CFCA and IAFC Survey Review and Analysis Final Report

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Executive Summary

- Officials with IAFC and CFCA successfully administered a questionnaire regarding firefighter backgrounds, interests, and motivations to a large number (845) of Connecticut Firefighters
- Descriptive statistics and visualizations (charts, graphs, etc.) give an overview of the population and the responses regarding recruitment and retention motivations
    - The employment status of the respondents is "All Volunteer (74.4%) with 14.7% more that have some volunteer duties. Only 10.9% of respondents are "All Paid" firefighters
    - The Years of Service of respondents ranges from less than 1 year to 65 years. Due to the wide and uneven distribution of Years of Service values, these were reclassified into 5 categories to significantly reduce interclass variation
    - The responses to inquiries regarding the Motivation to Join the Fire Service are dominated by friend or family referrals and other personal contact with firefighters
    - An examination of firefighter beliefs for others leaving the fire service shows that 75% of the responses fall into two broad groups "Other Commitments" and "Leadership Issues"
- The analysts use categorical responses from the survey to create cross-tabulations and visualizations between variables in order to illustrate the relationships between them
- For this report, the Chi-squared statistic tests the strength of the correlations between variables.
    - Correlation analyses with the "Years in Service" variable determine related characteristics of tenured firefighters. The results indicate:
        - Longer serving firefighters are more likely to enjoy administrative duties
        - Longer serving firefighters are less likely to enjoy medical and HAZMAT duties
    - Correlation analyses on Motivations to Join the service were conducted on a subset of responses to determine what, other than personal contact, led to recruitment. Special Events were valuable for recruiting those who did not already have acquaintances in the fire service
    - Correlation analyses of the questions regarding social media use and perceptions of benefit can inform the recruitment strategies going forward
        - More than 60% of all respondents reported that they used Facebook
        - Firefighters with more years of service are less likely to use Facebook than would be expected, compared to their more recently enlisted counterparts
        - Among all groups of firefighters (regarding years of service), fewer felt that Facebook is a good recruitment tool than responded they use Facebook themselves
- Steps moving forward should include:
    - Informing the marketing strategies under development using the descriptive statistics/visualizations and correlation analyses herein,
    - Performing additional statistical analyses and exploring more relationships in the survey, and
    - Making suggestions to improve future survey efforts using the lessons learned from the analysis of this survey

Background and Overview

A survey regarding background and recruitment and retention issues as perceived by Connecticut firefighters was administered from March 2012 through May 2013. Several parties (researchers and practitioners) reviewed and revised the survey before finalizing it and making it available to the firefighters. The survey was available to firefighters in digital form via an online survey system (Survey Monkey) and in paper form when firefighters requested access to a written survey.

There were 845 responses to the survey from both electronic and paper versions. As is common with large surveys of this type, some respondents only chose to answer a subset of the questions. For the analysis below, this will lead to slightly different values of "n", the total number of respondents, depending on which question is being analyzed. Details regarding the number of responses are given in the "Response Rates" section below. The answers to all of the questions were not mutually exclusive, and in two instances, the respondents had the opportunity to choose multiple responses. In addition, on some questions, the firefighters were given the option of answering "N/A" or "Not applicable", or they had the option to leave questions blank.

The survey asked a series of questions of the firefighters in several broad categories:

- Basic information items such as Firefighter Status, Primary Occupation, Years of Service, and some demographic information
- Enjoyment levels that firefighters felt for various duties and the time spent each week completing those duties
- Enlistment reasons that compelled their call to fire service
- Social circle structure of the firefighters before and after recruitment
- Motivations firefighters felt for remaining in the fire service, and beliefs regarding why others had left the fire service
- Social media use and firefighter beliefs regarding its effectiveness for recruitment efforts

Officials collected the raw data from the digital and written surveys, and analysts reviewed the findings and generated this report based on those responses.

Nature of the Survey Questions and Potential Analytical Methods

The data from the survey were primarily categorical in nature. That is, officials asked the firefighters to respond to questions in a format similar to that of a Likert Scale, which has several categories on an ordered scale. As an example, in this survey, the firefighters answered questions on the extent to which they enjoyed performing administrative tasks as part of their job. The possible response categories included "I like it very much," "I like it," "Neutral," "I don't like it," or "I strongly dislike it." Since these responses were categorical rather than continuous in nature, there are limitations to the quantitative analyses that can be performed. Due to these limitations, this report includes two types of analyses - descriptive and correlative – that are valid on these types of data. The descriptive analyses include descriptive statistics, such as averages or median values, and descriptive visualization techniques, such as frequency distributions or histograms. The correlation analyses limit comparisons to pairs of variables using cross-tabulations and Chi Squared tests for independence. This report begins with an explanation of response rates, continues with descriptive statistics, and then focuses on the methods for correlation analysis.

Response Rates

The response rates for the questionnaire, which listed 15 questions, varied by question. Every respondent answered the first question on "Firefighter Status (Volunteer/Paid)." Therefore, this was the only question for which we have an absolutely complete dataset of responses. For the question regarding "Primary Occupation" 104 respondents left this question blank, giving a non-response rate of 12%, although it should be noted that all but 13 of those 104 had also noted their status as "All Paid Firefighter". They may have felt that the question had already been sufficiently addressed, although a response of "I work only as a paid firefighter" was an available response for the "Primary Occupation" question. 706 respondents provided a full street address, while an additional 12 respondents provided their city and state only.

Overall, as noted in the following table, the rates at which the respondents omitted answers – the non-response rates – generally increased from 0% to 16% with the progression of survey questions. The "Primary Occupation" question noted above was the only significant deviation from this pattern. This derivation from the trend may indicate the need for changes to the format or content of this question.

Such a decrease in response rate is not unexpected, since respondents will sometimes tire of answering questions or be distracted from the survey, causing them to omit responses on later questions in a survey of this length. Although alterations may improve future non-response rates on questions, some respondents may still leave questions blank when completing a lengthy series of questions. Moreover, future survey architects should consider the importance of questions for the analysis of recruitment and retention prior to subsequent survey efforts, so that the questionnaire lists questions with greater importance at the beginning of the survey.

Questions	Topic	Responses	Blanks	Non-Response Rates
1	Firefighter Status (Volunteer/Paid)	845	0	0%
2	Primary Occupation	741	104	12%
3	Years in Service	824	21	2%
4	Professional Likes and Dislikes	815	30	4%
5	Time Spent on Job Duties	776	69	8%
6	Primary Motivation to Join	770	75	9%
7	Peers in Fire Service Before Joining	761	84	10%
8	Peers in Fire Service Now	761	84	10%
9	Speculation Why Others Left	757	88	10%
10	Motivations to Continue in Service	750	95	11%
11	Other Motivations for Serving	745	100	12%
12	Location Information	706	139	16%
13	Social Media	720	125	15%
14	Age	713	132	16%
15	Fire Department	716	129	15%

'Other' Responses

Four areas of the survey permitted firefighters choose "Other" as an option, and then to write in responses that were not among the predetermined alternatives. These four areas were Primary Occupation, Primary Reason to Join the Service (2 related questions), Why Others Left the Service (2 related questions), Motivations to Stay in the Service. The number of respondents who chose the "Other" option and added a text response for the four areas were:

- Primary Occupation – 154 responses

- Reasons to Join the Service
  - Enticements to Join the Service (Other) – 152 responses
  - Primary Reason to Join the Service (Other) – 148 responses
- Reasons why Others Left the Service
  - Why Others Left the Service (Other) – 64 responses
  - Primary Reason Others Left the Service (Other) – 30 responses
- Motivations to Stay in the Fire Service (Other) – 17 responses

While it is difficult to quantitatively analyze these responses further, due to the idiosyncratic nature of the individual opinions, a qualitative overview can have some value.

