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Assessing the Repercussions of a Mass Departure  
of Building Inspectors from the Code  
Professional Industry in Utah

George Reese Williams

A thesis submitted to the faculty of  
Brigham Young University  
in partial fulfillment of the requirements for the degree of  
Master of Science

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School of Technology  
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June 2015

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## ABSTRACT

### Assessing the Repercussions of a Mass Departure of Building Inspectors from the Code Professional Industry in Utah

George Reese Williams  
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Master of Science

National studies suggest that eighty percent of existing code professionals are expected to retire within the next fifteen years. As part of this research, it was determined that approximately half of all licensed building inspectors in the State of Utah will reach retirement age within the next ten years. As building inspectors make up a large part of the Code Professional Industry this demographic was selected as the focus of this research. The purpose of this research project was to assess the urgent need for new entrants into the Code Professional Industry in Utah. As part of this research, trends within the local industry over a 20 year period were evaluated. A statewide survey of over 300 licensed building inspectors was conducted to investigate the demographics of the industry, and gain first-hand insight from individual code professionals. This research was successful in quantifying the size of the Code Professional Industry in Utah, and numbering the populations of certified professionals in each individual code discipline. In addition, projected losses were established within each code discipline, discovering many disciplines in which over 50% of current professionals would be lost within a ten year period. In addition projections were made contrasting the number of code professionals leaving the industry versus the small anticipated number of individuals entering the industry. This research conclusively predicts a steady and dramatic decline in the number of licensed code professionals, unless the industry actively works toward addressing the issue. The group of aging code professionals possess a level of knowledge and experience not easily replaced. This study was based on an extensive statewide survey of licensed building inspectors in Utah, and collected opinions, concerns and insights directly from the Code Professional Industry. The findings of this study provide a unique look at this specialized industry within a single state. The lessons learned likely apply to populations of code professionals in other locations. This study concluded that a combination of phased retirement, modified work duties and mentoring programs would be of great benefit to the Code Professional Industry, by allowing the transfer of knowledge between the outgoing generation and the future generation of code professionals.

Keywords: building department, building codes, construction regulations, code professional spectrum, international code council (ICC), international building code (IBC), certification, inspector, building official, plans examiner

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# **1 INTRODUCTION**

## **1.1 Introduction**

The knowledge, understanding and job skills of those responsible for ensuring compliance with building codes and other construction regulations is developed over years of experience in the industry. Simple observation of the industry would suggest that a large portion of the construction and building inspector industry in Utah will soon reach retirement age. The depth and impact of this looming industry-wide loss of code professionals is unknown. Only by immediately evaluating the local industry as a whole, can appropriate action be taken.

### **1.1.1 Statement of the Problem**

What impact will losing half of the building inspectors in Utah have on the Code Professional Industry in Utah?

### **1.1.2 Background and Need**

Preliminary data obtained from Utah's Division of Occupational and Professional Licensing (DOPL) suggested that of the roughly 600 licensed building inspectors in the State of Utah, 47% were over the age of 55. More alarmingly the data indicated that 9.5% of licensed building inspectors in Utah were already over the age of 65. It's clear that the industry will soon be in need of a large number of individuals with a very unique set of skills. The need for this new

group of construction and building inspectors is dependent upon the rate at which the group of aging inspectors retires, the ability of a younger generation of code professionals to obtain the right qualifications and training, and lastly the way in which the industry continues to evolve going forward. Without an adequate evaluation of the current state of the industry coupled with a careful strategic plan of action, the industry risks abruptly losing years of experience and expertise, and placing building safety in the hands of a very inexperienced and unprepared group of replacements.

Ensuring building safety is a difficult undertaking as the construction of buildings involves numerous individuals performing a variety of unique tasks over the course of many days. Unlike most forms of manufacturing where large volumes of individual products are assembled, most newly constructed buildings are one-of-a-kind, having never been previously built and with little likelihood of ever being constructed in the same manner again. As such, those evaluating building safety and code compliance must be highly skilled.

In the United States building and construction inspectors perform the task of ensuring that buildings are constructed in accordance with locally adopted construction codes and regulations. The Bureau of Labor Statistics concludes that as of May 2013 the Construction and Building Inspector occupation was made up of 87,620 individuals (Bureau of Labor Statistics 2013). In addition to the individuals providing physical inspections, a similarly large group of individuals such as plans examiners, building officials and permit technicians make up what for the purposes of this research will be referred to as the “Code Professional Industry.”

The demands on this industry to understand and enforce a very complex and ever-changing set of rules and regulations are substantial. Construction codes have evolved from a very basic form in Babylonia as early as 2000 B.C. to the most current versions which contain



hundreds of individual chapters covering nearly all aspects of modern construction. As a result of the evolution of codes, the individuals who make up the Code Professional Industry must possess a skillset far different from those who have filled this role in the past.

In the State of Utah the total number of Construction and Building Inspectors totals only a few hundred people (Bureau of Labor Statistics 2013). This relatively small group of people undoubtedly consists of individuals of different ages, specialties, levels of experience and backgrounds. The Code Professional Industry in Utah appears to be approaching a transitional period where a large percentage of the industry will be retiring in the next 10 to 15 years. With this transition comes an eminent loss of institutional knowledge and experience.

Acknowledging the eventual retirement of individuals within the local Code Professional Industry in its own right is of little value. However, quantifying the pending retirements and projecting the rate at which they will occur is of great value as it allows for strategic proactive planning. This information when coupled with the rate at which new professionals are or are not entering the industry paints a more detailed picture of how the industry will change in the coming years.

In order to counteract the inevitable losses in the supply of code professionals a comparably sized group of new professionals must enter the field. Recent studies have found that younger professionals are not entering the industry at a significant rate (NIBS 2014). In order to be prepared for their future job duties, these individuals must have access to the proper training, be able to obtain the proper credentials, and have adequate interaction with the outgoing professionals who can then pass along the knowledge and expertise they have gained through years of experience.

The final hurdle in working towards continued progress in the code professional industry is dependent upon the Code Professional Industry as a whole, which has become an international community (International Code Council 2014). The evolution of the industry on a global scale will directly affect the industry on a local level. Very little is known about the Code Professional Industry from an academic perspective; it appears that past research in this field is virtually non-existent (Levesque 2011). In order to better understand the changing dynamics of the Code Professional Industry in Utah a snapshot of the current status of those individuals who make up the industry was necessary.

## 1.2 Purpose of the Study

The purpose of this study was to take a snap shot of the code professional industry in Utah in order to examine its current health and long-term viability. Once a snap shot was taken, the data could then be used to evaluate the impact that losing a large portion of the people who make up the industry could have. No clear source existed that provided hard numbers regarding who exactly made up the Code Professional Industry in Utah.

It was assumed that Utah had a relatively small code professional population, and that it would be possible to pull data from various sources in order to generate a comprehensive list of code professionals. The demographics of this population were assumed to be relatively homogenous and a large percentage of the group was expected to be approaching retirement age. On the contrary very few younger people had been observed entering the profession. The data that was gathered was intended to quantify the age demographics within the profession, while also capturing the dynamics of those entering and exiting the industry.

In addition to capturing the age demographics and industry dynamics a compilation of the current credentials of those that make up the Code Professional Industry in Utah was desired.

One of the challenges of replacing those individuals exiting the industry will be finding and training individuals with the right combination of credentials to fill the impending need. A complete list of credentials broken down into individual code disciplines was not available. By compiling a complete list of credentials the industry as a whole could be evaluated in order to identify what skills and training may be necessary.

The process of compiling the desired data involved evaluating the industry and identifying what other organizations potentially kept records pertaining to those whom make up the industry. Two sources were contacted, each of which contained partial lists of those in the assumed to be industry. The Division of Occupational and Professional Licensing (DOPL) provided a list of currently licensed individuals, as well as the historical account of the industry dating back to 1993. This data served two purposes; first providing a list of all individuals licensed as building inspectors in the Utah, and secondly providing the historical data related to who was licensed, for how long, and in what capacity. The International Code Council (ICC) provided a current list of all certified individuals in the State of Utah which was a larger list when compared to the DOPL data, and included many people who did not necessitate state licensure. The ICC data also contained individual certifications in each unique code discipline held by each professional which filled the need for understanding the credentials of those in the local industry.

### **1.3 Research Objectives**

The following research objectives are central to the research:

- 1) Determine the true size and make-up of the current Code Professional Industry in Utah.
  - a) What unique code disciplines are the most and least common in the State of Utah?
- 2) Discover the age demographics of the population of licensed building inspectors in the State of Utah, and how they are expected to change in the next 5 to 10 years.

- a) How many code professionals are expected to soon retire from the Code Professional Industry in Utah and when?
  - b) What individual skills will be lost with the mass retirement of code officials in the next 5-15 years?
- 3) Measure observable trends that have occurred within the Code Professional Industry in Utah between 1993 and 2014?
- a) How has the total number of licensed building inspectors in the State of Utah changed during the time period between 1993 and 2014?
  - b) Is the number of licensed building inspectors increasing or decreasing when compared to permit valuation, size of the work force and population?
  - c) If the current rates of inspectors exiting and/or retiring from the industry vs. new inspectors entering the industry continue; is a skilled worker shortage imminent?
  - d) What size jurisdictions/building departments will be most affected by the upcoming mass retirement of building inspectors in Utah?

#### 1.4 **Significance to the Field**

The Code Professional Industry in the State of Utah can greatly benefit from this research. Those who are part of the Code Professional Industry will now be able to plan for the demographic changes that are going to take place. Rather than planning for an unknown number of individuals leaving the industry at an unknown rate the industry now has reliable data to base decisions on. This research can also be duplicated in other states or regions experiencing similar challenges. In addition, this research may spawn efforts to encourage collaboration between government and private organizations with the purpose of making this type of data more readily available in the future.

Emphasis can now be made on passing down the knowledge, skills and expertise of the soon to retire group of professionals. The need to preserve the lessons learned throughout the past decades is of great importance and research such as this emphasizes the urgency in which such a process must take place.

Individuals interested in entering the Code Professional Industry can now see specific code disciplines that are underrepresented in the State and focus their personal professional development into those areas. These same individuals now have a more accurate understanding of the future job outlook in the industry. With a large percentage leaving the industry the need for individuals with code specific skills is substantial.

By looking at the vast array of individual code disciplines local governments can now have a better understanding and appreciation for the unique skills needing for individuals working in municipal building departments. Policy makers at the state and local level should now be able to use this research to encourage education in specific code disciplines in which credentials are lacking.

Local governments are now better prepared to make hiring decisions, strategically plan for the retirement of many of their current staff, and develop strategic retirement plans that include proper mentoring and training for the next generation of code professionals. Local code professional communities may be better able to serve their members by offering training in the areas where the state is lacking qualified individuals.

Those individuals that are approaching retirement may be more likely to pass along their knowledge to future code professionals, now that the importance of such practices has been established. The potential of a skilled worker shortage may motivate those approaching retirement to work longer, or on a part-time basis. Local governments may consider flexible

work schedules, partial retirement or other accommodations to enable aging professionals to work beyond traditional retirement age.

## 1.5 Definitions

**Certification-** Formal recognition presented to an individual upon demonstration of a minimum level of competence in any of the various code disciplines.

**Code Discipline-** An individual area of expertise within the larger Code Professional Spectrum.

**Code Professional-** An individual with professional responsibilities related to the administration and enforcement of building safety codes and ordinances; inclusive of individuals with responsibilities related to any code discipline depicted in the Code Professional Spectrum.

**Code Professional Industry-** The industry responsible for the administration and enforcement of building safety codes and ordinances, as depicted in the Code Professional Spectrum.

**Code Professional Spectrum-** A graphical representation of all code disciplines making up the Code Professional Industry as a whole.

**Credential-** Either a certification, license or degree issued to an individual indicating legal authority to perform work related to any of the various code disciplines.

**DOPL-** Utah Division of Occupational and Professional Licensing

**ICC-** International Code Council

**Municipality-** A city, town or entity that has corporate status and acts as a local government responsible for the issuance of building safety permits.

## **2 LITERATURE REVIEW**

### **2.1 Introduction**

The Code Professional Industry is facing an unavoidable changing of the guard in the next 10 to 15 years. A recent national survey of 3,850 code professionals found that over 80 percent expect to retire or pursue other opportunities within 15 years (NIBS 2014). Mass retirement within such a specialized industry will undoubtedly have a substantial impact as those retiring possess many years of experience, and industry specific knowledge and expertise. According to the national survey a majority of Code Professionals approaching retirement age have more than 25 years in the construction industry (NIBS 2014). In the State of Utah, data suggests that roughly half of those currently licensed will reach retirement age within the next 10 years, suggesting that the problem in Utah may be even more pressing. In the next 10 years Utah is poised to lose 47% of licensed building inspectors, representing countless years of collective experience in the industry. The effect of losing roughly half of the building inspectors in Utah is unknown; this research seeks to discover the potential repercussions of such a mass departure of inspectors.

The literature review for this thesis addressed three areas related to the upcoming departure of Code Professionals in Utah. The first section addressed research related to the code industry as a whole, including its history and evolution that have brought us to its current state. The second section focused on recent research regarding the future of code professionals on a

national scale. Finally, the third section discussed research related to skilled worker shortages and what can be done to appropriately respond to the potential crisis related to the loss of these professionals.

## **2.2 The Role of Construction Regulations**

It can be assumed that from the time early man moved out of cave dwellings and started constructing primitive homes, the importance of safe construction has been a concern. As for recorded history the first written record of a construction code can be attributed to the Babylonian King Hammurabi around 2000 B.C. (International Code Council 2007). This primitive code consisted of six simple rules and governed appropriate construction costs as well as various specific performance requirements. Failure to meet the performance requirements levied substantial liability upon the contractor for the costs of necessary repairs, liability for potential loss of life and catastrophic failure was ultimately punishable by death. As a performance code the requirements of King Hammurabi did not attempt to prescribe the methods, materials or means by which construction took place.



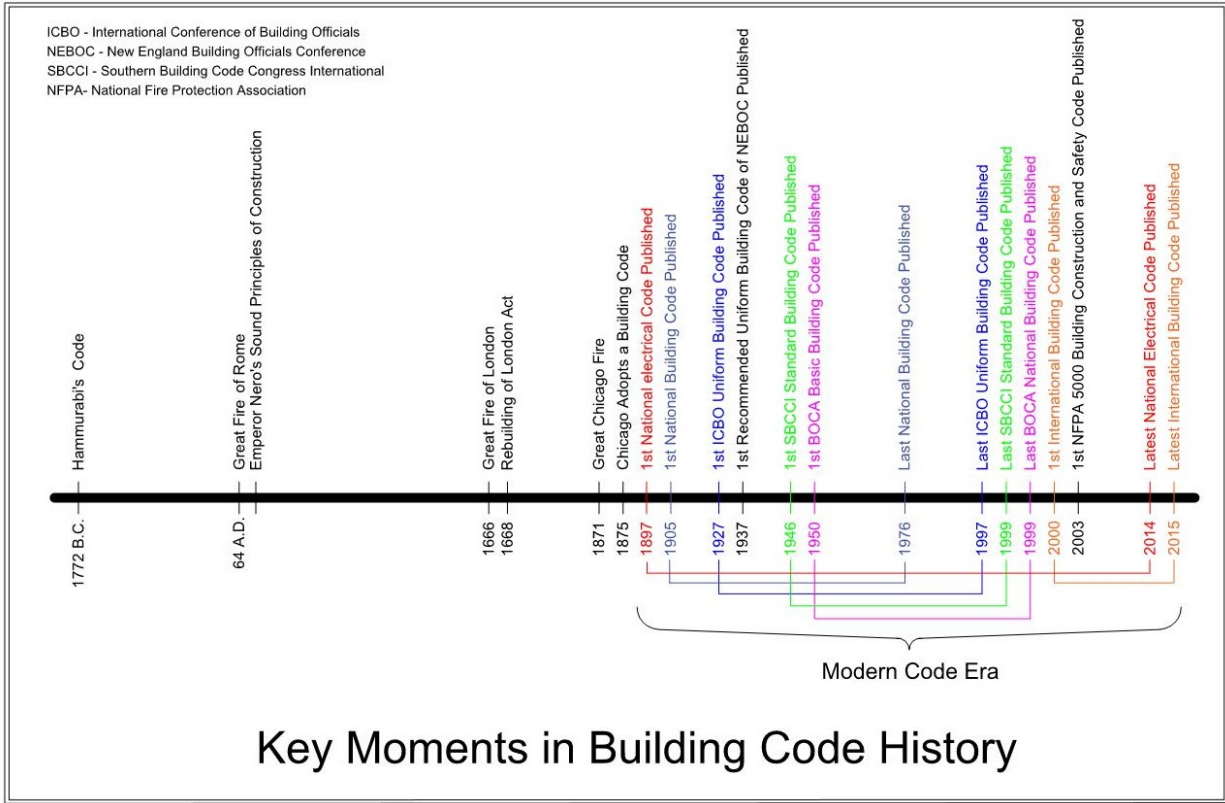


Figure 2-1: Key Moments in Building Code History

Figure 2-1 depicts a chronology of building code history, and outlines a series of devastating events, each of which resulted in the further development of construction regulations. Following Hammurabi’s Code it is likely that many other performance codes followed as civilization began to grow. One of the next documented cases of construction regulations came by way of Nero, Emperor of Rome in 64 A.D. (International Code Council 2007). The regulations put into effect in Rome focused on fire resistance, sanitation and usefulness. Most interestingly the codes began to address “sound principles of construction” (International Code Council 2007). Nero’s codes not only addressed the performance of construction, but also the means and methods. This was among the first times in recorded history that construction regulations appear to have been monitored and controlled (International Code Council 2007).

The following 1,600 years of building code history was largely a reactionary process as various governments dealt with tragedies involving substantial loss of life, property and peace of mind. Governments were unwilling to sit idle as the threat of these types of catastrophes once again repeating themselves became all too real. The potential for history to repeat itself was an unacceptable risk and governments, and likely the general public, appear to have recognized the need for additional regulations and controls.

In the modern code era steady progress in the realm of construction codes and regulations has taken place beginning in the United States with the Great Chicago Fire of 1871, which resulted in the adoption of Chicago's first building code in 1875. Prior to the turn of the century the first National Electrical Code had been published, followed by the first National Building Code in 1905. Over the next 100+ years multiple codes and code making organizations were established, dissolved and combined, each leaving its mark and contributing to the codes and regulations of today.

### **2.2.1 The Benefits of Building Codes**

When people sit in a movie theater, visit a public library or walk through a shopping mall questions along the lines of Is this a safe building?; How do I get out of here in a fire?; Are the exits properly sized for the number of occupants in this space?; or Should this building be equipped with fire sprinklers? seldom cross the mind of a typical person. This is due to the incredible safety record associated with buildings constructed in the modern era, which can be attributed in part to modern building codes and regulations. According the National Fire Protection Association (NFPA) since 1977 the total number of fires, loss of life and the direct property damage amounts have steadily decreased (National Fire Protection Association 2013).

Figure 2-2 shows annual totals for the period between 1977 and 2012 with the year 2001 being omitted due to the abnormal numbers associated with the tragedies of 9/11/01.

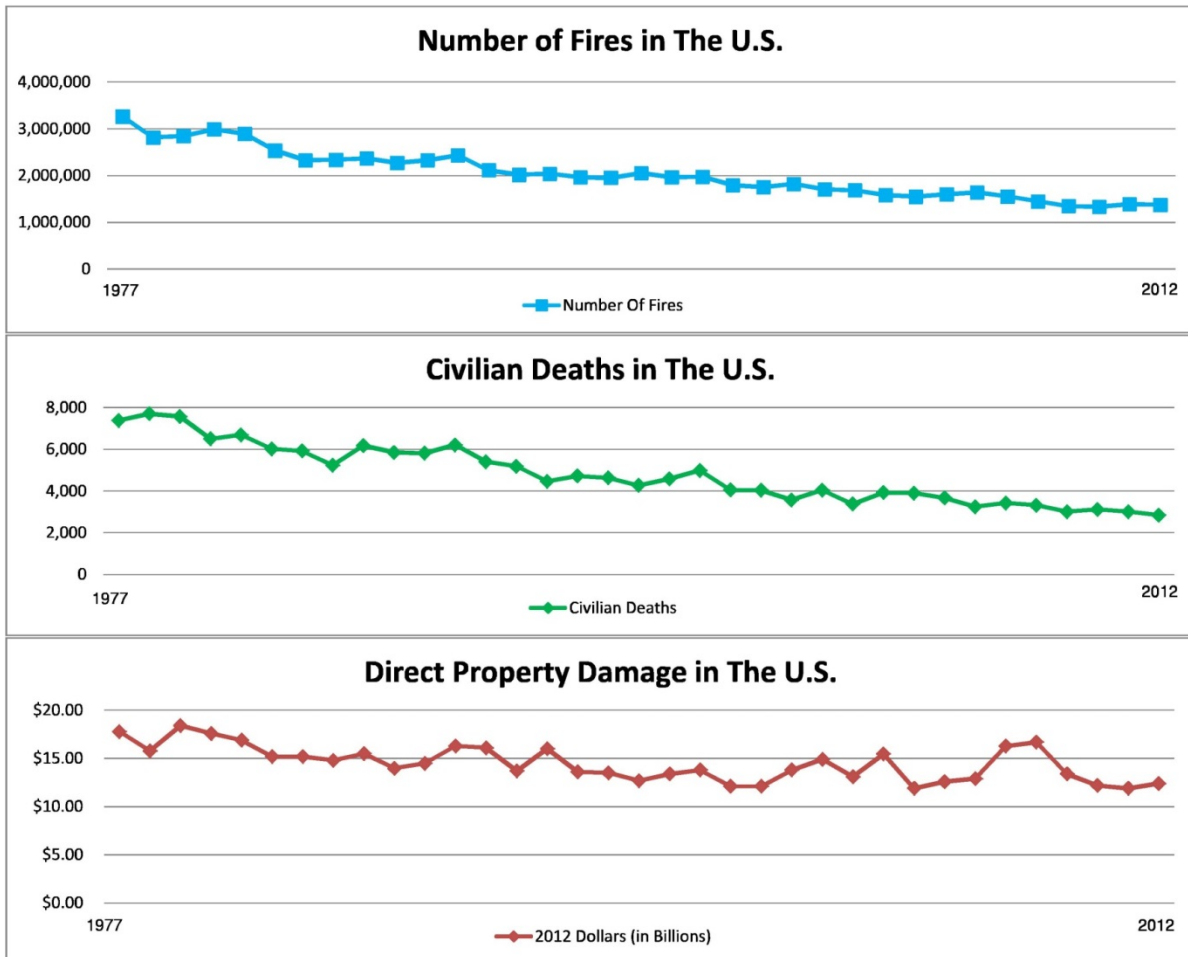


Figure 2-2: U.S. Fires 1977 - 2012

Recently earthquakes in Haiti, China, Nepal and South America have demonstrated and reinforced the need for adequate construction standards. Similar 7.1 magnitude earthquakes struck Chile in 2011 and Haiti in 2010. While both earthquakes caused damage the quake in Chile where building codes are used and enforced caused minimal damage, whereas the Haiti earthquake resulted in more than 300,000 lives lost (Weiland 2011).

A lesser known benefit of building codes is improved handicapped accessibility. In order for many provisions of accessibility standards such as the Americans with Disabilities Act (ADA) to be implemented accessible features must be properly designed and installed at the time of construction. Modern building codes provide scoping for accessibility standards, and give local municipalities authority to enforce accessibility standards. Accessibility codes enable substantial portions of the population to utilize a wide variety of buildings such as businesses, schools, libraries, parks and other facilities. It's a common misconception to assume that accessibility standards are geared primarily for people in wheelchairs. In reality accessibility measures benefit a much larger population such as individuals who have difficulty walking, the visually impaired, the hearing impaired, individuals with reaching and manipulation disabilities, those with lack of stamina, and individuals of extreme physical size (International Code Council 2010). One source estimates that the population of Americans with disabilities numbers 43 million people (The Council for Disability Rights 2014). The same source explains that large portion of the population rely on building codes and construction standards to ensure that they are not excluded from the mainstream of American life by inaccessible environments.

Historically building codes have focused on the protection of human life and property, modern energy codes work to alleviate other societal issues. Modern energy codes are greatly benefiting the general public, as they effectively reduce energy consumption. Studies have shown that on a state-wide level well-designed energy efficiency programs can reduce total energy use by as much as 20% (Tonn and Peretz 2007). As energy costs increase, the need for and benefits of energy codes will likely be made manifest. A study completed by the Oak Ridge National Laboratory identified some of the barriers facing improved energy efficiency and both a general lack of knowledge regarding energy efficiency, and unfamiliarity with new energy

efficient products were listed (Schweitzer and Tonn 2005). This suggests that the public is unaware of the benefits of constructing energy efficient buildings.

