? Did they not post someone on the sidewalk; did they not make sure the door was completely open? Those become your critical errors. So you want to emphasize in the checklist what the data tells you. What were the critical errors that lead to these kinds of consequences?

6. How much input do employees throughout Boeing have in developing checklists? Or if an event happens, what is the process for developing a checklist? Is there a policy or procedure in place?

   Yes, there definitely is a process. If something happens out there, well for example in the last few years we have realized that there is a kind of icing phenomenon that happens in the atmosphere that can affect our engines and our airspeed instruments. We really didn't know if was happening. It's sort of invisible ice crystals that can puff up above huge thunderstorms. And the airplanes that are in cruse over the ocean or land think they're well above the weather but in fact can be affected by these ice crystals. And we really just figured that out in the last few years. So we created a new checklist to look for the sign of

this and then take appropriate actions. So yes, new data will come along and Boeing has an organization process for first says, “Do we have enough information to consider a new checklist?” Then we gather information from all the engineers who have the expertise. We may even do an industry effort with other manufactures like Airbus or Embraer and make it a cross industry type of effort if it lends itself to that. And then we will develop and test in simulators a checklist. Sometimes it will involve airlines, our customers. Then we’ll deploy the checklist through our publishing system. So we have a pretty organized process for going through that.

7. Are the checklist routinely checked or reviewed?

Yes, we do have a rev cycle for our manual that’s every six months. But we don’t have a formal system that says, “Go see if the checklists are still working.”

We have lots of airlines out there using checklists and so the normal checklist are being used thousands and thousands of times everyday. Airlines will sometimes add their own items on to them, but if they decide that Boeing really ought to consider a change, we definitely hear about it. So we do get feedback and as the world changes and policies change and air traffic rules sometimes change, they do evolve.

The some of the non-normal checklists are used pretty regularly in training. Those get a lot of eyes on them and again we’ll get feedback if something isn’t working. But the majority of non-normal checklists are just sitting they’re not really being used very often because the failure don’t really occur very often. They’re just sitting in the book ready to be used, but no formal process for reviewing. They were carefully created in the first place and validated in the simulator and the assumption is they remain valid after that.

8. Can you give me some feedback on the results from the implementation of my test checklists?

The survey results should tell you that a checklist might really be an appropriate tool. That this is something that may be a good fit. Looking at your checklists I can make some comments that may be helpful. Because it may be that the checklists could be improved and then you would fine even better responses on that.

So “pre-response” header, you can make the title pretty clear as to what is the point in time before which the checklist should be complete. So if it’s beginning to pull out of the station, may “pre-response” is very clearly defined in your world, but I couldn’t tell from that exactly what point at which this has got to be done. And sometimes using the word, “before” is the way to do it. Such as “Before Departing Station.” That’s one idea.

Now the first four items look like what I call critical items. The next one, electronic devices, says like you have a policy that no one should be doing that. You want to make the checklist as short as possible. You want to allow them to get through it as quick as you can. So you want to make sure these are the items that are going to be the direct items that are going to stop an accident from happening. “Address confirmed with dispatch,” do you need that before you even pull out? Can that possibly be combined with “established route?” The other thing you can try to do is whittle the words. In other words, “address and route known” or something like that. These are not training, they’re not telling a person exact what to do, they’re only supposed to queue, “Yeah have we done that?” So you want to use the minimum numbers of words that are going to fire off those thoughts in their head – what I have to do – without making a full description. So

there may be ways you can combine those two and shorten them to the point where it's just going to queue the thought.

9. So actually "emergency signals are on" could be combine with the last item "officer signals driver to disengage?" Maybe "emergency signal on" would indicate you're ready to response?

   Yes.

10. So two or three items could shorten the first checklist?

    Yes. Sure and a few words trimmed here and there just to queue the thoughts. So that one over all seems to be a kind of good, "do then confirm" checklist. You have nine items; you could have a six-item checklist, just a handful of words. One line for each one and you know you're done and you go. You're safety to go.

    Now the "En route" one was interesting to me. Because to me it brought up the question of what's the roll of training, versus full written procedures, versus checklists? There three different animals. The full written procedures would be your entire manual on how you operation, all the documentation, all the rational, all the background information. You training is what you go through initially in order to be bought up to have all skills and knowledge and attributes that you need in order to do the job. But it's kind of a one time or one time plus recurrent type thing that maintains your knowledge and skills. The checklist then is just this tool that you use in real time as you're doing your job and it's going to make sure you don't forget critical actions.

    So when I look at the "En route" one let's see, "how fast you're driving," "how you're approaching intersections with caution," to me that looks like training. How did you imagine it would be used as a checklist while you're in the process?

11. It is probably written as more of a list of considerations that vary depending on the circumstance. Is that accurate?

    Yes, I can see that. I think it you phase it that way, literally write it that way, as "en route consideration read as work load allows." Or may someone, such as the captain, who's not driving can just be thinking about these things. If it's strictly a checklist and it's going to be "en route considerations," then this gets back to the operational concept that's in the "Checklist Builder." The first question that comes to my mind is how's it going to be used? How is someone going to know when to read it and how should they look at it? Should they like at each item as something I should do right now? Are they going to call it out and going into action and do it?

    No, these aren't really like that. These are like you said, considerations, so they should probably be titled that way. So you can tell that you've shifted from a "do then confirm" checklist in the first column to a list of "en route considerations" in the second column to again another "do then confirm" checklist in the third column. So that business of what is the operation concept, how will this really be used is made a little clearer.

12. On the "Returning" checklist there were certain things I felt should be confirmed before even leaving the fire scene.

    So then that first bit before the dashed line is a "before departing the incident scene?" You do all that list, so again you write "before such and such" or however the words you would use to describe that. Now they'll know, "okay before we put this thing in gear to go back to the station these are the things we need to do." And that will make it really clear. Again where I saw, "obey traffic laws," that sounded more like training not a real time checklist item. Although maybe it's an appropriate reminded, I don't know, I

don't know your whole domain but I'm just telling you how it struck me as I read it. And then the last part, what's the significance of the dashed line?

13. So my third column may actually be two separate checklists?

    I think you do have two checklists here because you have two "pause points." One is "before apparatus departs incident scene" and the second is "before backing into the station." Or whatever words you use so it's clear when you read it. And this one again is where we run into this with our checklists and doctors run into it with their checklists, sometimes you have a lot of time, sometimes you have less time for a shorter or longer checklist. For the one in the upper right corner before leaving the scene, you've really got time. Maybe there another incident to go to, but you really should take your time and make sure everybody's okay, there's no rehab required, let's size-up the situation and okay now we're ready to get back on the road.

    Now maybe the next one, you're out in the street. You don't want to spend a lot of time out in the street before backing into the station. So that one has got a little more pressure on it to be a short sweet checklist. Cause you want the guys using it. If they don't use it you haven't done anything. So short and sweet so they can put out the card and hit these four items, "doors open, everybody's off, guides in place…yes checklist complete let's back-in." But I think you have a separate checklist there because there is a separate "pause point."

14. From what you are telling me I can reduce the points on the "Pre-Response" checklist and write that, make the "Returning" checklist two different checklists and maybe take the "En route" checklist out. And maybe the "En route" could be on the reverse side as not a checklist, but considerations to remember?

Yes, beautiful, exactly! And then what that allows you to do is start using bigger font. Because if you're on a bumpy road or it's dark out were you arrive for the "Returning" checklist where lighting is kind of poor, the big the font is the better. And if this is going to be a laminated card, say 8 ½ by 11, use black text on white just as you have here, don't use a lot of fancy colors. And make the font as big as you can. And the little dot, "Yes," might not be adding anything. You should think about whether the item, just the text by itself is enough of a queue. Unless you want them to physically mark, "yes" on this thing.

So in other words there are way you can physically change the layout of this and buy yourself some space and use as large a font as you can because you'll make it more readable.

15. I could see taking the "yes's" out. I could read through four items and look for one response. Everybody should have done this! Is that correct?

    Right. Yes.

16. I don't need to say, "apparatus free of all obstacles"… "Yes?" I could ask, "Are we free of obstacles, tools secure and door fully… yes?"

    Exactly! Or they could be three lines; whichever makes sense if they are three separate things to look for. But putting them in the form of an actual sentence with the word "yes" after it may not contribute anything compare to just a phase that queues the item. In fact it is better, to address the last thing you said, to put them as a list instead of putting them as a series of comments generally. They're easier to read if they're itemized as a list then if they're string of three or four things in a sentence.

17. Earlier you said the “No electronic devices are in use” would apply to a procedure. Do you think that is unnecessary?

    Again, I don’t know your domain. And if one of the contributors to incidents in getting out of the station, that these guys are still texting or talking on the phone, then that deserves to be on the checklist. So I don’t want to minimize it. The items that really do matter in the safety and in carrying out your procedure effectively you should kind of have a high bar. It was only a question on my part.

Appendix C

Atlantic City Fire Department Survey Letter

Joseph D. Rush, III
117 N. Sumner Avenue
Margate, NJ 08402
609-214-6630 cell
josephrush1@comcast.net

December 2, 2012

Dear Atlantic City Fire Department Officer,

I am soliciting your help with my Applied Research Project (ARP) for the National Fire Academy's Executive Fire Officers Program. My ARP involves the use of "Checklists" within the fire service. More specifically, to develop and produce a checklist that addresses safety concerns related to responding to and returning from emergency incidents.

The aviation and medical industries have experienced great success in reducing the number of accidents, mishaps and oversights by developing and implementing checklists. Checklists should not be lengthy, ideally containing 5 to 9 items. Items should be ones that are dangerous to overlook, but often missed. "The working should be simple and exact… and use the familiar language of the profession" (Gawande, 2009, p. 123).

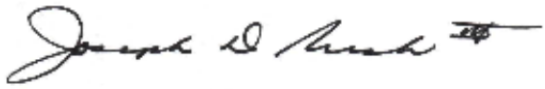
Various examples of checklists including a "Checklist for checklists" can be found at: http://gawande.com/the-checklist-manifesto

If you are interested and willing to assist me with my ARP, after reviewing the sample checklists on the link listed above, kindly take the short survey listed at:

Survey will end December 31, 2012

Thank you in advance for your help.

Respectfully,



Joseph D. Rush, III

Gawande, A. (2009). *The Checklist Manifesto: How To Get Things Right.* New York, NJ: Picador

Appendix D

Atlantic City Fire Department Survey Results

1. Has your company or battalion experienced an accident with ACFD emergency response vehicles?

Yes, while responding to an emergency incident	7	50.00%
Yes, while performing routine non-emergency operations	3	21.43%
No	4	28.57%

2. If "Yes," was the accident(s) avoidable?

Yes	10	71.43%
No	0	00.00%
N/A	4	28.57%

3. How would you categorize the operation or task being performed when the accident occurred?

Simple – straightforward and routine in nature	6	42.86%
Complicated – requiring team effort, specialized expertise or unanticipated difficulties	3	21.43%
Complex – by nature the outcomes remain highly uncertain	1	07.14%
N/A	4	28.57%

4. What would you consider to be the root cause of the accident?

Inattentiveness	7	70.00%
Complacency	6	60.00%
Distraction	7	70.00%
SOP/SOG Violation	3	30.00%
Lack of Supervision	2	20.00%
Lack of Training	1	10.00%
Traffic Violation	1	10.00%
Other	1	10.00%

5. In your opinion are the ACFD's SOP/SOG's for emergency vehicle operations adequate?

Yes	10	71.43%
No	4	28.57%

6. In your opinion is the ACFD's emergency vehicle operation training adequate?

Yes	5	35.71%
No	9	64.29%

Appendix E

Non-ACFD Fire Departments Survey Letter

Joseph D. Rush, III
117 N. Sumner Avenue
Margate, NJ 08402
609-214-6630 cell
josephrush1@comcast.net

December 3, 2012

Dear Fire Service Professional,

I am a 4th year student in the National Fire Academy's Executive Fire Officers Program (EFOP). I am soliciting your help with my final Applied Research Project (ARP). My research involves the use of "Checklists" within the fire service. More specifically, to develop and produce a checklist that addresses safety concerns related to responding to and returning from emergency incidents.

The aviation and medical industries have experienced great success in reducing the number of accidents, mishaps and oversights by developing and implementing checklists. Checklist should not be lengthy, ideally containing 5 to 9 items. Items should be ones that are dangerous to overlook, but often missed. "The working should be simple and exact… and use the familiar language of the profession" (Gawande, 2009, p. 123).

Various examples of checklists including a "Checklist for checklists" can be found at: http://gawande.com/the-checklist-manifesto

If you are interested and willing to assist me with my ARP, after reviewing the sample checklists on the link listed above, kindly take the short survey listed at:

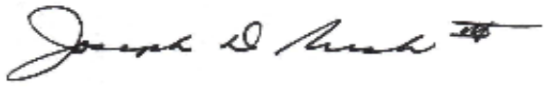
http://www.surveymonkey.com/s/ZTXGJ3F

Survey will end December 31, 2012

If you or a company officer on your department is willing to implement the final checklist for a trail period, please indicate by checking "yes" for question #10.