With regard to Primary Occupation (Other) several groupings of related responses appear. These included Public Safety (Dispatcher, Corrections Officer, Emergency Medical Technician (EMT), Other Fire Related, Law Enforcement, Paramedic), Automotive and Transportation (Automotive, Diesel Technician, Fleet Manager, Mechanic, Truck Driver), and Caregiving (Daycare, Stay-at-Home-Mom/Dad).

For the two questions concerning the Reasons to Join the Service, the dominant groupings of responses included Family Traditions of Firefighting, Desire to Volunteer or Provide Community/Civic Service, Interest from other Groups (Boy Scouts, Military), Recruitment Efforts, and Employment Opportunities.

When firefighters described their opinions regarding why Others Left the Service (on two questions) their responses fell into the areas of Leadership (Chief, Officers, Administration), Career v. Volunteer Issues, Injury or Burn out, Retirement, and Unfair Treatment (Bullying, Harassment, Mistreatment).

Finally, when firefighters added other reasons why they choose to stay in the service there was no broad consensus. Several responses focused on education; both the opportunities to learn and the opportunities to train others.

Non-mutually Exclusive Questions

With two questions, "Enticement to Join the Fire Service" and "Speculation Why Others Left the Fire Service" (Question 9), the questionnaire format gave the respondents the opportunity to choose multiple answers. Multiple choices generated 1,156 responses for the "Enticement to Join" question and 2,892 responses for the "Speculation Why Others Left" question. This analysis will review the responses with respect to this modified answering approach.

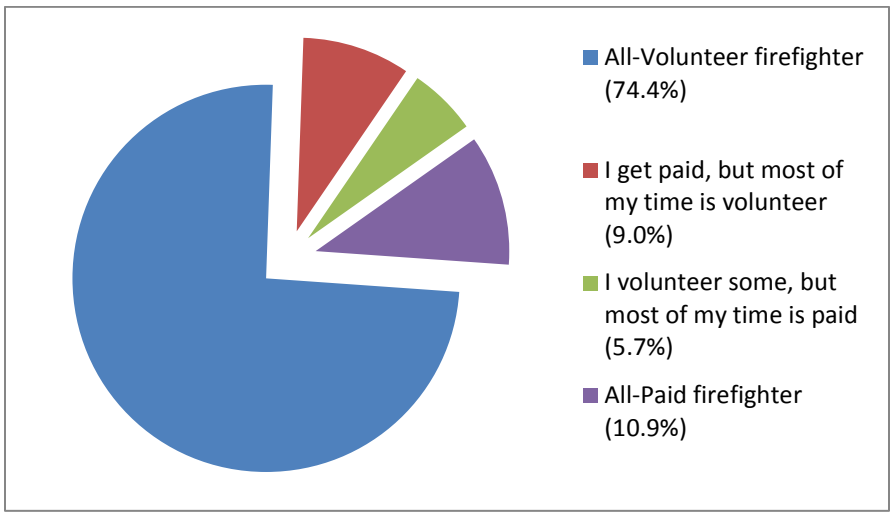
Descriptive Analysis

Descriptive statistics regarding several of the question areas are provide to show the nature of the respondent population, and some of the most prominent trends in their responses.

Descriptive Analysis - Status

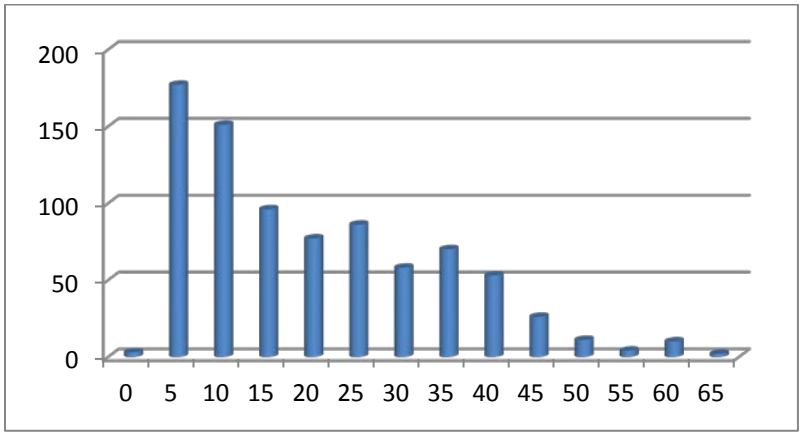
First, the survey segmented the respondent firefighter population into four status groups, "All Volunteer," "All Paid," "Paid/Mostly Volunteer," and "Volunteer/Mostly Paid." Among the groups, the largest was "All Volunteers" comprising nearly three quarters of the population (74.4%). An additional 9% (76 respondents) self-identified as "Paid/Mostly-Volunteer". 48 respondents (5.7%) described themselves as

"Volunteer/Mostly Paid", leaving 92 respondents (10.9%) who consider themselves to be "All Paid" firefighters.

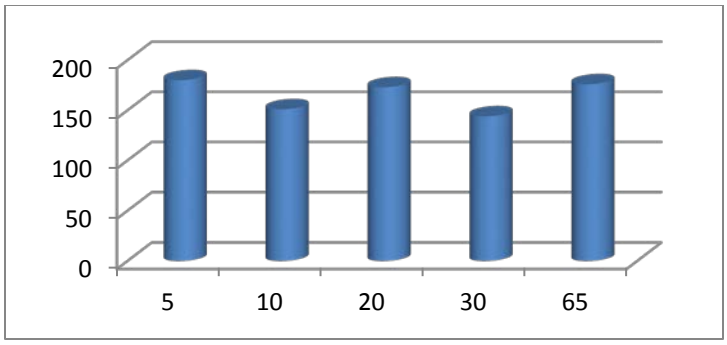


Descriptive Analysis – Years in Service

Next, Question 3 addressed the "Years in Service" category for each respondent; the range of values was from 0 (presumably indicating less than one year in service) to 65. The chart below shows a histogram of "Years in Service" using 5 year service cohorts.