A system of model energy codes encourages improved energy efficiency, and indirectly leads to societal benefits such as lower amounts of late utility payments, safer homes, healthier homes and a decrease in homelessness (Tonn and Peretz 2007). More energy efficient homes cost less to heat and cool; more energy efficient businesses are more profitable, new energy efficient lighting can increase luminosity resulting in safer working environments (Tonn and Peretz 2007). The energy codes of today are designed to have a lasting impact, as buildings constructed in accordance with modern energy codes will likely exist for many years to come.

Building codes are the result of mankind reacting to the tragedies of the past in an effort to prevent them from happening again. It is not uncommon to hear code officials say “the codes were written blood” (Byrne 2011), meaning that past deaths tend to form and shape the codes. The Code Professional Industry is crucial in ensuring that the lessons learned from these past tragedies are not lost, that past mistakes aren’t repeated and that a reasonable level of safety is provided in the built environment.

Many Americans have benefitted from building codes over the past 100+ years, although most are unaware of their influence on their daily lives. As a result of building codes people can be sure that when they enter a building there is a high likelihood that the building is safe. Safety is difficult to define as elements of safety are relative. Constructing a building that is 100% safe may not be an obtainable goal. Building codes attempt to provide a reasonable level of safety, which is why codes continue to change as the definition of reasonable also changes over time. The infrequency of building collapses, large loss of life fires and deaths associated with

substandard construction is a testament to the effectiveness of building codes and construction regulations.

The adoption of building codes is generally in response to a disaster or tragedy. History has shown that after substantial losses of life and/or property there is often an immediate movement to prevent such instances from occurring in the future. As was the case with the Great Fire of London, and the Great Chicago Fire this is often accomplished by way of stricter codes and more diligent enforcement.

In the year 1666 a fire destroyed nearly two-thirds of London. This led to Parliament enacting stricter construction regulations through the adoption of the Rebuilding of London Act, although the process took nearly two years to complete. In the mean-time a large portion of the city began to rebuild making the adoption of the act much less effective. The London Fire of 1666 destroyed 15,000 buildings representing an enormous loss of property, while fortunately only killing six people.

In the United States the most notable event that spurred the adoption of construction codes was the Chicago Fire of 1871. The fire destroyed 17,000 buildings representing roughly 28% of the city, while tragically killing over 250 people (International Code Council 2007). This example of loss of life and property resulted in 60 insurance companies declaring bankruptcy. Four years passed before building codes and other fire-prevention ordinances were enacted once again showing the cause and effect pattern of disasters followed by an increase in public awareness of the importance of building regulations.

After the terrorist attacks of September 11, 2001 additional changes were made to building codes to ensure that similar building failures would not occur in the future. The National Institute of Standards and Technology (NIST) performed extensive investigations into what

exactly happened to the World Trade Center buildings and issued a report that contained 30 broad recommendations applicable to the building codes, referenced standards, the design community and emergency responders (International Code Council 2011). The resulting changes to the codes included stricter elevator requirements, additional stairways in high-rises, increased fire resistance requirements, impact resistant shafts, self-luminous exit pathways and provisions to ensure better radio communication coverage for emergency responders. These changes highlight the need to modify code requirements based on past history, with the intent of improving public safety (International Code Council 2011).

### **2.2.2 The Evolution of Building Codes**

Buildings codes must evolve to meet the demands and needs of the construction practices of their time. In the same way that construction materials and methods have changed drastically over the past 4,000 years, so have the breadth and application of building codes. Building codes continue to grow in length and complexity, requiring the code professionals working in the industry to adapt to the demands placed on them. As the industry in Utah faces a mass departure of professionals, it's important that the industry recognize the demands that will be placed on the next generation of code professionals. As the building codes evolve, so must the code professional and current codes dwarf previous codes in length, subject matter and complexity. This suggests that the next generation of code professionals' skills and abilities may need to dwarf those of the past generation.

The first documented building codes were written by Hammurabi in 1772 B.C. and consisted of the following six simple rules (International Code Council 2007):

- 228: If a builder build a house for a man and complete it, that man shall pay him two shekels of silver per sar of house as his wage.

- 229: If a builder has built a house for a man and his work is not strong, and if the house he has build falls in and kills the householder, that builder shall be slain.
- 230: If the child of the householder be killed, the child of the builder shall be slain.
- 231: If the slave of the householder be killed, he shall give slave for slave to the householder.
- 232: If goods have been destroyed, he shall replace all that has been destroyed; and because the house was not made strong, and it has fallen in, he shall restore the fallen house out of his own material.
- 233: If a builder has built a house for a man and his work is not done properly and a wall shifts, then that builder shall make that wall good with his own silver.

As building codes evolved over the next several hundred years the topics covered and the detail in which construction was regulated grew exponentially. Over 3,000 years after Hammurabi a devastating fire in London in 1666 the Rebuilding of London Act was passed which marked another advancement in building regulations. The Rebuilding of London Act consisted of a mere nine pages, made up of 40 short sections (Charles 1666). The act required that the outsides of all buildings be made of brick or stone, governed the allowable heights of stories and thicknesses of walls, required the widening of a number of streets deemed too narrow, required one entire portion of the city to be raised three feet and limited how close buildings could be built to the River of Thames among other things. These provisions were designed to limit the potential for another mass conflagration and demonstrate how building codes have expanded and evolved over time.

In the United States the first national building code wasn't published until 1905. Published by the National Board of Fire Underwriters the 1905 National Building Code served as an early attempt to create a single code, "for all matters concerning, affecting or relating to the construction, alteration, equipment, repair or removal of buildings or structures erected or to be



erected” as stated on the title sheet of the publication. The 1905 National Building Code consisted of 37 parts (chapters), 166 individual sections and was a total of 263 pages long. The 1905 National Building Code also referenced 18 referenced standards issued by the National Board of Fire Underwriters, most notably the National Electrical Code. The National Building Code continued to be printed through 1976; however, the title was later used by Building Officials and Code Administrators International (BOCA). The 1999 (BOCA) National Building Code had grown to 35 chapters, with 317 individual referenced standards, and totaling 376 pages.

The first Unified Building Code (UBC) was published in 1927 by an organization known as the International Council of Building Officials (ICBO). The intent of this code was to standardize construction from city to city and was geared toward public safety. The UBC was published every three years and 22 editions were published between 1927 and 1997. The 1927 edition consisted of 43 chapters and totaled 265 pages. In contrast the 1997 edition was split into two volumes consisting of 23 chapters and five appendices, with the first volume totaling 422 pages and the second totaling 469 pages for a total length of 891 pages.

The first edition of the International Building Code (IBC) was published in 2000. The 2000 IBC contained 35 chapters, 10 appendices, 500 referenced standards and over 700 pages. The 2012 IBC is the 5th edition, and the edition currently adopted in the State of Utah which consists of 35 chapters, 13 appendices, 537 referenced standards, and over 696 pages in length. Figure 2-3 graphically shows the exponential growth of building codes over time. If the past growth of the codes is indicative of future growth, the next generation of code professionals may need to be even more skilled than those currently approaching retirement.

In similar fashion the National Electrical Code (NEC) was first published in 1897 and contained 6 Classes (chapters) and totaled 55 pages. Over time more than 50 editions of the National Electrical Code have been published, each one slightly longer and more complex than the previous version. Figure 2-4 shows the growth pattern of the NEC between 1897 and the present. The 2014 National Electrical Code is the 53<sup>rd</sup> edition and contains 9 chapters and totals 910 pages. When compared to the 1897 edition which was only 55 pages in length, this represents over a 1500% increase in size. The electrical codes are just one of many code disciplines, each of which are constantly changing and consistently expanding.

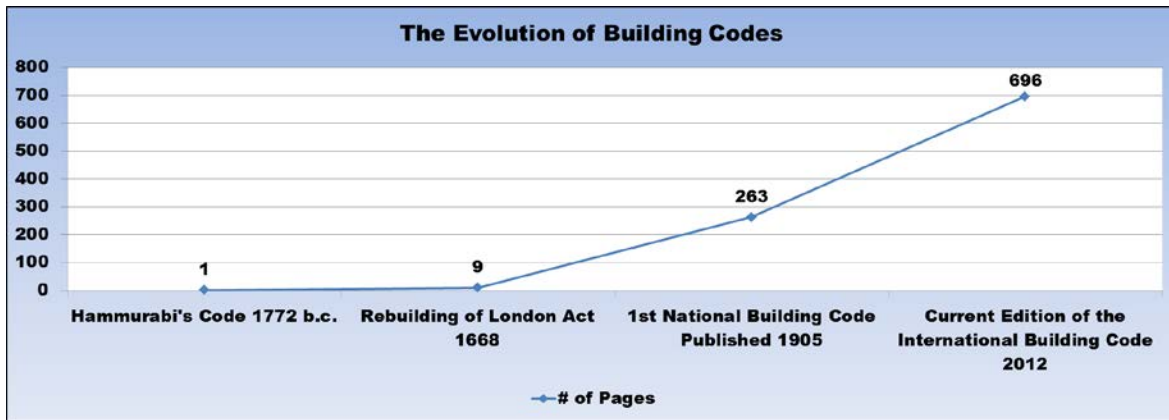


Figure 2-3: Growth of Building Codes

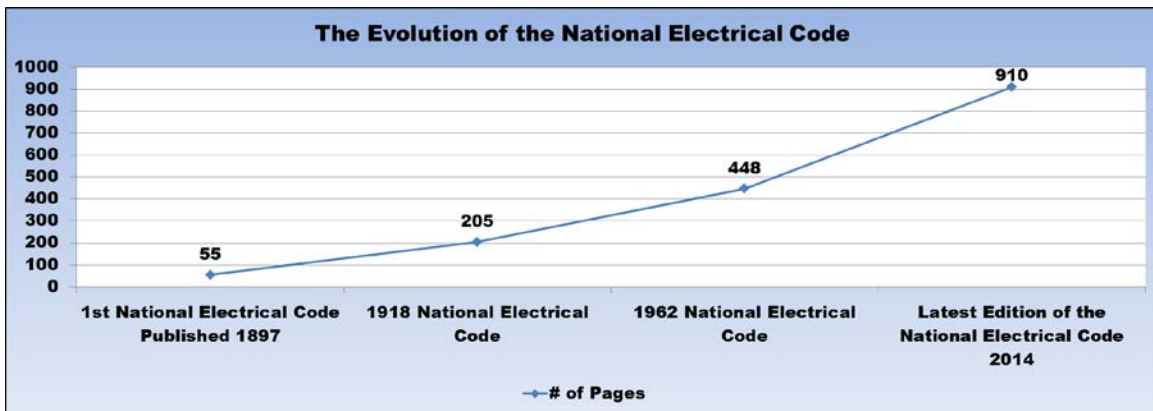


Figure 2-4: Growth of the National Electrical Code

The ICC publishes a total of 19 individual codes. Table 2-1 includes ICC’s most commonly used and adopted codes, in addition to the National Electrical Code (NEC) which continues to be the most widely accepted electrical code in the country. In all this set of construction codes in use in the United States include 250 individual chapters and a total of 4,082 pages.

**Table 2-1: Collective Chapters and Pages of Modern Codes**

<b>Code</b>	<b>Chapters</b>	<b>Pages</b>
IBC: International Building Code	35	696
IRC: International Residential Code	44	908
IEBC: International Existing Building Code	16	294
IFC: International Fire Code	80	506
IPC: International Plumbing Code	14	156
IMC: International Mechanical Code	15	136
IFGC: International Fuel Gas Code	7	168
IECC: International Energy Conservation Code	5	138
IPSDC: International Private Sewage Disposal Code	14	74
NEC: National Electrical Code	9	870
ICC-A117.1-2009: Accessible and Usable Buildings and Facilities	11	136
<b>Totals:</b>	250	4,082

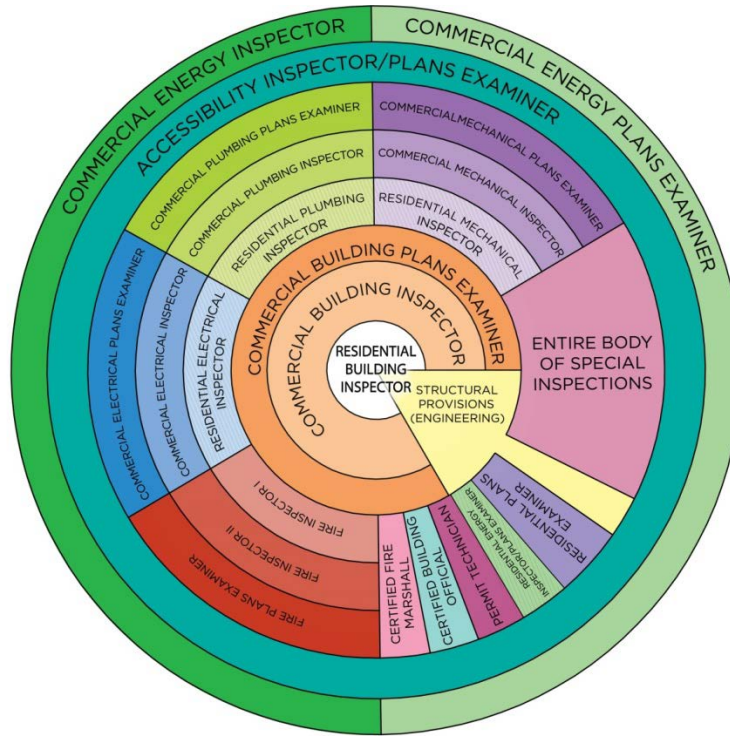
When compared to the 6 rules that originally made up Hammurabi’s building code, or even the 9 pages that made up the Rebuilding of London Act, it’s clear that construction codes and regulations have evolved substantially and will most likely continue to do so. This evolution that has taken place results in the need for very highly skilled professionals who possess extremely unique skills and abilities.

This challenge is compounded by the high number of code professionals working for small jurisdictions. A national study conducted by the ICC discovered that over 33% of code professionals work in building departments with four or fewer people (NIBS 2014). These small

jurisdictions often have a single person assuming the responsibilities of the building official, plans examiner, building inspector, plumbing inspector, mechanical inspector, electrical inspector, fire inspector and so forth (International Code Council 2007). Mastering volumes of codes, hundreds of individual chapters and thousands of pages of technical material in multiple code disciplines is a herculean task. It takes a very highly skilled and trained individual, along with a substantial amount of time to master the current body of codes. It's for this reason that evaluating the repercussions of losing large percentages of the industry must take place.

### **2.2.3 The Code Professional Spectrum**

Members of the Code Professional Industry come from a wide variety of backgrounds and possess a wide variety of unique and specialized skills. A building inspector in one city may have an entirely different set of skills and responsibilities than a building inspector in another city. A municipality may employ 3 or 4 building inspectors, none of which hold the title of electrical inspector. However, each of them may in fact be electrical inspectors and have responsibility over inspections in virtually all of the various code disciplines. As a result the Code Professional Industry often suffers as job titles can be ambiguous. For this purpose and as a part of this research The Code Professional Spectrum was generated as shown in Figure 2-5.



**Figure 2-5: The Code Professional Spectrum**

The Code Professional Spectrum highlights each of the unique skill sets that are necessary in order to ensure code compliance, and is organized to some extent based on Figure 2-6. The ICC Certification Progression chart shows the order in which individuals most commonly obtain ICC Certifications. Being that the Commercial and Residential Building Inspector certifications are commonly among the first two or three certifications obtained, those disciplines were placed at the center of the spectrum. Likewise the remaining disciplines were arranged in a similar fashion to suggest that professionals in the industry generally begin obtaining certifications located towards the center of the spectrum and work their way towards the outer edges as their careers progress.



**Figure 2-6: ICC Certification Progression**

In an effort to clearly represent each of the many code disciplines that make up the Code Professional Industry, a graphical representation was needed. The graphic was subdivided according to a number of the available ICC certifications which adequately define individual code disciplines. Each area depicted in the spectrum represents a specific area of expertise or specialty. An individual code professional generally specializes in many of the various code disciplines shown, but rarely all of them.

The Code Professional Spectrum is organized in the following manner. The primary code disciplines of building, mechanical, plumbing, electrical and fire are color coordinated, each having for the most part a residential and commercial inspector specialization, as well as a plans examiner specialization. Structural provisions apply to all elements of the spectrum to some extent and are graphically shown as an arrow which overlaps the commercial and residential building inspector and plans examiner disciplines. The entire body of special inspections is represented in light yellow to the right of the spectrum which could have been broken down into more detail; however, for the purposes of this research further detail was not deemed necessary. The outer rings include accessibility and energy code specializations which are relatively new to the Code Professional Spectrum. The bottom right quadrant is broken out into various other

specializations which are separate from the other disciplines and represent specialties and roles that are integral to the Code Professional Industry.

The Code Professional Spectrum is valuable as it represents all of the many specialized skills of the industry as a whole, where generally various specializations within the whole are seen as independent parts. It's common to look at residential inspectors as a separate group from commercial inspectors; or to look at fire inspectors as part of the fire department as opposed to part of the Code Professional Industry. In the same sense special inspectors are generally employed by independent testing and engineering firms, where for all intents and purposes they play a vital role in the industry as a whole. Lastly, the individuals involved in the structural provisions of the code can easily be grouped in with various engineering disciplines which further fragments the industry as a whole. The concept of the Code Professional Spectrum is unique as it brings all associated disciplines together with the intent of unifying a wide variety of independent professional occupations into a single industry.

From a functionality perspective the spectrum can be used to counteract the tendency of viewing all building inspectors as equals. Individuals and groups of individuals tasked with the role of ensuring code compliance are often lacking expertise in various code disciplines, but carry the generic title of building inspector nonetheless. It is common for decision makers, department heads and local government leaders focus on the long list of qualifications/certifications that individual professionals do have, as opposed to those they do not have. The Code Professional Spectrum allows everyone involved in the industry to see areas in which expertise is lacking, allowing them to react appropriately through additional training, or hiring of additional staff with needed expertise.

It would be highly uncommon for a single individual to possess expertise in all areas of the Code Professional Spectrum; however, a building department should have individuals with credentials sufficient to ensure some level of expertise in all areas of the spectrum, or access to them. A recent national survey discovered that over 33% of code professionals work in building departments with a staff of only 1 to 4 individuals (NIBS 2014). This suggests that it is all too common to have a very small staff in charge of ensuring code compliance for virtually all areas of the spectrum. This intensifies growing concern over losing 47% of the licensed building inspectors in Utah, as the loss of these experienced professionals will dramatically limit a municipality's expertise, resulting in large holes in the Code Professional Spectrum.

#### **2.2.4 The Code Professional Industry in the United States**

According to the Bureau of Labor Statistics as of May 2013 the Construction and Building Inspector occupation in the U.S. was made up of only 87,620 individuals (Bureau of Labor Statistics 2013). This is a very small sliver of the American workforce, and when compared to other occupations such as Architecture and Engineering which employ 2,380,840 individuals it is clear that construction and building inspectors are a small specialized group (Bureau of Labor Statistics 2013). According to the International Code Council a total of 41,000 individuals have obtained certifications in the various code disciplines (Porter 2014). These individuals collectively hold a total of 166,000 individual certifications (Porter 2014). This represents a further narrowing of the number of individuals trained and certified as code professionals in the United States.

The Bureau of Labor Statistics categorizes all construction and building inspectors under occupational code 47-4011. According to their website this occupation provides the following services *“Inspect structures using engineering skills to determine structural soundness and*



*compliance with specifications, building codes, and other regulations.*” (Bureau of Labor Statistics 2013). There are many other administrative personnel such as building officials, plans examiners and office staff who may not be categorized under occupational code 47-4011 who are part of the code professional industry.

There is no clear source of data available that quantifies the number of individuals who make up the Code Professional Industry in the United States. Statistics show that the industry with the highest concentration of employment for construction and building inspectors is the Architectural, Engineering, and Related Services, at 2.04% of industry employment, followed by Local Governments at 0.69% of industry employment (Bureau of Labor Statistics 2013). As occupational code 47-4011 does not make up a large percentage of other industries it is not possible to understand without very specific research and analysis. This research represents an attempt on a state-wide level to compile detailed information specific to the Code Professional Industry.

### **2.2.5 The Code Professional Industry in Utah**

The U.S. Census Bureau formally recognizes 212 building permit issuing jurisdictions in the State of Utah (United States Census Bureau 2014). Each of these jurisdictions is faced with the challenge of administering construction codes through the issuance of permits followed by the performance of periodic inspections at different intervals during the construction process. In order to administer the construction codes adopted by the State of Utah each jurisdiction must employ qualified individuals.

The Utah Department of Workforce Services publishes a document entitled “Utah Occupational Report for Construction and Building Inspectors.” This document provides a 10 year projection for individual occupations. According to the report, as of 2012 the Construction

and Building Inspector occupation in Utah was made up of 820 individuals (Utah Department of Workforce Services 2012). The report also projects an employment population of 1,020 in 2022 which represents 2.4% annual growth, necessitating 20 additional inspectors annually. This data is valuable to the research as it suggests that in addition to the challenges of losing 47% of the licensed building inspectors in the State, the industry will need to account for 2.4% growth, magnifying the potential shortage of qualified professionals.

### **2.2.5.1 Utah Licensing Requirements**

As the challenges of losing large percentages of the licensed inspectors in Utah are evaluated, the requirements of the State regarding obtaining licensure must be clearly understood. The licensing requirements govern how the industry can and will respond to a decreased supply of inspectors, coupled with an increased demand for inspectors as indicated by the projected 2.4% growth (Bureau of Labor Statistics 2013).

In Utah the Division of Occupational & Professional Licensing (DOPL) regulates the licensure of building inspectors. In accordance with Utah Administrative Rule R156-56 two levels of licensure are available: Limited Inspector and Combination Inspector. Limited Inspectors must demonstrate competence in one of eight disciplines through a certification process administered by the ICC. The eight disciplines recognized by the State are building, electrical, plumbing and mechanical with each discipline divided into both a commercial and residential component. A state licensed Combination Inspector must demonstrate competence in all eight code disciplines through a certification process administered by the ICC. These requirements define who is allowed to perform inspections within the Code Professional Industry in Utah.

### 2.3 Past Academic Research

Although much has been written academically with respect to building codes in general, very little has been written about the professionals that ensure code compliance through plan reviews, inspections and code administration. Other researchers such as Levesque (2011) have acknowledged that very little academic research focused on the regulatory body of building inspectors has taken place, making an academic literature review difficult. As a result of the lack of formal research a number of alternative sources were consulted, in an effort to gain a sound understanding of the industry.

A handful of books have served as the primary authority on the Code Professional Industry. One reference book that has become the industry standard for code professionals is Building Department Administration (BDA) by Robert E. O'Bannon. The first issue was published in 1973 by the International Conference of Building Officials (ICBO). Due to the constantly changing industry the book has since been updated both in 1989, 2007 and most recently in 2012. The rapid changes to the industry have required the text to address complex issues such as the use of new technologies in building departments, sustainability, green building and building regulations at the international level (International Code Council 2007). The current version of BDA as well as past versions are authored and edited by members of the Code Professional Industry, with varying backgrounds and responsibilities. This book and others provide valuable insight into the industry. However, they highlight the need and opportunity for academic research in this field.

The ICC's recent national survey concludes that only 8% of code professionals possess some form of advanced degree (NIBS 2014). This represents a very small number of people, and limits the potential for research related to code professionals. The literature review would appear

to indicate that the portions of the construction industry with more of an academic history such as engineering and architecture lead the way with published research related to building codes. This research tends to focus on the science behind the codes, and less on occupational science.

Much has been written regarding elements of structural design on various construction materials and individual products as they relate to current and past code requirements (ACI Committee 2005). Likewise much has been researched and published regarding seismic design requirements, real-world performance of structures during seismic events, fire prevention and performance, various elements of life-safety as it relates to the code and a variety of legal case-studies involving building codes and enforcement. The industries that supply a majority of construction materials, being the lumber industry, concrete industry and steel industry appear to have been adequately represented in the body of work related to general building code research.

In the past 15 years much emphasis has been made on green building, energy conservation, sustainability and similar topics. As a result much research related to building codes and the code professional industry has been focused on these topics. Rather than specifically studying the code professional, research has focused on the science behind the codes.