Thank in advance for your help.

Respectfully,



Joseph D. Rush, III

Gawande, A. (2009). *The Checklist Manifesto: How To Get Things Right.* New York, NJ: Picador

Appendix F

Non-ACFD Fire Departments Survey Results

1. Has your fire department experienced accidents with emergency response vehicles?

   Please use most recent accident if your department has experienced multiple accidents.

Yes, while responding to an emergency incident	21	46.67%
Yes, while performing routine non-emergency operations	21	46.67%
No	3	06.67%

2. If "Yes," was the accident(s) avoidable?

Yes	35	77.78%
No	7	15.56%
N/A	3	06.67%

3. How would you categorize the operation or task being performed when the accident occurred?

Simple – straightforward and routine in nature	37	82.22%
Complicated – requiring team effort, specialized expertise or unanticipated difficulties	5	11.11%
Complex – by nature the outcomes remain highly uncertain	0	00.00%
N/A	3	06.67%

4. What would you consider to be the root cause of the accident?

Inattentiveness	17	40.48%
Complacency	15	35.71%
Distraction	9	21.43%
SOP/SOG Violation	5	11.90%
Lack of Supervision	4	09.52%
Lack of Training	8	19.05%
Traffic Violation	9	21.43%
Other	7	16.67%

5. After reviewing the sample checklists provided on the link included, do you feel simple "Checklist" offer a potential to reduce the number of emergency response accidents?

Yes	38	84.44%
No	7	15.56%

Appendix G

Atlantic City Fire Department Checklist Components

Please list 5 to 9 items that should be checked after receiving an alarm, but prior to the apparatus moving. The list should focus on steps firefighters miss, skip or shortcut, but pose a real danger when overlooked. Please use simple and exact wording that is familiar to the fire service.

1. Remove charging cord from charging outlet attached to apparatus 2. Assign members to ensure all compartment doors are properly secured and no obstacles are on floor 3. Ensure there are no unsecured items tools inside apparatus cab where members are seated 4. All members are to be seated and seat belts secured 5. Captain ensures overhead bay door is all the way in raised position and stopped 6. Driver confirms everyone is belted in place before starting apparatus and signals captain task complete 7. Captain gives driver ok to start apparatus and proceed to alarm location 8. Captain radios dispatch of his response and confirms address location

1/11/2013 9:16 PMView Responses

1. Make sure all fire apparatus doors and compartment doors are close. 2. Make sure all fire personal are seated properly and belted in 3. Make sure overhead door fully open. 4. Driver should observed all warning buzzers and lights especially air brakes and all gauges. 5. Observed surrounding, such as other firefighters equipment, tools, etc. 6. Most important while leaving firehouse, look both ways observing pedestrians, and on coming traffic.

1/10/2013 8:24 PMView Responses

All equipment unplugged to apparatus, all personal gear removed from in front of vehicle, all equipment properly stored, everyone properly seated and belted, weather and traffic conditions, location of other emergency vehicles, which will be responding to the alarm

12/31/2012 1:35 PMView Responses

1. Make sure all doors and compartments are shut. 2. Make sure the apparatus is safely brought off apron. Slowly 3. Make sure no traffic is approaching while pulling out. 4. Make sure everyone is buckled up safely. 5. Make sure there are no obstacles in the way

12/15/2012 3:28 PMView Responses

Ensure everyone is seated seatbelts buckled apparatus door completely open equipment secured in place make sure compartment doors are closed

12/15/2012 10:00 AMView Responses

1: Before entering apparatus check for open compartments 2: fasten seat belts 3: each member should have a mental size up of the location responding to 4: Stop at all red lights, only continue when clear 5: be aware of hydrants locations, fire size and location 6: listen to your officer

12/13/2012 8:14 AMView Responses

Item in front and around apparatus lights on

12/12/2012 12:05 AMView Responses

1. All the apparatus doors are closed. 2. The bay doors are fully open. 3. All members know the address of the alarm. 4. All members have their seat belts on and fasten. 5. All warning lights

are on, and civilian vehicles have stopped, before proceeding out of station into traffic.
12/11/2012 11:00 PMView Responses
Checking Address to ensure we know our best route. Checking to make sure doors are closed on apparatus. Is there any traffic blocking Apparatus responding? Are there any Pedestrians in the way of responding apparatus? In front of the firehouse? Any tools, Gear? Hanging off of the apparatus? Did the driver do a 360-degree of the apparatus prior to leaving?
12/11/2012 1:11 PMView Responses
Check doors and seat belts
12/11/2012 9:30 AMView Responses
Driver and Officer Responsible for: - 360 - Compartment Doors Closed - Garage Door fully up - Tiller, piece fully out of station until door close - Seat Belts, Lights / Sirens - Speed limited: (by traffic and weather conditions)
12/6/2012 8:31 AMView Responses
Seatbelts on, route to be taken, preplans, any information that a member may be aware of that will help us in our job such as information passed on by other captains and firefighters. Any equipment not on the truck, for example Haz-Mat meters
12/5/2012 3:22 PMView Responses
ALL MEMBERS IN FULL GEAR NO GEAR OR EQUIP. HANGING ON OUTSIDE OF APPERATUS ALL COMPARTMENTS CLOSED ALL MEMBERS SEATBELTED KNOW THE LOCATION AND ROUTE TO INCIDENT LIGHTS AND SIREN ON
12/3/2012 12:07 AMView Responses
Misread this is for leaving an incident # 10. 1.Vehicle must be at a complete stop. 2.Driver must ensure emergency air brake is on. 3.After members enter the vehicle they must ensure all loose equipment are secure. 4.All passengers must acknowledge they are seated and seat buckled by driver. 5.Driver must check/inform company officer he is ready to drive.
12/3/2012 10:01 AMView Responses

Please list 5 to 9 items that should be followed while en route to the emergency scene please include apparatus placement. The list should focus on steps firefighters miss, skip or shortcut, but pose a real danger when overlooked. Please use simple and exact wording that is familiar to the fire service.

1. 1st engine and chief should respond at emergency speed stopping at all red lights and obeying all rules of the road for a building alarm of fire, remaining units respond at reduced speed until emergency is confirmed. Telephone or radio alarms have all first due units responding at emergency speed. 2. Captain must monitor speed of apparatus and assist driver in navigating response route 3. Captain must attain minimum view of 3 sides of fire building upon arrival at emergency scene 4. Front of building must be left open for aerial apparatus 5.all apparatus doors should be shut after members exit apparatus
1/11/2013 9:16 PMView Responses

1. Maintain control of vehicle. 2,Apperatus driver should not drive within ten feet of vehicle in front or 300 ft. of another emergency vehicle. 3, Stay within the traffic safety laws. 4. Always stop at red lights, and slow on yellow. 5. When approaching four way intersection always slow down look both ways and proceed, especially when approaching on a yellow and red light. 6. When using sirens, driver should change tone to alert on coming traffic. Example changes from whelp to yelp. 7. Drivers should always read traffic at lease one to two blocks, looking at traffic patterns and traffic behavior. 8, Most important Apparatus Drivers should always look at pedestrians traffic an be aware of jaywalkers, children running into the street in or around park cars 9, when approaching fire calls, apparatus drivers should approach slow to the incident and place apparatus at an advantageous position for safety

1/10/2013 8:24 PMView Responses

Following set routes to an alarm, look out for crossing emergency vehicles, collapse zones, overhead obstructions or hazards, position vehicle to protect operators from on coming traffic, position vehicles to have proper and easy access to tools and hoses to be used

12/31/2012 1:35 PMView Responses

1. Slowly exit firehouse 2. Stop at all red lights and stop signs 3. Drive apparatus at a safe speed 4. Leave at least a car width between parked car and apparatus 5. Notify PD to block off street

12/15/2012 3:28 PMView Responses

obey all traffic laws come to complete stops at intersections pay attention to the ways apparatus are proceeding into the scene listen to wear companies are staging placing apparatus up hill up wind and out of danger zones

12/15/2012 10:00 AMView Responses

1: en route, seat belts fastened, mental size up of fire location 2: hydrant locations, best approach to the hydrant 3: being aware of traffic and traffic flow 4: each fire fighter needs to size up the fire building, fire location, hose placement and attack 5: understanding traffic flow and best approach to the fire scene 6: Establishing a water source, establishing the best location for placement for of the apparatus, giving the company the best effective location for attack. 7: allowing room for the ladder company to perform their duties properly. 8: being aware of over head power lines, 9: being aware of structural defects within the fire building, i.e.: holes in floor, missing steps on stairs

12/13/2012 8:14 AMView Responses

Weather conditions

12/12/2012 12:05 AMView Responses

1. All warning lights shall be on. 2. Apparatus shall be driven in the left-hand lane when responding to emergency calls. 3. Intersections where the traffic is against the apparatus (i.e. Red-lights/Stop-signs) the driver shall come to a complete stop before proceeding through the intersection. 4. Intersections where the traffic is with the apparatus (i.e. Green-lights) the driver will take their foot off the accelerator and be prepared to come to a complete stop. 5. In all instances the driver will only proceed through the intersection when it is safe to do so. 6. Once on scene the driver will make sure that the emergency brake/maxi brake is applied.

12/11/2012 11:00 PMView Responses

All traffic signals all orders by the chief. Don’t drive into oncoming traffic, unless it is an extreme emergency. Did the driver block traffic enough, so that FF personnel can safely proceed to the address? Monitor radio for any hazards.

12/11/2012 1:11 PMView Responses

Leave room for the Ladder. Check map for hydrants. Follow traffic laws

12/11/2012 9:30 AMView Responses

Driver and Officer Responsible for: - 360 - Compartment Doors Closed - Garage Door fully up - Tiller, piece fully out of station until door close - Seat Belts, Lights / Sirens - Speed limited: (by traffic and weather conditions)

12/6/2012 8:31 AMView Responses

Listening to the size-up, going over what will be done when we get on scene, stopping at red lights and stop signs, making sure all members are in full PPE, watching for anything suspicious on the way to the scene

12/5/2012 3:22 PMView Responses

MONITOR THE RADIO OTHER RESPONDING APPERATUS WATER SUPPLY BUILDING ACCESS COLLAPSE ZONES ROOM FOR ADDITIONAL APPERATUS PEDESTRIANS SCENE SAFTEY

12/3/2012 12:07 AMView Responses

1. Members should be seated and buckled. 2. Each member should inform the driver he is safely seated and buckled. 3. Driver should acknowledge and confirm dispatched address with Company officer. 4. Driver should approach each intersection safely coming to a complete stop and proceed at red lights and stop signs. 5. Company officer should inform driver where apparatus should be stopped well in advance to location.

12/3/2012 10:01 AMView Responses

Please list 5 to 9 items that should be checked and/or followed while returning from the

emergency scene please include backing into the fire station. The list should focus on steps

firefighters miss, skip or shortcut, but pose a real danger when overlooked. Please use simple and

exact wording that is familiar to the fire service.

1. All tools inventoried and secured in apparatus compartments 2. Captain and crewmembers 360 apparatus to ensure no obstacles exist in path of exit egress from emergency scene. 3. All members seated and buckled in place 4. Driver ensures all members buckled in place 5. Captain gives driver ok to return to quarters 6. All members exit apparatus upon arrival back at station 7. Captain supervises men to stop all pedestrian and vehicular traffic 8. Captain positions rear spotter to assist driver in backing apparatus onto station apron where apparatus will come to complete stop 10 feet from overhead door. 9. Captain will supervise repositioning of members to assist driver backing into station ensuring a rear spotter as well as side spotters who also are aware of pedestrian traffic.

1/11/2013 9:16 PMView Responses

1, Make sure apparatus drivers turn off overhead warning lights. 2, Fire personal should make sure all compartments door or shut and do a three sixty around apparatus. 3,If backing away from incident scene apparatus driver will have spotters on the left, right, back, and front of apparatus. 4, Apparatus driver shall obey all traffic laws while returning to station, also all fire personal must have on there seat belts. 5, While returning Apparatus driver must not ride close

behind other vehicle and must keep back at lease 300 ft. and not riding abreast of other emergency vehicle. 6, When approaching firehouse, driver should wait until all clear, meaning all traffic is stop (red light), all pedestrian traffic is stop 7, All fire personal should look both way before exiting out of apparatus and take position (right-side, left side, Front and back this will in sure safe backing for the apparatus. 8, Once apparatus is inside firehouse operator will first put apparatus in neutral, put park break on, turn off vehicle. This also should include a three sixty of vehicle.

1/10/2013 8:24 PMView Responses

On coming traffic, all equipment properly secured, blind spot should be avoided by using a spotter, fatigue of firefighters, obey all traffic signals, checking all PPE once back at station for safety

12/31/2012 1:35 PMView Responses

1. Make sure all personnel is accounted for. 2. All doors and compartments shut 3. Stop at all stoplights and stop signs. 4. Make sure all personnel get out to back apparatus in firehouse bay. 5. Make sure apparatus backs straight in without error.