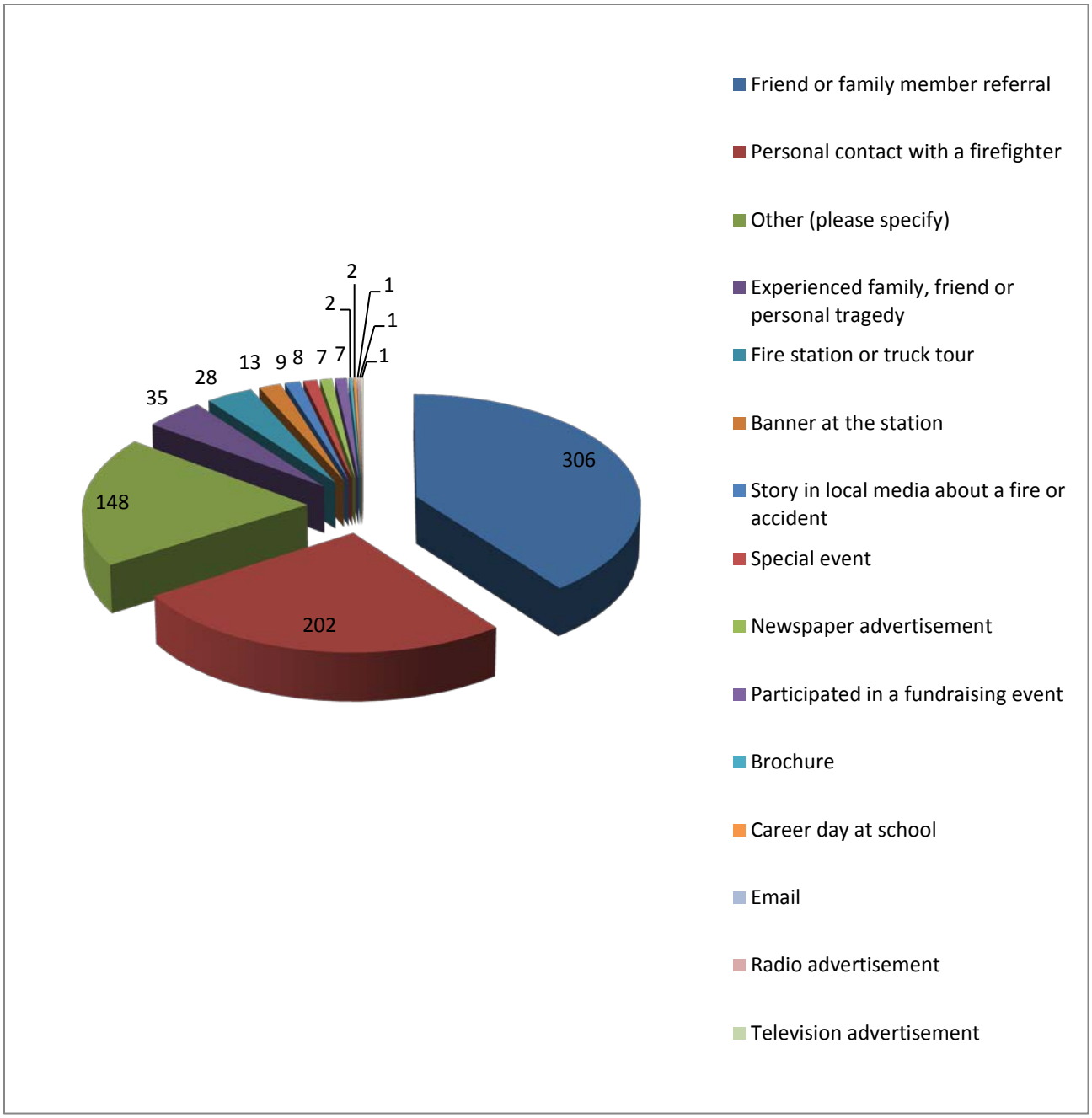
For analysis with other categorical variables from the survey, these respondents were classified into five categories in order to minimize the differences between classes. The age groups were 1) Up to 5 years of service, 2) 6 to 10 years of service, 3) 11 to 20 years of service, 4) 21 to 30 years of service, and 5) 31 to 65 years of service. The distribution is significantly more even with this classification as can be seen in the graph below.



Descriptive Analysis – Motivations to Join the Fire Service

Although many firefighters chose many options when permitted to describe their motivations for entering the fire service, we begin here by examining what they identified as their primary motivation for doing so. As the chart below shows, the motivation for joining the fire service is dominated by two categories; "Friend or family member referral" and "Personal contact with a firefighter". Nearly two thirds of the responses (65.8%) were in one of these two categories. When responses of "Other" are included, many of which dealt with personal or generational ties to the fire service, this trend becomes even smaller. This result is consistent with results from several other surveys of firefighter motivations. Remarkably, information from media outlets (Radio, Television, Newspaper, Local Media) were the primary recruitment motivator for only 18 respondents; less than 3% of those surveyed.

These results could be interpreted to provide either difficulties or opportunities for recruitment of volunteer firefighters. On the one hand, the dominance of personal contact for success in recruitment could mean that that is really the only successful means of recruiting volunteers. On the other hand we know that advertising can be an effective means of motivating people to act, and perhaps the best means of advertising to generate volunteers has not yet been determined or implemented. We explore some of these ideas in the section on correlation analysis below.



Descriptive Analysis – Why Others Left the Fire Service

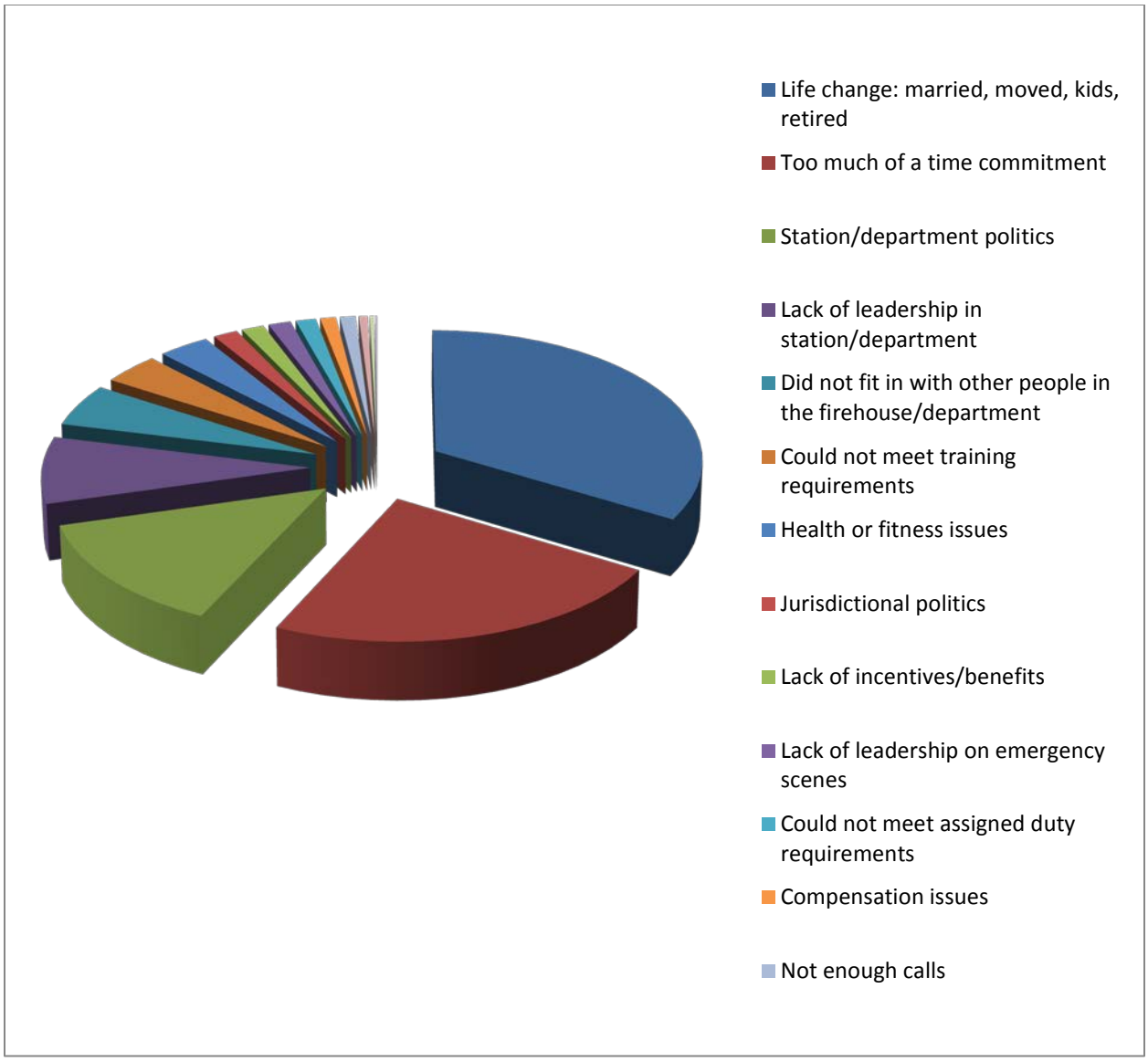
One of the survey questions tallied the impressions from firefighters about their beliefs regarding why others had chosen to leave the fire service. This question is designed to highlight retention issues and to suggest approaches that may lead to increased retention of volunteers. The results of that question are displayed graphically below. Two groupings of responses clearly dominate the beliefs of firefighters; we term those groupings "Other Commitments" and "Leadership Issues".