Relatively little has been written regarding the code professional industry. Studies would suggest that over 46% of code professionals were products of the individual construction trades (NIBS 2014). As a result many code professionals lack formal education, a majority passed through the various trade schools, and only a small percentage have completed college programs (NIBS 2014). A recent study concluded that only 35% of those sampled had completed a bachelor's or other advanced degree (NIBS 2014). As a result it appears the academic world has only had limited opportunity for exposure to the unique challenges and industry-wide problems that continue to exist.

In addition to the lack of academic exposure, the code professional industry has also suffered from lack of unity, and lack of a common voice. Historically code professionals made up a small part of much larger government entities. Data from the Bureau of Labor Statistics indicates that the industry with the highest concentration of employment as building inspectors is the Architectural, Engineering and Related Services Industry (AERS). However, building inspectors only make up 2% of overall employment in the AERS Industry (Bureau of Labor Statistics 2013). Municipalities generally employ a number of code professionals who are fairly isolated from any particular industry at large. Local chapters of code professionals associated with any of the larger code making organizations meet periodically to discuss trends and issues associated with the profession, the largest of which in Utah is the Utah Chapter of the International Code Council which has only approximately 365 members (Utah Chapter ICC 2009). The ICC as a whole has certified over 41,000 individuals making it the largest code organization in the country (Porter 2014). Even the ICC pales in comparison to the likes of the larger national organizations such as the American Institute of Architects with 83,000 members (AIA 2014) the National Association of Home Builders with 140,000 members (NAHB 2014), or the American Society of Civil Engineers with 146,000 members (ASCE 2014).

### **2.3.1 National Study on the Aging Code Professional Industry**

Concern over the aging Code Professional Industry is not a phenomenon unique to Utah. The International Code Council (ICC) recently addressed the issue by teaming with the National Institute of Building Sciences (NIBS) in conducting an industry wide survey which included respondents from all 50 states and 3 foreign countries (NIBS 2014). The survey consisted of a series of questions set out with the intent of discovering age demographics, compensation levels, educational and professional backgrounds, time spent in the construction and code professional

industries, as well as anticipated retirement timelines. The purpose of this study was to quantify the portion of the industry that would soon be retiring, understand their backgrounds and allow for a strategic plan to ensure the long-term viability of the current regulatory system. This survey was the first known academically structured investigation into the Code Professional Industry as a whole. By examining the means and methods of this recent national study a more strategic approach to investigating similar problems on a local level could be made.

The NIBS (2014) study solicited survey responses from code professionals around the United States, as well as Australia, Canada, and India. Invitations were made through emails, newsletters and press releases and ultimately 3,850 responses were provided. Roughly 41,000 individuals held ICC certifications suggesting that the respondents represented roughly 10% of those certified (Porter 2014). The respondents were asked a series of 25 questions in a survey format, with basic questions such as age, state where employed, level of education, current salary, etc. Questions regarding level of education included options for associates degrees, bachelor's degrees, advanced degrees, technical schools, and high school. In addition to level of education additional questions requested that specific programs such as architecture, engineering, construction management and other fields be specified. Respondents were also questioned as to their past or current experience in the various trades, time spent in the construction industry as a whole and at what age they joined the Code Professional Industry. Respondents were also asked why they entered the industry, what their job responsibilities were, size of the municipality they work for and most interestingly when they planned on leaving the profession. Lastly the respondents were asked what advice they would provide for current high school students interested in entering the industry.

### **2.3.1.1 Age Demographics Within the Industry**

The results of the NIBS (2014) study confirmed the worries of the Code Professional Industry as it was discovered that 45.6% of the respondents were 55 to 64 years old, with an additional 9% between the ages of 65 and 74. A staggering 82% of respondents planned to leave the industry through retirement or to pursue an alternative career within the next 15 years, and 30% planned to leave the industry within the next 5 years (NIBS 2014). If this study represented a fair representation of the industry, and using the 41,000 individuals who held ICC certifications (Porter 2014), the number of Code Professionals in the United States exiting the industry within the next 15 years could total 33,620 individuals. The concern over a mass exodus of Code Professionals in the near future appears to have been substantiated at a national level. This thesis research further examines and quantifies the scale of this national problem at a State of Utah level.

### **2.3.1.2 Educational Backgrounds of Code Professionals**

The NIBS (2014) study provided previously unknown data regarding the educational backgrounds of code professionals. Only 35% of respondents had completed a bachelor's degree, with only 9% having an advanced degree. Of those with bachelor's degrees, 26.6% had studied business, 30% engineering, 15.5% architecture and 14.4% construction management, with public administration, government, education, fire science and planning making up the remainder. The relatively high concentration of business graduates was surprising to the researchers, as it hadn't been thought of as a significant source of potential code professionals. The remaining group of professionals was fairly evenly split between high school education, technical and vocational schooling, and associates degrees. Of those with advanced degrees 26% had completed programs in architecture, 27% engineering, 16% government, 14% business, 7% planning with the

remainder in education, Administration and Law. This data was valuable as the industry looks to discover a source for the next generation of code professionals. Utah faces a similar need for a future generation of code professionals; this data may suggest recruiting efforts be made in specific academic programs that have proven to produce code professionals in the past.

Of those with technical and vocational training, 31% specialized in carpentry, 22% in plumbing, 21% electrical and 17% heating ventilation and air conditioning (HVAC). Only 4% of respondents had formal technical or vocational training in inspections or codes. These findings appear to support the idea that each of the major trades is fairly evenly represented within the Code Professional Industry. The survey also confirmed the general school of thought discovering that 47% of code professionals began their careers in the trades. The portion of the industry that had completed associates degrees was also divided between construction management at 21%, Engineering Technology 20%, Architectural Technology & Codes/Inspection both at 16% with Trades at 13%, Fire Science Systems 10% and 4% in Building Construction Technology. A focus on recruiting individuals from a combination of universities, community colleges, tech school and the construction trades appears to be warranted. The research associated with this thesis compares the Code Professional Industry in Utah with the results of the NIBS (2014) study, while investigating where those in the industry feel the next generation of code professionals will come from.

### **2.3.1.3 Age When Entering the Industry**

The NIBS (2014) study concluded that the most likely age when individuals entered the Code Professional Industry was between 30-39 years old as was the case with 35% of respondents, with an additional 28.1% entering between the ages of 40-49 years old. A surprising 22.4% of those surveyed entered the profession between the ages of 20-29. This conflicts with



conventional wisdom as the survey results indicated that only 3.4% of those responding to the survey were under the age of 35. This would seem to indicate that in the past a larger portion of the industry was made up of younger people.

#### **2.3.1.4 Code Professional's Salaries**

The NIBS (2014) study gathered salary data which indicated that 41.3% of those surveyed earn between \$50,000 and \$74,999 per year, representing a clear majority. Over 20% earn between \$75,000 and \$99,999 per year indicating that the potential for higher wages exists within the industry. This data could also suggest that the higher salaries are reserved for those in supervisory positions, who have earned administrative duties due to their extended years in the industry. The salary data must be evaluated in conjunction with the survey's data measuring the number of years respondents had spent in the industry. While more than 60% had over 25 years in the construction industry, only 17% had over 25 years in the Code Professional Industry. This data suggests that professionals often enter the Code Professional Industry as part of a career change made later in life. This data also suggests that wages within the industry are at a level where they can compete with other industries such as general construction, construction trades, architecture and engineering which is later addressed (see Section 2.5).

#### **2.3.1.5 Sizes of Communities and Municipalities Served**

Of those who responded to the NIBS (2014) survey, 33.2% worked in building departments that consist of 1 to 4 people, with an additional 23.9% working in departments of 5-9 individuals. This data is of value as the impact of losing code professionals becomes stark. When you consider the small sizes of the departments that may be effected, losing any one individual has more of an impact. Small building departments have very little elasticity, and are

generally minimally able to absorb the workload of any one individual. The communities the survey respondents serve were of different sizes, with 31.2% having populations of less than 25,000 and another 28.4% between 25,000 and 74,999. The populations served and the size of the building departments served correlate with one another as smaller municipalities tend to have proportionally smaller building departments as seen in Table 2-2. With Utah’s largest city Salt Lake City having an estimated population of 191,180 the data depicted in Table 2-2 was limited to the applicable ranges (Utah Demographics 2014).

**Table 2-2: Size of Department vs. Population Served**

<b>Size of Building Department</b>			
<b>1 to 4</b>	<b>5 to 9</b>	<b>10 to 14</b>	<b>15 to 24</b>
33.2%	23.9%	12.5%	9.7%
<b>Population Served</b>			
<b>&lt; 25,000</b>	<b>25,000 - 74,999</b>	<b>75,000 - 149,000</b>	<b>150,000 - 249,000</b>
31.2%	28.4%	14.1%	7.8%

### **2.3.1.6 Roles Within the Code Professional Industry**

Another telling aspect of the NIBS (2014) research involved investigating the roles of each code professional in their respective building departments. Over 38% identified as having general inspector duties, and 51.8% identified as having plan review duties. This data suggests that plan review is often not a specialized function. This appears to be in part due to the small size of nearly 60% of the municipalities. Smaller building departments tend to have overlapping roles more often than larger ones. This also indicates that the future generation of code professionals will need to be proficient in a wide variety of code disciplines, in order to ensure that smaller municipalities have expertise in all areas of the Code Professional Spectrum.

### **2.3.1.7 Advice to Future Code Professionals**

The NIBS (2014) survey concluded with advice from current code professionals to those interested in entering the field, primarily high school students. The results of the survey suggest that a majority of current code professionals recommend vocational training, a few years working in the construction industry prior to entering the Code Professional Industry. Many expressed positive experiences in the industry. Only a small representation of responses discouraged entering the industry, although politics and an unbalanced ratio of pay vs. responsibility were noted. This data was valuable as those who have worked in the industry appear to stress the importance of vocational training, and on-the-job experience in the construction industry. Discovering how to provide the next generation of code professional with the suggested training and experience may be challenging. If the industry fails to plan for the mass departure of code professionals, the demand for inspectors may be immediate, not allowing sufficient time for vocational training and hands on construction experience. The challenge becomes one of focusing training opportunities as code professional require knowledge and understanding in many code disciplines, whereas vocational training and on-the-job experience are generally limited to an individual trade.

### **2.3.1.8 Study Conclusions**

The ICC study through the National Institute of Building Sciences (2014) appears to be among the first of its kind. During the course of the literature review no similar studies were located. The findings of the NIBS (2014) study clearly framed the inevitable coming change in the industry within the next 5-15 years as many within the industry plan on retiring. One of the aims of this research was to collect similar data for the industry in the State of Utah. The NIBS (2014) study also found that many of the code professionals with multiple years of experience

will be among those leaving the industry. The small jurisdictions which made up a majority of the sample will likely be impacted most dramatically. Utah is made up of a large number of small jurisdictions, suggesting that the approaching mass retirement will have a dramatic impact. Although nearly a quarter of NIBS (2014) respondents entered the industry prior to age 30, only 3.4% of the respondents were under the age of 35. Utah also appears to lack code professionals in the sub 35 age range; this thesis research quantifies this population. Individuals are entering the industry later in life, which limits the time available to master the necessary skills. From an educational perspective the trades have historically been the primary source of code professionals; however, individuals with all levels of education make up the current industry. Likewise individuals with many different fields of study have ended up in the industry suggesting that recruitment efforts must remain broad and diverse when searching for the next generation of code professionals. As Utah prepares to replace nearly 47% of licensed building inspectors it will be important to pull professionals for various industries, and various educational backgrounds.

### **2.3.1.9 Limitations of the Study**

There are several limitations in the NIBS (2014) study. The study did not address gender or ethnicity measures. Although diversity has not been an obvious issue related to this issue, it's clear that all underrepresented groups have added potential to ensuring adequate number of code professionals in the future. Gender issues appear to be most relevant in this industry as it has historically been relatively male dominated.

The NIBS study was unable to match specific skills and certifications to the portion of the industry that plans on exiting the industry within 15 years. In order to be prepared to continue administering the building regulatory system the industry must not only have the next generation

of code professionals, but the next generation must have the proper credentials necessary in order to carry out the required work. This research attempts to match certification and licensing in specific code disciplines to the portion of the industry that will soon be retiring.

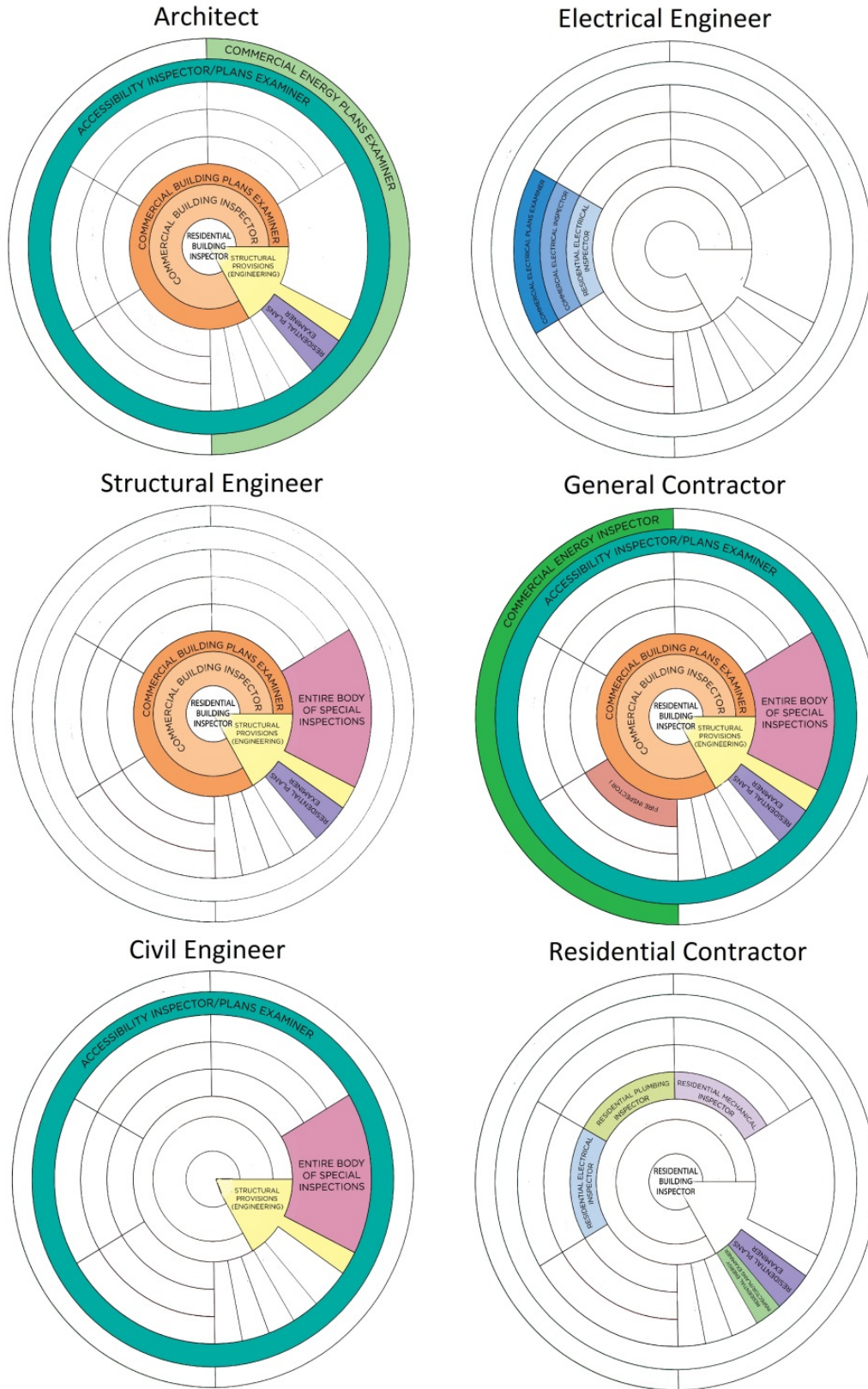
Another limitation of the NIBS (2014) study is that it was administered in an online format, with participants notified of the survey through email, newsletters and press releases. The data collected supports recent observations indicating an aging population of code professionals; however, the problem may be more pronounced than the data suggests when you consider that the older code professionals are less likely to be utilizing email and viewing online newsletters and press releases. In addition the data appears slightly positively skewed with respect to the level of education completed. Those with higher levels of education may be over represented considering the sample size was less than 10% of those with ICC certifications, and the survey method appears to favor those more involved in the International Code Council, it's newsletters and press releases. Lower level code professionals may not have seen the survey, may not have recognized its value to the industry, or may have been too busy to respond. A true random sampling of code professionals might provide more reliable data.

#### **2.3.1.10 The Next Generation of Code Professionals**

As the industry looks toward the future there is no clear source of future code professionals. Observations suggest that in the past it was fairly common for individuals from the various trades to transition into working as a building inspector, plumbing inspector, electrical inspector, etc. It appears that over time competency in some of the other code disciplines would be gained and eventually an inspector with expertise in multiple code disciplines would emerge. In other instances municipalities are known to have employed systems of specialty inspectors, each of which specialized in a single construction discipline; however, this method appears to

have been overly cumbersome as a single inspection could require upwards of four different inspectors. With a specialty model single discipline inspectors could transition from their individual trades into employment as inspectors in the same trade with little additional training. The current Code Professional is generally asked to gain and maintain expertise in nearly all aspects of the Code Professional Spectrum. The current industry trend toward combination inspectors appears to discourage individuals from the various construction trades from entering the industry, as they only have a small portion of the necessary skills and experience required.

The professional industries associated with construction such as architects, engineers, contractors and the construction trades employ individuals who possess specialized skills. An attempt to quantify those specific skills has not been made, but to emphasize the challenges facing the next generation of code professionals theoretical Code Professional Spectrums have been created for a number of occupations emphasizing the true vastness of the Code Professional Spectrum (see Figure 2-7). Each professional occupation has been credited some level of expertise in the highlighted areas based on the nature of the occupation. The highlighted areas do not represent the same level of expertise that a member of the Code Professional Industry might possess; rather, they represent an area of transferable skills which if developed could be put to use in the Code Professional Industry. As is made clear in Figure 2-7, there is no single occupation that adequately encompasses the spectrum of expertise needed in the next generation of code professionals. In the same sense the true value of the population of experienced code professionals who will soon reach retirement is made evident. As the industry prepares for the upcoming mass retirement in Utah it must have a true understanding of both the number of individuals that will be needed, as well as the wide range of skills that must be developed.



**Figure 2-7: Relevant Code Qualifications Based on Occupation**

## 2.4 Impacts of An Aging Workforce

This section explores the challenges and issues associated with an aging work force. The NIBS (2014) survey of code professionals indicated that 45.6% were between the ages of 55 to 64 years old. This large percentage of older workers, in combination with the apparent lack of younger workers entering the industry indicates that the Code Professional Industry may have to rely on these older professionals for years to come. The NIBS (2014) survey indicated that 9.0% of code professionals were 65 to 74 years old; consequently there is a high likelihood that percentage may increase in the future. By understanding the practical details of an aging workforce the impact of the approaching mass retirement of code professionals could be better understood and measured.

The approaching retirement of the baby boomer generation has been anticipated for many years. Those born between 1946 and 1964 are generally referred to as the baby boomer generation and they have started to reach and surpass retirement age. The construction industry is not immune to the inevitable retirement of its workforce. One example is the International Brotherhood of Electrical Workers (IBEW) which as far back as 2008 projected that 60% of their experienced utility workers would retire in the next 2 to 3 years (Silverstein 2008). Being that the approaching retirement of the baby boomer generation cannot be stopped, researchers have proposed alternate solutions to provide continuity during the transition. Possible solutions include: delaying retirement, adjusting job duties to accommodate older workers and flexible work schedules to encourage phased retirement (Silverstein, 2008, Arnone, 2006, Burtless and Quinn 2002). The following sections outline potential methods of coping with an aging workforce of code professionals, and explore the impact these alternatives might have on the industry as a whole.



### **2.4.1 Delaying Retirement**

Delaying retirement may alleviate current needs within the code professional industry; however, if action is not taken to find, train and employ the next generation of code professionals the industry will only be delaying the inevitable. Many researchers have concluded that our current workforce may need to stay on the job longer, and postpone retirement in order to soften the pending loss of large numbers of skilled professionals (Silverstein, 2008, Arnone, 2006, Burtless and Quinn 2002). The number of people planning to put off retirement beyond the age of 62 rose nationally from 35% in 1998 to 55% in 2004 and is most likely increasing (Silverstein 2008). *“Many older Americans might benefit by staying active in the workforce longer – at least on a part-time basis – simply because they derive satisfaction from working and from the social relations hips they develop in the workplace”* (Burtless and Quinn 2002). The Code Professional Industry in Utah could greatly benefit from a portion of its professionals following national trends, and delaying retirements. Such a delay would alleviate the abrupt loss of professionals, and allow the industry to adequately respond to the potential crisis through additional training programs and recruitment efforts.

### **2.4.2 Modified Job Duties**

Those in the Code Professional Industry have a wide variety of job duties, as made evident by the Code Professional Spectrum. As people age their cognitive capacities diminish to some extent. In order to best utilize the current population of older code professionals, and encourage them to remain in the workforce beyond retirement, it will likely be necessary to adjust job duties according to their abilities. Studies have concluded that tasks requiring performing multiple tasks or holding multiple items in working memory as especially sensitive; however, many functions are “crystallized” which are better preserved with age (Silverstein

2008). The job duties of code professionals often involve complex thought processes and memorization of thousands of individual code sections. Although these tasks may on the surface appear to be vulnerable to the effects of age, it is not unusual for code professionals to continue to work well into their 70's as evident from recent ICC national survey data (NIBS 2014). This may suggest that a sufficient portion of the job duties of code professionals can be retained well beyond retirement age and that delaying retirement is a viable option.

In order to retain older code professionals, slight modifications to their job duties may be necessary. Although the cognitive functions may be intact, the physical duties of code professionals may exceed the capacity of some older workers. The American Association of Retired Persons (AARP) suggests that, *“If employers are to reap the benefits of the work ethic and experience of older workers, they must design the workplace of the future to meet their needs”* (Silverstein 2008). This is clearly the case within the code professional industry as inspection duties involving climbing scaffolding, entering crawl spaces, and walking steep pitched roofs are not conducive to the older work force. Studies have concluded that workers in poor health, or who work in physically demanding jobs are typically first to retire (Burtless and Quinn 2002). There are many aspects of the code professional industry that are not physically demanding, and through modifying job duties the industry could extend the careers of many of its older professionals. The National Institute of Building Science's demographic survey concluded that a majority of code professionals perform a combination of inspection, plan review and administrative duties (NIBS 2014). A move towards more specialized roles within building departments may be necessary in order to fully utilize older workers beyond typical retirement age.

### **2.4.3 Phased Retirement**

The National Institute on Aging conducts a Health and Retirement Study every two years. The study, “has consistently shown that three out of every four older workers have said they would prefer to reduce hours gradually rather than retire abruptly” (Silverstein 2008). Studies have shown that only 11.2% of companies are considering hiring retirees as consultants or contractors, or using on-call pools of retirees (Arnone 2006). The code professional industry must be creative in finding methods of allowing for a phased retirement, such as flexible hours, part-time contracts, as-needed contracts and similar methods of ensuring that those retiring still have viable options to contribute to the industry.

### **2.4.4 Capturing Institutional Knowledge**

A recent article in Benefits Quarterly begins with the statement “Few trends are as predictable and irreversible as the aging of the American population” (Arnone 2006). The purpose of the study was to examine how organizations are responding to their aging workforces and determining how they plan on transferring “business wisdom” defined as, “*value that is uniquely derived from experience alone.*” As the Code Professional Industry plans for the future there is much business wisdom that will be lost due to the pending mass retirement; this phenomenon is also referred to as talent gap or brain drain (Arnone 2006). The study also indicated that only 18.6% of survey respondents listed the mentoring of younger workers by older workers as a method of capturing and transmitting business wisdom. The code professional industry is in great need of programs that facilitate the mentoring of younger workers. Inspectors primarily work alone and relatively unsupervised; as a result, the opportunities for older more experienced workers to pass along business wisdom are limited. The cost of training the next generation of code professionals could be substantial. “*While younger employees result in lower*

*compensation costs, productivity that results from training them for their new roles could end up costing substantially more” (Arnone 2006).*

#### **2.4.5 Aging Workforce Conclusions**

Based on the research that has been done, it is clear that through strategic planning accommodations can be made to extend the professional contributions of those that will soon reach retirement age. The continued employment of an older workforce cannot be undertaken without taking steps to support their productive capacities and minimize their potential vulnerabilities (Silverstein 2008). The code professional industry needs to make adequate accommodations to ensure that the next generation of professionals can be mentored, and the business wisdom of the retiring generation is passed down to the rising one. Failure to act will result in an abrupt loss of institutional knowledge, as well as substantial monetary costs as the new generation of code professionals will require significant training. Without strategic planning the sources of available training may be limited, as those best suited for providing training may no longer be part of the industry.