12/15/2012 3:28 PMView Responses

Keep distance between returning apparatus 300ft pay attention to exiting the apparatus in traffic watch for cars while backing in to stations repositioning while apparatus are backing in to stations stopping at bay door before apparatus proceed back into the stations

12/15/2012 10:00 AMView Responses

1: Upon return: check apparatus for missing items and anything that may fall off, causing an accident 2: Seat Belts fastened 3: items in the passenger cab are secure, unable to fall / move causing injury 4: approaching the fire station, observing traffic flow. 5: Backing In: Be aware of traffic flow and ensuring that all traffic has stopped before dismounting 6: When the apparatus is backing in, one or two men observe the reverse movement to avoid hit obstacles 7: Two men watching traffic, face the direction the traffic is approaching, it ensure a safe area

12/13/2012 8:14 AMView Responses

Traffic

12/12/2012 12:05 AMView Responses

1. All apparatus doors are closed and the wheel chocks have been removed. 2. All the warning lights are off. 3. All members have their seat belts on and fasten. 4. The driver has the turn signal on and looks in the mirror before pulling out into traffic. 5. The apparatus should be driven in the right-hand lane, when returning from an emergency scene. 6. Upon arriving at station, the driver shall wait until the traffic signals have stopped traffic in both directions before members dismount. A member will stand in each direction of travel to ensure that traffic has stopped. 7. All members shall ensure that the apparatus bay doors are fully open. 8. The driver shall turn on all warning lights and the other members shall carefully guide the apparatus backwards. 9. The driver shall stop 10 feet before entering the station, and the Company Officer shall check to ensure it is safe to enter the station.

12/11/2012 11:00 PMView Responses

Apparatus Air Brake engaged? All doors shut? Apparatus plugged in to charge? Did all FF Personnel get out of the vehicle while backing into the station, to block traffic? Are overhead doors up? Are the down after being station?

12/11/2012 1:11 PMView Responses

Walk around the truck check the doors and hose.

12/11/2012 9:30 AMView Responses

Driver and Officer Responsible for: - 360 - Seat Belts - Speed limited: (by traffic and weather conditions)

12/6/2012 8:31 AMView Responses

Making sure everyone in the company is ok physically and or mentally, obeying traffic signs & signals, all persons out of the truck when backing into the station, everyone watching the corners to make sure there is enough clearance, checking over the truck to make sure all equipment is present, and making sure the equipment is cleaned and in working order

12/5/2012 3:22 PMView Responses

GEAR AND EQUIP. STOWED SEATBELTS

12/3/2012 12:07 AMView Responses

This is for #8 question. 1. As members walk to apparatus they must ensure all compartment doors are closed and secured. 2. Members should ensure that no obstructions are around apparatus. 3. After members enter vehicle they must ensure all loose equipment are secure. 4. All passengers must acknowledge they are seated and seat belt buckled by driver. 5. Driver must check/inform company officer he is ready to drive.

12/3/2012 10:01 AMView Responses

Appendix H

Non-ACFD Fire Departments Checklist Components

Please list 5 to 9 items that should be checked after receiving an alarm, but prior to the apparatus moving. The list should focus on steps firefighters miss, skip or shortcut, but pose a real danger when overlooked. Please use simple and exact wording that is familiar to the fire service.

1. Do you know the address you're going to, street, etc. before you turn a wheel? 2. Do you know the area, and the closest hydrant(s)? 3. Are there any hydrants OOS in the area? 4. Is the address pre-planned, and what is expected of your crew for that bldg. 5. Seat belts on and secure 6. Air pressure correct for brake usage. 7. All doors (cab and truck) closed and secured 8. All hook ups manually disconnected if needed (air, electric, exhaust, etc.)

1/10/2013 12:53 AMView Responses

1) Make sure wheel chocks are removed from tires 2) Ensure that all compartments to the apparatus are closed and equipment is secured 3) Ensure all members are seated. 4) Ensure all members are seat belted. 5) Confirm the correct address to ensure a safe direct route. 6) Confirm that the overhead door is completely open. 7) Have emergency lights on prior to disengaging the emergency brake

1/9/2013 2:20 PMView Responses

1. MAKE SURE GARAGE DOOR IS COMPLETE UP 2. ONCE DOOR IS UP DOOR CLOSURE IS SECURED 3.ALL PERSONNEL ARE PROPERLY SEATED ACCORDING TO DEPARTMENT SOG 4. PERSONNEL NOT RESPONDING & VISITORS TO STATION ARE CLEAR OF APPARATUS 5 ALL VISUAL & AUDIBLE ALARM DEVICES ON THE APPARATUS THAT INDICATE AN OPEN DOOR OR COMPARTMENT ARE CHECKED OUT 6 FOR VOLUNTEER FDS, KNOW WHO YOU WENT OUT WITH ON YOUR APPARATUS

1/9/2013 10:38 AMView Responses

Correct address, safest route to scene, road conditions, weather, all seat belts buckled, driveway is clear, right-side and left side firefighters have checked to ensure there side of truck is clear, ensure emergency lights and sirens are working.

1/9/2013 8:24 AMView Responses

Guides on each side of apparatus when pulling out of quarters all firefighters on apparatus all firefighters seated all firefighters seat belted all warning lights operational side view mirrors set properly all compartment doors closed open compartment warning lights not sounding/activated overhead door completely open

1/8/2013 9:31 PMView Responses

1-donning proper PPE 2- seated & belted 3- confirm dispatch address 4- ensure vehicle is disconnected from any shoreline air / power source 5- check area in front of vehicle is clear of personnel 6-ensure all assigned members are on board

1/8/2013 8:52 PMView Responses

Seat belts, lights/siren if needed - type of emergency (confirmed fire, alarm, CO call, accident w entrapment, accident no injuries, medical emergency 2. 1st due unit 2nd due unit, accountability

tags, contact dispatch, pack up/no pack up

1/8/2013 5:42 PMView Responses

1. All TO gear on, 2. All passengers seat belted in and wearing head phones if provided, 3. All apparatus doors shut, 4. Overhead door locked up and fully open, 5. Driver knows location of emergency and how to get there, 6. Driver checks right, left, right, before entering roadway.

1/8/2013 4:28 PMView Responses

Radio, PPE, seat-belt, do you know where you are going, do you know the shortest way to get there, do you have an alternate route depending on your arrival for positioning, was a 360 of the apparatus completed

12/30/2012 7:26 PMView Responses

Seatbelts, operating within normal limits (gauges for oil, tachometer, etc.), emergency lights/siren (if applicable), compartment door closed indicator, 270 degree check (mirrors for side and front before moving, time of day considerations

12/16/2012 8:57 AMView Responses

Everyone on board. All doors closed. (People) Chauffer checked the circle of safety (nothing hanging off the rig). All apparatus doors closed (equipment) Bay door all the way open Chauffer knows where he is going

12/15/2012 12:17 AMView Responses

1. All occupants seated and belted. 2. Warning lights activated for all emergency responses. 3. Headlights on before apparatus is in motion. 4. Proper air pressure is reached in the apparatus air tanks prior to disengaging the parking break. 5. Apparatus officer gives the operator the OK to respond. 6. Proper side view mirror adjustment. 7.Giving 3 beeps of the apparatus horn prior to moving.

12/13/2012 8:17 PMView Responses

Seat belt on Apparatus doors closed and latched Emergency lights on charging cords disconnected Bay door completely open

12/13/2012 6:33 PMView Responses

Seat belts emergency lights personnel properly dressed

12/13/2012 11:09 AMView Responses

All firefighters in full PPE, dressed prior to boarding the apparatus. All members seated and all members wearing seat belts. Apparatus bay/garage door fully open. Apparatus not placed in drive until all of the above steps are completed. Operator ensures emergency lights are activated and siren as apparatus enters the street.

12/12/2012 10:42 AMView Responses

The address -- driver knows how to get there the readiness of the personnel that they are safely boarded the seatbelts are on all warning lights are activated all traffic rules are observed no movement until officer confirms everyone is confirmed boarded, geared, and belted hearing protection on ensure the door is all the way up

12/12/2012 10:07 AMView Responses

1. Emergency Lights 2. Horn 3. Siren 4. Pump Operation 5. Wipers 6. Steering 7. Brakes 8. Tires 9. Headsets (If equipped)

12/10/2012 10:57 AMView Responses

Items to check: Address and response route Personnel in proper riding assignment No open

compartments Seat belt usage Shorelines released Bay door fully open

12/9/2012 12:00 AMView Responses

Is the apparatus ready to be moved? Are all members on board & secured? Do the driver and officer both know where the unit is responding to and for what reason? Do the driver & officer agree on the route to be taken? Do the driver & officer agree on the response mode (lights & siren/reduced speed)? What are road conditions and does driving need to be adjusted.

12/7/2012 2:17 PMView Responses

1- confirm the address 2--plan the route and staging area you will go to first or how you will approach the scene 3--identify and special hazards at the address 4--determine other units that will be responding to the same address and their routes 5--points where routes of responding units intersect.... remind officer to state...approaching the intersection of walk and don't walk streets 6--seatbelts 7--confirm the crew is onboard

12/6/2012 7:28 PMView Responses

1. Is everyone on board and seat belted? 2. Are all compartments closed? 3. Is stall door fully up? 4. Is air pressure fully up for braking? 5. Check for traffic before pulling out?

12/6/2012 7:14 PMView Responses

Garage Door (we hit a bunch of these!) Shoreline Acknowledge the run data on MDC/Printout PPE on Seatbelts on Know where you're going closest water supply

12/6/2012 1:21 PMView Responses

1. Everyone on the truck 2. Everyone seat belted 3. Where are we really going? (Is the information on the dispatch wrong) 4. Do we know the best way to get where we are going? 5. Are we "fighting for position."?

12/5/2012 8:32 PMView Responses

Mirrors, Overhead doors, firefighters, equipment, apparatus doors, and clearances

12/5/2012 5:14 PMView Responses

All doors closed and secured. Seatbelts on and secure. Loose equipment secured. Bay door up and not moving back down. Hands off bay door opener.

12/5/2012 4:01 View

Walk around the vehicle, ensure all rides are belted, seated, prepared to move, check apparatus alarms before driving an apparatus, Ensure all compartments are closed, ensure all lose equipment is secured (especially in the cab)

12/5/2012 11:39 AMView Responses

Air pressure, apparatus overhead door fully open, compartment and cab doors closed, address verified, personnel on board, seat belts fastened

12/5/2012 10:34 AMView Responses

Read back of the address to dispatch doors closed all personnel seated Seat belts

12/4/2012 11:17 PMView Responses

All personnel on the apparatus with seat belts fastened, apron and roadway clear of vehicles and traffic, specific address or location is known, emergency service warning lights and sirens engaged, road conditions are such as to allow safe travel

12/4/2012 8:51 PMView Responses

1) Do we know where we are going (primary and secondary routes 2) Have I made note of the environmental impacts (weather, snow, rain, dark) and made appropriate mental adjustments for

driving 3) Do we have all personnel assigned to the apparatus on the apparatus and secured 4) Do all personnel have the appropriate PPE with them or already donned 5) Are all apparatus doors shut and secured 6) Is all equipment on the apparatus 7) Are we on the correct radio frequency for this incident 8) Is the bay door open completely 9) Are all my emergency lights on

12/4/2012 4:24 PMView Responses

All personnel are wearing seat belts

12/4/2012 2:46 PMView Responses

Confirm location and be familiar with routing to location. Make sure crew is in proper seat. Make sure crew is using seatbelts. Make sure emergency lights are engaged. Make sure there are no audible or visual alarms on driver panel. Make sure apparatus bay doors are fully open.

12/4/2012 2:31 PMView Responses

Compartments closed, no obstructions, doors fully opened, occupants seated and restrained, any air/electric shorelines disconnected, items secured in cab

12/4/2012 1:48 PMView Responses

1) Seatbelts 2) All personnel are on rig 3) App bay door is in full up position 4) Location of alarm is known to driver, and acknowledged by officer. 5) All in cab equipment is secure.

12/4/2012 11:03 AMView Responses

Everyone on board Seatbelts secure Apparatus doors closed bay doors clear Apparatus free of shorelines Know where you're going

12/4/2012 10:37 AMView Responses

Circle check items/if’s seated/belted

12/4/2012 10:28 AMView Responses

1) Quick walk around and check for open doors/compartments. 2) All firefighters are seated and secured. 3) All firefighters have there gear, on the apparatus before it roles. 4) All firefighters have their headsets on before the apparatus roles. 5) The officer and drive are in agreement on the location of the emergency.

12/4/2012 10:05 AMView Responses

All personnel present; confirm alarm info; confirm location; confirm hydrant placement, seat belt check; clear ramp for exit; traffic clear in all directions; emergency lights engaged before apparatus movement

12/4/2012 9:33 AMView Responses

Knowing the address of the incident and most appropriate route to get there, any road closures that were known due to construction, crews all dressed in PPE, all doors of the apparatus body closed, no obstructions in the path of the moving apparatus, all drop cords removed from the apparatus and out of the way, all firefighters seated wearing a seatbelt, the company officer giving the OK to move the apparatus.