The "Other Commitments" group contains the top two response categories of "Life change: married, moved, kids, retired" and "Too much of a time commitment". The 393 responses for this category represent more

than 50% of the total number of responses received (51.9%). These reasons for leaving the service are external to the fire departments themselves, and strategies to combat them may do well to focus on accommodating firefighters schedules and commitments rather than making some fundamental change in the department itself.

The second grouping – "Leadership Issues" – consisted of the responses "Station/department politics", "Lack of leadership in station/department", and "Did not fit in with other people in the firehouse/department". These responses represented nearly another 25% of the total responses to this question. The responses to "Other" that were discussed above having a focus on leadership, management, and treatment in departments confirm that this is an issue worthy of further examination. These issues are internal to the department, and may suggest that introspection regarding departmental policy would be of value, and opportunities for team-building and leadership training could increase retention among volunteers. The nature of which sub-populations chose these options is explored further below.

As a note, we omitted two categories; "Other" which is discussed above, and "I have no idea" which does not lead us to conclusions regarding retention issues.



Correlation Analysis Methods – Cross Tabulations

Beyond examining the distribution of responses, analysts can – within limits – derive quantitative correlations between the responses to pairs of questions. Determining the level of correlation between variables suggests what characteristics of firefighters might correlate with traits that are associated with long-serving firefighters (retention). In addition to these characteristics, other correlated traits might inform processes to encourage firefighters to volunteer for service (recruitment).

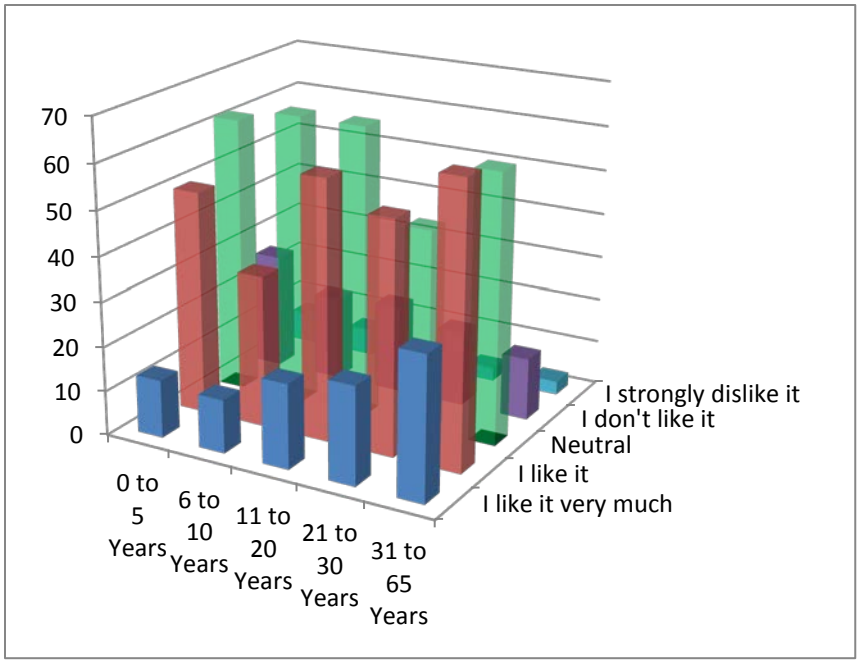
Correlations begin by generating cross-tabulations between any two variables. This process essentially produces a two-dimensional frequency distribution with the categories for one variable tabulated in rows and the categories for the second variable tabulated in columns. The value in any cell of the resulting matrix is the count of respondents who chose both the category associated with the row variable and the category associated with the column variable. For example, the following table shows the cross-tabulation of the variables "Years in Service" and "Enjoyment of Duties-Administrative."

	Enjoy Duties - Administrative					
Years in Service	**Like it very much**	**Like it**	**Neutral**	**Don't like it**	**Strongly dislike it**	**Total**
0 to 5 Years	13	50	62	26	7	158
6 to 10 Years	12	34	65	19	6	136
11 to 20 Years	19	58	65	20	3	165
21 to 30 Years	22	52	45	17	3	139
31 to 65 Years	32	63	60	14	3	172
Grand Total	**98**	**257**	**297**	**96**	**22**	**770**

This cross-tabulation allows comparisons to determine the correlations between these variables. In the example above, some trends are clear in these numbers. First, in nearly every cross-category, many firefighters are neutral with regard to their enjoyment of administrative duties. However, over 55% of the firefighters who have 21 or more years of service, chose the categories of "Like it very much" or "Like it" with regard to their enjoyment of administrative duties, while the corresponding percentages for the other years in service categories are 39.9%, 33.8%, 46.6%, and 53.2%, respectively.

Based on these figures it appears that there is a relationship between years of service and enjoyment of administrative duties. As years of service increases, so does the likelihood of enjoying administrative duties. Although it remains to be seen how strong this relationship is, and while the correlation between enjoyment of administration duties and length of service may not represent a causal relationship, the relationship exists nonetheless. In this case, these results could be interpreted to mean that one may be able to encourage retention by 1) targeting persons who are more predisposed to administrative duties, 2) making administrative duties more attractive to firefighters with fewer years of service, or 3) reducing administrative duties altogether for more junior firefighters.

With this cross-tabulation, it is possible to visualize the values of the matrix in three dimensions. In this case, the results include the counts of firefighters choosing their respective categories. This three-dimensional visualization provides the ability to view the general trend of the responses across the two variables.



Correlation Analysis Methods – Chi-squared Test for Independence

Finally and perhaps most importantly, the Chi-squared test for independence uses these cross-tabulations to test the strength of the correlation relationship between these two variables. This test is appropriate with two categorical variables from the same population, which is the case here. Moreover, the sampling strategy is simple-random sampling where no firefighter has a greater chance than any other to complete the survey, and the sample is no more than one-tenth the size of the population. In this case, the 845 responses represent significantly less than 10% of the total number of firefighters in Connecticut – approximately 26,435 in 2005.

In order to determine the extent to which we can determine the category of one variable from the category of the other variable, we first need to formulate our null and alternative hypotheses. In the case of this example, the hypotheses are:

- Null hypothesis → N_0 = The responses to "Years in Service" are independent of the responses to "Enjoyment of Duties – Administrative"
- Alternative hypothesis → N_a = The responses to "Years in Service" are not independent of the responses to "Enjoyment of Duties – Administrative"

If we can reject the null hypothesis, and therefore accept the alternative hypothesis, we can act with some certainty in the knowledge that we can predict the response to one variable from the response to the other. If we can predict a level of enjoyment for administrative duties based on "Years in Service" we can use this to our advantage in recruitment and retention efforts.