#### **2.5 The Potential of a Skilled Worker Shortage in Utah**

The retirement of large percentages of the Code Professional Industry in Utah could lead to a skilled worker shortage. Understanding the various types of skilled worker shortages, how they occur, and what can be done to avoid or lessen the impact of such shortages is a crucial part of assessing the impact of the approaching mass retirement in Utah.

In Utah the potential for a skilled worker shortage has been made apparent as municipalities at times have struggled to fill open positions. The Utah Department of Workforce Services projects 2.4% growth in the Building and Construction Inspector job market through

2022 (Utah Department of Workforce Services 2012). The projected rate of growth will require an additional 200 inspectors between 2012 & 2022. This information when combined with the pending departure of nearly 300 licensed building inspectors to retirement, would lead to drastically increased demand for code professionals. It is unclear as to where these professionals will come from and how they will obtain the right skills and qualifications necessary to obtain State licensure. In order to understand the potential implications of the mass departure of building inspectors a literature review focused on skilled worker shortages was conducted.

### **2.5.1 What Is a Skill Shortage?**

An article from The National Institute of Labour Studies at Flinders University in Australia clearly outlined the various types of skilled worker shortages, and what contributes to each type occurring in an industry (Richardson 2007). Richardson's research was geared at using vocational education and training to match the skills required by employers with the skills offered by workers. Richardson quoted the United States Bureau of Labor Statistics in saying, "*...there are no objective measures or direct indicators of skill shortages;*" this element of uncertainty establishes the need to focus on contributing factors as opposed to direct indicators. In the Utah market a decrease in the supply of code professionals due to retirement will undoubtedly be a contributing factor if a skilled worker shortage is to occur.

According to Richardson there are four basic types of skilled worker shortages, each of which can be evaluated with respect to the Code Professional Industry in Utah. The following sections will assess each of the 4 basic types of skilled worker shortages, their likelihood of occurring, and the potential impact on the Code Professional Industry in Utah.

## **2.5.2 Level 1 Shortage**

According to Richardson (2007) the first type of shortage is a Level 1 shortage, which generally occurs within an industry when, *“there are few people who have the essential technical skills who are not already using them and there is a long training time to develop the skills.”* In Utah the general sense is that there isn’t a large population of code professionals with the proper certifications and licenses that are not currently employed in the industry, suggesting that the first element of a Level 1 shortage is present. In order to have a true Level 1 shortage there has to be a long training time to develop the necessary skills, which could be viewed as barriers to entry. It is important to make the distinction that a long training time does not necessarily mean a difficult or expensive training time. As previously addressed in this research, due to the Utah licensing requirements for building inspectors a long training time does exist to develop the necessary skills of a code professional. The following sections will address a variety of the barriers to entry that will delay the industry’s ability to respond to drastic changes in the supply of code professionals. Together the limited supply of code professionals, and the relatively long training time required to gain licensure, would suggest that Utah does run the risk of a Level 1 skilled worker shortage occurring if large percentages of the industry abruptly retire.

### **2.5.2.1 Barriers to Entry**

One of the conditions of a Level 1 shortage is a long training time to develop the necessary skills associated with an industry. Long training times can be viewed as barriers to entry, for individuals interested in entering an industry. For these purposes an examination of the barriers to entering the Code Professional Industry in Utah was conducted. An unsubstantiated claim has been made that Utah was the first State to mandate licensure of building inspectors. Although the claim cannot be verified, it is true that in 1989 the State of Utah passed the

Uniform Building Standards Act which addressed the qualifications of inspectors in section 58-56-9. The provisions of the new regulations were delayed for a period of four years to allow those in the industry time to obtain the proper qualifications. Beginning July 1<sup>st</sup> 1993 certification through a nationally recognized code organization was required in order to obtain a professional license (Utah Code Unannotated 1989). This marked a sweeping change within the local industry, as the necessary skills associated with performing the duties of a code professional were now quantified, standardized and mandated by State law. As a result a process was created which required time, effort, expense and most importantly demonstrating a minimum level of competence. Until this time there were virtually no barriers to entry, and the industry could grow fairly effortlessly, and was very elastic in its ability to respond to changing conditions.

Individuals entering the industry today are faced with multiple barriers to entry including the expense of study guides, flashcards, online prep courses, code books and payment of exam fees, but more importantly the time necessary to study, certify and demonstrate competency. The cost of code books and reference materials add to the up-front costs associated with obtaining certification and State licensure. Table 2-3 outlines some of the potential costs for code books and reference materials which provide the basis for the certification exams required for State licensure as a Combination Inspector.

**Table 2-3: Cost of Code Books**

<b>Cost of ICC Code Books Related to Utah DOPL Combination Inspector License*</b>	
2012 International Residential Code \$91.50	2012 International Building Code \$98
2012 International Plumbing Code \$63	2011 National Electrical Code \$69
ICC-A117.1-2009 \$36.95	2012 International Mechanical Code \$60
ICC Concrete Manual \$69.50	2012 International Fuel Gas Code \$60
<b>Total Cost for Code Books: \$547.95</b>	

In addition to the up-front cost of code books, the ICC certification examination costs range from \$116 to \$194 each, with the standard exam fee being \$189. The exams required to obtain Combination Inspector license status in Utah are outlined in Table 2-4.

**Table 2-4: Cost of ICC Exams**

<b>ICC Exams Necessary for Utah DOPL Combination Inspector License</b>	
Residential Building Inspector \$168	Commercial Building Inspector \$189
Residential Electrical Inspector \$168	Commercial Electrical Inspector \$189
Residential Plumbing Inspector \$168	Commercial Plumbing Inspector \$189
Residential Mechanical Inspector \$168	Commercial Mechanical Inspector \$189
<b>Total Cost for Exams: \$1,428</b>	

As the total cost of the eight required exams totals \$1,428, assuming every exam is passed on the first attempt, it's easy to understand the challenge facing individuals interested in entering the Code Professional Industry in Utah.

In addition to the cost of purchasing study materials and paying for exams passing certification exams requires a substantial time commitment. In order to reach proficiency in each of the various code disciplines codes have to be read and understood, vocabulary must be learned and preparation must take place. This time frame varies for each individual, specifically based on their past experience; however, if a theoretical period of 6 weeks per certification exam was used



as a baseline, a total of 48 weeks would be required to gain licensure as a Combination Inspector in Utah. This time frame of roughly 1 year establishes a baseline for the ability of the industry to react to changing needs, and represents the “long training time” referenced by Richardson (2007) when describing a Level 1 shortage.

### **2.5.3 Level 2 Shortage**

A Level 2 shortage exists when, “*there are few people who have the essential technical skills who are not already using them but there is a short training time to develop the skills*” (Richardson 2007). As the primary difference between a Level 1 and a Level 2 shortage is the duration of the necessary training period, an argument could be made that at best an industry may be able to transition from a Level 1 shortage to a Level 2 shortage through improving training methods; hence, accelerating the training period. With respect to the Code Professional Industry in Utah, the time necessary to obtain the proper ICC certifications and state licenses could be shortened through improved training, study groups and better resources; however, it could also be accomplished through modifying the State licensing requirements.

### **2.5.4 Skills Mismatch**

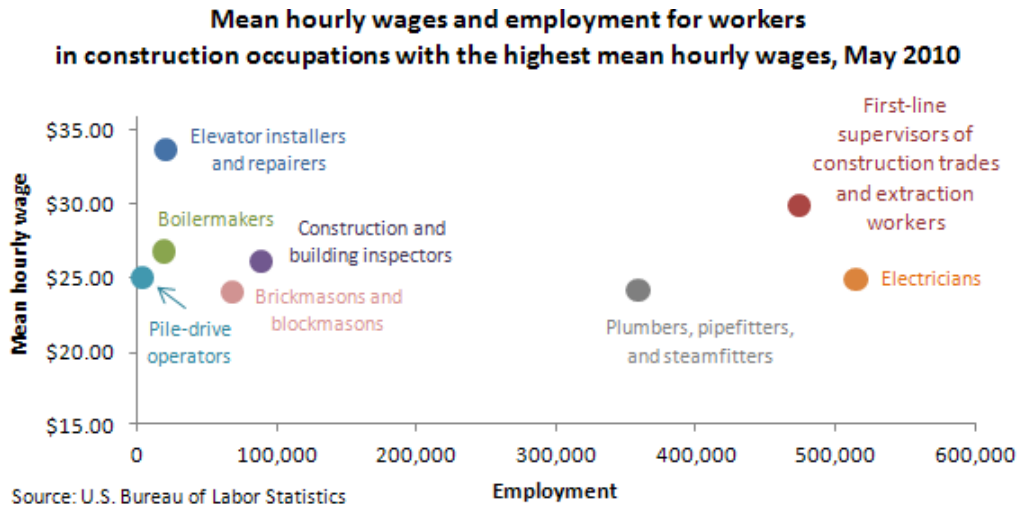
Rather than being considered a Level 3 shortage, the third phenomenon associated with skilled worker shortages is referred to as a Skills Mismatch. As opposed to an actual shortage of skilled workers a Skills Mismatch occurs when, “*there are sufficient people who have the essential technical skills who are not already using them, but they are not willing to apply for the vacancies under current conditions*” (Richardson 2007). There is little evidence to suggest that a Skills Mismatch exists within the Code Professional Industry in Utah due to the limited and declining number of individuals with the required credentials. It is, however, worth examining

the potential of the industry lacking appeal to individuals who would otherwise be willing to obtain the necessary certifications and licenses and become code professionals. When Richardson (2007) references “current conditions” it is generally referencing compensation and working conditions.

As the Code Professional Industry in Utah loses a large percentage of its professionals a new generation must be found. Although not specifically a Skills Mismatch there are populations of skilled workers in other industries who have similar relevant skills that could be repurposed in the Code Professional Industry. The NIBS (2014) study discovered that, “*becoming a code professional is a career change made later in a person’s overall career.*” This suggests that although a Skills Mismatch does not exist, as these individuals from other industries do not have the specific certifications and licenses, the concept of working to ensure that these individuals are willing to apply for vacancies in the future is valid. The NIBS (2014) study highlighted job security and salary as the top reasons for pursuing a career as a code professional; however, most of the survey respondents entered the industry decades ago. The financial incentive to enter the industry has since changed as will be discussed in Section 2.5.4.1.

#### **2.5.4.1 Wage Comparison**

According to the Bureau of Labor Statistics who compared construction related occupation wages in 2010, Construction and Building Inspectors had a mean hourly wage of \$26.11. Figure 2-8 highlights how these wages compare to individuals from the individual construction trades.



**Figure 2-8: Mean Hourly Wages in Construction 2010**

It is clear from the information in Figure 2-8 that code professionals only marginally compete with members of the construction trades such as plumbers, electricians, brickmasons, etc. On the contrary, first-line supervisors in the construction trades make substantially higher wages. As a result of this data, it is clear that individuals in the construction trades today, where roughly 60% of today's code professionals originated (NIBS 2014), have little financial incentive to transition from the trades to the Code Professional Industry. This mean hourly wage data also supports claims made by those in the industry arguing that the ratio of pay vs. responsibility is unbalanced (NIBS 2014).

Comparing the wages of code professionals and other construction related industries is valuable in understanding the potential of a skilled worker shortage. If the industry reacts by increasing training efforts, modifying licensing requirements, or removing other barriers to entry the result may be a Skills Mismatch which would not alleviate a skilled worker shortage. Only by joint efforts toward ensuring there are sufficient numbers of professionals with adequate

skills, and ensuring current conditions entice professionals to enter the industry, can a skilled shortage be averted.

### **2.5.5 Quality Gap**

Richardson (2007) identifies the fourth level of skilled worker shortage as a Quality Gap. A Quality Gap occurs when, *“There are sufficient people with the essential technical skills who are not already using them and who are willing to apply for the vacancies, but they lack some qualities that employers consider are important”* (Richardson 2007). The concept of a Quality Gap appears to have a possibility of occurring within the Code Professional Industry in Utah once all previously discussed challenges have been resolved. Once the number of certified and licensed professionals in Utah reaches an acceptable level, and the Code Professional Industry becomes an attractive employment option, the possibility still exists for those interested individuals to lack certain qualities that employers consider important.

Evidence of this potential scenario is manifest by recent ICC publications aimed at addressing the non-technical skills and personality traits that have only recently been identified as being important in the industry. The ICC recently published a book entitled *“Inspector Skills”* which addressed the soft skills and people-related skills that are valued in the industry (International Code Council 2014). The development of these soft skills is a necessary part of the Code Professional Industry’s efforts toward developing the next generation of code professionals. A focus must be made to develop both technical and soft skills in order to ensure that the new generation of code professionals meets the demands of the industry.

### **2.5.6 Skilled Worker Shortage Conclusions**

Using the categorization methods presented by Richardson (2007) it appears that in Utah a Level 1 shortage is imminent, with some elements of a Skills Mismatch being a likely factor. The time involved to acquire the necessary ICC certifications and associated State licenses constitutes what would be considered a long training time. The relatively long training time will be a factor as a large number of code professionals retire in the next 5 to 15 years. Unlike conditions prior to the State mandated licensing of building inspectors, there is now a lag in the industry's ability to react to increased demand for professionals. There appears to be some elements of a Skills Mismatch in the sense that those in the construction trades who could most easily obtain the necessary skills to enter the industry, may not be willing to apply for the vacancies. Unlike many of the current code professionals who cited salary as part of why they entered the industry (NIBS 2014), the next generation of code professionals may not have similar incentives. Lastly when considering the appropriate action to be taken by the industry to avoid a skilled worker shortage, efforts to provide both technical training, as well as soft skills must be taken. Failure to develop soft skills amongst code professionals could result in a Quality Gap.

### **2.6 Summary**

The Code Professional Industry has and will continue to change as codes continue to evolve. The demands placed on code professionals are increasing and the new generation of code professionals must be skilled in a very broad spectrum of code disciplines. The challenges facing the industry in Utah parallel those of the industry in general, as national studies indicate that code professionals from across the country are reaching retirement age in large numbers. The impact of a mass retirement will most directly impact the smaller jurisdictions, which are common in the State of Utah. The industry will need to adjust to the changing needs of these

aging code professionals. Changes can be made to optimize the contributions of those soon to be retiring such as adjusting job duties and phased retirement. Through mentoring the industry can avoid brain drain and pass along the knowledge and expertise of its most experienced professionals. Various forms of skilled worker shortages could occur as a result of the mass retirement facing the industry in Utah; however, a Level 1 shortage in which a combination of an insufficient population of trained professionals, and a relatively long training time is most likely. Other forms of shortages such as a Skills Mismatch or Quality Gap are possible, depending on how the industry reacts, and prepares for the future. This study builds upon the current research literature as it narrows the focus from a national level to a state-wide level and from non-industry specific applications to the Code Professional Industry exclusively.

### **3 METHODOLOGY**

#### **3.1 Introduction**

Nearly half of the licensed building inspectors in the State of Utah will reach retirement age within the next 10 years, as 47% are over the age of 55. This mass departure of code professionals may have an adverse effect on the code professional industry, as well as the construction industry as a whole. The loss of 47% of local professionals will result in a smaller, less experienced group of professionals assuming the responsibility of ensuring public safety through the enforcement of building codes. This research focuses on the goal of better understanding the effects of the approaching mass retirement of building inspectors in Utah.

The author determined that the following research objectives would be of most value to the local Code Professional Industry in Utah, and could be used as a guide for future research in other locations. Each of the four primary research objectives are accompanied by secondary research questions which further define the intent of the research.

- 1) Determine the true size and make-up of the current Code Professional Industry in Utah.
  - a) What unique code disciplines are the most and least common in the State of Utah?
- 2) Discover the age demographics of the population of licensed building inspectors in the State of Utah, and how they are expected to change in the next 5 to 10 years.
  - a) How many code professionals are expected to soon retire from the Code Professional Industry in Utah and when?

- b) What individual skills will be lost with the mass retirement of code officials in the next 5 to 15 years?
- 3) Measure observable trends that have occurred within the Code Professional Industry in Utah between 1993 and 2014?
- a) How has the total number of licensed building inspectors in the State of Utah changed during the time period between 1993 and 2014?
  - b) Is the number of licensed building inspectors increasing or decreasing when compared to permit valuation, size of the work force and population?
  - c) If the current rates of inspectors exiting and/or retiring from the industry vs. new inspectors entering the industry continue; is a skilled worker shortage imminent?
  - d) What size jurisdictions/building departments will be most affected by the upcoming mass retirement of building inspectors in Utah?

In an attempt to adequately respond to the research objectives a mixed methods approach was used in this research. Research has suggested that mixed methods should be used in an attempt to fit together insights provided by qualitative and quantitative research into a single workable solution (Johnson and Onwuegbuzie 2004). This inquiry involved a process of gathering and analyzing existing quantitative information, which was then carefully combined into a single workable database unique to this research.

Once the available data was analyzed it became apparent that a state-wide survey of code professionals was necessary to supplement the available data and provide additional qualitative data. Many of the research objectives could be partially addressed utilizing the newly compiled database; however, other objectives involved posing questions directly to the Code Professional Industry in Utah and soliciting individual responses.



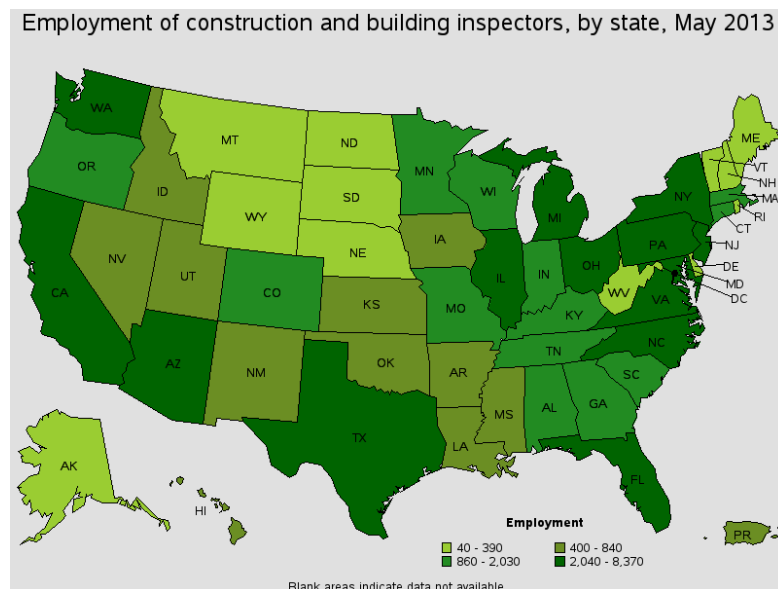
The existing data was primarily quantitative as it involved the number of code professionals, the number of individuals with specific licenses and certifications and trends within the industry over the specific period of time. On the contrary the state-wide survey involved qualitative data as it posed questions regarding why individuals entered the Code Professional Industry, when they anticipate retiring and where they expected the next generation of code professionals to come from. By utilizing a mixed methods approach a more complete analysis of the Code Professional Industry in Utah could be conducted as the size, make-up and qualifications of the industry could be quantified without failing to account for the attitudes and beliefs of the code professionals themselves.

### **3.2 Setting**

The research related to this thesis took place in the State of Utah. This location was selected for many reasons, among which were: proximity to the researcher, familiarity with the local industry, known availability of data, and the size of the code professional population. This research was conducted through Brigham Young University located in Provo, Utah which is geographically central to the research setting. The primary author of this research has been a licensed building inspector in Utah since 2005. As a member of the code professional community the author was previously aware of relevant issues associated with the research. Further, Utah was a prime setting for the research as the building inspector profession has been regulated through State licensing since 1993 (Utah Code Unannotated 1989). A 20 year history of licensing the building inspector occupation resulted in the availability of detailed licensing records which were a valuable and much needed data source. Discovering trends in the Code Professional Industry would not have been possible without the available records. In addition, licensing requirements in Utah involved certification through the International Code Council

which presented another source of data, as well as a standardized method of comparing individual skills and qualifications.

Utah has a population of code professionals may be comparable to those in other states, which indicates that this research design may be applicable in other locations, as well as replicable. According to the Bureau of Labor Statistics (2013), the Construction and Building Inspector occupation in Utah employs 820 individuals, which was determined to be a manageable sample size. Figure 3-1 depicts employment population numbers for Construction and Building Inspectors in the United States. A total of 11 states have comparable sized populations of construction and building inspectors, with an additional 12 states having populations smaller than that of Utah. As a result the methods used in this research to evaluate the code professional industry in Utah could easily be duplicated in other states with comparable populations, and most likely could be duplicated on a large scale in states with populations of any size.

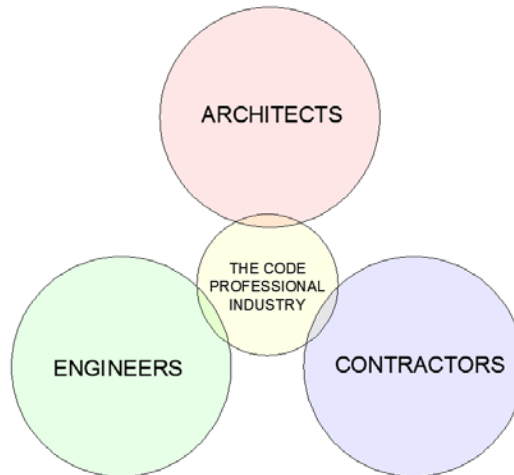


**Figure 3-1: Code Professional Populations Nation-Wide**

### 3.3 Subjects & Participants

The intent of this research was to evaluate the code professional industry in Utah. The study was designed to involve the entire code professional industry which would include people currently or previously involved in any element of the Code Professional Spectrum (see Fig 2-6). The code professional industry is made up primarily of inspectors, plans examiners, building officials and secretarial staff, who are generally referred to as permit technicians.

There are also other secondary professionals who although not involved in the code community on a daily basis participate through attending code specific training, participating in the code development processes, obtaining certifications through the national code bodies and in a variety of other ways. These secondary professionals include architects, engineers, contractors and a variety of other professionals. With that said, the code professional industry does not include architects, engineers and contractors in general, as these professions have their own industries which although they consistently interact with one another, have very different roles in society. Fig. 3-2 depicts the slight overlap within the various industries and represents those individuals who have bridged the gap and actively participate in multiple industries. This research included the code professional industry as a whole, inclusive of these secondary professionals.

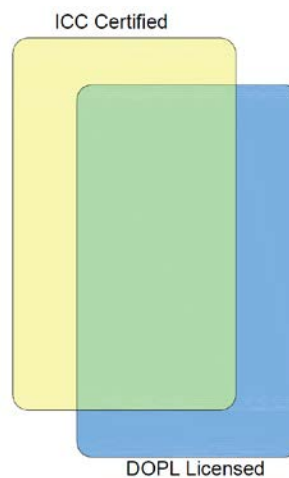


**Figure 3-2: The Code Professional Industry Model**

In order to address the research objectives two overlapping populations were investigated. The first population was that of individuals in Utah who possessed an International Code Council (ICC) certification. The second population consisted of individuals in Utah registered as licensed building inspectors by the Division of Occupational and Professional Licensing (DOPL). As seen in Figure 3-3, there was considerable overlap between the two populations. The population of ICC certified individuals in Utah totaled 872 people as of 7/10/2014; whereas the population of building inspectors with licenses issued by DOPL as of 7/9/2014 totaled 679 people. Of these two populations there was an overlap of 627 people.

This research focused on both populations for the purposes of determining the true size and make-up of the Code Professional Industry in Utah; however, the remaining research objectives could only be addressed through focusing in on the population of building inspectors licensed by DOPL. The data available from DOPL included age demographics, a history of licensing dating back more than 20 years, as well as contact information. By combining the

available data sources and using a survey to gather additional data the research objectives could be met.



**Figure 3-3: ICC and DOPL Overlap**

### **3.3.1 Description of the Participants**

The survey participants were all licensed by the Division of Occupational and Professional Licensing (DOPL), as either Limited or Combination Inspectors. The individuals involved in this research were from a variety of backgrounds. The survey data included code professionals employed by various types of municipalities including city, county and state governments, as well as individuals employed by private 3<sup>rd</sup> parties, and individuals employed by local school districts. In addition to demographic differences, the survey data involved both men and women respectively. Participants ranged in age from as young as 25 to over 75 years old. The survey data was designed to capture a fair sampling of the population as a whole. In all over 303 licensed inspectors participated in the survey.