12/4/2012 9:17 AMView Responses

All personnel seated, SCBA secured to seat or on FF, officer verifies seatbelts in place, head seats on, approach verified between officer and driver, interior cab items secured

12/4/2012 9:11 AMView Responses

1. Is the truck ready to go 2. Walk around truck 3. Who sits where 4. Everyone have their gear 5. Seatbelts 6. The driver drives, officer uses radio 7. Know where we're going 2.

12/4/2012 8:28 AMView Responses

Seat belts, bay doors, all personnel on board

12/4/2012 7:53 AMView Responses

Address Turnout gear Door alarms Crew Bay door

12/3/2012 9:47 PMView Responses

1. Mental attitude, not overwhelmed by emergency response. 2. Vehicle operating properly, (air brake pressure good as an example). 3. Know where you are going. Know incidents current status. 4. Who else is responding and from where. Everyone seat belted in? 6. Deep breathe and put in drive. Know prior to arriving where you will position your unit

12/3/2012 8:59 PMView Responses

1. Walk to the fire apparatus 2. Is the area in front of, in rear of, under and over the apparatus free from obstructions? 3. Is the driver fatigued or otherwise not able to operate the vehicle in a safe manner? 4. Are there any warning indicators, alarms, or vehicle function warnings being displayed 5. Are all doors, windows and equipment fastened and ready to go? 6. Are all occupants seated and safety belts are in place?

12/3/2012 8:56 PMView Responses

Please list 5 to 9 items that should be followed while en route to the emergency scene please include apparatus placement. The list should focus on steps firefighters miss, skip or shortcut, but pose a real danger when overlooked. Please use simple and exact wording that is familiar to the fire service.

1. What is your main job function, and what tools will you need to fulfill it? (TIC, axe, halogen, stretch hose line, etc.) 2. All PPE on correctly and functioning (hood on, collar up and secured, SCBA on and operational, gloves on, etc.) 3. Driver brakes on, pump engaged and pump light(s) green? 4. Driver, PO, correct pre-set pump pressure? (Make sure pressure is not too high to send water.) 5. If the building is pre-planned, any known pit-falls/dangers I know of that my crew should know?

1/10/2013 12:53 AMView Responses

1) Utilize your knowledge of streets for safest/quickest route 2) travel at the proper speed. 3) Utilize your emergency equipment (lights, siren and air horn). 4) Pass on the left side of traffic. 5) Proceed through red lights and stop signs once all opposing traffic has stopped. 6) Proper placement at the emergency scene will be conducive to successful efforts

1/9/2013 2:20 PMView Responses

1 OBEY ALL TRAFIIC LAWS 2 IF LIGHTS ARE ON SIREN SHOULD BE ON ACCORDING DEPARTMENT SOG 3 NO CREW MOVEMENT UNTIL AT SCENE 4 IF NOT ISSUED ORDERS BEFORE ARRIVAL, STOP SHORT OF SCENE BEFORE PROCEEDING IN TO ASSESS FOR WATER SUPPLY OR AERIAL PLACEMENT. FUTURE THINK IS THE TERM USED. 5 IF ORDER ARE CHANGED & THE APPARATUS MUST BE MOVED. MAKE SURE ALL PERSONNEL ARE ON BOARD OR SAFELY AWAY

1/9/2013 10:38 AMView Responses

Traffic conditions, double looking in the blind spots, drive the speed limit, stop at all intersections, know where the other apparatus are responding from, have situational awareness all the time, place apparatus in safe area but close enough for operations.

1/9/2013 8:24 AMView Responses

Dispatch notified apparatus responding and repeat back the address list of o/s fire hydrants reviewed insure apparatus stays within speed limit insure apparatus obeys all traffic laws i.e. traffic lights follow SOP's regarding which apparatus has the front of a fire building i.e. attack pumper, or ladder company Secure a water source if you miss you water supply let next arriving company know to grab it insure that all emergency brakes have been set in place

1/8/2013 9:31 PMView Responses

1- request update from dispatcher / 1st in unit 2- ensure safe driver operation 3- request orders / staging location 4- update crew as to assignment / status 5- direct driver / operator to water supply / ladder positioning required 6- direct crew to assigned area of operation

1/8/2013 8:52 PMView Responses

Contact command for assignment /radio channel level 1 2 or 3 staging assign firefighters - tools/equipment - hydrant bag medical bag etc. PPE worn radios donned and on a separate checklist could be developed for the pump operator - brake neutral engage pump chocks tank valve flake hose contact nozzle charge line scene lights water supply etc.

1/8/2013 5:42 PMView Responses

1. All firefighters wait until apparatus comes to complete stop before unbuckling seat belt and exiting, 2. All blind spots are checked and driver proceeds with caution before changing lanes, 3. Driver comes to a complete stop at all stop signs or red lights before proceeding through them, 4. Rear of apparatus is checked before apparatus backs up and then driver backs up with help of F/F in rear seen in drivers mirror, 5. All firefighters should look right, left, right before exiting apparatus to check for on-coming traffic, even on sidewalk side.

1/8/2013 4:28 PMView Responses

Are your emergency lights/sirens on and working, are you positioning yourself according to the SOP's, did an officer instruct you to position yourself in a place that does not follow the SOP's, are following a route where other apparatus may be traveling, did you voice over the radio your route of travel so other responding apparatus if you are taking the same route, is alternative equipment needed that will aid your response- for example insta-chains, is the height of the apparatus known for any low clearances

12/30/2012 7:26 PMView Responses

Hydrant info, additional scene information if possible, stop at all red lights and yields, drive defensively, do not go over 10 MPH of posted speed limit, be aware of school zones and railroad crossings, watch for power lines as you arrive, hydrant man should check traffic before exiting apparatus

12/16/2012 8:57 AMView Responses

Lights on Map on computer Communicate if intersections will possibly coincide with other apparatus response Establish 1st or second due Water supply IAP Route of entry to block/lot/complex Ladder given the address

12/15/2012 12:17 AMView Responses

1. Stopping at all red lights and stop signs. 2. Recognizing the command of the intersection prior to proceeding through the intersection. 3. Following the departments SOGs on maximum

allowed apparatus speed. 4. Having the engine company leave enough room at the scene of the incident for aerial ladder placement. 5. Having the engine leave enough room for the aerial apparatus to remove any rear mounted ladders from their compartments 6. Placement of wheel chocks upon arrival at the incident. 7. Identification of overhead obstructions to include power lines and trees. 8. Parking apparatus outside of the building collapse zone or on the corners of the building to limit the damage from a collapse if one occurs. 9. Sounding the horn with one beep to alert the occupants that it is OK to exit the apparatus.

12/13/2012 8:17 PMView Responses

Seat belt on Remain seated Emergency lights on Lane of travel Traffic control operator on

12/13/2012 6:33 PMView Responses

Stop at all red lights stop at all stop signs clear and audible radio traffic

12/13/2012 11:09 AMView Responses

Operator must come to a complete stop at all stop signs and red lights. (NO ROLLING STOPS) Operator should slow the apparatus at all intersections even if they have the green light and right of way. Operator and officer should constantly being scanning for any unexpected hazards that arise during the response such as bicyclists, pedestrians, etc. Operator should operate the apparatus at a safe speed at all times to allow for safe emergency breaking. The officer should at all times ensure that the driver/operator is operating the apparatus in a safe manner at all times and immediately correct or stop any unsafe actions. Upon arrival at the scene the operator and officer should ensure that the apparatus is parked in the safest manner and location possible to avoid other vehicles striking the apparatus. This is particularly important when there are insufficient police on scene for traffic control measures.

12/12/2012 10:42 AMView Responses

NO SPEEDING NO "cowboy" driving -- reckless announce arrival and function observe scene assignment SOP's No apparatus or personnel or company freelancing ensure crew is aware of assignment be aware of the other driver including fire apparatus observe traffic rules cover the brake at intersections be prepared to stop be aware of obstructions to positioning such as overhead wires position with an objective in mind communicate any exceptions in response to command

12/12/2012 10:07 AMView Responses

1. Continued operation of emergency lights 2. Continued operation of horn 3. Continued operation of siren 4. Air pressure monitored 5. Speed 6. Apparatus placement 7. Radio traffic monitored (dispatch or TAC channel depending on local operating policies) 8. Personnel assignments reviewed 9. MCT consulted for pertinent information (if equipped)

12/10/2012 10:57 AMView Responses

Emergency lights and siren working proper Clear intersections before proceeding through Proper speed Use of turning signals Know locations of controls for wipers, defrost and heater Placement of wheel chocks on scene

12/9/2012 12:00 AMView Responses

Do the conditions based on updated information warrant a change in response mode? Are there impediments to response that may require a change in actions? What function will the apparatus be expected to perform? What function will the crew be expected to perform? Will the apparatus be able to fit into assigned area and if so will adjustments be needed to get apparatus in position? Have hazards such as construction, soft surface, traffic, pedestrians, collapse risk,

fire exposure, and other risks been taken into account?

12/7/2012 2:17 PMView Responses

1--traffic conditions per time of day...consider slowing down around school areas when kids/buses are moving 2--road and wx conditions 3--update/confirm route you are on is what command wants 4--are you going to the scene or to a staging area 5--follow sops or is command going to order a change to them...eng co establishes a water supply...maybe he needs you to work outside normal sops/ops

12/6/2012 7:28 PMView Responses

1. Complete stop at all traffic lights, look, and listen 2. Follow established speed limits parameters IAW SOPS 3. More than one apparatus consider alternate routes. 4. Use lights and siren IAW SOPS 5. Place apparatus uphill, upwind, out of collapse zone. 6. Parking brake and chocks placed.

12/6/2012 7:14 PMView Responses

Watch all intersections safe speed for conditions pre-arrival information from dispatch via radio or computer switch to appropriate radio channel size up apparatus placement STOP! Set brakes set pumps (if engine company)

12/6/2012 1:21 PMView Responses

1. Are we "fighting for position"? 2. Do we know our position? 3. STOP at stop signs (this drives me crazy) 4. Are the other members helping? i.e. guiding, reminding 5. Are we listening to what is going on around us?

12/5/2012 8:32 PMView Responses

Other vehicles, pedestrians, obstructions, intersection approach, mirrors,

12/5/2012 5:14 PMView Responses

Apparatus stopped and parking break set before disconnecting seatbelt. Cab door closed and secured before leaving hydrant. Apparatus properly spotted and parking break set before disconnecting seatbelt. All occupants back out of cab while maintaining grip on hand- holds. Set chocks.

12/5/2012 4:01 PMView Responses

Remain seated, remain seat belted, listen to the driver/officer for needed information, be aware of environment

12/5/2012 11:39 AMView Responses

Warning devices activated, personnel and public clear of the front of the apparatus when beginning motion, guide personnel used if backing up is necessary, intersections clear, response pattern of other responding companies (intersections where companies are likely to meet)

12/5/2012 10:34 AMView Responses

Clear intersections maintain distance from vehicles in front assure communication between apparatus (to avoid an intersection event by two different responding units) officers assisting the driver/operator with clearing traffic officers tracking on scene communications to build 'picture' of event

12/4/2012 11:17 PMView Responses

Safest route to location is being taken, intersections are cautiously approached and evaluated for safety before entering, the start of scene size-up is performed before arrival if possible, apparatus is positioned in a safe position and out of harms way if possible, all crew remains seated until apparatus come to a complete stop

12/4/2012 8:51 PMView Responses

Preplan available for structure Protocol available for type of emergency Additional information captured (if any) Correct dispatch compliments sent - if not request balance of the dispatch Safe operation of vehicle - if not correct immediately Preparation for assignment(s)

12/4/2012 4:24 PMView Responses

All personnel is fully dressed

12/4/2012 2:46 PMView Responses

Confirm call location. Confirm nature of call. Obtain additional information from dispatch. Confirm nearest hydrant location. Officer and Driver should confirm direction to approach scene.

12/4/2012 2:31 PMView Responses

Occupants remaining seated/restrained (not gearing up), attention to driving, no use of phones/electronic devices, driver not operating the radio, driver operating siren/air horn only via horn ring, maintaining due regard

12/4/2012 1:48 PMView Responses

1) Seatbelts are on. 2) Correct path to scene is followed. 3) All equipment that is removed from its secure positioning (i.e. (SCBA, irons, TIC, etc.) are securely held onto, and not just sat on the cowling or floor. 4) The vehicle is parked in an efficient but safe location. **While there is a desire to mention speed, braking, vehicle travel, etc.....the driver should be trained in this all prior to the dispatch, and the officer should have full confidence that the driver will follow and obey the driving rules.

12/4/2012 11:03 AMView Responses

Appropriate speed Attention to traffic signals per local protocol driver's attention only on driving Give others room; expect them to do what is not 'rational' to you Disembark apparatus only when ordered to do so safe placement at scene; may vary depending on apparatus and surroundings Wheels chocked according to protocol

12/4/2012 10:37 AMView Responses

Speed/stop signs/ distractions in the cab/ staging or placement issues such as cones, distance, protecting scene etc./ wheels chocked-brake on

12/4/2012 10:28 AMView Responses

1) Inform firefighters on your apparatus of updates or changes that may be happening. 2) Clear intersections together. 3) Ensure the driver knows where he is going. 4) Any assignments once on scene. 5) Ladder gets the address, engine pulls short of the scene if the hydrant is short / before the emergency and / or the engine pulls long if the hydrant is on the other side and just pass the emergency scene.