Once we have established our analytical framework, we can use the Chi-squared test for independence to determine whether we can reject the null hypothesis with some level of certainty. This test requires us to determine the number of degrees of freedom available for the test. Generally, the degrees of freedom are the number of independent pieces of information available to generate the value of the statistic.

In the Chi-squared test, the equation to calculate the degrees of freedom is as follows:

$$\text{d.f.} = (r - 1) * (c - 1)$$

where r is the number of categories for the row variable, and c is the number of categories for the column variable.

The Chi-squared test determines the level of correlation based on the difference between the expected frequencies and the observed frequencies in each cell of the cross-tabulation. We therefore must compute r * c expected frequencies, according to the following formula:

$$E_{r,c} = \frac{(n_r * n_c)}{n}$$

where $E_{r,c}$ is the expected frequency count for level r of the row variable and level c of the column variable, n_r is the total number of sample observations at level r of the row variable, n_c is the total number of sample observations at level c of the column variable, and n is the total sample size. In the example using the cross-tabulation given above, the calculation of the expected value for the 1st row and 4th column cell (with an observed frequency of 26) would be calculated as:

$$E_{1,4} = \frac{(158 * 96)}{770} = 20$$

The test statistic itself compares the observed and expected frequencies by using of the following equation:

$$X^2 = \sum_r \sum_c \frac{(O_{r,c} - E_{r,c})}{E_{r,c}}$$

where $O_{r,c}$ is the observed frequency count in cell r,c and Er,c is the expected frequency count for the same cell.

With a value for the Chi-squared test statistic in hand, and the appropriate degrees of freedom, we can compare the value of the test statistic against the reference Chi-squared distribution. This comparison allows us to determine the probability that the correlation we see in the data happened by random chance. If it is unlikely that the correlation is due to random chance, then we can reject the null hypothesis and act with certainty in the knowledge that the variables are related.

The probability level at which the null hypothesis is a subject of considerable debate, and is generally based on discipline or area specialty norms. A p-value of 0.05 is common, although there is substantial variation in accepted values. For the example above, the derived p-value is 0.03. This means that a value of this statistic, as extreme as the value found in this case, only occurs 2 times in 100 by random chance. Therefore, it is very

unlikely that this relationship has occurred due to random chance, and with that level of certainty, we can reject the null hypothesis that these variables are independent.

In the following section, we use the cross-tabulations, their visualizations, and the Chi-squared test to examine a series of relationships and make suggestions about potentially significant relationships that may have consequences for recruitment and retention of firefighters.

Correlation Relationships that Suggest Actions for Recruitment and Retention

Since the survey results database has 96 variable columns that correspond to firefighter responses, it is theoretically possible to generate correlations from every possible pair of variables. However, these combinations would generate 96*95 = 9,120 correlations. We do not recommend generating this number of correlations for two reasons; first, many of these correlations would not make logical sense. For example, correlating a variable measuring why a firefighter is compelled to enlist with a variable describing why firefighters believe others have left the service would not generate actionable information. Second and perhaps most importantly, it would be extremely difficult to derive actionable information from that many correlation data points.

In the light of the issues in this section, we select variables for correlation analysis that we feel may give some insight into the motivations of firefighters to do their jobs and to stay in their jobs for an extended time. In this spirit, we focus on the variable of "Years in Service" as it appears to be appropriate for measuring the characteristics of tenured firefighters. The first example that follows focuses on the variables regarding "What Compelled your Enlistment" for insight into recruitment. The second example looks into issues regarding the use of social media to inform recruitment efforts.

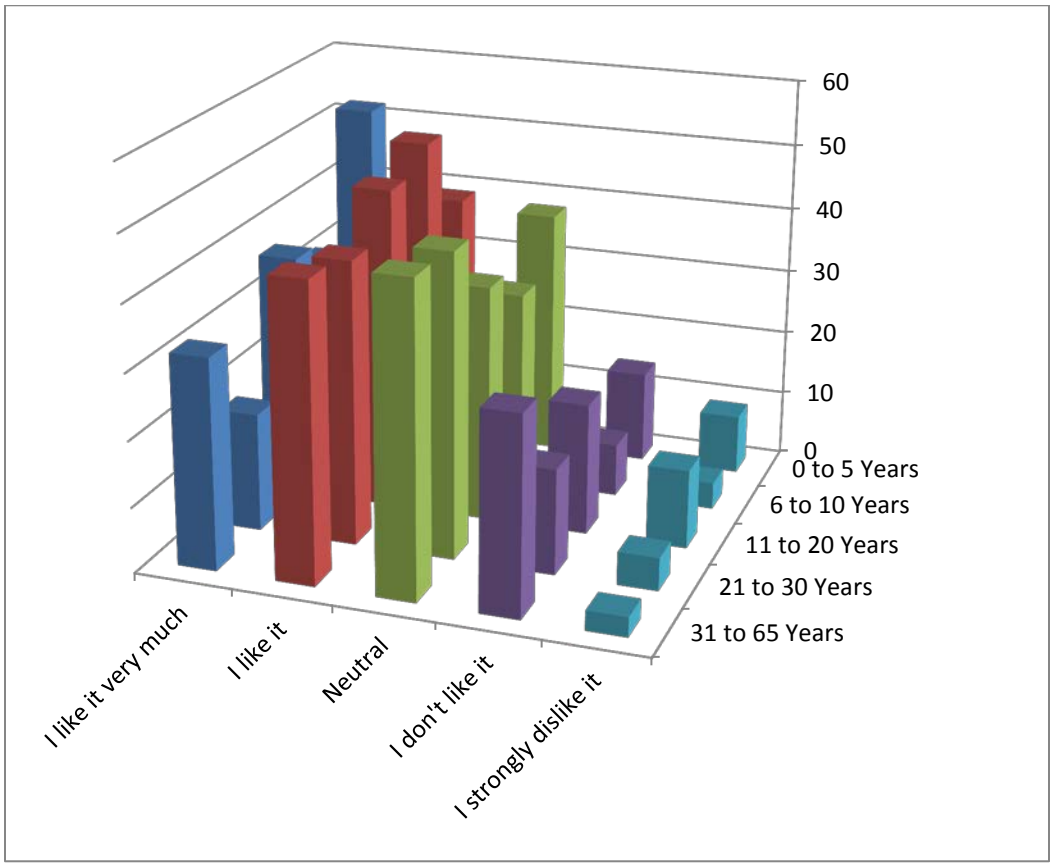
Correlation Analysis - "Years in Service"

In contrast to the above example where longer serving firefighters are more likely to enjoy administrative duties, there are less-popular duties among firefighters with greater time in service. When we examine the correlation between "Years in Service" and "Enjoyment of duties – Medical Response" we see a strong relationship between length of service and a **drop** in the enjoyment of this type of duty. We include both the actual and the expected values in the tables below.

By examining the cross-tabulations of observed and expected values we can see that there are far fewer firefighters who have served 31 or more years who respond that they "Like it very much" or "Like it" with regard to "Medical Response" duties than is expected. Further, there are more respondents than expected in younger years of service cohorts that respond that they "Like it very much" or "Like it". The Chi-squared statistic is extremely strong in this case with a p-value of 0.0003, suggesting that such a strong relationship would only be observed through random chance approximately 3 times in every 10,000 surveys. We can be very certain that the affinity of younger firefighters for Medical Response duties that we observe is not a result of random chance.