## **3.4 Measurement Instruments**

### **3.4.1 Introduction**

In order to respond to the research objectives multiple sources of data had to be consulted. A portion of the reasoning behind selecting Utah as the basis of this study involved known sources of existing information, such as Utah's Division of Occupational and Professional Licensing (DOPL) which maintains records of all professional licenses issued within the state, the International Code Council (ICC) which maintains a database of all professionals who have completed certification tests in a variety of code disciplines, and lastly the Utah Construction Information Database which contains building permit data for nearly all Utah cities and counties dating back to 1958. Although there were multiple sources of existing data applicable to the research objectives, elements of the research objectives could not be answered without obtaining additional data through the issuance of surveys. Each of the primary sources of data is discussed in detail in the following sections.

### **3.4.2 Utah's Division of Occupational and Professional Licensing Data**

The first source of data was obtained from the Division of Occupational and Professional Licensing (DOPL) for the State of Utah, which governs the licensing of building inspectors. A data request was quickly processed and resulted in the receipt of a spreadsheet containing 2,130 records of individual licenses current as of 7/10/2014. The spreadsheet obtained from DOPL included the following information for each licensee: license name, license type, license number, license status, name of licensee, issue date, expiration date, street address, city, state, zip code, phone number and email as well as basic data regarding disciplinary action taken by DOPL if applicable.

The DOPL database provided information enabling the researcher to divide inspector licensees into 15 different categories as shown in Table 3-1. All of the designations with the exception of “Combination Inspector” and “Limited Inspector” are now obsolete.

**Table 3-1: DOPL License Designations**

<b>Utah Building Inspector License Designations</b>
Building Inspector - Obsolete
Building Inspector Trainee - Obsolete
Building Inspector I-Combo Trainee-Obsolete
Building Inspector II-Combo Trainee - Obsolete
Building Inspector III-Combo Trainee-Obsolete
Building Inspector I-UBC Trainee - Obsolete
Building Inspector III-UBC Trainee - Obsolete
Building Inspector I-NEC Trainee - Obsolete
Building Inspector III-NEC Trainee - Obsolete
Building Inspector I-UMC Trainee - Obsolete
Building Inspector III-UMC Trainee - Obsolete
Building Inspector I-UPC Trainee - Obsolete
Building Inspector III-UPC Trainee - Obsolete
Combination Inspector
Limited Inspector

Some notable information missing in the DOPL data was the gender of each licensed individual, the ages of each licensed individual and the specific certifications held by each licensed individual. Data regarding gender would have been of little value as it is common knowledge that the Code Professional Industry is male dominated. Based on common first name gender allocations the DOPL data would suggest that the male to female ratio is roughly 14:1; further refinement of this rough calculation was determined to be of little value to the research.

The data obtained from DOPL provided valuable insights into the Code Professional Industry in Utah. From the data a timeline of individuals entering and exiting the industry could be established as the data provided the date of first licensure, as well as a history of license

reclassifications and time frames of when individuals exited the industry thus allowing prior licenses to expire. The number of individuals with specific types of licenses could be extrapolated representing inspectors from various code disciplines. Some information regarding geographic dispersion was available; however, it was inconsistent as it was unclear as to whether the ZIP codes provided were home addresses or those of a place of employment.

### 3.4.2.1 Age Demographic Data

To supplement the DOPL database a second informal data request was made to the Department of Professional Licensing to obtain ages for all individuals with active building inspector licenses. A list of ages associated with every licensed building inspector in the State of Utah was provided. The list of ages was separate from the original DOPL data and the ages were not traceable to individuals on the list as they had been randomized to prevent any potential efforts to correlate the ages with the previously supplied data. It would have been beneficial to the research to obtain ages matched with each individual on the list which could then be tied to their years of experience, license type, certifications and location however; this was not made available. The results of this isolated data are summarized in Figure 3-4.

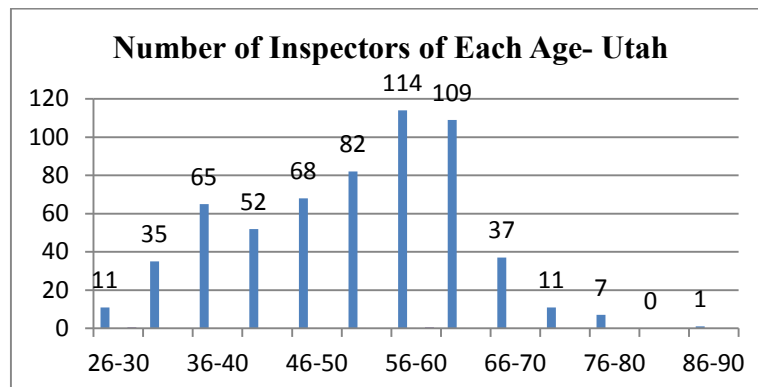


Figure 3-4: Age Demographics of Inspectors in Utah



The isolated age data acted as a separate list which enabled the researcher to understand the age demographics of the entire group of actively licensed building inspectors, in addition to allowing projections to be made regarding pending retirement numbers based on traditional retirement ages. This information was crucial in order to quantify the extent of the approaching mass retirement which was expected however; the scale and time frame was previously unknown. The inability to tie ages to specific licensed inspectors emphasized the need to obtain supplementary age data in the proposed state-wide survey.

The DOPL data provided a very reliable source of data as it had been collected and maintained over a period of more than 20 years by a State agency. The information contained in the data was consistent, and there were virtually no apparent errors. Of the 2,135 licensing records only one appeared to have been incomplete, as neither an original license issuance date nor subsequent expiration date was provided.

There were 48 individuals that had obtained licensure through DOPL as Limited Inspectors but did not appear to have necessary certifications issued by ICC. This could be explained by alternate certification options through the International Association of Electrical Inspectors (IAEI) and the American Welding Society (AWS); however, it is more likely that these individuals obtained licensure prior to State licensing requirements and have maintained licensure throughout this time period, to the present day.

In addition four individuals were licensed as Combination Inspectors although they do not appear to have the necessary certifications. Due to the lack of alternate certification programs this inconsistency is more difficult to rationalize. Due to the small number of individuals in this group it was considered to be of little consequence in the summary statistics generated as a result of this research.

### 3.4.3 The International Code Council Data

The third source of data was obtained through the International Code Council. The ICC is a conglomerate of previously existing model code organizations, and now serves as the primary model code organization in the United States. Currently all 50 states and the District of Columbia have adopted the codes written, published and maintained by the ICC (International Code Council 2014). Over 41,000 individuals have certified in various code disciplines through the ICC (Porter 2014). The State of Utah recognizes ICC certifications as minimum qualifications necessary for licensure, and DOPL requests copies of such certifications pursuant to licensure, as evident by their licensing application forms. The ICC maintains a database which enables the general public to search for code professionals based on name, city, state, type and category. The data base is also a resource for contractors or members of the general public to verify the credentials of their local code professionals.

The ICC database includes the following statement, *“ICC certification for code enforcement professions attests to competent knowledge of construction codes and standards in effect on the date of certification or renewal.”* One of the research objectives was to discover the number of people involved in the code professional industry in Utah. The ICC certification database not only provided the number of individuals currently certified, but also provided a reliable source of information regarding individuals who have qualified through testing to receive certification in various code disciplines. For the purposes of this research the only quantifiable method of measuring an individual’s expertise in any of the many code related disciplines is through the possession of ICC certifications, or possession of state issued licenses which require equivalent certifications in specific areas.

The data obtained from the International Code Council was highly reliable as the large international organization is constantly updating their database. Due to public access to the database, there is added incentive to provide accurate information and there is sufficient traffic to discover errors and abnormalities. In an effort to verify completeness of the data obtained from ICC a brief email was sent to ICC's Director of Certification and Testing inquiring about the total number of ICC certificate holders residing in Utah (Porter 2014). This request resulted in a response stating that as of 7/09/2014 there were 874 individuals in Utah with certifications. The online database had provided the names of 872 individuals which confirmed that the data obtained was substantially accurate.

Being that many Code Professionals perform ancillary tasks that do not require licensing the data pool was expanded to include everyone with ICC certifications residing in Utah. This potentially could have included people who originally certified in Utah and have since moved out-of-state. It could also fail to include people who originally certified outside of the State of Utah but have since relocated to Utah; however it is likely that these individuals would obtain state licensure and would be discovered in the DOPL data. The data collected could possibly fail to count for individuals certified outside of Utah who are participating in the industry in roles that don't require state licensure, which would include administrative duties, design work (architect, engineer, contractor), or plans examiners.

One challenge of the ICC database search was that ICC certified individuals have the ability to list either a personal address, or a business address. In addition the process of updating contact information involves either calling by phone or printing a form which then must be signed and returned to ICC. As a result the list of ICC certified professionals listing a Utah address may or may not be 100% accurate. The compiled list may contain names of individuals

who no longer live or work in the State of Utah, and the list may also be missing the names of individuals who have since relocated to the State. Despite the potential inconsistencies, the list provided a baseline estimate of the number of ICC certified individuals living and working in Utah as of 7/09/2014.

#### **3.4.4 The Survey**

The survey associated with this thesis was entitled the Utah Code Official Demographics Survey and consisted of 16 short questions (see Chapter 4). The survey was based on a recently conducted demographic survey administered by the ICC in conjunction with the National Institute of Building Sciences (NIBS 2014). Although the research associated with this thesis commenced prior to any knowledge of the NIBS survey the research objectives and direction of this research fortunately paralleled those of the national survey. As a result the survey design was patterned after the NIBS survey; however, changes were made to collect a different data set and streamline and to survey in an effort to secure better response rates.

The NIBS 2014 survey focused on the educational and career pathways of those in the Code Professional Industry, as well as gathering retirement time-frame expectations. For the purposes of this study information regarding the educational and career pathways was less of a focus, so it was omitted from the survey design. The survey consisted of a series of 16 short questions with conditional branching, meaning that the number and type of questions varied based on an individual's responses. The survey was in an attempt to gather the following supplemental data:

- 1) Current age range in 5 year increments
- 2) Number of years in the industry
- 3) Age upon entering the industry
- 4) Reason for entering the industry
- 5) Job status

- 6) Primary job role
- 7) Size of community served
- 8) Size of building department served
- 9) Anticipated retirement time-frame
- 10) Preferred retirement type
- 11) Opinion regarding time-frame for training new code professionals
- 12) Perspectives on the source of the next generation of code professionals.

#### **3.4.4.1 Sampling Plan**

The participants for the survey were selected through a convenience sample based on the number of individuals from the DOPL data from which email addresses could be located. The DOPL data provided email addresses for roughly 40% of the 615 licensed building inspectors. Additional searches were performed online utilizing publicly available resources, membership directories from local code organizations were scoured and an email list was compiled consisting of 512 individuals. The survey could not be administered to the entire population of code professionals, despite the relatively small size. As a result an appropriate sample size had to be determined in order to properly evaluate and interpret the survey responses.

Sample sizes were determined based on the size of the larger population, as well as the population sizes of each age group, when divided into 5 year increments. The age related data that had been made available by DOPL enabled the researcher to know that the age demographics for the group of licensed building inspectors were distributed as shown in Figure 3-5. These population totals were used in determining the number of respondents from each age group necessary in order to ensure validity and reliability. Based on 303 individual responses and a known population of 615 licensed building inspectors a confidence interval of  $\pm 4\%$  was achieved.

### **3.4.5 Utah Construction Information Database**

In order to evaluate the Code Professional Industry in Utah a reliable source of data regarding the annual volume of construction state-wide over a period of time was needed. One available resource was the Utah Construction Information Database maintained by the Bureau of Economic and Business Research (BEBR) at the University of Utah. The BEBR is one of the primary sources of information on the Utah economy, and gathers data specific to Utah (BEBR 2014). The Utah Construction Information Database is a collection of building permit data from each month for nearly all cities and counties in Utah dating back to 1958.

The Utah Construction Information Database (UCID) allows for various reports to be generated which are organized into 10 different tables. Within the UCID, Table 2 provides a year-to-date summary of permit data for state, cities and counties. For the purposes of this research a sample period dating from 1993 to 2014 was selected which matches that of the data available from Utah's Department of Professional Licensing. Individual reports were run for each year focusing on two specific data features namely: new dwelling units constructed, and total construction valuation in dollars. Each of these data features will be discussed in detail in the following sections.

The number of new dwelling units permitted is a good barometer for the construction industry as a whole. New housing starts can be indicative of the construction industry as a whole. A large portion of the work performed by code professionals is tied to residential construction, so by comparing the number of new residential permits in a given year to the number of licensed building inspectors in the State for the same year provided valuable insight on the current state of the industry. Questions regarding whether the industry is currently doing more with fewer

people, or whether the industry has in the past could now be answered. As the prospect of a shrinking workforce is evaluated it was necessary to make these types of comparisons.

In an effort to validate any conclusions related to the size of the code professional industry with respect to number of new dwelling units permitted as second source of data was used which was the total valuation of permitted construction. Proposed construction is assigned a project valuation at the time of permit issuance. This valuation is generally based on nationally tabulated square footage costs specific to construction materials and the intended use of the proposed construction. The International Code Council publishes this type of data biannually each February and August in a table entitled “Building Valuation Data” (ICC 2014). Building departments then perform a calculation based on the square footages of the proposed construction in order to determine a valuation. This valuation may or may not reflect the actual construction costs associated with the building; however it a representative cost associated with the permitted work. For the purposes of this research the total state-wide valuation data for a given year is indicative of the amount of work shouldered by the code professional industry in a given year. Comparisons of total valuation annually to the number of licensed inspectors in the state provided a quantifiable means of judging the health of the industry. As these ratios were compared on an annual basis the effect of changes within the industry, relative changes in technology, and the evolution of codes could be evaluated.

The Utah Construction Information Database was not viewed as a complete representation of all construction work in the State during the sample period. The database relies on a voluntary submission of data from each of the permit issuing bodies in the state. As a result the data is only as reliable as the individuals responsible for submitting the data, and very likely omits a rather substantial number of permits, with their associated construction valuations. Whether voluntary

participation rates have increased or decreased during the sample period is unknown. Regardless of the reliability of the data, the values obtained through the Utah Construction Information Database clearly depict trends in construction; which enables conclusions to be drawn with respect to the health of the Code Professional Industry in Utah.

### **3.5 Procedure**

Once the various data sources had been identified it then became necessary to collect the data and then organize the data into a usable format. The DOPL data arrived on 7/10/2014 and was current as of that morning. The data from DOPL had arrived in an Excel spreadsheet format which created the foundation for what would ultimately be an even larger database. The DOPL data was neatly organized and required very little manipulation. Using a simple Excel sort feature the data was sorted alphabetically by name to enable a systematic evaluation of exactly who was on the list.

Next the process of collecting the ICC data took place. In anticipation of the DOPL data arriving the ICC data was pulled from the online database on 7/09/2014, which was current as of the day prior. This resulted in the DOPL data being current as of 7/10/2014 and the ICC data being current as of 7/08/2014. The ICC online database capped search results at 500 records. In order to collect the total number of ICC certified individuals in the State of Utah a systematic search based alphabetically by last name was conducted. The results of the search netted 872 individuals. This list of 872 individuals was transferred into a MS Word document which was also organized in alphabetical order. The ICC data contained the full name of the individual, address and a list of each individuals ICC certifications, which was one piece of information not provided in the DOPL data.



Once the DOPL and ICC data had both been obtained a process of merging two separate data sources commenced. This process involved searching for each individual's name in the DOPL spreadsheet, then crediting each person with individual certifications based on the ICC data. The ICC data contained individuals with 79 unique certification categories; as a result each of these certification categories received their own column in the spreadsheet. This manual process involved individually searching 872 names, and then manually entering 4,389 individual ICC certifications. Manual entry of certification data left room for human error and in an effort to be as accurate as possible the data was spot checked multiple times for accuracy.

When the two lists were consolidated it was discovered that 65 individuals were licensed by DOPL but were not present on the list of ICC certified individuals with Utah contact information. These 65 names were individually searched using the ICC online database; this time conducting a nation-wide search as opposed to specific to Utah. An additional 11 individuals were located who had listed addresses in other states as their contact information and for that reason did not come up during the original search. A total of 2 names were discovered who did list Utah addresses on their ICC certifications and were missed during the original data entry. These additional 13 individuals accounted for another 87 certifications bringing the state-wide total to 4,389.

Once this process was complete there were 52 individuals not accounted for in the ICC database but identified in the DOPL data as licensed building inspectors. Of the remaining 52 individuals four were licensed as Combination Inspectors and the remaining 48 were licensed as Limited inspectors. As a result, the next task involved crediting all state licensed "Combination Inspectors" with certification in the eight specific code disciplines required in order to obtain licensure. Due to the ICC's method of awarding certain certifications based on the completion of

a combination of individual certifications each state licensed “Combination Inspector” was credited each of the following certifications as shown in the Table 3-2.

**Table 3-2: Combination Inspector License Certification Equivalence**

<b>ICC Certifications Credited to Utah State Licensed Combination Inspectors</b>	
Residential Building Inspector*	Commercial Building Inspector*
Residential Electrical Inspector*	Commercial Electrical Inspector*
Residential Plumbing Inspector*	Commercial Plumbing Inspector*
Residential Mechanical Inspector*	Commercial Mechanical Inspector *
Residential Combination Inspector	Commercial Combination Inspector
Combination Inspector	*Required for Utah DOPL Combination Inspector License

Due to inconsistencies in the DOPL data a number of individuals licensed as “Combination Inspectors” were given credit for applicable certifications required for state licensure, regardless of whether the specific certification was discovered during the ICC search. This process resulted in the manual entry of an additional 2,048 certifications; bringing the total number of certifications held by Utah code professionals to 6,437.

Lastly, various ICC certifications are only obtainable through completion of multiple related ICC certifications. For example to obtain the ICC Electrical Inspector certification an individual must first complete the Residential Electrical Inspector and Commercial Electrical Inspector certifications. A manual examination of the certification list was conducted verifying that the certifications credited to each individual accurately reflected their skill set. The intent was to quantify the number of people in the State with specific skills applicable to each of the individual code disciplines. This final examination of the data resulted in another 417 certifications being credited for a total of 6,854.

The result of combining the two sources of data was a unique database containing 917 names of individuals who can be traced to the code professional industry in Utah through either ICC certifications, DOPL licensing, or both. This list most likely did not contain a many of the secretarial staff associated with the code professional industry.

Upon completion of the initial combined database it became apparent that additional data was necessary in order to meet the research objectives. The lack of a link between the individuals in the database, their unique certifications, and their ages was problematic. In addition, it was apparent that being of retirement age didn't necessarily equate to actual retirement. In an attempt to fill in the gaps in the data a survey was designed.

The survey was distributed via email to 512 individuals. The email contained a brief introduction to the research and explained its potential benefits to the industry. The email contained a link to an online survey administered through Qualtrics, an online survey hosting site. The email link directed survey participants to a separate website where a 16 question survey was administered. The original survey was distributed on 3/04/2015 and a two week period extending to 3/17/2015 was granted.

Following the two week period a total of 303 responses were received representing a response rate of over 60% of those whom the survey was distributed. The survey results were then tabulated and manually entered into the primary database consisting of both the ICC and DOPL data. The survey results were then tabulated and analyzed.

### **3.6 Statistical Analysis**

In an effort to respond to the various research objectives a certain level of statistical analysis took place. Through the process of compiling the ICC data and the DOPL data the true size and make-up of the Code Professional Industry in Utah took shape. Not only was the

number of individuals quantified, but they could now also be broken down into various sub-categories such as licensed, unlicensed, combination, limited, building code professionals, fire code professionals etc. For this portion of the analysis there wasn't a need for additional statistical analysis beyond simply quantifying data.

In the same sense, once the various data were compiled it was easy to quantify the number of individuals in the State of Utah with each of the previously identified ICC certifications, which totaled 6,854 individual certifications in 79 different categories. With respect to licenses 2,135 licensing records were tabulated, then sorted into 14 different categories based on license type. The number of actively licensed building inspectors was discovered to be 615.

Through a combination of age data provided by DOPL and data collected in a state-wide survey age demographics were established as the number of code professionals of each age, and in each age group were tabulated. Through utilizing the DOPL licensing dates and expiration dates a fluid picture of the number of code professionals at all times during the study period of 1993 – 2014 was established. This process involved using simple Excel formulas to count the number of licenses issued each year, while subtracting all licensed that expired or where reclassified during the same time period. Totals were generated for both January 1<sup>st</sup> and July 1<sup>st</sup> of each year beginning in July of 1993 and continuing through July 2014.

Through utilizing the data related to number of licenses of each type issued per year, trends in the industry could now be evaluated. Peaks and valleys in the number of licensed inspectors could be identified and tabulated.

Expected retirement dates were established based on the DOPL data which provided the ages of all licensed inspectors as of 7/30/2014. This data could then be extrapolated and

projected, quantifying the number of licensed inspectors reaching retirement age each year through 2025. In addition the current population of inspectors was tabulated quantifying the number of licensed inspectors already beyond retirement age based on the same three retirement ages.

The survey data related to inspector's ages was not used to validate the DOPL data regarding the building inspector population in Utah. The survey data served as a link, linking each individual's ICC certifications with the age demographics; this was completed through the use of summary statistics as the known age demographics and populations were used to evaluate sample sizes, and determine confidence levels, and margins of error. The survey results provided an individual's name and age which could then be entered into the database that had been created. The survey respondents served as representative samples of the larger population as a whole. By utilizing this method not only could the number of licensed inspectors that are likely to retire be quantified, but the impact of their retirement could now be measured as the specific skills that will be lost with retirement were now known. In addition the survey data identified each respondents role in the building department which further quantified the specific areas within the industry that will be most affected by the approaching wave of retirements.

## **4 RESULTS**

### **4.1 Introduction to Sub-Papers**

In order to capture the ideal audience for this research it was determined with support from the thesis committee that two journal article modeled papers be written. As the Code Professional Industry appears to lack a strong academic presence, a greater number of potential end users could be reached through this alternative medium.

The general findings of this thesis could be adequately summarized based around two basic concepts. The first paper making up the whole of Chapter 5 is entitled “Responding to the Approaching Mass Departure of Code Professional Industry in Utah.” This paper quantifies the population of code professionals in Utah, determines their unique skills, assesses who will be exiting the industry and provides projections for when these losses will occur. The second paper which makes up the whole of Chapter 6 is entitled “Strategic Utilizations of the Aging Population of Code Professionals in Utah.” The material in Chapter 6 addresses methods of dealing with the impending losses, focuses on the professionals that will be exiting and offers potential methods of strategically acting in ways that may prolong the careers of the industry’s most experienced professionals.

The intent of Chapters 5 & 6 was to facilitate reformatting in an effort to have each of the provided sub-papers published in an accredited journal. For the purposes of this thesis formatting remained consistent with that of the parent document.

As a continuation of this chapter the key data has also been presented, which serves as reference material for this thesis, the provided sub-papers and the conclusions found in Chapter Seven. The complete survey results have been provided with brief analysis. The complete survey has been included as Appendix A. Survey responses in the “other” category allowed for survey respondents to manually enter text responses. Due to the size and number of these types of responses they have been included as Appendix B; however, an analysis of such responses has been provided in this chapter in conjunction with their respective survey questions.

## 4.2 Survey Results

The results of the survey conducted in association with this thesis have been included in their entirety as Appendix B of this document. Conclusions drawn from each of the survey questions will be briefly discussed in the following sub-sections.

### 4.2.1 How Many Years Have You Been a Code Administration or Code Enforcement Professional?

Table 4-1: Survey Question #1

#	Answer		Response	%
1	Less than 5 years		26	9%
2	5-10 years		68	23%
3	11-15 years		52	17%
4	16-20 years		62	21%
5	21-25 years		40	13%
6	More than 25 years		50	17%
	Total		298	100%

Although a large proportion of code professionals in Utah are over the age of 55, responses to Survey Question #1 indicate that a much smaller proportion of them have been in

the Code Professional Industry throughout the duration of their careers. Only 30% of survey respondents indicated over 20 years of experience in the industry, whereas 46% of the industry is over the age of 55. As additional code professionals are sought out it's important to take into consideration the potential to draw individuals later in their careers.