12/4/2012 10:05 AMView Responses

Confirm/estimate arrival order/position; tool assignments, building construction, vehicle positioning, repeat and confirm personnel are clear and ready for work assignments

12/4/2012 9:33 AMView Responses

All traffic codes including speed. All firefighters remain seated and belted until the parking brake is set. Apparatus placement appropriate per conditions and tasks assigned by the IC. All backseat firefighters should remain quiet, listening to orders from the Company Officer, and allowing the officer and driver to communicate.

12/4/2012 9:17 AMView Responses

Speed limits, stopping for ALL red lights/stop signs, slowing for ALL intersections, placement for type of event (gas odor/leak, mutli-family, arrival order, suppressed structure, etc., not placing SCBA during response, assignment of personnel made (tasks)

12/4/2012 9:11 AMView Responses

1. Quickest and safest route 2. Weather/road conditions 3. Is this truly an emergency 4. Other companies responding 5. Keep seatbelt on until vehicle stops 6. Apparatus placement should be according to SOG; safe distance, able to go to work

12/4/2012 8:28 AMView Responses

Stopping at red lights, appropriate speed, distractions, overhead lines

12/4/2012 7:53 AMView Responses

Traffic laws Citizen traffic Moving to proper TAC channel Listening to radio traffic Complete size up

12/3/2012 9:47 PMView Responses

Shall check mental attitude is in proper focus to respond safely, remembering you are responsible for the safety of your crew and civilians.

12/3/2012 8:59 PMView Responses

1. Is it necessary to operate the lights and sirens for this response? 2. Operate the apparatus at a safe and prudent speed for the conditions 3. Are traffic patterns slowing the response, is there an alternate response route 4. Is the driver operating the vehicle safely? 5. Will this route allow for an efficient hose lay? 6. Will this route allow for other vehicles to pass at the scene?

12/3/2012 8:56 PMView Responses

Please list 5 to 9 items that should be checked and/or followed while returning from the emergency scene please include backing into the fire station. The list should focus on steps firefighters miss, skip or shortcut, but pose a real danger when overlooked. Please use simple and exact wording that is familiar to the fire service.

1. Prior to leaving, all equipment and members accounted for, and secured. 2. IF backing, make sure all members are IN VIEW of the driver, either directly or in mirrors. 3. IF Unable to see or account for a crewmember. STOP BACKING UP IMMEDIATELY. 4. Same rules apply when backing into the station. 5. Once back in apparatus bay, air brakes applied and functioning properly. 6. If used, wheel checks in place. 7. All landlines back in use (air, electrical, ventilation, etc.)

1/10/2013 12:53 AMView Responses

1) Make sure wheel chocks are removed from tires 2) ensure that all compartments to the apparatus are closed and equipment is secured 3) ensure all members are seated. 4) Ensure all members are seat belted. 5) Ensure that emergency lights are turned off 6) proceed back to station observing all traffic regulations

1/9/2013 2:20 PMView Responses

1. ONCE AGAIN, GARAGE DOOR UP, DOOR CLOSURE SECURED 2 WALK AROUND

APPARATUS, CHECK FOR UNSECURED ARTYICLES BEFORE IT MOVES 3 FOR VOLUNTEERS FDS, MAKE SURE THE PERSONNEL YOU WENT OUT WITH ARE ACCOUNTED FOR AS THIS CHANGES SOMETIMES IN THE PERSONNEL YOU MAY BRING BACK. 4. ROAD GUARDS! 5. OBEY TRAFIIC LAWS. NO LONGER EMERGENCY VEHICLE!

1/9/2013 10:38 AMView Responses

All equipment is properly secured, all compartments are closed, all personnel are seat belted, 360 check of apparatus, follow all traffic rules, backing into station use guide men on each side, Captain controls the backing up with hand signals

1/9/2013 8:24 AMView Responses

All equipment is placed back on apparatus all compartment doors are closed properly insure firefighters are seated insure firefighters are seat belted in guides should be in place when backing fire apparatus into quarters notify dispatch when returning to quarters notify dispatch when you arrive back at quarters

1/8/2013 9:31 PMView Responses

1- ensure that you have all your people 2- ensure that all equipment is properly stowed 3- note any equipment requiring attention when back in quarters 3- confirm crew status (injuries/ issues) 4- ensure driver is in shape to drive 5- operate vehicle in FULL accordance w/ laws on way home 6- operate lights when backing into quarters w/ lookouts

1/8/2013 8:52 PMView Responses

All equipment stowed all compartment doors closed seat belts lights/siren on/off spotter assigned when backing up contact dispatch in service

1/8/2013 5:42 PMView Responses

1. Main emergency lights are off. 2. All traffic laws are complied with. 3. All blind spots are checked before changing lanes, 4. Firefighters are seat belted in and wearing headphones if provided, 5. Apparatus comes to a complete stop before crossing into on coming lane to back into firehouse, 6. Rear of apparatus is checked before apparatus backs up and then driver backs up with help of F/F in rear seen in drivers mirror, 7. All firefighters wait until apparatus comes to complete stop before unbuckling seat belt and exiting.

1/8/2013 4:28 PMView Responses

Is a spotter utilized while backing-up, is the fuel greater than 3/4, are all members present, has all PPE ready for service, is the booster tank full, is all equipment ready for service

12/30/2012 7:26 PMView Responses

Ensure all equipment is loaded properly (used hose not on the hose bed, hand tools, etc.), use proper lifting techniques, helmets should be worn when anything over the head is being reloaded, obey all traffic laws/rules, if backing use minimum 2 ground guides

12/16/2012 8:57 AMView Responses

All on board doors closed(people) (equipment) circle of safety all equipment used now accounted for Spotters in place

12/15/2012 12:17 AMView Responses

1.Checking that all apparatus compartment doors are secured prior to moving the vehicle. 2. Making sure all exterior mounted equipment (ladders, hooks, etc.) is secured prior to moving the vehicle. 3. Removing and stowing the wheel chocks. 4. All personnel seated and belted prior to moving the apparatus. 5. Officer gives operator permission to move the vehicle. 6. Sounding

the horn with 3 beeps prior to moving forward. 6. Minimum of 2 spotters while backing the apparatus on scene and into the station.

12/13/2012 8:17 PMView Responses

All equipment stored in compartments and secured Seat belt on Remain seated Spotter for backing in

12/13/2012 6:33 PMView Responses

All safety equipment proper backing procedures tools that were used water supply

12/13/2012 11:09 AMView Responses

All members should remain in their PPE (turnouts) while returning from the incident. In the event another alarm is received they will not attempt to dress in the cab of the moving vehicle. All members should be seated with their seatbelts on. If apparatus needs to be backed out of the incident scene that there should be two backers to ensure a safe back up. Operator and officer shall ensure that the apparatus is operated in a safe manner returning to the station and that all traffic laws are obeyed. Operator and officer should constantly scan for any unforeseen hazards that arise. Upon arrival back at the firehouse, the emergency lights should be activated. All members with the exception of the operator should exit the apparatus. Members that exited should ensure that traffic has come to a stop and also ensure that there are no pedestrians in the backing area. The members will then serve as backers and ensure that the apparatus is safely backed in to the firehouse.

12/12/2012 10:42 AMView Responses

All gear stowed properly all personnel on apparatus and belted before proceeding no backing up without guides all non-drivers off apparatus to stop traffic before backing in no warning lights during return trip warning lights on when backing in observe all traffic rules

12/12/2012 10:07 AMView Responses

1. Speed 2. Spotters for backing 3. Reflective vests for spotters 4. Radio traffic (to ensure the next call is not missed) 5. Properly clearing the unit from the call 6. Quick review of steps needed to restore apparatus to full service upon arrival at station (cleaning, replenishing equipment, etc.)

12/10/2012 10:57 AMView Responses

All tools and equipment returned to apparatus All compartments closed Wheel chocks picked up All personnel using seat belts Spotter for backing apparatus Apparatus restocked Apparatus shorelines re-connected

12/9/2012 12:00 AMView Responses

Has the vehicle been restored to over the road driving condition? Have all members been accounted for and are seated with seatbelts on? Is the driver suffering fatigue in anyway as a result of the operation? Have road conditions changed since unit arrived at the scene? What is the unit's fuel status? Are driver and officer on same page as to destination?

12/7/2012 2:17 PMView Responses

1--all equipment is on board 2--driver does walk around to insure cabinets shut, tools secure 3--plan route 4--do we need fuel or other supplies to put us back in normal service 5--stop outside the station 6--put out ground guide 7--sound horn and back in

12/6/2012 7:28 PMView Responses

1. All equipment placed back on apparatus 2. Remove chocks 3. All personnel on board and buckled up 4. Sign out from scene 5. Obey all traffic laws (Its not an emergency anymore) 6.

Drive through stall-Ensure door is full up 7. Ensure all compartment are closed 8. Use mirrors & spotters 9. Ensure sufficient air pressure for breaking

12/6/2012 7:14 PMView Responses

All compartment doors closed All members safely on board Seatbelts fastened lose equipment stored correctly unit status updated (Available, OOS, Etc.) Safe to move into traffic from scene prepare to enter quarters (lights on if traffic stops) backer(s) dismount and can be seen but driver Garage door ALL the way open Back in, stop signal by backer.

12/6/2012 1:21 PMView Responses

1. Is lighting adequate 2. Are guide persons in place 3. Go SLOW 4. Go Slower 5. Practicing this maneuver

12/5/2012 8:32 PMView Responses

Mirrors, pedestrians, obstructions, blind spots, other vehicles.

12/5/2012 5:14 PMView Responses

All equipment properly mounted and secured including hose. All compartment doors closed and secured. Driver walk around apparatus to ensure nothing left on tailboard, running boards, etc. Vehicle backer at all times. Seatbelts on and secure.

12/5/2012 4:01 PMView Responses

Restock all used equipment, refill water tank, check all used equipment for serviceability,

12/5/2012 11:39 AMView Responses

Equipment restored, compartments closed, personnel on board, seat belts fastened, pump or aerial restored and ready for service, booster tank full

12/5/2012 10:34 AMView Responses

All equipment returned to unit all equipment cleaned on scene (wash down with hose) SCBA reloaded with fresh cylinders all empty cylinders returned to apparatus, placed stem in to indicate OOS hose reloaded or dirty hose removed and stored in some method

12/4/2012 11:17 PMView Responses

All equipment is returned to its proper position on the apparatus before leaving the scene, apparatus is watched carefully as it is backed up if necessary and personnel assist the driver with this task, all crew members are in their seats with seat belts engaged prior to the apparatus leaving the scene, proper roadway conduct is maintained, the apparatus is placed backing the station with the help of crew members guiding the driver back.

12/4/2012 8:51 PMView Responses

Immediate restock of PPE, supplies, equipment, fuel, water etc. Cleaning of PPE Correction of any discrepancies found on directions to the emergency Correction of any discrepancies found on preplan Correction of any discrepancies on protocol Case review of incident and future actions for improvement

12/4/2012 4:24 PMView Responses

Driver is aware of the territory and alarm location

12/4/2012 2:46 PMView Responses

Make sure all equipment is properly stowed and secured on the rig. Make sure all doors are properly shut. Make sure all traffic laws are obeyed. Make sure everyone is properly using their seatbelt. Utilize spotters whenever backing.

12/4/2012 2:31 PMView Responses

Spotter, overhead doors opened fully, appropriate lighting, communications with spotter, use of mirrors, speed, post incident apparatus check.

12/4/2012 1:48 PMView Responses

1) Seatbelts 2) Driver walk around to make sure equipment is secure, and any clearance issues are taken into account. 3) At least one back up person if a need to back the unit. Potentially two or more personnel to back the unit if in a confined area.

12/4/2012 11:03 AMView Responses

Seatbelts All personnel accounted for All equipment and doors secure Appropriate spotter when backing, maybe more than one Obey all traffic laws returning to station Personnel don't leave apparatus till ordered to do so Parking break set Shorelines attached All equipment and apparatus back in service.

12/4/2012 10:37 AMView Responses

Circle check stuff/speed/stop signs/spotters for backing/ bay door open fully

12/4/2012 10:28 AMView Responses

1) Ensure all equipment is on the apparatus 2) That firefighters are ok (no injuries) and they have all there gear. 3) There is a spotter at all times the apparatus is backing up and within view of the driver. 4) The apparatus and equipment is checked for damages and cleaned.

12/4/2012 10:05 AMView Responses

Equipment secured and confirmed, personnel seated and belted, travel speed per policy, traffic stopped before entering ramp, reverse operations with spotter(s), emergency lights when backing, sound air horn prior to backing.

12/4/2012 9:33 AMView Responses

Spotter, spotter, spotter... Traffic control, traffic control, traffic control... All doors from the crew exiting the apparatus for spotter and traffic control are securely closed. Ensure all items in the path of the moving vehicle are cleared and removed from area. All drop cords secured up and out of the way of the moving apparatus.