Actual Values	Enjoy Duties – Medical Response					
Years in Service	**Like it very much**	**Like it**	**Neutral**	**Don't like it**	**Strongly dislike it**	**Total**
0 to 5 Years	52	39	38	14	9	152
6 to 10 Years	32	52	30	8	4	126
11 to 20 Years	37	49	36	20	12	154
21 to 30 Years	18	43	46	16	5	128
31 to 65 Years	32	45	47	30	3	157
Grand Total	171	228	197	88	33	717

Expected Values	Enjoy Duties – Medical Response					
Years in Service	**Like it very much**	**Like it**	**Neutral**	**Don't like it**	**Strongly dislike it**	**Total**
0 to 5 Years	36	48	42	19	7	152
6 to 10 Years	30	40	35	15	6	126
11 to 20 Years	37	49	42	19	7	154
21 to 30 Years	31	41	35	16	6	128
31 to 65 Years	37	50	43	19	7	157
Grand Total	171	228	197	88	33	717



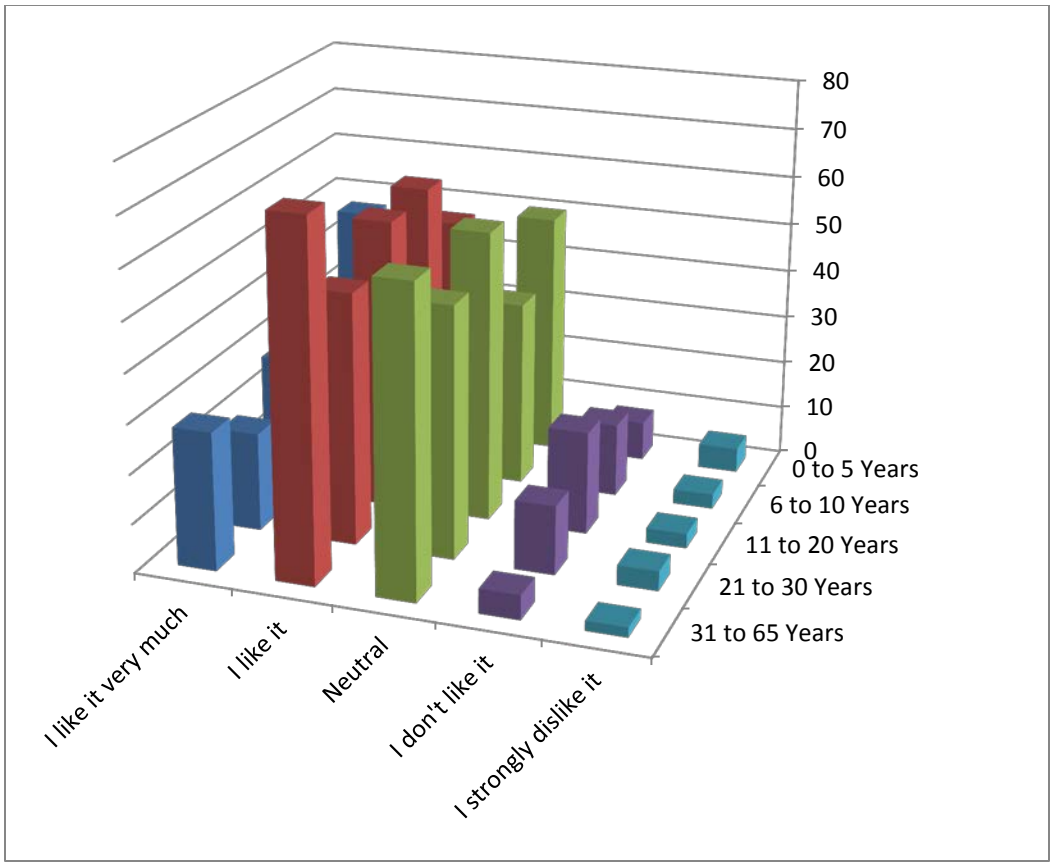
So there appears to be a very strong relationship between less of an affinity for medical response and length of service. Why does this relationship exist and how can it encourage retention? Is this a reflection of a change in duties over a number of years, where more medical response is now the norm? Is it possible that firefighters who enjoy medical response are leaving to pursue greater opportunities to practice that duty? If

so, are there means of encouraging them to stay, perhaps by increasing medical response training for those who are interested?

A similar relationship exists with the cross-tabulation between "Years of Service" and "Enjoyment of Duties – HAZMAT." This has a low p-value (0.004), suggesting a strong correlation between the variables. Again it is the younger firefighters (those with fewer years of service) who tend to enjoy HAZMAT response more often than expected.

Actual Values	Enjoy Duties – HAZMAT					
Years in Service	**Like it very much**	**Like it**	**Neutral**	**Don't like it**	**Strongly dislike it**	**Total**
0 to 5 Years	47	47	50	8	5	157
6 to 10 Years	27	60	38	15	3	143
11 to 20 Years	28	59	59	21	3	170
21 to 30 Years	20	51	51	14	4	140
31 to 65 Years	28	72	62	5	2	169
Grand Total	150	289	260	63	17	779

Expected Values	Enjoy Duties – HAZMAT					
Years in Service	**Like it very much**	**Like it**	**Neutral**	**Don't like it**	**Strongly dislike it**	**Total**
0 to 5 Years	30	58	52	13	3	157
6 to 10 Years	28	53	48	12	3	143
11 to 20 Years	33	63	57	14	4	170
21 to 30 Years	27	52	47	11	3	140
31 to 65 Years	33	63	56	14	4	169
Grand Total	150	289	260	63	17	779



Again, it may be that these specialized response duties appeal more to younger firefighters, or that these duties are not the norm when the older firefighters entered the service.

However, from these results, it appears that there are clear differences in duty preferences.. The firefighters who have served for various lengths of time have different preferences for duties. Firefighters who have served for longer are more likely to enjoy administrative duties, and they are less likely to enjoy medical response or HAZMAT response.

Correlation Analysis - "What Motivated you to Join?"

Based on the results of this survey, there are several challenges in addressing issues of recruitment. First, of course, officials administered the survey to existing firefighters, a group that has already gone through several – if not many – screening processes since their initial recruitment. Therefore, by its nature, this survey does not capture the responses of those who expressed interest but never completed the process of becoming a firefighter. Second, many of the respondents have served for more than 11 years (and some for decades), so their experiences with regard to their own recruitment happened some time ago. Third, as demonstrated in the descriptive analysis, there was an overwhelming response from firefighters indicting that their personal contact with friends, family members, or other firefighters significantly influenced their decision to enlist.

This response is so overwhelming that it needs no further analysis. It would clearly be a benefit to exploit this knowledge in the recruitment of volunteer firefighters. The question we address here is, "*What else* has a

significant influence on the decision to enlist"? Toward that end, we have created a subset of the survey responses by deleting groups of responses to the survey database:

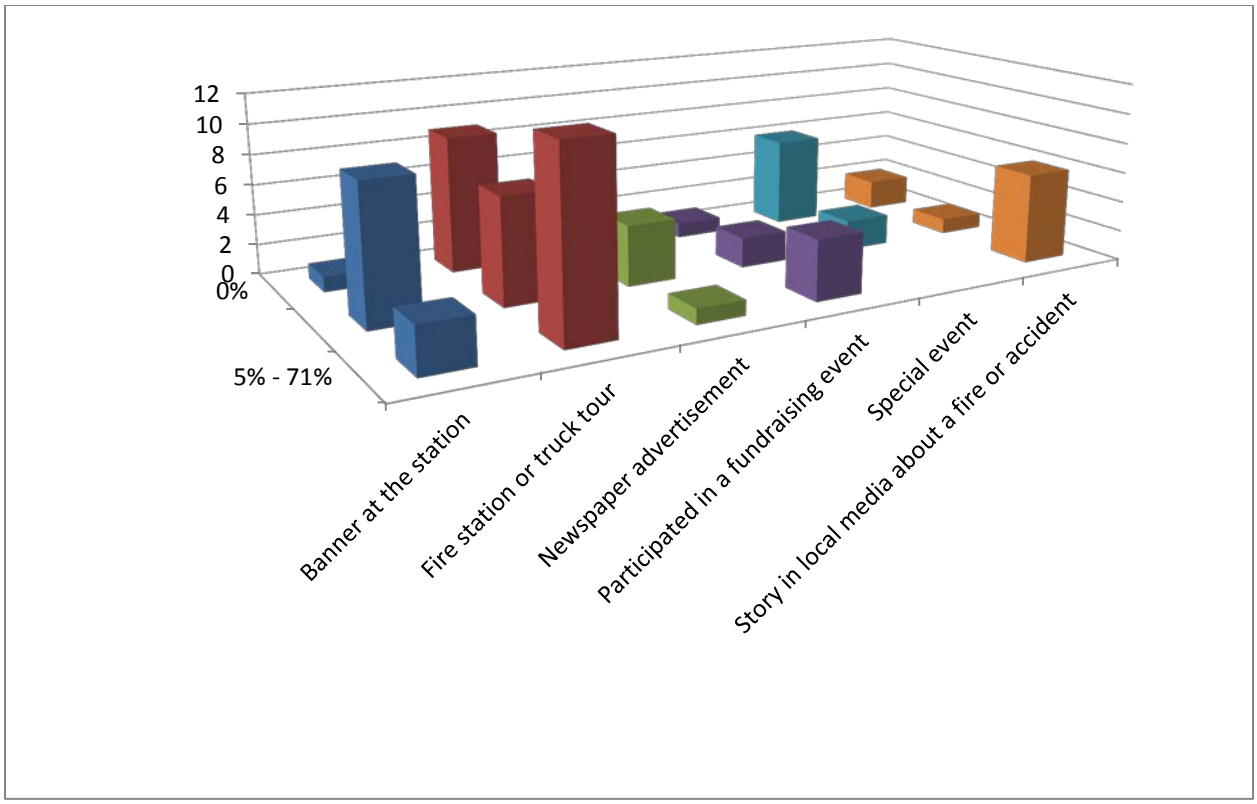
- Due to the acceptance of their overwhelming influence, we have deleted:
  - "Friend or Family Member Referral"
  - "Personal Contact with a Firefighter"
- Due to the fact that it would be an inappropriate strategy to take advantage of personal tragedies, even for the benefit of volunteer firefighter recruitment efforts, we have deleted:
  - "Experienced, Family, Friend, or Personal Tragedy"
- Due to minimal respondent selection:
  - "Radio"
  - "Email"
  - "Television"
  - "Brochure"
  - "Career Day at School"
- Due to the fact that the responses cannot be easily quantified or categorized we have deleted
- "Other"

After narrowing down the database and the possible enlistment tools, the remaining categories are "Banner at the Station," "Station or Truck Tour," "Newspaper Advertisement", "Participated in Fundraising," "Special Event," and "Story in the Local Media."

Since the purpose of this analysis is to illuminate what will influence potential recruits, *other than* those with personal contacts among firefighters, in the next step we cross tabulated the "Enlistment Tool" variable with the variable "Firefighter Social Circle % Before Service." The presumption here is that this correlation (if it exists) will show that those firefighters who did not have personal contact are more likely to be influenced by a particular enlistment tool. Although there are some potential difficulties with the Chi-squared test in this case, the value for this relationship is significant at the 0.05 level ($p = 0.01$). An examination of the tables shows that this is driven by the "Special Event" category. Those firefighters who state that they knew no one (0% of their acquaintances) in the fire service prior to joining, were more likely than expected to be motivated to join by attendance at a special event. Descriptions of special events commonly include Bingo Night, Pancake Breakfasts, Fairs and Festivals, and the like.

Observed	Enlist Tool						
% Social Circle before	Banner	Truck tour	Newspaper	Fundraising	Special event	Local media	Grand Total
0%	1	9	2	1	6	2	21
1% to 3%	9	7	4	2	2	1	25
5% to 71%	3	12	1	4		6	26
Grand Total	13	28	7	7	8	9	72

Expected	Enlist Tool						
% Social Circle before	Banner	Truck tour	Newspaper	Fundraising	Special event	Local media	Grand Total
0%	4	8	2	2	2	3	21
1% to 3%	5	10	2	2	3	3	25
5% to 71%	5	10	3	3	3	3	26
Grand Total	13	28	7	7	8	9	72

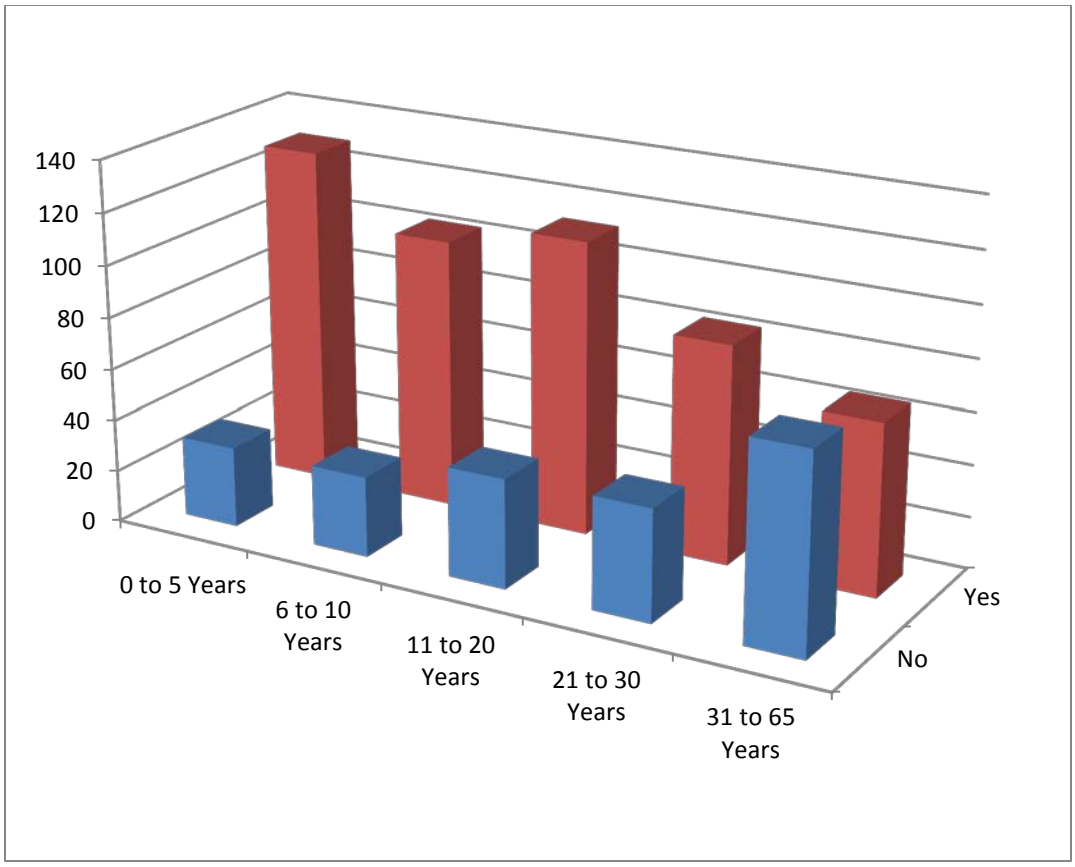


Correlation Analysis - "Do you use Facebook?" "Should we use Facebook to Recruit"

There is significant interest in using new means of social media to attract recruits for volunteer fire service. This is the motivation for including questions on this topic in the survey. While it may not be an unexpected finding, we can show that firefighters with more years of service are far less likely to use Facebook than their more recently enlisted colleagues.