Another conclusion drawn from Survey Question #1 is that only 9% of survey respondents have less than five years in the industry. This 9% represented only 26 individuals, suggesting that progress towards developing the next generation of code professionals has been limited during the past five years.

#### 4.2.2 At What Age Did You Become A Code Administration or Code Enforcement Professional?

Table 4-2: Survey Question #2

#	Answer	Response	%
1	Less than 20 years old	4	1%
2	20-25 years old	36	12%
3	26-30 years old	58	19%
4	31-35 years old	71	24%
5	35-40 years old	51	17%
6	41-45 years old	40	13%
7	46-50 years old	23	8%
8	Over 50 years old	16	5%
	Total	299	100%









When survey respondents were asked their age upon entering the Code Professional Industry a majority (24%) responded with 31-35 years old, with 60% responding in the range of 26-40 years of age. This data could be used to target future code officials based on their age demographics, using historical trends. It could also be used to identify age demographics that may be underrepresented. Overall the survey responses indicate that portions of the next



generation of code professionals could potentially come from a variety of age groups. Historically less than 1% commenced prior to age 20, and less than 5% entered after age 50. Although this provides a 30 year target demographic, efforts to recruit the next generation must not be excessively focused to a more refined age range.

**4.2.3 What Was the Primary Factor Leading You to Pursue a Job as a Code Administration or Code Enforcement Professional?**

**Table 4-3: Survey Question #3**

#	Answer		Response	%
1	Salary/benefits		64	21%
2	Job security		73	24%
3	Respect for the profession		28	9%
4	Friend/family/colleague suggestion		44	15%
5	Engagements with code officials		19	6%
6	Exciting work environment		13	4%
7	Physical limitations		11	4%
8	Other		46	15%
	Total		298	100%

The two primary factors leading individuals to enter the Code Professional Industry were discovered to be job security and the allure of salary and benefits, which accounted for 45% of respondents. Salary and job security appear to be related to the steady and consistent paychecks possible through work as a government employee, in contrast to the fluctuating pay and workload common to contractors and subcontractors in the construction industry. As studies have suggested that many current code professionals entered the industry after experience in the construction trades (NAHB 2014), the responses to this survey question are not surprising.

A total of 15% of the survey respondents indicated that they entered the industry due to family, friend or colleague suggestions. As the industry aims to replace exiting professionals, the

simple method of personal invitations into the industry must be acknowledged as a portion of the solution. Of those responding with “other” which consisted of 46 respondents, many indicated that they were assigned or reassigned by their employers, which in this case would have likely been a municipal government. This appears to suggest that if other trained professionals are not available for hire, local governments will likely modify job assignments amongst their current staff. Without further research the success rate and quality of these types of reassignments is unknown.

#### 4.2.4 Are You Currently Working in the Code Professional Industry?

Table 4-4: Survey Question #4

#	Answer	Response	%
1	Yes	287	96%
2	No	12	4%
	Total	299	100%

The survey was distributed to 512 individuals with active licenses issued by Utah’s Division of Professional and Occupational Licensing (DOPL), which represents a group that would logically be assumed to be active in the industry. Survey results confirmed this logic by indicating that 96% of respondents are currently working in the industry. This confirms the belief that a significant population of potential code professionals is not waiting in the wings. Those with the relevant qualifications are being utilized at a very high rate. This may also suggest that although it is a small population of only 4%, those who have exited the industry are maintaining licensure to some extent. This population, albeit small, serves as a potential source for a

temporary solution if a shortage were to occur. Efforts should be made to encourage continued licensure beyond retirement as a precaution.

#### 4.2.5 What Size Community Do You Currently Serve?





Table 4-5: Survey Question #5

#	Answer		Response	%
1	Population < 10,000		34	12%
2	Population 10,000 - 24,999		45	16%
3	Population 25,000 - 49,999		54	19%
4	Population 50,000 - 74,999		25	9%
5	Population 75,000 - 99,999		18	6%
6	Population over 100,000		44	15%
7	School District		14	5%
8	3rd party provider		43	15%
9	Other		8	3%
	Total		285	100%

Survey Question #5 indicated that the current population of code professionals works for a variety of jurisdictions of varying populations. Being that population alone does not serve as a clear metric for construction activity this question was used more for the purposes of cross-tabulating survey results. It was of note that 15% of survey respondents now work for a third-party provider. Although a relatively small percentage of the industry, the third-party providers indirectly reflect the portion of local governments interested in alternative solutions, such as contract, part-time and as-needed code professionals.

#### 4.2.6 What Size Building Department Do You Currently Serve?

Table 4-6: Survey Question #6

#	Answer		Response	%
1	1-4 people		112	51%
2	5-7 people		31	14%
3	8-10 people		34	15%
4	Over 10 people		43	20%
	Total		220	100%

One metric that appeared to be critical in evaluating the impact of losing a large percentage of code professionals, was the size of the building departments that would be effected. The survey results indicated that 51% of code professionals work for building departments consisting of 1 to 4 people. Simple mathematics would suggest that the loss of any one individual in these very small departments will have a dramatic impact, representing at best a 25% reduction in force if not replaced. In many situations the retirement of a code professional will eliminate 50 to 100% of current building departments.

This data also highlights the challenges facing local governments as they attempt to respond to the potential loss of key people within their building departments. In order to train or mentor future code professionals, these small departments may have to overstaff their department to a substantial level. Smaller departments often have limited financial resources, and to some extent a limited volume of work. Justifying the preemptive hiring of a future code professional may be difficult to justify.

#### 4.2.7 What is Your Age?

Table 4-7: Survey Question #7







#	Answer		Response	%
1	18 to 24		0	0%
2	25 to 30		6	2%
3	31 to 35		20	7%
4	36 to 40		28	9%
5	41 to 45		29	10%
6	46 to 50		37	12%
7	51 to 55		37	12%
8	56 to 60		60	20%
9	61 to 65		59	20%
10	66 to 70		16	5%
11	71 to 75		4	1%
12	76 or Older		1	0%
	Total		297	100%

Obtaining voluntary age data was of utmost importance to this research. Although age demographics were known thanks to information provided by DOPL, a link between the age demographics and individual code professionals was not available. As a result, linking professional licenses and certifications with each age demographic was not possible. The voluntary age data matched the DOPL age demographics as expected. The two highest populations of code professionals were those 56 to 60 years old, and those 61 to 65 years old which constituted 40% of all respondents, evenly distributed between the two groups. An additional 24% were evenly distributed between ages 46 to 50 and 51 to 55. This data was a confirmation of previously known demographic data. Of note was a complete lack of respondents under age 25, and only 2% age 30 or under. It appears that the demographic age 30 and under is not entering the industry. This may represent a change in the perception of younger professionals towards the industry.

A total of 6% of the industry is over the age of 65. Without comparable historical data it's unclear as to whether this percentage is higher than normal, or whether it has decreased over time. If the potential exists to increase the population of code professionals in this demographic and extend their careers beyond typical retirement age, it may allow additional time for the industry to react to the approaching changes.

#### 4.2.8 What Currently is Your Primary Job Role?

Table 4-8: Survey Question #8

#	Answer		Response	%
1	Commercial Inspector		108	38%
2	Residential Inspector		46	16%
3	Building Official		97	34%
4	Residential Plans Examiner		8	3%
5	Commercial Plans Examiner		23	8%
6	Permit Technician		1	0%
	Total		283	100%

When asked about their primary job roles respondents primarily indicated a role as a commercial inspector, as selected by 38%. A similarly large population of 34% of code professionals indicated a role as a building official, with only 8% selecting commercial plans examiner. This data may be skewed as a number of respondents voiced complaints that the survey only allowed selection of a single role. This appears to indicate that many code professionals perform multiple roles. Regardless of this fact, it's clear from the data that many of those who will soon exit the industry perform commercial inspections and act as building officials. These two areas must be treated as areas of focus as the next generation is located, trained and mentored. The potential loss of building officials is of particular concern as they

generally administer over the building department. The loss of a municipalities building official will likely be of substantial impact on a community. Likewise, the loss of commercial building inspectors will impact larger buildings, or a greater number of stories and with the potential for a higher number of occupants.

#### 4.2.9 What is Your Current Job Status?

Table 4-9: Survey Question #9

#	Answer	Response	%
1	Full-time	256	90%
2	Part-time	10	4%
3	Retired- Still Working in the Industry	17	6%
	Total	283	100%

Survey respondents were asked about their current job status and 90% indicated they are currently employed as full-time workers. Only 4% were working part-time schedules, with an additional 6% indicating that they were retired and still working in the industry. This confirms that very few licensed code professionals are not utilizing their specialized training and participating in the industry. The population that has already retired and is currently working in the industry appears to be rather substantial, suggesting that the physical and mental aspects of the job can and are achievable beyond retirement age. If additional efforts can be made to ensure that job demands meet the abilities of these post-retirement code professionals, the immediacy of the need for the next generation may be diminished.

#### 4.2.10 When Do You Plan on Leaving the Building Regulatory Profession Either Due to Retirement or to Pursue an Alternative Career?

Table 4-10: Survey Question #10

#	Answer	Response	%
1	I already left the profession	5	2%
2	Less than 5 years	63	22%
3	5-10 years	87	31%
4	11-15 years	51	18%
5	16-20 years	32	11%
6	More than 20 years	46	16%
	Total	284	100%

In order to fully understand the rate at which code professionals will be exiting the industry, a more in-depth evaluation of retirement plans needed to be made. Relying on age alone was not a clear indicator of pending retirements as professionals may chose to remain in the industry beyond retirement age, and other professionals may elect to exit the industry prior to retirement. The survey results indicated that 2% had already left the profession, 22% anticipated leaving within five years, and a full 31% planned on exiting the industry within the next 5 to 10 years. As a whole, 55% of the industry will likely exit the industry within 10 years. This establishes a clear representation of the limited amount of time available to find, hire, train and mentor the next generation of code professionals.

#### 4.2.11 What Caused You to Leave the Code Professional Industry?

Table 4-11: Survey Question #11

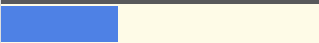

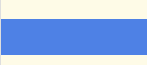
#	Answer	Response	%
1	Retirement	5	29%
2	Other Opportunities	12	71%
	Total	17	100%



The survey was designed with conditional branching meaning that based on each individual's responses, the questions posed changes to ensure relevant questioning. As a result some questions had a large sampling of respondents than others. Question #11 was posed to those who had previously indicated that they had already left the industry. Although only 17 responses were recorded, 71% indicated that they left the industry to pursue other opportunities. Only 29% cited retirement as the impetus for their exit, suggesting that the Code Professional Industry faces threats from multiple other sources beyond retirement and the aging of those in the industry. To combat additional losses to other opportunities, efforts must be made to maximize the allure of the industry whether it is through salary, benefits, job security, community respect or flexibility. As previously discussed the motives behind why people originally entered the industry must be taken into consideration.

**4.2.12 If It Were 100% Up to You, What Form of Retirement Would You Prefer?**

**Table 4-12: Survey Question #12**

#	Answer		Response	%
1	Abrupt Retirement		103	37%
2	Phased Retirement		43	15%
3	Retire- Continue working in the Industry		136	48%
	Total		282	100%

In an effort to understand to preferences of the industry with respect to retirement the question was posed to the industry by way of the survey. A total of 48% of survey respondents indicated that they would prefer to retire and continue working in the industry. The specifics of their continued involvement in the industry were not discovered; however, the data suggests that

many of the current code professionals are open to the idea of continued involvement. It will be the responsibility of the industry to create opportunities for these individuals if their continued involvement is desired. Only 37% of respondents preferred an abrupt retirement, and an additional 45% selected a form of phased retirement. As this survey and research is exploratory in nature the specifics of what a phased retirement might look at were not addressed, meaning future research may be necessary.

#### 4.2.13 In Your Opinion Where Will the Next Generation of Utah Code Professionals Come From?

Table 4-13: Survey Question #13

#	Answer		Response	%
1	The construction trades		140	60%
2	Technical/vocational schools		43	18%
3	Community colleges		19	8%
4	University graduates		7	3%
6	Other (please specify)		24	10%
	Total		233	100%

As a large portion of this research involved preparing for the next generation of code professionals, the input of the industry with respect to this specific challenge was desired. The initial question resulted with 60% of the sample suggesting that the construction trades would be the likely source. This may be indicative of the historical source of code professionals, or a biased response based on the personal career paths of those surveyed; however, it clearly represents the consensus of the industry. Questions regarding the construction trade’s ability to provide an adequate number of future code professionals, with the right skills, background and training remain to be seen. As the industry continues to evolve, becoming more complex and

technical in nature it's possible that the construction trades may not be the best source or future code professionals.

Another popular potential source included technical and vocational schools and community colleges, although the NIBS (2014) study indicated that they represented a combined total of only 26% of responses. Only 3% of respondents suggested the next generation of code professionals would come from universities. The industry appears to be hesitant towards a generation of code professionals originating from a classroom setting, and prefer a more hands-on approach to training. From an efficiency perspective the classroom offers advantages as a single instructor can train dozens of potential professionals. An on-the-job training program within the industry will result in a teacher-student ratio of nearly 1:1.

Apart from the multiple choice options, nearly 10% of those surveyed selected an "other" option which enabled for manual text input. Those selecting this option indicated a bias towards building departments training up the next generation of code professionals from within. This method would provide some advantages as an individual's work ethic, temperament and level of understanding would likely already be known. On the contrary this method involves a training, certification and licensing process that start at ground zero, which could prove to be lengthy processes. If technical schools, community colleges or universities could provide training and facilitate certification and licensing, a population of potential code professionals ready to hit the ground running would be available. This would be of less cost to the local municipality, but may also require higher entry level wages.

**4.2.14 In Your Opinion, on Average How Long Would It Take a New Hire to Obtain a State Issued “Combination Inspector” License?**

**Table 4-14: Survey Question #14**

#	Answer	Response	%
1	Less than 1 year	32	11%
2	1-3 years	205	70%
3	4-5 years	51	17%
4	More than 5 years	5	2%
	Total	293	100%

As part of working towards establishing a new generation of code professionals a realistic time frame for obtaining the necessary certifications and licenses was necessary. The survey posed the question and resulted in 70% indicating a period of 1 to 3 years. Although a more detailed analysis may have been desirable, the differences between individuals, their abilities and aptitudes made this data of sufficient value. Only 11% indicated that an individual could obtain a state issued combination inspector license in a period of less than one year. A total of 17% indicated that 4 to 5 years would be required, and only 2% suggests a time period exceeding five years.

This data sheds light on the amount of time a municipality may need to invest in training an individual with no prior certifications. During the training period the individual is generally unable to perform a full work-load, and requires additional time, supervision and resources. The cost of replacing the next generation of code professionals may be substantial. If individuals were better qualified prior to obtaining employment by a local municipality substantial costs savings may be possible. Future research regarding the actual cost of training code professionals is needed to further evaluate this issue.

**4.2.15 If You Were to Retire Yet Continue Working in the Industry, How Many Hours a Week Would You Want to Contribute?**

**Table 4-15: Survey Question #15**

#	Answer	Response	%
1	Less than 10	1	20%
2	Less than 20	2	40%
3	Less than 30	2	40%
4	A full 40	0	0%
5	40+	0	0%
	Total	5	100%

As previously discussed due to conditional branching, some questions received a higher response rate than others. Question #15 asked respondents if they were to retire and continue working in the industry, how many hours they would like to contribute. Although there were only five respondents, the responses were fairly evenly divided between ten, twenty and thirty hours a week. None of the respondents indicated that they would like to retire and continue working a full forty hours a week. This data suggests that prolonging the careers of those exiting the industry will likely only provide a fractional solution to the problem.

**4.2.16 What Are Your Thoughts on the Future of the Code Professional Industry in Utah?**

The final survey question allowed respondents to manually type their thoughts on the future of the Code Professional Industry in Utah. Nearly 200 respondents provided feedback regarding everything from concerns regarding shortages of qualified workers to complaints against local governments for understaffing building departments (See Appendix B). The results of the survey respondents were tabulated and summarized based on generally recurring themes. Once complete, responses were formatted as in Table 4-16.

**Table 4-16: Summarized Responses to Survey Question #16**

28%	Reinforced the Need for Additional Training Opportunities & Programs
27%	Acknowledged the Current Lack of Qualified Individuals
24%	Highlighted the Need for the Industry to Attract New Entrants
24%	Stressed the Need for Increased Public and Government Awareness Regarding the Industry as a Whole
23%	Voiced Complaints Regarding Need for Higher Salaries
18%	Expressed Concerns Regarding Supply vs. Demand in the Industry
11%	Shared General Positive Feedback Regarding the Survey
6%	Expressed Negative Views Toward ICC and the Certification Processes
4%	Shared Concerns Regarding Inadequate Staffing of Building Departments by Municipalities
4%	Recognized Trends in the Industry Towards 3rd Party Providers
3%	Expressed Concerns Regarding Appropriate Code Cycle Durations
3%	Shared Opinions Related to a Lack of Unity Within the Industry
3%	Voiced Concerns with Respect to a Lack of Soft Skills/Intangible Skills Within the Industry
2%	Complaints Regarding Permit Fees Staying in the Building Department
1%	Voiced Concerns Regarding a Need for Flexible Work Schedules

The general consensus of the industry focused on an awareness of a lack of qualified individuals, the necessity to attract new entrants and the need to provide additional training opportunities. Other popular concerns involved raising public awareness of the importance of the Code Professional Industry, and a need for more competitive salaries. Many of these issues take time to resolve, and those best suited to enact change are many of the same individuals that will soon be exiting the industry. This suggests that it may be crucial to work towards preserving the current stock of code professionals, while actively working towards attracting new entrants and providing additional training opportunities.

#### **4.3 Chart Depicting Number of ICC Certified Professionals in Various Categories**

One objective of this research involved determining the specific credentials of the Code Professional Industry in Utah. This information has been provided in a table format in an effort to facilitate analysis and provide a comprehensive view of the industry as a whole. The content of the table was distributed into several smaller tables for use in Chapters 5 and 6; however, for

the purposes of the thesis the data set was preferred in its unaltered state as provided in Table 4-17.

In addition to the number of individuals possessing various ICC Certifications, Table 4-17 also provides percentage figures indicating the number of code professionals who plan on exiting the Code Professional Industry within the next 10 years. These percentages were derived from the state-wide survey, based on responses to survey question #10. Responses to this question were then cross tabulated with the database containing each individuals ICC certifications, thus resulting in the percentage figures provided beneath each numerical total.

As is clearly evident in the table, code disciplines that will suffer losses in excess of 50% within the next 10 years are shown in red. All of the standard residential and commercial inspector certifications are projected to lose between 54 and 60 percent of current certification holders. From a numeric perspective, the highest population of certified inspectors exists in the building disciplines, whereas the smallest population is found in the electrical discipline. As a whole the total population of combination inspectors is relatively small, and poses to be reduced by the largest percentages, representing losses of nearly 60%.

**Table 4-17: Certification Chart**

Utah Code Professional Industry Certifications					
<b>Top line:</b> Total number of certified/licensed professionals					
<b>Bottom Line:</b> Percent of the industry exiting within <b>10 years</b> , based on survey results					
Residential Inspector Certifications					
Residential Building Inspector	Residential Mechanical Inspector	Residential Electrical Inspector	Residential Plumbing Inspector	Residential Combination Inspector	Residential Plans Examiner
474	405	382	408	313	32
54%	54%	54%	54%	60%	36%
Commercial Inspector Certifications					
Commercial Building Inspector	Commercial Mechanical Inspector	Commercial Electrical Inspector	Commercial Plumbing Inspector	Commercial Combination Inspector	
443	391	365	401	290	
56%	56%	57%	56%	59%	
Legacy Inspector Certifications					
Building Inspector Legacy	Plumbing Inspector UPC	Combination Inspector-Legacy	Combination Dwelling Inspector	Mechanical Inspector UMC	Light Commercial Combination Inspector-Uniform
1	55	48	7	61	3
0%	78%	74%	100%	72%	100%
Commercial Plan Review Certifications					
Building Plans Examiner/ Building Plans UBC	Mechanical Plans Examiner	Electrical Plans Examiner	Plumbing Plans Examiner	Combination Plans Examiner	Accessibility Inspector/Plans Examiner
209	22	16	20	9	79
58%	27%	33%	31%	25%	55%
Fire Certifications					
	Fire Inspector I	Fire Inspector II	Fire Plans Examiner	Certified Fire Marshal	
	99	106	36	3	
	61%	77%	54%	50%	
Specialty Certifications					
Commercial Energy Inspector	Commercial Energy Plans Examiner	Residential Energy Inspector/Plans Examiner	Fuel Gas Inspector	Zoning Inspector	Permit Technician
45	35	89	3	9	45
52%	43%	48%	0%	100%	25%
Property Maintenance and Housing Inspector	Green Building—Residential Examiner	IgCC Commercial Inspector	IgCC Commercial Inspector with ASHRAE 189	IgCC Plans Examiner	IgCC Plans Examiner with ASHRAE
13	1	1	1	1	1
57%	100%	100%	100%	100%	100%
Code Official Certifications					
Certified Building Code Official	Certified Mechanical Code Official	Certified Electrical Code Official	Certified Plumbing Code Official	Certified Fire Code Official	Certified Housing Code Official
19	3	4	4	5	5
55%	0%	50%	0%	67%	20%
		Master Code Professional	Certified Building Official		
		22	81		
		42%	62%		
Special Inspector Certifications					
Master of Special Inspection	Reinforced Concrete Special Inspector Associate	Reinforced Concrete Special Inspector	Reinforced Concrete Special Inspector-Legacy	Structural Steel and Bolting Special Inspector	Prestressed Concrete Special Inspector
9	7	93	20	50	31
17%	50%	28%	33%	36%	25%
Prestressed Concrete Special Inspector-Legacy	Spray-applied Fireproofing Special Inspector	Structural Masonry Special Inspector	Structural Welding Special Inspector	Structural Steel & Welding Special Inspector	Soils Special Inspector
11	59	120	32	16	17
33%	26%	30%	29%	50%	25%
Non-Building Related Certifications					
P-E Kitchen System Technician	Portable Fire Extinguisher Technician	UST Decommissioning	UST Installation/Retrofitting	WY State Specific Class A Storage Tank Operator	Utah Class B UST System Operator
1	1	13	17	12	2
AST Installation/Retrofitting	UST Cathodic Protection	UST Tank Tightness Testing	Vapor Recovery System Installation and Repair	California USI Service Technician	Colorado Class B UST System Operator
2	2	5	1	1	1
Includes: Active License, Expired License & Unlicensed. Source: ICC Database					
The following certification categories were redistributed for clarity: Building Inspector- Allocated as both Commercial and Residential Building Inspector Mechanical Inspector- Allocated as both Commercial and Residential Mechanical Inspector Electrical Inspector- Allocated as both Commercial and Residential Electrical Inspector Plumbing Inspector- Allocated as both Commercial and Residential Plumbing Inspector Combination Inspector- Allocated as both Commercial and Residential Combination Inspector				<b>Total Professionals:</b>	872/445
				<b>Total Certifications:</b>	6854/3907
				<b>Anticipated Losses:</b>	57%
					*As of July 2014



Table 4-17 also shows great disparity between the number of commercial inspectors in each of the standard code disciplines, and the number of certified plans examiners in each discipline. A fairly proportional relationship exists between the populations of building inspectors and building plans examiners, which hovers around a 2:1 ratio. On the contrary, the remaining disciplines of mechanical, electrical and plumbing inspectors when compared to respective plans examiners hover around a 20:1 ratio. This is indicative of current state licensing requirements that do not regulate plans examiner qualifications.

The ICC certification area that poses to lose the largest percentages of current certificate holders is in the fire related categories. A total of 61% of Fire Inspector I and 77% of Fire Inspector II certificate holders will exit the industry within 10 years. Although the reasons behind these elevated percentages are unclear, it may indicate that the Code Professional Industry and fire protection industries are gradually growing apart. As many of those exiting the industry are of retirement age, this data may suggest that code professionals used to be more involved in fire related inspections, which are now more likely to be conducted by local fire authorities.

Another concerning figure within Table 4-17 is that 62% of Certified Building Officials will likely leave the industry within 10 years. Building officials manage and direct building departments and are of utmost importance to those within the department. A building official is often the most experienced, tenured and knowledgeable individual in the building department. The prospect of losing nearly two-thirds of these types of individuals should be of concern.

Lastly the data contains information regarding the Special Inspector Certifications that does not match the trends found throughout the remainder of the table. Unlike other areas of the Code Professional Spectrum, projected losses in the special inspection categories seldom exceed 35%.