12/4/2012 9:17 AMView Responses

Tools and equipment secured, doors closed properly, all seated with seat belts, head sets, warning equipment on (if backing), backer and vehicle front person in place when backing (for a 360 view)

12/4/2012 9:11 AMView Responses

1. Are you in service or out for another call 2. Seatbelts 3. Weather/road conditions 4. Fuel/Water/Equipment in service 5. Utilize bakers when backing

12/4/2012 8:28 AMView Responses

Personnel on board, seat belts, bay doors up, other cars, backing into the station

12/4/2012 7:53 AMView Responses

Hose secure Door alarms Personnel Traffic laws Proper backing procedures

12/3/2012 9:47 PMView Responses

A backing person in place, if applicable traffic controlled. Check fuel. Make sure all equipment used is back in proper service. After action review after every response.

12/3/2012 8:59 PMView Responses

1. Is the driver fatigued or otherwise not able to operate the vehicle in a safe manner? 2. Is the area in front of, in rear of, under and over the apparatus free from obstructions? 3. Are all doors,

windows, and equipment fastened, closed, secured and ready to go?
12/3/2012 8:56 PMView Responses

Appendix I

First Edition Checklists

Safety Emergency Vehicle Response Checklists

Pre-Response

Apparatus is clear of all obstacles?
- Yes

Apparatus compartment doors closed and tools secured?
- Yes

All members are in proper PPE, seated with seat belts secured?
- Yes

Overhead door fully opened and stopped?
- Yes

No personal electronic devices are in use?
- Yes

Emergency signals are on?
- Yes

Address confirmed with dispatcher?
- Yes

Confirm established route with driver?
- Yes

Officer signals driver to disengage air break and begin response.

En Route

Exit fire station slowly and cautiously.

Weather conditions considerations
(Wipers, defroster or headlights)

Response speed is appropriate?
(Incident type and weather conditions)
- No – Adjust speed appropriately

Intersections approached with caution?
(Traffic/Pedestrians aware of apparatus)
- No – Use caution/Change siren tone

Apparatus assignment is known?
- No – Request assignment
- Yes – Continue

Apparatus placement is appropriate for assignment? Consider:
- Intended use
- Other apparatus/Assignments
- Situational Obstructions

Apparatus is stopped, positioned for safe disembarking and air brake engaged?
- Yes

Returning

Members mentally/physically okay?
- Yes – Continue
- No – Rehab, Monitor and/or replace

Apparatus is clear of all obstacles?
- Yes

Apparatus compartment doors closed and tools secured?
- Yes

Use guides if backing out is required.

Confirm all members are in proper PPE, seated with seat belts secured?
- Yes

Emergency signals off/Obey traffic laws.

Apparatus is stopped, positioned for safe disembarking and in neutral?
- Yes

Overhead door fully opened and stopped?
- Yes

Guides are in proper position?
- Yes

Officer signals driver begin station entry.

Apparatus brought to a complete stop prior to fire station entry?
- Yes

Apparatus in neutral, air brake engaged and emergency signals off?
- Yes

Responders are encouraged to modify these checklists to fit their local fire departments practices.

Revised 01/2013

Appendix J

Test Group Implementation Guidelines

Implementation Guidelines

The implementation of the Emergency Vehicle Response Checklist will be for a trial period of 2 months. It is important that the implementation include a short segment at each shift's daily roll call. During this time the fire officer should remind all members that the checklists are being utilized and the responsibilities of each riding position. Each company member should in turn tell all company members what riding positions they occupy and state that they clearly understand their responsibilities. It is the fire officer's responsibility to ask for and receive a "Confirmation" for each checklist objective.

It is important that the checklists do not violate any departmental rules & regulations or standard operating procedures. It is also important that emergency response times are not unnecessarily impacted. The checklists are reaffirming tasks that should have already been completed. Any change in the timing of emergency responses should be due to catching an important safety measure that was missed and corrected.

The attached 3 emergency response checklists are 1st drafts. It is acceptable to make modification to the checklists to fit your company's practices or as part of a continual effort towards making improvements.

At the end of the implementation period, task group participants will be asked to take a short survey critiquing the checklists. If for whatever reason task group participants do not implement the checklists for the full 2 months, please commit to participating in this survey. The data obtained and reason(s) for stopping will still be very useful. Please also note any modifications made to the checklists and the reasons for each. This will also be useful data.

Checklists Objectives

It should be noted that the checklists are not “how to” procedures. The checklists items are simply important items that are often overlooked. It is not the objective of a checklist to tell a member to “remove chalks” or “unplug charging cable.” The objective is to ensure the apparatus is clear of all obstacles. Items such as, “perform mental size-up” are not listed on the emergency vehicle response checklist because those types of objectives pertain to different tasks. Implementation of the emergency response checklists should increase the efficiency and effectiveness of the company while responding to and returning from incidents.

Proposed Timeline

The target implementation period is February 1, 2013 thru March 31, 2013. If you are unable to start the implementation process on February 1, 2013, please start it as soon as possible. There will be a short post implementation survey available April 1, 2013 and opened for a week to 10-days.

Supplemental Research Information

Attached please find PDF files and an explanation of each:

ARP Checklists.pdf – Checklists developed for trial implementation.

Focus Group Letter.doc – Letter of request and implementation instructions.

Survey(s) Results.pdf – Survey results of 14 ACFD Officers pertaining to accidents within the ACFD and the development of checklists and 45 Non ACFD Officers pertaining to accidents within their fire departments and the development of checklists.

checklist_for_checklists.pdf – Checklist to be used when developing checklists. To be used as a guideline through the development process.

aviation_checklist.pdf – An example of aviation checklists. Several checklists are included on this one page.

surgical_safety_checklist.pdf – An example of a surgical safety checklist.

The New Yorker.pdf – An article written by Atal Gawanda, author of "The Checklist Manifesto." This article provides a brief foundation of the usefulness of checklists.

Additional Comments

If you wish to have the 8½x11 checklists PDF laminated, please confirm so by return email and I will mail one out as soon as possible.

Focus group members that are not company officers can still take part in this trial implementation period by partnering with a company officer.

Appendix K

Test Group Request Letter

Joseph D. Rush, III
117 N. Sumner Avenue
Margate, NJ 08402
609-214-6630 cell
josephrush1@comcast.net

January 27, 2013

Dear ACFD Fire Officer,

I am in the process of completing my final Applied Research Project (ARP) for the National Fire Academy's Executive Fire Officer's Program. My research involves developing and implementing "Checklists" that address safety concerns related to responding to and returning from emergency incidents.

As part of my procedures, I have conducted two surveys. Both surveys are similar; one directed at the Atlantic City Fire Department and one toward other fire departments. The resulting information was obtained to assist in the development and implementation of the checklists. I have evaluated that information and developed a first draft of the checklists.

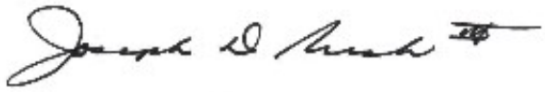
As the next step in my procedures I would like to assemble a test group within the Atlantic City Fire Department tasked with implementing the checklists for a period of 2 months beginning February 1, 2013 and ending March 31, 2013. I respectfully request you be a part of this test group.

Included in the following 3 pages is a detailed explanation of this implementation process, the proposed timeline and additional information you may find helpful.

Please review it and advise me as early as possible if you are willing to be part of this test group.

Thank you in advance for your help.

Respectfully,



Joseph D. Rush, III

Appendix L

Test Group Members

Captain Duane Brock

Atlantic City Fire Department

Atlantic City, NJ

Captain Edward Coursey

Atlantic City Fire Department

Atlantic City, NJ

Acting Captain Daniel Dunn

City of Wildwood Fire Department

Wildwood, NJ

Captain Thomas Gaeta

Cherry Hill Fire Department

Cherry Hill, NJ

Lieutenant John Rodriguez

Bath Fire Department

Bath, Ohio

Captain William G. Noke

Concord Fire Department

Concord, MA

Assistant Chief Edward Beirne

Metro West Fire District

St. Louis County, MO

Fire Chief Timothy Whitham

Morganfield Fire Department

Morganfield, KY

Lieutenant Spencer Dean

Sedgwick County Fire District #1

Park City, KS

Appendix M

Test Group Survey Letter

Joseph D. Rush, III
117 N. Sumner Avenue
Margate, NJ 08402
609-214-6630 cell
josephrush1@comcast.net

April 2, 2013

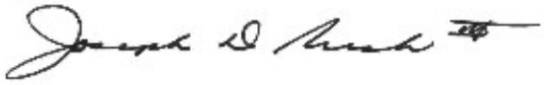
Dear Fire Officer,

On my original survey for my National Fire Academy Executive Fire Officers Program ARP you had expressed a willingness to implement my "Checklists" for a trial period. I have concluded the trial implementation of my "Checklists" as of March 31, 2013 and will be posting a survey by Saturday, April 6, 2013. If you were able to implement my checklists for ANY period of time for 2/1/2012 - 3/31/2013 I would appreciate you completing this final part.

I will send you a short email as soon as the survey is posted on surveymonkey.com

Thanks again for you help!

Respectfully,



Joseph D. Rush, III

Appendix N

Test Group Survey Results

1. During the checklist implementation period of February 1, 2013 – March 31, 2013 how often did you implement the checklist?

Entire period – 100% of the time		4	44.4%
Approximately – 75% of the time		3	33.3%
Approximately – 50% of the time		1	11.1%
Approximately – 25% of the time		1	11.1%

2. How was the usability of the checklist?

Very usable		5	55.6%
Somewhat usable		3	33.3%
Not Very usable		1	11.1%
Unusable		0	00.0%

3. How did the checklists flow?

Flowed well		4	44.4%
Flowed somewhat well		5	55.6%
Flowed poorly		0	00.0%
Did not flow		0	00.0%

4. How did the checklists work in a team environment; were all company members engaged and at the right time?

Worked well in team environment		4	44.4%
Worked somewhat well in team environment		4	44.4%
Worked poorly in team environment	1	11.1%	
Did not work in team environment		0	00.0%

5. Was it easy to know when to initiate the checklists at a consistent point?

Very clear		5	55.6%
Somewhat clear		4	44.4%
Somewhat unclear		0	00.0%
Unclear		0	00.0%

6. Was there always enough time to complete the checklists?

Always enough time		2	22.2%

Mostly enough time		5	55.6%
Rarely enough time		2	22.2%
Never enough time		0	00.0%

7. Was the physical form of the checklists usable?

Very usable		5	55.6%
Somewhat usable		2	22.2%
Not very usable		2	22.2%
Unusable		0	00.0%

8. Was the font size readable in all lighting and environmental conditions (moving vehicle) in which it was used?

Always readable		3	33.3%
Most time readable		6	66.7%
Rarely readable		0	00.0%
Unreadable		0	00.0%

9. Were the checklists read aloud?

Yes, always read aloud		0	00.0%
Sometimes read aloud	6	66.7%	
No, never read aloud	3	33.3%	

10. If you answered, “Yes, Always Read Aloud” to the previous question, were the checklists read word for word?

Yes – Word for word		0	
No – abbreviated		0	

11. Did the checklists catch any errors?

Yes		3	33.3%
No		6	66.7%

12. If you answered, “Yes” to the checklist catching any errors, what type of error(s) did the checklists prevent? Please add a comment with details.

Major accident or mishap		0	00.0%
Minor accident or mishap		3	100.0%
Both		0	00.0%

Backing without a spotter

Placement for scene operations

The driver forgot to check whether all the compartments doors were closed prior to moving the vehicle. By utilizing the checklist the error was corrected before any damage was done.

13. Did the implementation of the “Pre-Response” checklist slow your response time?

(6 focus group members skip the question)

No	3	100.0%
Yes – (15-30 Seconds)	0	00.0%
Yes – (31-60 Seconds)	0	00.0%
Yes – More than a minutes	0	00.0%

14. If you answered “Yes” to the previous question, was the increase in response time

outweighed by the potential benefit of running the checklist? Please comment.

Yes	0
No	0

No comments were posted.

15. During the checklists implementation period, did you modify the checklists to fit your

fire department practices? Please comment.

Yes	3	37.5%
No	5	62.5%

The checklist worked as written

Yes specifically telling the driver to engage the vehicle. I didn't think that was necessary

We added a component for backing of vehicles. This addition noted the presence of, and acknowledgement of a backup spotter. One of the times this process was skipped, one of ladder trucks backed into a tree.

16. During the checklists implementation period, did you modify the checklists to fit your

practices or preferences? Please comment.

Yes	5	62.5%
No	3	37.5%

Yes I did because a majority of the checklist items my company already practiced prior to taking part in the survey. It did sever to make us more aware of doing them consistently.

Shortened to - Ready in the back- doors up

Yes while waiting to back into the station, I have the driver put on the hazard lights, until the light turned red stopping all traffic in the direction of travel.

17. After implementing the checklists, do you feel checklists are a substitute for training?

Please comment.