Observed Values	Do you use Facebook?		
Years in Service	No	Yes	Grand Total
0 to 5 Years	31	130	161
6 to 10 Years	31	104	135
11 to 20 Years	42	113	155
21 to 30 Years	43	84	127
31 to 65 Years	76	66	142
Grand Total	223	497	720

Expected Values	Do you use Facebook?		
Years in Service	No	Yes	Grand Total
0 to 5 Years	50	111	161
6 to 10 Years	42	93	135
11 to 20 Years	48	107	155
21 to 30 Years	39	88	127
31 to 65 Years	44	98	142
Grand Total	223	497	720



There is a clear trend showing that far more of the newer (and presumable younger) firefighters use Facebook than would be expected if there were no correlation between "Years in Service" and use of Facebook. Conversely, the firefighters with longer tenure are far more likely not to use Facebook than would be otherwise expected. This trend is confirmed by an extraordinarily strong value of the Chi-squared statistic (p-value = $4*10^{-10}$). There is no question that, when younger potential volunteers are the target audience for volunteer enlistment materials, Facebook is a viable medium for disseminating these materials. It should be noted however, that the greater than expected Facebook use results hold true for all of the cohorts up to 20 years of service. This represents more than 60% of the firefighters surveyed, and is not simply the youngest or newest firefighters. Moreover, although firefighters with more years of service are less likely than expected to use Facebook, a significant percentage of them did in fact use it. More than 55% of the firefighters with 21 or more years of service did state that they use Facebook.

Interestingly, the firefighters themselves appear to be less enthusiastic about Facebook as a recruiting tool than might have been expected given the number who use Facebook themselves. Compare the observed values for firefighters' belief in Facebook to recruit firefighters (below), to the observed values for firefighter use of Facebook (above).

Observed Values	Facebook to recruit?		
Years in Service	No	Yes	Grand Total
0 to 5 Years	48	113	161
6 to 10 Years	48	87	135
11 to 20 Years	56	99	155
21 to 30 Years	52	75	127
31 to 65 Years	60	82	142
Grand Total	264	456	720

In four out of the five categories of "Years of Service," fewer firefighters respond that Facebook is appropriate to recruit than responded that they use Facebook themselves. This illustrates that some firefighters are comfortable using Facebook for their personal uses, but they do not feel that Facebook is appropriate for recruitment efforts. To pursue a Facebook recruitment strategy, it may be worthwhile to try to explore why some firefighters feel this way and to try to anticipate any difficulties in the use of Facebook for recruitment.

Correlation Analysis – "Primary Reason Others Left the Service"

The descriptive analysis above showed clearly that two major categories of issues were suspected to be responsible for a large number of firefighters leaving the service. One category was more external to the department and included life changes and time commitments. The other category was internal to the departments and included issues of leadership, politics, and fit. Here we examine if there is a relationship between the beliefs regarding why firefighters leave the service and the years in service of the persons holding those beliefs.

The cross tabulations showing the observed and expected frequencies are below. The Chi-squared test shows a strong relationship ($p = 0.0007$) between the number of years of service and the beliefs regarding firefighters leaving the service. A comparison of the observed and expected frequencies shows some clear trends that explain this relationship. First, with regard to leadership, the two youngest cohorts identify leadership issues as the reason for firefighters leaving more often than expected, while the oldest three cohorts all identify leadership less often than expected. The same is generally true of "Station Politics" although for some cohorts the observed and expected values are identical. Concerning time commitments, the opposite is true; those with fewer years of service are less likely than expected to ascribe time commitments as the reason for firefighters leaving the service, while longer serving firefighters feel this is an issue more often than expected.

Observed Values	Reasons Why Others Left the Fire Service					
Years in Service	Did not fit in	Leadership	Life change	Station politics	Too much time	**Total**
0 to 5 Years	11	12	44	22	17	106
6 to 10 Years	6	22	49	19	21	117
11 to 20 Years	9	8	54	21	38	130
21 to 30 Years	4	4	42	16	40	106
31 to 65 Years	6	11	43	16	45	121
Grand Total	36	57	232	94	161	580

Expected Values	Reasons Why Others Left the Fire Service					
Years in Service	Did not fit in	Leadership	Life change	Station politics	Too much time	**Total**
0 to 5 Years	7	10	42	17	29	106
6 to 10 Years	7	11	47	19	32	117
11 to 20 Years	8	13	52	21	36	130
21 to 30 Years	7	10	42	17	29	106
31 to 65 Years	8	12	48	20	34	121
Grand Total	36	57	232	94	161	580

These results suggest a disconnect between what younger and older firefighters believe about retention issues. These results do not suggest that either group is right or wrong in their beliefs, but only that those differences in beliefs exist.

When comparing these results to those from another recent survey conducted by the Volunteer & Combination Officers section of the IAFC (http://www.zoomerang.com/Shared/SharedResultsSurveyResultsPage.aspx?ID=L24PVLVM3 WQD), the importance of this issue becomes apparent. That survey of 979 officers asked for the reasons given by volunteer or paid-on call members who had left the department. Only 8% of the respondents to the survey stated that "Department Leadership" was an expressed reason for leaving. These results contrast to more than 25% of the respondents in the survey under review here. Although the questions are significantly different in that one asked about expressed reasons and the other asked about beliefs, the difference between officers and the general firefighter population was nonetheless considerable.

Additional Relationships and Validity Issues

Lastly, there were several relationships investigated that are not described in detail here. This is generally for one of two possible reasons. First, there is a rule of thumb that when conducting a Chi-squared test for independence - any one cell of the cross-tabulation matrix may not have fewer than 5 respondents. Although this did not occur frequently with the testing, it did occur. Other relationships have many cross-tabulation cells with fewer than five respondents per cell. Examples of such relationships included:

- "Years in Service" with "Enjoyment of Duties – Training"
- "Years in Service" with "Enjoyment of Duties – Fire Response"

On examining these relationships the small (or zero) values in many of the cells are due to near unanimity of answers across all categories. While answers that are uniform across categories certainly tell us about the likes and dislikes of fire fighters, they do not allow us to discriminate between subgroups, or to use the differences between them to our advantage in recruitment or retention efforts.

Steps Moving Forward

We hope that the analyses above (and subsequent investigations) will be of continuing use. In the continuing research and applied recruitment and retention efforts, we see three primary areas. For immediate and medium-term contributions, see below.

Informing the Marketing Process

The analyses presented in this document are all intended only to support the overall research effort designed and implemented by the IAFC/Esri and Interra on behalf of, and in conjunction with, the CFCA. In the short term, the relationships described above can inform the developing marketing strategies. We hope that ongoing discussions with the marketing experts can lead to additional research questions that encourage greater success in recruitment and retention.

Additional Statistical Analyses

There are additional statistical analyses that may prove beneficial to overall future efforts. These can loosely be grouped into three categories:

- Ongoing additional descriptive analysis as identified by any of the interested parties
- Additional correlation analysis identifying relationships of interest based on ongoing discussions
- Use of the technique Analysis of variance (ANOVA) to determine if a relationship were to exist between variables, where in the distribution the variables move in unison.