Interestingly these types of inspectors generally work for private firms which are hired by building owners or contractors. A majority of the inspectors in all other aspects of the table are employed by local governments. This data appears to suggest that the mass departure of code professionals is to some extent tied to the local government model. Further research is needed to investigate why this stark difference exists. It may be related to the nature of job, physical demands, or many other factors.

In all, the data suggests that the industry as a whole will lose 57% of its current supply of ICC Certifications within the next 10 years. These losses involve 445 code professionals and represent a net loss of over 3,900 individual certifications. To put that in perspective, if five new ICC Certifications were awarded every day, it would take nearly 26 months to recover what will be lost. At the end of this period the State of Utah would be left with a large population of ICC certified code professionals, none of which would have more than only a couple of years of experience. Replacing the one group of certified individuals with another group of certified individuals is a start, but it will not adequately replace those who will be leaving the industry.

## **5 RESPONDING TO THE APPROACHING MASS DEPARTURE OF CODE PROFESSIONALS IN UTAH**

### **5.1 Introduction**

Building inspectors perform the task of ensuring that buildings are constructed in accordance with locally adopted construction codes and regulations. Building inspectors and other professionals are part of what is referred to as the Code Professional Industry. The demands on this industry to enforce very complex and ever-changing rules and regulations are substantial, and the profession plays a critical role within the architectural, engineering, and construction industries. Construction codes have evolved from a basic form in ancient Babylonia (around 2000 B.C.) to their current state, consisting of numerous volumes and hundreds of individual chapters. As a result, code professionals today require a skillset far different from those who have filled this role in the past.

The Code Professional Industry is quickly approaching a transitional period in which a majority of professionals will soon be retiring. A national survey recently reported that over 80% of code professionals expect to retire or exit the industry within fifteen years (NIBS 2014). Further, a majority of Code Professionals approaching retirement age have more than 25 years of experience in the construction industry (NIBS 2014). This suggests that society risks abruptly losing an entire generation of highly experienced professionals. In order to counteract the inevitable losses, a new generation of code professionals must be found. Unfortunately, the same national survey also indicated that younger professionals are not entering the industry at a

significant rate (NIBS 2014). The purpose of this research was to assess the health and long-term viability of the Code Professional industry in Utah, and explore the impacts of a mass departure of code professionals. This paper evaluates and quantifies the unique skills and expertise that will be lost, and those that likewise will be in need of replacement. This paper also aims to provide direction and focus to the Code Professional Industry, enabling a proactive response to an imminent problem.

## **5.2 The Evolution of Building Codes**

Due to growing complexity within the codes, the demands currently placed on code professionals to understand, interpret, and enforce a vast amount of information is substantial. In the United States the first national building code was published in 1905, and consisted of 37 parts (chapters), 166 individual sections, and was a total of 263 pages in length. Today, the International Code Council (ICC) publishes at least 19 individual codes, consisting of 250 individual chapters and a total of 4,082 pages.

The steady growth and evolution of the codes results in a need for very highly skilled professionals who possess extremely unique skills and abilities. Mastering volumes of codes, hundreds of individual chapters and thousands of pages of technical material in multiple code disciplines is a not a simple, or quickly achievable, task. As the industry prepares to lose hundreds of experienced professionals who have spent their careers mastering these volumes of codes, it is important to acknowledge the gravity of the situation with respect to the volume of knowledge and expertise that is at risk of being lost.

### **5.2.1 The Code Professional Spectrum**

Members of the Code Professional Industry hold a wide variety of unique and specialized skills. The Code Professional Spectrum was generated, as seen in Figure 5-1, to help better visualize the entire range of skills essential to the Code Professional Industry, and highlights each of the unique skillsets involved in ensuring code compliance. The various disciplines are arranged in a circular manner suggesting that code professionals generally start their careers by obtaining certifications located towards the center of the spectrum and work their way towards the outer edges as their careers progress, although not exclusively the case. Some professionals initially specialize in a specific discipline related to an individual construction trade, such as electrical, plumbing or mechanical. For these types of professionals, progression would normally commence within their respective area of specialty, eventually branching outward to other areas of the spectrum.

The Code Professional Spectrum is subdivided according to many of the currently available ICC certifications, which help define individual code disciplines. Each area depicted in the figure represents a specific area of expertise or specialization. An individual code professional generally specializes in many of the various code disciplines shown, but rarely all of them. From a functionality perspective, the spectrum can be used to counteract the tendency of viewing all inspectors as equals. It is common for decision makers, department heads and local government leaders to focus on the long list of qualifications/certifications that individual professionals do have, as opposed to those they do not have. The Code Professional Spectrum allows everyone involved in the industry to see areas in which expertise may be lacking, allowing them to react appropriately through additional training, or hiring of additional staff with needed expertise. The industry appears to be moving toward the concept of a “combination

inspector,” or in other words a single inspector who can provide expertise in many if not all areas of the Code Professional Spectrum.

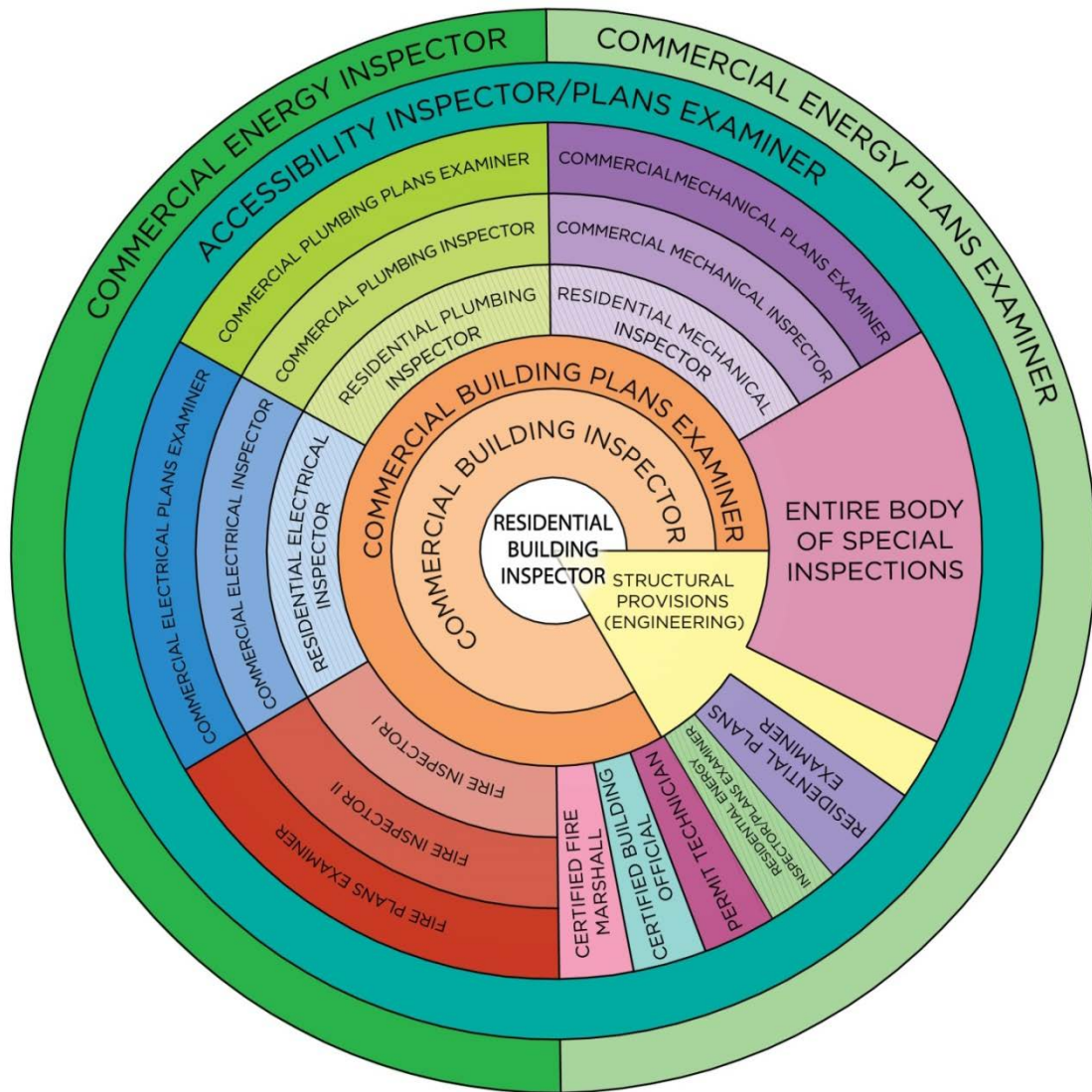


Figure 5-1: The Code Professional Spectrum

### 5.2.2 Competency Scale

One difficulty related to this research was the challenge of measuring and quantifying an individual's competence and expertise in any given area of expertise or code discipline. Possession of a state issued license does not guarantee competence, knowledge or expertise. Likewise, possession of an ICC certification fails to adequately demonstrate competence in the same respect. Figure 5-2 highlights the concept that completion of certification exams only suggests a minimum level of baseline knowledge. Although actually measuring competency would be more desirable, using licenses and certifications as an indication of competency was the most reliable and quantifiable metric available.

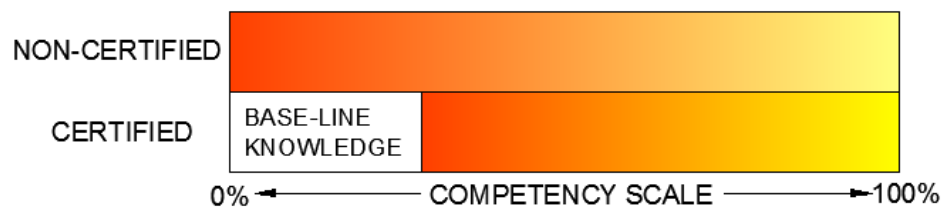


Figure 5-2: Impact of Certification on Competency

### 5.3 Methodology

Several data sources were utilized for this research. The first set of data came from the Division of Occupational and Professional Licensing (DOPL), a state agency which regulates code professionals in Utah. The DOPL data consisted of state licensing records dating back to 1993. This data was used to evaluate fluctuations in population size, determine the current number of licensed professionals and establish preliminary age demographics. The second data set was obtained through the International Code Council (ICC), and consisted of a list of certified professionals claiming Utah residence, as well as a list of specific certifications held by each

individual. A state-wide survey of code professionals was also utilized to supplement the existing demographic and certification data.

The existing data was primarily quantitative, as it involved the number of code professionals, the number of individuals with specific licenses and certifications and trends within the industry over the specific period of time. On the contrary the state-wide survey involved qualitative data, as it posed questions regarding why individuals entered the Code Professional Industry, when they anticipate retiring and where they expected the next generation of code professionals to come from. Research has suggested that a mixed methods approach should be used to fit together insights provided by both qualitative and quantitative research within a single workable solution (Johnson and Onwuegbuzie 2004). By utilizing a mixed methods approach a more complete analysis of the Code Professional Industry in Utah could be conducted as the size, make-up and qualifications of the industry could be quantified without failing to account for the attitudes and beliefs of the code professionals themselves.

### **5.3.1 The Survey**

The state-wide survey associated with this research consisted of sixteen short questions with conditional branching, meaning the number of questions varied based upon each individual's responses. The survey was modeled after a recently conducted demographic survey administered by the ICC in conjunction with the National Institute of Building Sciences (NIBS 2014). The NIBS 2014 research focused on the educational and career pathways of those in the Code Professional Industry, as well as gathered retirement timeframe projections. For the purposes of this research, information regarding the educational and career pathways was omitted from the survey design. The primary objectives of this survey was to obtain traceable age demographics that could be tied to the existing database of code professionals, a critical step



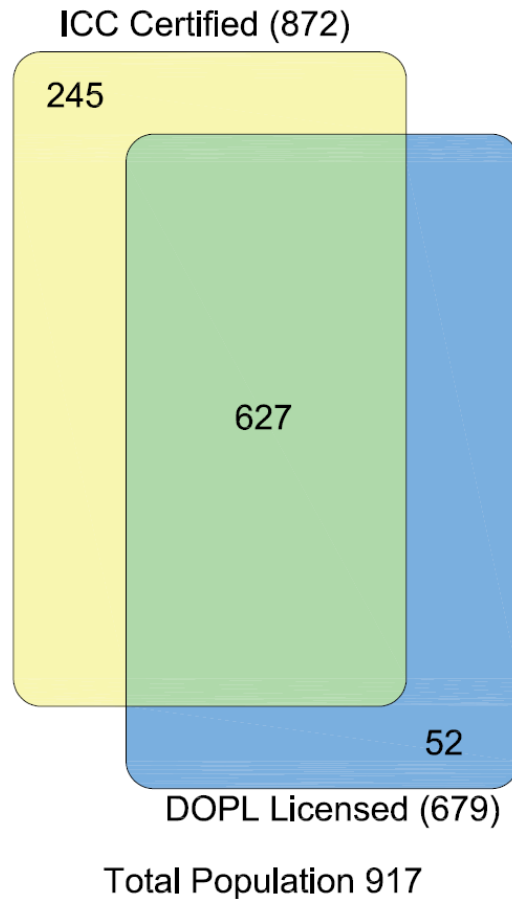
in establishing which skillsets and certifications would be lost to retirement in the next ten years. In addition, the survey collected anticipated retirement time-frames, which were considered to be a better indicator of projected retirement than age alone. Lastly, the survey posed a series of questions related to current and anticipated involvement in the industry and desired retirement formatting.

The survey was intended for distribution to each of the 615 individuals with active licenses issued by the state of Utah. However, email addresses could only be located for 512 individuals within the population. Of those, a total of 303 individuals participated in this research, still representing over 49% of the total population. As a result of this extremely high response rate, a confidence interval of  $\pm 4\%$  was achieved.

#### **5.4 Sizing-Up the Code Professional Industry in Utah**

In order to evaluate the Code Professional Industry in Utah it was important to first quantify the number of individuals who make up the industry. Two data sources were investigated: individuals in Utah licensed as building inspectors by the Division of Occupational and Professional Licensing (DOPL), and individuals in Utah currently certified by the International Code Council (ICC). The total population of the Code Professional Industry in Utah consisted of 917 individuals (see Figure 5-3). Of that, the population of ICC certified individuals in Utah totaled 872 people. On the other hand, the population of licensed building inspectors totaled 679 people, although only 615 such licenses were active. A portion of the population of licensed professionals presumably pre-dated the ICC certification process, resulting in a population of licensed inspectors that uncharacteristically do not have the relevant ICC certifications. By establishing the population of code professionals in Utah, an evaluation of

potential losses and anticipated replacements could be viewed in terms of the actual population, as opposed to merely a percentage of an unquantified population.

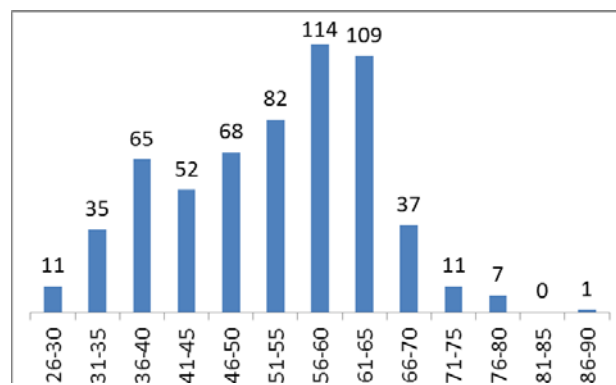


**Figure 5-3: Utah's Code Professional Industry**

### 5.5 Utah's Aging Population of Code Professionals

The data in Figure 5-4 was obtained through Utah's Division of Occupational and Professional Licensing (DOPL) and represents available age data for active building inspector licenses. Although the initial data suggested that a large population had already reached or would soon be reaching retirement age, it did not clearly indicate when the anticipated retirements would actually occur. As part of the supplementary research survey, participants were asked

when they planned to leave the building regulatory profession either due to retirement or to pursue other opportunities. A total of 50% of those age 56 and older responded with answers of ten years or less, and surprisingly 22% of those 55 and under also responded with answers of ten years or less. Thus, approximately 55% of the 615 currently licensed building inspectors in Utah (or 318 individuals) plan on exiting the industry within the next ten years, although only 47% will be beyond retirement age. A total of 73% (or 449 individuals) plan to exit the profession within the next fifteen years, which is not quite as drastic of a mass departure as the 80% that could be experienced nationally (NIBS 2014), yet still represents a similarly daunting scenario.



**Figure 5-4: Number of Inspectors of Each Age**

## 5.6 Skills of the Code Professional Industry in Utah

Survey participants were also asked to identify how long they had been working in the Code Professional Industry. A total of 284 of the participating individuals (i.e., 46% of licensed building professionals) responded to this question. This information was used to estimate that the Code Professional Industry in Utah has a total of approximately 10,120 collective years of industry specific experience. Those planning to exit the industry within the next ten years have a calculated total of 6,880 years of collective experience, or an average of around 20.5 years of

experience each. This indicates that the Code Professional Industry in Utah will lose 68% of its collective years of experience over the next ten years. For an industry which is heavily dependent on experiential knowledge, a great need exists to rapidly increase in the number of new entrants, thus initiating the process of gaining such experience in advance of the inevitable losses.

As the industry prepares for the future it is important to have a clear understanding of exactly what will be lost when the departing population is no longer contributing. The Code Professional Industry relies heavily on the experience of its professionals. Due to the nature of the job, being able to draw on the past experience of someone who has been involved in the construction of a similar building; or is familiar with specific building products and methods is of great value. Growth as a code professional takes place gradually over time. Thus, this substantial loss of industry knowledge is very significant.

Table 5-1 shows the total number of certifications held by individuals in Utah for residential inspection, commercial inspection, and commercial plan review. The table also shows the percentage of each population that plan to exit the industry within the next ten years. Based on these results, the industry stands to lose upwards of 50% of certified inspectors in nearly all categories. Of greater concern is the nearly 60% of all combination inspectors that will be lost from an already limited population hovering around a mere 300 people. Combination inspectors will be more difficult to replace as they require a greater level of certification in the specific areas of building, electrical, mechanical and plumbing.

Simply acquiring the necessary certifications will likely take considerable time. The research participants were asked to identify how long they felt it would take for an individual to obtain a state issued Combination Inspector license after being hired. A Combination Inspector license requires a total of eight residential and commercial inspector certifications specific to

building, mechanical, electrical and plumbing. A total of 70% of the industry agreed that a rather substantial training period of 1 to 3 years was necessary for a new hire to obtain a state issued Combination Inspector license. This suggests an urgent need to initiate the process of introducing interested candidates into the Code Professional Industry in Utah, sooner rather than later. Once certified, reaching a higher level of proficiency comparable to those exiting the industry will continue to gradually take place over time.

**Table 5-1: Common Inspection Certifications and Percentages Lost**

Includes: Active Licenses, Expired Licenses & Unlicensed. Source: ICC Database As of July 2014					
Residential Inspector Certifications					
Residential Building Inspector	Residential Mechanical Inspector	Residential Electrical Inspector	Residential Plumbing Inspector	Residential Combination Inspector	Residential Plans Examiner
474	405	382	408	313	32
54%	54%	54%	54%	60%	36%
Commercial Inspector Certifications					
Commercial Building Inspector	Commercial Mechanical Inspector	Commercial Electrical Inspector	Commercial Plumbing Inspector	Commercial Combination Inspector	
443	391	365	401	290	
56%	56%	57%	56%	59%	
Commercial Plan Review Certifications					
Building Plans Examiner/ Building Plans UBC	Mechanical Plans Examiner	Electrical Plans Examiner	Plumbing Plans Examiner	Combination Plans Examiner	Accessibility Inspector/Plans Examiner
209	22	16	20	9	79
58%	27%	33%	31%	25%	55%
<b>Top line:</b> Total number of certified/licensed professionals					
<b>Bottom line:</b> Percent of the industry exiting within <u>10 years</u> , based on survey results					

One particular area for concern was the disproportionate number of ICC certified commercial inspectors to commercial plans examiners in Utah (see Table 5-1). Plans examiners are not currently regulated by DOPL; and as a result relatively few individuals are certified as plans examiners. The current ratios include 2:1 for building, 18:1 for mechanical, 23:1 for electrical, 20:1 for plumbing, and 32:1 for commercial combination inspectors to plans examiners. It is likely that a large population of professionals maintain competence as plans examiners, due in large part to their many years of experience in the industry, despite a lack of

formal certification. However, the next generation of code professionals will not have the luxury of drawing upon such a source of personal experience. As a result, commercial plan review is likely an area in which large numbers of qualified professionals will be needed.

Table 5-2 shows the number of certifications held by individuals in Utah for fire, code official and special inspection, as well as the percentage of those individuals planning to exit the industry within the next ten years. The fire code disciplines appear to be on course for especially large losses, with 61% of Fire Inspector I's and 77% of Fire Inspector II's exiting the industry within ten years. This data suggests that the industry needs to strategically plan for the future and make efforts to target these areas of particular concern. Although the industry as a whole appears to be on course for significant losses across the board, some areas such as the special inspection categories appear to be of less concern with only around 30% of professionals exiting within the next ten years. The special inspection industry is primarily private, consisting of firms which are hired by building owners and contractors for inspection and testing. A great majority of the Code Professional Spectrum consists of areas of expertise primarily related to municipal building departments. This may suggest that the private sector is more cognizant of future need, as the viability of their future businesses depends on strategic planning.

One standard certification is Certified Building Official (CBO), which is common amongst those engaging in building department administration. Table 5-2 shows that 62% of those holding the CBO certification will be exiting the industry within ten years. This suggests a significant demand for building officials in the coming years. As building officials administer over building departments, the loss of these types of qualified and experienced individuals will likely have a ripple effect. Building officials generally have many years of experience in addition to a high level of expertise. It is typical for building official positions to be filled by individuals

already within the industry, as opposed to someone from outside the industry stepping into these roles. With that in mind, it is important for the industry, and especially local governments, to begin identifying potential future building officials and ensuring that adequate training and preparations are made for the future.

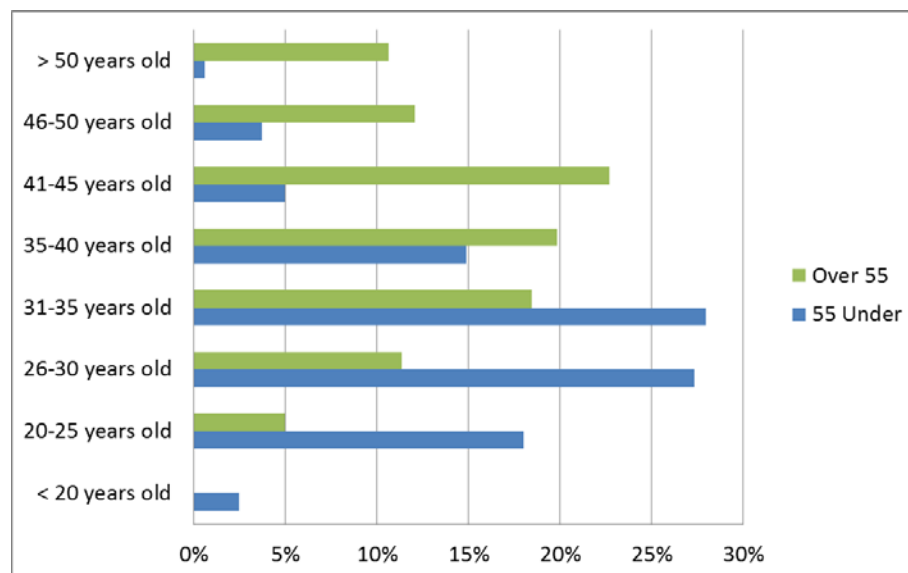
**Table 5-2: Specialty Certifications and Percentages Lost**

Includes: Active License, Expired License & Unlicensed. Source: ICC Database					
Fire Certifications					
	Fire Inspector I	Fire Inspector II	Fire Plans Examiner	Certified Fire Marshal	
	99	106	36	3	
	61%	77%	54%	50%	
Code Official Certifications					
Certified Building Code Official	Certified Mechanical Code Official	Certified Electrical Code Official	Certified Plumbing Code Official	Certified Fire Code Official	Certified Housing Code Official
19	3	4	4	5	5
55%	0%	50%	0%	67%	20%
		Master Code Professional	Certified Building Official		
		22	81		
		42%	62%		
Special Inspector Certifications					
Master of Special Inspection	Reinforced Concrete Special Inspector Associate	Reinforced Concrete Special Inspector	Reinforced Concrete Special Inspector-Legacy	Structural Steel and Bolting Special Inspector	Prestressed Concrete Special Inspector
9	7	93	20	50	31
17%	50%	28%	33%	36%	25%
Prestressed Concrete Special Inspector-Legacy	Spray-applied Fireproofing Special Inspector	Structural Masonry Special Inspector	Structural Welding Special Inspector	Structural Steel & Welding Special Inspector	Soils Special Inspector
11	59	120	32	16	17
33%	26%	30%	29%	50%	25%
<b>Top line:</b> Total number of certified/licensed professionals					
<b>Bottom Line:</b> Percent of the industry exiting within <b>10 years</b> , based on survey results					

In an effort to understand the effects of a mass departure on specific building departments, survey participants were asked what size of building department they worked for. The results indicated that 51% of code professionals work in building departments consisting of four or less people. For small building departments the loss of any one individual represents at least a 25% reduction in force. In addition, training new professionals requires significant time and resources, further resulting in a decrease in productivity. When considering the suggested 1 to 3 year time

period required for an individual to obtain a combination license, these costs and inefficiencies must be considered and the effects may continue for some time.