Yes	1	12.5%
No	7	87.5%

There is no substitute for proper and continual training in the fire service. The checklists serve as a reminder to firefighters.

Items on the checklist still need to be addressed in training environment.

In my opinion there is no substitute for training.

The lists should be considered a supplement to training.

There is never a replacement for training. There was training on using the

No I don't believe that the checklist is a substitute for training, however I believe along with the checklist and daily training they are helping in the safety of all involved.

18. After implementing the checklists, do you feel checklists are a substitute for experience?

Please comment.

Yes	1	12.5%
No	7	87.5%

Experience helps a firefighter become more proficient and knowledgeable in their job as does training. However, experience alone cannot replace training and training alone cannot replace experience. A combination of both is necessary and the checklists help

remind members of the required tasks.

Experience may add to the checklists.

Not a substitute but a good reference that can play a role for new or acting officers who lack experience and a system of how they respond to and return from alarms.

Experience can equate with complacency, which brings us back to the reason why we should be using the lists.

Checklists are a reminder of items to be inspected, not dependent upon relying upon experience to ensure all items are checked.

No the checklist is not a substitute experience, however I feel that it helps those with limited experience feel more comfortable.

19. After implementing the checklists, do you feel checklists usage would require a cultural change within the fire service? Please comment.

Yes	7	87.5%
No	1	12.5%

Firefighters and Fire Officers already use mental checklists on a daily basis subconsciously. The written checklist is a physical form that can assist while making these subconscious decisions.

Most items on the checklist are already done in a more informal way.

The fire service is somewhat a creature of habits sometimes bad, sometimes good but change with in the fire service is difficult in my experience.

Some folks are just so ingrained with a particular method, especially senior members, that a cultural shift would be a necessity.

It took a bit of coaching and monitoring here, as we use checklists for apparatus inspections, weekly tests, etc.

Yes because the culture of the fire department is to get there as fast as possible. We (the fire department) have to remember that we have to get there as fast and safely as possible.

20. After implementing the checklists, do you feel checklists usage has a place in the fire service? Please comment.

Yes – During emergency operations	1	12.5%
Yes – During non-emergency operations	1	12.5%
Yes – During both emergency and non-emergency operations	6	75.0%
No	0	00.0%

As with anything new the checklists should be a training topic at the company level. The checklists may not be utilized on every single response but serve as a constant reminder of what you are supposed to be doing.

But they would have to be practical and able to adapt to changing environments because we deal with situation that sometimes call for us to adapt and over come.

We cannot expect to remember it all, even pilots use checklists during start up operations during every flight.

Yes for the safety of the Fire Personnel, the Public, as well as Property damage.

Appendix O

Second Edition Checklists

Safe Emergency Vehicle Response Checklist

Pre-Response	Returning	In Station
Apparatus clear of obstacles	Member mentally/physically okay	Apparatus stopped/in neutral & positioned for safe disembarking
Compartment doors closed/tools secured	Apparatus clear of obstacles	Emergency signals on
PPE on/seat belts secured	Compartment doors closed/tools secured	Guides in position
Overhead door open/stopped	Guides in position	Overhead door open/stopped
Address/Route known	Seat belts secured	Begin entry
Emergency signals on	Emergency signals off	Stop Apparatus/check alignment
		Complete entry

Responders are encourged to modify these checklists to fit local fire department practices.
Revised 4/2013

Appendix P

Daniel Boorman Email

On May 29, 2013, at 7:36 PM, "Boorman, Daniel J" <daniel.j.boorman@boeing.com> wrote:

Hi Joe,

Checklist looks great! I think you embraced the concepts I was talking about, and it looks, from my uninformed point of view, like a usable checklist.

I have some comments, but they are more nits now. Take or leave as you see fit, of course.

- Think about what people will call the checklist. The current title at the top is long, and doesn't suggest an obvious short name. So I suggested shortening to "Response Checklist". The only issue would be imagining what additional future checklists you may have, and this title should be detailed enough to distinguish it from other future checklists.

- The individual operational phase checklists, ideally, are titled as "Before XXX" (Before Taxi, Before Takeoff), so that it is very clear that they must be completed before taking the action that could be hazardous. In this case, moving the apparatus. But I couldn't think of any short names that start with "Before". Your titles, Pre-Response, etc. are very usable for calling for the checklist. So I suggest small font, italic subtitles to each one, stating clearly when it must be completed. It could be argued that this is training, but it is also critical to safety that the checklist be accomplished at the correct time.

- The third item in the Returning checklist, question: which of these two actions is completed first? If some tools are secured in compartments, then compartment doors are closed, it could be re-phrased: Tools secured/compartment doors closed.

- My most important suggestion, from a generic checklist construction standpoint, is the third phase checklist. The way you have it, it isn't all done at one time; it's almost done in three stages. That makes it a semi-read/do checklist instead of a do-confirm. All your others can be clean do/confirm checklists. I suggested changes so that the third checklist can be a pure do/confirm. If I understand your procedures correctly:
  - The apparatus is stopped and in neutral. (That it is positioned correctly may be more technique/training than a checklist item?)
  - Most of the members leave the apparatus (I assume that is what disembark means), and move clear/safe
  - Emer signals are used
  - Some members take position as guides
  - The overhead door is confirmed open
  - My suggestion: a stop when the apparatus is mid-way in is briefed out loud.

Now, having done all that, call for and read the checklist out loud. Everthying should be done

already; the checklist is complete and the procedure can safely be carried out from training with no further checklist reading.

Like I said, take or leave. I appreciate you keeping me in the loop. It’s exciting to work on a firefighting checklist. I guess like any kid, I want to be a firefighter.

Dan

Appendix Q

Third Edition Checklists

Response Checklist

Pre-Response	*Pre-Returning*	*Pre-Station Entry*
Apparatus clear of obstacles	**Member mentally/physically okay**	**Emergency signals on**
Compartment doors closed/tools secured	**Apparatus clear of obstacles**	**Guides in position**
PPE on/seat belts secured	**Tools secured/Compartment doors closed**	**Overhead door open/stopped**
Overhead door open/stopped	**Guides in position**	**Stop Apparatus prior to station entry**
Address/Route known	**Seat belts secured**	
Emergency signals on	**Emergency signals off**	

Responders are encourged to modify these checklists to fit local fire department practices.
Revised 5/2013

Appendix R

Ami Karlage Email

From: "Joseph D. Rush, III" <josephrush1@comcast.net>
Subject: Research Project for the National Fire Academy
Date: October 6, 2012 2:05:49 PM EDT
To: gawande@gawande.com

October 6, 2012

Dear Dr. Gawande,

I am a Battalion Fire Chief with the Atlantic City Fire Department and a student in the National Fire Academy's (NFA) Executive Fire Officers Program (EFOP). The EFOP requires students to attend the campus in Emmitsburg, MD for four 2-week classes over a period of 4 years. After attending each class the student is required to submit an Applied Research Project (ARP), which is due 6-months after attendance. For my final ARP I would like to research the feasibility of using checklists within the fire service.

I understand you have a very busy schedule, but I was hoping you could give me a little guidance with my APR and possibly a short interview over the next several months. I am in immediate need of reference material and additional contacts for references and interviews. Your Assistant Liz Guzy had replied to my prior email. Any assistance you or your assistant could lend me would be greatly appreciated.

The goal of the NFA's EFOP is to create a body of research that moves the fire service forward. From what I understand, none of the thousands of ARP's completed have dealt with the usefulness of this tool. I truly believe that your research on checklists can be very useful to the fire service.

Part of my ARP would likely entail creating several checklists and implementing them on a trial basis. Needless to say, any useful information I uncover or develop would be forwarded to you for any possible further use.

Respectfully,

Joseph D. Rush, III
Battalion Fire Chief

117 N. Sumner Avenue
Margate, NJ 08402
(609) 214-6630
josephrush1@comcast.net

From: "Karlage, Ami" <AKARLAGE@PARTNERS.ORG>
Subject: RE: Research Project for the National Fire Academy
Date: October 11, 2012 1:56:24 PM EDT
To: "'Joseph D. Rush, III'" <josephrush1@comcast.net>

Dear Mr. Rush,

I'm happy to give you what help I can. Right now, I think what might be most useful to you is a little bit of background in systems research and thinking (the broader arena into which the checklist fits). Something like The Systems Bible by John Gall (available on Amazon) would probably be a good introduction to the kind of thinking that produced the checklist.

Until you have more specific topics, I think most periodicals or journals would not be as helpful. They tend to be quite targeted in their focus, and I'm guessing that this early in the project, more general information would be more helpful.

Best regards,
Ami Karlage
Research Assistant to Dr. Atul Gawande

Appendix S

The Checklist Builder

The Checklist Builder

What is a checklist?

A checklist is a tool to help you do what you intend to do when accomplishing your most important processes.

A checklist is a simple list of important actions that you could miss. A checklist doesn't include everything you do in a procedure, usually far from it. It's only a list of selected critical items that are important and could have been missed.

Why do experts use checklists?

No matter what your level of expertise, experience and diligence, critical actions will still occasionally be missed. Everyone, in any job, is subject to unexpected interruptions and distractions, and human memory is not perfect.

Checklists are in use in many fields, such as aviation, space, nuclear power, medicine, forensics; really, anywhere that people need to get things right every time. A well constructed checklist enhances teamwork and raises the expectations and performance of the entire team.

A checklist does not:

- teach you to do something
- make you change your practices
- replace or interfere with your judgment or critical decision-making

And using a checklist doesn't imply that you are any less excellent at doing your job. Instead, it only implies that you and your team are human, and that your endeavors are difficult, complex, and subject to unexpected turns.

What are the different kinds of checklists?

Normal and Non-normal Checklists

A normal checklist covers the actions that you intend to do (or at least consider) *every time* in a process.

A non-normal checklist covers contingency actions that may be needed occasionally, or even very rarely.

These two types of checklists are used in different circumstances and used in different ways, so they should be kept separate.

How do I know which processes need a checklist?

In general, the processes that need checklists have one or more of these characteristics:

- critical (errors have safety impact, significant cost, or impact continued business success)
- complex (many or difficult steps, complex environment with stress, team environment, interruptions, distractions, etc.)
- history of errors

If you choose a process that really doesn't need a checklist, the users will figure this out right away, and have a negative experience with the checklist. On the other hand, a well designed checklist applied to a process where it's needed is very quickly appreciated by the users, because they find that it catches their errors and helps them get better outcomes.

We suggest you start with one normal checklist and apply it to a procedure or process that you do often. Go through the whole cycle of developing, testing and refining your first checklist before you take on more. The initial experience will really help.

We also suggest that you involve all the team members who will be affected by the checklist. Each team member will have a different perspective, and the end product will be more effective for the whole team.

Steps in the Checklist Builder:
1. Operational Concept
2. Critical Items
3. Pause Points
4. Reduce and Phrase
5. Format
6. Test and Improve

1. Operational Concept

This means you know exactly what the checklist is for and how it will be used. If you draft the checklist without doing this first, it will probably be awkward to use, and ultimately it may not be used at all. There are eight questions below with background information for each. Write down your ideas for each question. The answers will form your operational concept.

A first step will be to define the beginning and end of the process the checklist will cover. It should be well contained, preferably with the same person or team present for one continuous activity. (Think of an airplane flight, with the pilots conducting the flight from preflight through takeoff, landing, and finishing with engine shutdown.)

Questionaire:

What is your checklist title?

> The title is the name of the process, stated briefly and clearly. This title will be used to call for the checklist and ensure you have the correct checklist.
> Think about the long term, when you may have a number of checklists to choose from. The title should be a unique description of the process. Avoid unnecessary adjectives, such as "high quality", "new", etc.

What are the process beginning and end points?

> State the events or conditions that mark the beginning and end of the process.

Is the process well-practiced?

Is this a well-practiced, frequently accomplished process that the participants typically do from memory? Or is this an infrequently accomplished process, or one that might be done by various people so that a given individual may not be well-practiced in it?

Is this a normal or non-normal process?

A normal checklist covers the actions that you intend to do (or at least consider) every time in a process.

A non-normal checklist covers contingency actions that may be needed occasionally, or even very rarely.

These two types of checklists are used in different circumstances and used in different ways, so they should be kept separate.

Will this be a do-and-confirm or read-and-do checklist?

In a do-and-confirm checklist flow, you will carry out your normal procedures, then at a designated "pause point" you will read a short list of critical actions and confirm they were all completed. If you missed an action, you will do it now. The do-and-confirm checklist flow is generally preferred to the read-and-do flow, and it is best suited for processes that you are well practiced at.

In a read-and-do checklist flow, you will take the actions in real time as the checklist is read out loud. You may also be taking other necessary actions that aren't on the checklist. Read-and-do checklists are best suited for infrequent or unexpected situations where your recall may not be perfect, especially under high stress and time pressure. But read-and-do checklists are generally not preferred, because you are combining the actions in the checklist with other actions, and the sequence of actions in the checklist may not match the sequence that is called for in the unique situation.

What is the physical form of the checklist?

Here are some possible checklist forms, and their pros and cons:

Checklist form	Pros	Cons
Poster on wall	No-one has to hold it, so very good for single user or situations where everyone's hands are busy or must remain sterile	Better when only one process will be done in a room. Only good for one-page checklists. Doesn't work if checklists must be marked.
Laminated card	Different checklist cards can be used for different processes. Easy to re-use. Can be marked with a white-board marker, then erased and re-used. Good for one or two-page checklists (back side) Good for one-page checklist with expanded info on backside	Doesn't work if marked checklist must be kept as a record

Paper checklist on clipboard	Can be marked with data. Can be kept as a record.	Can't be re-used.
Flip-book with tabs	Good for multiple checklists, such as non-normal/contingency checklists	
Tablet computer	Can have electronic check-boxes to keep your place in checklist Can record completion data and other data for automatic upload	Cost Reliability?

Who will call for the checklist?

Identify by title the person who calls for the checklist.

If this is a normal checklist, this person will recognize the pause-point, pause the procedure and call for the checklist.

If it is a non-normal procedure, this person will recognize the condition and the need for action, and must know that the checklist is available so that s/he can call for it by name.

It works much better if this is the highest authority person on the team, so that there is no doubt about the commitment to use the checklist. It should also be clear that anyone in the room who recognizes that the checklist is needed can suggest that it be accomplished.

Who will read and respond to the checklist?

Identify by title the person who will read the checklist out loud. It should be someone who is expected to have the capacity to access and read the checklist in the expected conditions.

For a do-and-confirm checklist, the person to respond to each item should be the person whose area of responsibility the item covers. For example, in a lab process, the item:

"Containers and tools – Inventoried and sterilized"

would be responded to and confirmed by the technician who accomplished this task. But in some cases you may want the person reading the checklist to respond, or the person in charge to respond.

Will the checklist be marked?

In its simplest form, the checklist is on a laminated card or poster that is read aloud at key pause points. There are no actual check boxes and it is not marked.

But it can be more elaborate. To help keep place in checklists (esp. longer, more complex checklists), check boxes can be physically marked with a white-board marker, then wiped off later.

At the extreme, a paper checklist can have permanent check marks, with additional data recorded in designated spaces, signatures and dates, and the checklist kept as part of the quality record for the process. Adding these other functions can have a downside. Not only does it add workload during the process, but if the checklist is kept, the goal shifts slightly from ensuring the best process outcome, to ensuring all the boxes are checked for the record. And the checklist changes from a memory tool that can only help you, to also being a quality enforcement tool that can be used to judge your performance. Keep it simple if possible.

When you have recorded the answers, the Operational Concept statement might look like this:

Sample Operational Concept

Operational Concept Statement for
Production Flight Preparation Checklist

The Production Flight Preparation checklist will cover the process that begins with a crew assigned on the day of the flight, and ends at the conclusion of the pre-flight meeting. This is a well-practiced process.

This is a normal checklist that will be used in a do-and-confirm flow. Exception will be a section for a crew briefing which will be read-and-do.

The checklist will be printed on a laminated card.

The checklist will be called for and read by the Captain. Responses will be by area of responsibility.

The checklist will have checkboxes that are marked, then erased and the checklist reused.

As you continue through the checklist building process, feel free to revisit and revise aspects of the operational concept as needed.

2. Critical Items

Your next step will be to brainstorm the individual items to include in your checklist. These are ***critical actions that, if omitted, may have a significant negative impact on the outcome of the process***.

At this stage, simply list all of the possible items. The list will be sequenced, reduced and wordsmithed later. It's a good idea to take notes on the evidence you found and reasons for including each item. It will be extremely helpful in the future to have notes about your rationale.

Here are some other considerations:
- Base your list on available research. For example, if the impact of various actions and interventions on the outcome of your process is known, use that information to build an evidence-based list of critical actions. Use all available resources: research, literature, other practitioners in the specialty area or related specialties. For a procedure accomplished by a team, consult the other specialties on the team. You may want to go further and compile a background document with as much information as you can gather about the known risks and impacts, benefits from safety practices, and other data that are relevant to the included checklist items.
- If an action has a history of being omitted, definitely include it. If it is rarely omitted but is an important action, it should still be included.
- If an action already has automatic safeguards in place to ensure it is done, don't include it. (For example, something that will trigger a reliable alarm system if it is forgotten.)
- In some cases, the checklist may not contain each action you took, but may have an inspection step that summarizes many actions. For example, if the detailed procedure included a series of tests, settings and adjustments to a piece of equipment, all of those actions may be covered by a checklist step that inspects the main status display of the machine.
- Consider items that prepare the team for unexpected contingencies, for example having extra safety equipment or extra supplies available or backup help for possible emergencies.
- Consider items that are focused on good teamwork, such as:
  - team introduction: each team member states their name and role

- briefing: the person in charge briefs the process, and highlights any special considerations that may apply
- statement of concerns: team members are invited to voice any special considerations or concerns
- For a non-normal checklist, consider the item, “Call for help”. This action is sometimes taken too late.

When you have compiled your list of critical items, you are ready to choose your pause points.

3. Pause Points

Now you will choose your pause points. These are points in the process when you are willing to pause for 20 seconds to 2 minutes, to make sure critical actions have been completed, before you move on to the next phase of the process. The number of pause points depends on the complexity of the process and how many natural phases it has. A simple process may have a single pause point, while a transport airplane flight has ten pause points.

Note that pause points apply primarily to do-and-confirm checklist flows. You may not have pause points in a read-and-do checklist.

Here’s how to do it:

A. Organize your critical actions chronologically and note by what point in the process each must be done.

B. Choose the natural stopping points in your process, when it’s a good time to check everything before going on to the next critical phase, and group the critical actions under each pause point.

Your checklist is organized by pause points and critical items, but it’s still a rough draft at this point.

C. Make sure that if any of the critical actions had been missed, it’s not too late to correct the mistake at the time of the pause point. If you find that a critical action can’t be corrected at the pause point, you may need to shift the pause point earlier, or you may need to add an earlier pause point.

Here are some more considerations for pause points:

- They need to be tied to events that reliably occur every time in the process. For example “Before takeoff” is a good pause point in a flight checklist, but “Before entering icing conditions” is not a good pause point because it may or may not happen during a flight.
- The event that cues the pause point should be unambiguous and easy to recognize for everyone on the team.
- The best pause point is phrased as “Before...” such as “Before anesthesia”. They can also be phrased as “At...” or “When...”. Pause points are less effective if they are phrased as “During...” or “After...” These are less definite events, harder to identify and may be delayed too long or missed altogether.
- The pause point should not itself be a critical action that could be missed. For example, “Before selecting landing flaps” is not a good pause point. On the day when everything is going wrong, the landing flaps may not be selected (and some other critical action may be missed too) and the checklist may not be read for that critical phase. This is probably the day the checklist is needed the most.

This is another good time to take notes on your rationale for choosing the pause points and organizing the items the way you did.

When you have chosen your pause points and organized all of the critical actions under the pause points, you are ready to refine the checklist.

4. Reduce and Phrase

A. Your draft checklist may have exactly the right number of items, or it may be too long. In this step you are going to reduce to the minimum number of critical items and refine the phrasing of the items so they're clear and concise. Keep in mind the philosophy behind the checklist when doing this step:
- The checklist (especially a normal checklist) is meant to jog your memory to make sure the "killer items" are done. It's not giving detailed descriptions because you are already an expert in the process. So the pause points and items will be very briefly and concisely expressed.
- The real test of the checklist is, will it be used? And the number one reason it won't be used is because it takes too much time to read. So we have an overarching goal to make the checklist easy and painless to use, and that means it's as brief as it can be, while still catching the killer items.

For each pause point, consider how much time is available. For example, you may be willing to take a few minutes to make sure everything is ready at the "Before opening active agents" pause point in a chemical or biological lab process. But at a point in the middle of a complex process that can't be stopped, you may only want to pause 15 seconds to read three critical items.

Also think about the process when things are going wrong. You may have even less time for a checklist, but the checklist is most needed under these off-nominal, high-stress conditions. Those are the conditions when important items tend to be missed.

Weigh the importance of the items, considering the evidence for each one, against these considerations, and trim the list of critical items down accordingly. Then record your rationale for the items that were kept, as well as the items that were dropped.

If you have removed some items, look again at the pause points. Are they still appropriate, given the remaining items?

B. You may want to iterate this next step with step A above, because they affect each other. In this step you will carefully phrase the items to be clear, brief and consistent.

The best form is an "Item – Action" form. For a do-and-confirm checklist, this will be in the past tense for actions you will confirm by memory were done, or the present tense for items you will visually confirm as the checklist is being read. For example:

- Flight squawks - checked
- Weather - checked
- Airplane options - reviewed

In some cases you will need to list several things in one checklist item. Use a list form for readability.

Format like this:

- Weather checked:
  - Current and forecast
  - Icing levels and turbulence
  - NOTAMS

Not like this:

- Check the current and forecast weather, icing forecast at various levels, and NOTAMS.

There are many format variations that may be required, depending on what the item must convey.

How much detail should be in the items? To determine that, think about the actual error you are trying to prevent. If “lab fire safety equipment” always comes together as one kit, you can simply say:

- Lab fire equipment ready

But if the fume hood may be forgotten on its own, you should include the details to catch the error:

- Lab fire equipment ready:
  - Fire extinguisher
  - Respiratory gear
  - Fume hood

You may still feel that some items need more explanation or detail than you want to put in the actual checklist. If your checklist is a one-page card, you can asterisk the items on the front that need expanded detail, and list the details for reference on the back. It’s best to keep the expanded information separate from the actual checklist, or if it’s on the same page, arrange the graphical elements so that it’s clear that the additional information is not part of the checklist itself. The goal is to be sure the checklist itself is always read in its entirety. As soon as you mix detail that is meant to be optional in the actual checklist, that opens up the door to other items being skipped, and it’s not really functioning as a checklist any more.

Finally, when you think you have reduced and phrased the checklist to be clear and concise, do a “single word check”. Look at each word individually and see if it can be removed without changing the meaning of the item. You may be surprised at the extra words remaining in your checklist.

C. In what order should the items appear under each pause point? For a read-and-do checklist, the items will always be in chronological order. But for a do-and-confirm checklist, there are a few ways to go:
- chronology
- criticality
- physical flow

Chronology: Placing the items in the sequence in which they occurred may help the team flow through the checklist, as they recall or confirm whether each item has been completed.

Criticality: There is also an argument to be made for placing the most critical killer items first, because the fact is that interruptions and distractions can occur, and the checklist may sometimes not be finished. If that happens, at least the most important items have probably been checked.

Physical flow: If the act of completing your checklist will largely be the act of inspecting the condition, settings or readiness of control panels, a machine, or a room or facility, the checklist should flow the same as the physical flow pattern that is the most logical and repeatable to inspect the physical object or area you are checking.

Decide which consideration seems most applicable to your checklist, and make notes on your rationale for item sequence.

You now have the content of your checklist defined, so all that remains is to format the checklist.

5. Format

Your checklist may take many forms. Here are some general formatting guidelines to help make the checklist usable and effective:

- Mixed case is faster and easier to read than all caps.

Examples:

- Notes and FMC messages reviewed
  vs.
- NOTES AND FMC MESSAGES REVIEWED

- The easiest fonts to read are simple sans serif fonts, such as Arial and Gill Medium

- The larger the font, the better for readability. The best checklist is uncluttered with a limited number of items, large (12 or larger) point font, and ample line space between checklist items. It's easy to get lost or skip items if the checklist is dense, cluttered or the line items and columns are packed together.

- Contrast between the type and background helps readability. Black type on a white background is best. An example of low contrast would be blue type on a green background. Avoid shaded or colored areas that reduce contrast.

- Make sure the list flow is instantly apparent to the eye. The lists should be vertical and aligned, and the sequence of pause points should have a clear left-to-right flow. Elements that are "floating" or out of alignment will cause the reader to lose his/her place and skip items.

- It is generally ineffective to use colors and symbols to code information in the items. For example, using green font for items that are to be read by the Lead Technician, and italics for items that need to be double checked. People tend not to notice the coding, or forget what it means. It's better to make such information explicit with text, if it is necessary at all. Also, colors are lost as soon as the checklist is printed or copied in black and white.

Congratulations! Your checklist is ready to test.

6. Test and improve

Your checklist has been carefully crafted, probably at your desk or in front of a computer. It's time to try it out in the real world, with real people, in the real-time flow of your process. It may play out a little differently than you expected. Here are some suggestions for the testing phase:

Involve all of the team members in the testing, and be sure everyone is familiar with the checklist and briefed on its use. If possible, run through the checklist out loud, including the actions and responses expected, before using the checklist in actual practice.

If practical, have other practitioners who do the same process test the checklist.

Take note of whether:
- The pause points are in the right place.
- The items are being interpreted as intended.
- The checklist can be used in accordance with the Operational Concept that you developed earlier.

After some experience using the checklist, you may only need small changes to get the checklist working well. If you find that it isn't working well, taking a second pass through the checklist builder process, starting with the Operational Concept, may help clarify the issues.

End of the Checklist Builder

Appendix T

Checklist For Checklists