To better understand the demographics of the current population of Code Professionals, survey participants were asked the age at which they entered the Code Professional Industry. As seen in Figure 5-5, there was a stark difference in responses between those over the age of 55 and those under the age of 55. The majority of those over the age of 55 entered the industry between the ages of 40 to 50 years old, whereas those under the age of 55 entered between the ages of 20 and 35 years old. This is somewhat consistent with the NIBS (2014) survey, which concluded that for many a career in the Code Professional Industry was the result of a career change, occurring later in life. However, although this may have been the case with many professionals over the age of 55, the younger generation of code professionals appears to be entering the industry sooner, but with less experience.



**Figure 5-5: Age Upon Entering the Industry**



The true significance of the information contained in Figure 5-5 is apparent without accounting for the age demographics of the entire industry. Although, those age 55 and under typically entered the industry between the ages of 20 to 35 years old, only 9% of the current population fit within this age demographic. On a global scale, although nearly 25% of NIBS (2014) respondents entered the industry prior to age 30, only 3.4% of the survey respondents were under the age of 35. If in the past this age demographic was a primary source of new entrants, current data would suggest that this source may be faltering. The industry must be aware of these trends, and make efforts to attract the next generation of code professionals from whatever sources necessary.

## **5.7 Historical Growth and Projections**

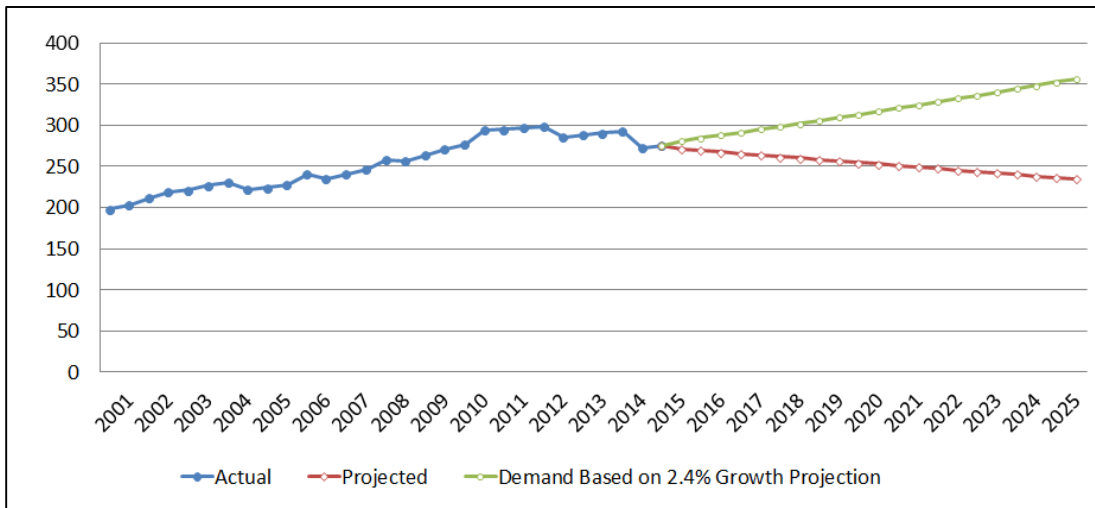
The Utah Department of Workforce Services (UDWS) publishes the Utah Occupational Report for Construction and Building Inspectors. The most recent report projects 2.4% annual growth through 2022, necessitating 20 additional inspectors annually (Utah Department of Workforce Services 2012). Unfortunately, this means that in addition to losing 55% of the licensed building inspectors in the State over the next ten years, the industry will also need to account for 2.4% growth. This only compounds the potential shortage of qualified professionals. To fully understand the potential need for licensed combination inspectors over the next ten years, it was essential to look at both the historical data in conjunction with the forecasted losses. Table 5-3 shows three distinct evaluation periods: the total trend of 2001-2014, the recession trend of 2007-2010, and the post-recession trend of 2011-2014. During the past fourteen years, the industry in Utah averaged 13.1 new combination inspectors and a loss of 7.6 combination inspectors for a net gain of 5.5 combination inspectors annually. The actual number of licensed combination inspectors during each of those years is shown in Figure 5-6. The other two

evaluation periods are acknowledged individually because they experienced somewhat different trends. During the recession, the industry experienced an average net gain of 13.5 combination inspectors annually. It is presumed that during this time, the Code Professional Industry was seen as favorable employment due to the general slowdown in the construction industry. On the other hand, in the four years following the recession the industry experienced an average net loss of 5.0 combination inspectors per year.

It is likewise presumed that during this time period a combination of two factors contributes to the recorded losses. First, fewer new licenses were obtained, in part due to opportunities within the rebounding construction industry. Second, an increased number of combination inspectors likely left the industry, as part of the initial wave of retirements associated with the aging population of code professionals. These recent contrasting time periods are important anomalies that represent transitional periods of extreme positive and negative historical growth. Ultimately, using the average net growth of 13.1 new combination inspectors per year, as experienced over the last fourteen years, in conjunction with the projected loss of 16.8 combination inspectors per year, as indicated by the research participants, the net loss of combination inspectors is projected to be 3.7 individuals per year. This decrease is also shown in Figure 5-6. Finally, Figure 5-6 shows the projected growth of 2.4% for the period of 2015 through 2025. Based on these projections, by 2025 the industry will have a shortage of over 120 combination inspectors.

**Table 5-3: Annual Rate of Combination Inspectors Growth**

Time Period- Historical Trend			
Jan 1 2001 - Jan 1 2015	<b>New</b>	<b>Lost</b>	<b>Net Gain</b>
Change in combination inspectors:	13.1	7.6	5.5
Time Period- During Recession			
Jan 1 2007 - Jan 1 2011	<b>New</b>	<b>Lost</b>	<b>Net Gain</b>
Change in combination inspectors:	19.8	6.3	13.5
Time Period- Post Recession			
Jan 1 2011 - Jan 1 2015	<b>New</b>	<b>Lost</b>	<b>Net Loss</b>
Change in combination inspectors:	8	13	-5
Projections			
Jan 1 2015 - Jan 1 2025	<b>New</b>	<b>Lost</b>	<b>Net Loss</b>
Change in combination inspectors:	13.1†	16.8*	-3.7
†Based on Historical Data		*Per Survey Results	



**Figure 5-6: Industry Trends and Projections**

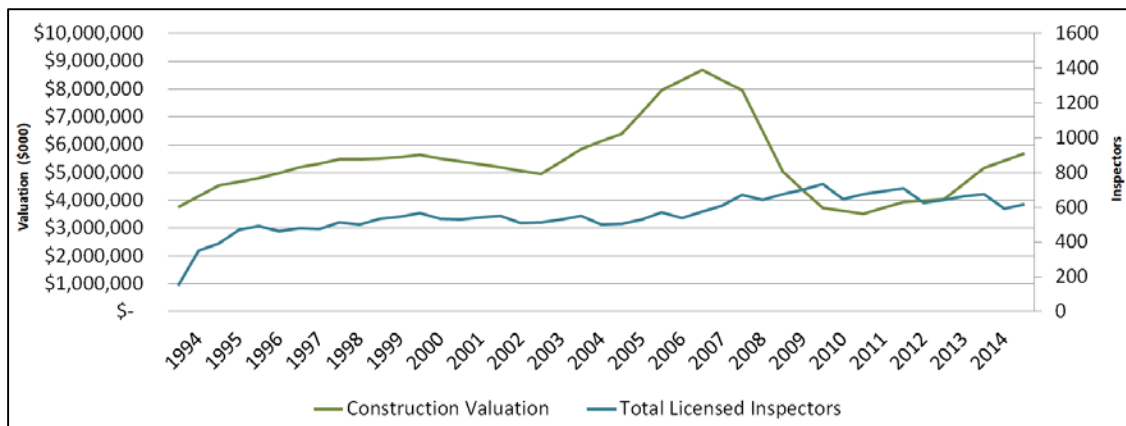
As the industry attempts to proactively respond to the projected loss of inspectors, understanding how the economy impacts the industry is important. If licensure rates experienced during the recession could be reproduced, the industry would be able to maintain a population of licensed inspectors comparable to the current population. Such a scenario would not support the 2.4% annual projected growth previously discussed. On the contrary if post-recession licensure rates continue, the projected shortage of licensed inspectors could be even more pronounced.

## 5.8 Elasticity Within the Code Professional Industry

The potential for a skilled worker shortage appears to be likely; however, evaluating the true capacity of the Code Professional Industry in Utah may indicate otherwise. Figure 5-7 shows the total number of licensed inspectors between 1993 and 2014. This data was used to compare the number of licensed inspectors to other metrics such as general population, size of the labor force and total construction valuation. The ratio of licensed inspectors when compared to population and labor force remained virtually unchanged during the sample period with a ratio of 1:4,000 versus general population and 1:2,000 when compared to total labor force. On the contrary, a large amount of fluctuation existed with respect to total construction valuation for the state.

Construction valuation is used when determining building permit fees, and represents average cost of construction based on square footages. Construction valuation data for Utah was obtained from the Utah Construction Information Database (BEBR 2014). For the purposes of this research, construction valuation is for the most part synonymous with the general workload expected by the Code Professional Industry. When the ratio of the number of inspectors was compared to the total construction valuation a certain degree of elasticity was discovered. Figure 5-7 shows the number of inspectors and construction valuation in Utah from 1993 through 2014. During the first nine years following the state-mandated licensing in 1993, construction valuation averaged around \$10M per licensed inspector, adjusted for inflation. This ratio began to rise substantially between 2003 and 2006; ultimately peaking at over \$15M per licensed inspector. This increase represented a corresponding 50% increase in workload for each inspector. The recession drastically reduced construction valuation figures, bottoming out in July 2009 at just over \$5M per inspector. From mid-2009 to 2014 this ratio has steadily increased to a point of

over \$7.5M per inspector; however, the \$10M standard that existed in the 1990's has not been equaled. This appears to indicate that the industry could be able to absorb some of the projected losses in personnel. If the ratio were not to exceed the 1:\$10M range, which appears to have been a steady industry norm in the past, the industry could feasibly perform as it has in the past. Although this suggests that a large volume of work can potentially be completed by a relatively small group of professionals, there is unfortunately little known about the quality or thoroughness of the industry's work during these past periods. However, it should be noted that past peaks in construction volume were accomplished by a population of professionals that were not only certified, but also experienced in the industry. If these elevated conditions recur, a less experienced group of professionals may have difficulty keeping pace.



**Figure 5-7: Number of Inspectors vs. Workload**

### 5.9 The Potential of a Skilled Worker Shortage in Utah

Beginning in 1993, certification through a nationally recognized code organization was required in order to obtain a building inspector license (Utah Code Unannotated 1989). The licensing program has evolved, and today professionals require certification from the

International Code Council (ICC). Until licensing laws were enacted, there were virtually no barriers to entry, the industry could grow fairly effortlessly, and was very elastic in its ability to respond to changing conditions. However, the skills associated with performing the duties of a code professional are now quantified, standardized and mandated by state law. The current process now requires time, effort, expense and a minimum level of competence.

In Utah, the potential for a skilled worker shortage has been manifest as municipalities have recently struggled to fill open positions. As previously noted, the Utah Department of Workforce Services projects a 2.4% growth in the Building and Construction Inspector job market through 2022 (Utah Department of Workforce Services 2012). This projected rate of growth will require an additional 200 inspectors over the next ten years. When combined with the pending departure of 318 licensed building inspectors over the same time period, a drastically increased demand for Code Professionals results, totaling a need for over 500 new individuals within the next ten years. It is unclear where these professionals will come from and how they will obtain the skills and qualifications necessary to obtain State licensure.

If no action is taken to alter the projected course of the industry, a Level 1 skilled worker shortage is likely. A Level 1 shortage is defined as a shortage occurring when, *“there are few people who have the essential technical skills who are not already using them and there is a long training time to develop the skills”* (Richardson 2007). This research confirmed that 96% of licensed inspectors were currently working in the industry, and therefore there is not a large population of other code professionals with the proper certifications and licenses not currently employed to draw from. This suggests that the first element of a Level 1 shortage is present. In order to have a Level 1 shortage there also has to be a long training time to develop the necessary skills. Likewise, this research indicated that 70% of professionals have the opinion that a period

between one and three years is necessary to obtain a combination inspector license. It is important to make the distinction that a long training time does not necessarily mean a difficult or expensive training time, as these types of challenges could be overcome through means such as simplifying licensing regulations.

In a Level 1 shortage there are no quick shortcuts leading to a trained and competent population of skilled workers. The only remedy for a Level 1 shortage comes over time as an adequate population of skilled workers is located, trained and employed. If the Code Professional Industry in Utah responds soon, the possibility of a skilled worker shortage may be averted; however, if the industry delays their response to the potential skilled worker shortage, the problem will be more difficult to solve.

#### **5.10 Potential Solutions**

This research project has explored the mass departure of code professionals in Utah. This when coupled with the NIBS (2014) research was specific to Utah, it is presumed that the results have implication for the national Code Professional Industry as a whole. The research confirmed that unless action is taken to alter the projected course of the industry, an eventual shortage of code professionals is eminent. An awareness of the potential shortage of code professionals in Utah allows the local industry to plan strategically and respond proactively. Many options exist to offset the pending losses, such as an increased focus on providing necessary training to those interested in entering the field, attempting to prolong the careers of the current aging workforce, and looking for new technologies that may decrease the man hours needed to perform the various tasks associated with the profession. The following sections address these potential solutions.

### **5.10.1 Availability of Technical Training**

In order to accelerate the rate at which the industry gains new entrants, additional efforts towards increasing the availability of training options is necessary. In this research participants were asked to provide comments regarding the future of the industry in Utah. Over 28% indicated a need for additional training opportunities. In response to preliminary results of this research, portions of the industry have already started responded to this need by providing training specifically targeted towards facilitating entry into the industry.

In late 2014 and early 2015 a free residential certification preparation course was offered in Northern Utah. A local consulting firm, in conjunction with the Beehive Chapter of the ICC provided an 18 session program, consisting of individual two hour courses. These courses were offered in person, as well as via webinar to locations throughout the state. The direct intent of the training program was to assist individuals in obtaining ICC certifications. In all, 82 people participated in the course at some level. Of those, 41% of participants attempted at least one ICC certification exam and a total of 36 individual ICC certifications were obtained, representing an 84% pass rate. Those passing certification exams indicated 20-50 hours were spent preparing for each exam. An additional 11 individuals obtained state licensure as a result of the training program. A follow up survey indicated that participants planned to attempt an additional 83 certification exams by the end of 2015. It should be noted, that those participating in the training were primarily made up of people already working in the Code Professional Industry. Only 26% of those who participated in the training were not currently working in the industry, suggesting that even those within the industry are eager to gain new skills and certifications. However, the success of this free training opportunity indicates that similar training is needed and would be



well received. This also suggests that additional code professionals may not be difficult to find, if adequate time is available for them to obtain certification, licenses and training.

### **5.10.2 Targeting Potential Sources of Code Professionals**

Making adequate training available is of utmost importance; however, raising awareness of the available training and attracting optimal candidates is also of concern. The survey associated with this research indicated 60% of the industry continues to believe that the next generation of code professionals will come from the construction trades. The NIBS (2014) national survey indicated that 47% of code professionals began their careers in the construction trades; however, this signifies that 53% of current code professionals did not come from the construction trades. As a result, relying exclusively on individuals from the construction trades does not appear to be the optimal solution. As the Code Professional Industry continues to evolve and grow in complexity, the role of a code professional must become an independent career, as opposed to an alternate career, the result of a decision made later in life.

In order to replace the large number of code professionals exiting the industry, two general populations should be targeted. The first population, referred to as the “student population,” consists of current and future high school, trade school, community college and university students. The second population, referred to as the “career change population,” consists of professionals currently employed in construction related industries such as engineering, architecture, construction management, the construction trades, and similar fields. The career change population is not as broad as the student population, as transition from virtually any field of study into the Code Professional Industry is viewed as a possibility. However, the key to the career change population is to capture relevant experience that can immediately be put to use within the Code Professional Industry.

The student population must be made aware of the potential career path, necessary training and education must be available, wages must be competitive, and job openings must be available once training is complete. As more and more jurisdictions move toward the use of combination inspectors, a means of obtaining proper certifications prior to entering the industry must be provided or local jurisdictions must invest the time and resources to train individuals in-house.

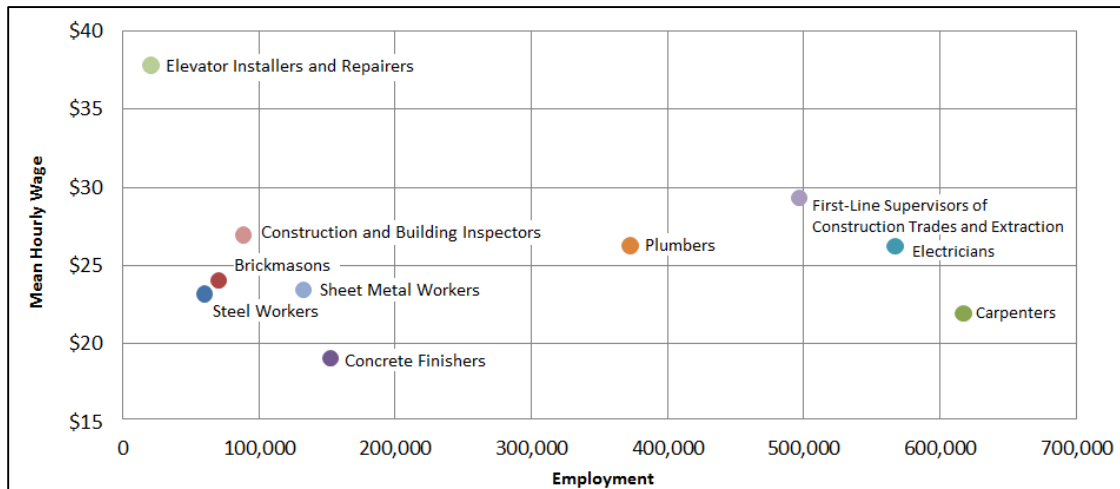
Many current code professionals entered the industry after age 40. It is important to continue pulling skilled professionals from other industries later on in their careers. For the career change population, many professionals will have 10 to 20 years of construction industry experience. This practical knowledge cannot be overlooked, as an industry attempts to not only replace the outgoing professionals, but to ensure that the new generation of code professionals is adequately prepared to perform. With this in mind, the next generation of code professionals will likely be a multi-generational group of individuals committed to ensuring public safety.

In order to pull qualified and skilled individuals from other career paths, the Code Professional Industry must work to provide competitive wages, job security and ample benefits. This research found that such factors were an important element for individuals pursuing a career in the industry. The motivation for students and those transitioning between careers to enter the Code Professional Industry is likely different. A single approach to entice one group may fail to entice the other. As a result, efforts need to be made to accommodate both groups. For the younger professionals, an internship program enabling on the job training and an opportunity for permanent employment at an entry level pay scale may be appealing. On the contrary, a skilled tradesman midway through a career is likely already being paid at or above the level of an experienced code professional. Internships, on the job training and an entry level pay scale will

not likely be desirable. The skilled tradesman will likely be motivated only by perceived job security, better working hours or less physically demanding job duties.

### 5.10.3 Wage Comparisons Within the Construction Industry

According to the Bureau of Labor Statistics which compared construction related occupation wages in 2014, Construction and Building Inspectors had a mean hourly wage of \$26.94 (Bureau of Labor Statistics 2014). Figure 5-8 highlights how these wages compare to individuals from the individual construction trades.



**Figure 5-8: Hourly Wage Comparisons in Construction**

It is clear from the information in Figure 5-8 that code professionals only marginally compete with members of the construction trades such as plumbers, electricians, brick masons, etc. On the contrary, first-line supervisors in the construction trades make marginally higher wages. As a result, it is also clear that individuals in the construction trades today, where roughly 60% of today's code professionals originated (NIBS 2014), have little financial incentive to transition from the trades to the Code Professional Industry. This mean hourly wage data

supports the concerns of those in this study that made an appeal for higher wages as well as by those in the industry arguing that the ratio of pay vs. responsibility is unbalanced (NIBS 2014).

The NIBS (2014) study gathered salary data, and indicated that 41% of those surveyed earn between \$50,000 and \$74,999 per year. Over 20% earn between \$75,000 and \$99,999 per year, indicating that the potential for higher wages exists within the industry. However, this data also suggests that the higher salaries are reserved for those in supervisory positions, who have earned administrative duties due to their extended years in the industry. Future research should evaluate the salary data in conjunction with the number of years individuals have spent in the industry.

#### **5.10.4 Prolong the Careers of Current Code Professionals**

Further research is necessary regarding the potential to extend the careers of current code professionals. As the industry ages, accommodations could be made in the form of modified job duties, phased retirement, and shortened work hours in an effort to encourage participation in the industry beyond the traditional retirement age. It is also possible that through these types of efforts and the addition to mentoring programs, the industry can avoid “brain drain” and pass along the knowledge and expertise of its most experienced professionals.

Emphasis must be made on passing down the knowledge, skills and expertise of the soon to retire group of professionals. The need to preserve the lessons learned throughout the past decades is of great importance, and this research emphasizes the urgency in which such a process must take place. The industry must work to extend the careers of the outgoing population as long as possible. The longer the outgoing population remains in the industry the more knowledge, experience and expertise can be passed along, which will likely translate into a better qualified and more competent group of replacements. As the primary purpose of the Code Professional

Industry is to ensure public safety, any effort to improve the industry's ability to do so must be made. The outgoing population can certainly benefit society by passing along what they know and what they have learned. It seems that failing to capture the benefit of this knowledge is a step backward in an industry that is modeled in a way that encourages progression and continual improvement.

#### **5.10.5 Potential Impact of New Technologies**

As a dramatic reduction in workforce appears to be a very real possibility, it is important for the industry to seriously evaluate the potential for new technologies and the impact it could have on the industry. If new technologies could be incorporated into the day-to-day operations of a building department, it may be possible in the future to administer equivalent code enforcement with a smaller population of code professionals. Although this would not alleviate the substantial loss of knowledge and experience, it may soften the immediate impact as the new generation gradually gains their own level of expertise.

Possible technologies include permit and building department administration software which decreases the amount of hand filing, and manual data entry involved with each permit. Various electronic devices are currently being utilized during the inspection process, to facilitate paperless inspection reports, as well as document distribution. It may be possible through the usage of digital video cameras and GPS technology to conduct remote inspections. A qualified code professional may be able to sit in front of a monitor while a less qualified individual visits the job site. This could possibly enable a greater volume of inspections as travel time to remote locations, or through high-traffic urban environments would be virtually eliminated. Through paperless three-dimensional plans available on a cloud-based server, the plan submission, review and processing time could also be greatly reduced. The key to improving efficiency is not strictly

associated with the utilization of new technologies, but also in improving processes. Ironically, a drastic reduction in force within the Code Professional Industry may be the catalyst for change that the industry has been waiting for.

### 5.11 Summary

The Code Professional Industry is rapidly changing, and constantly evolving. The pressure placed on the industry's professionals are demanding, and will likely increase. The next step in the evolution of the industry involves systematically replacing the industry's most experienced professionals, which must occur during the next ten to fifteen years. This limited period of time serves as a window of opportunity in which progress can be made to attract, train and employ the next generation of code professionals. On a local level the need for several hundred new professionals will arise, and efforts must be made to provide adequate training opportunities to facilitate interested individuals entrance in obtaining ICC certifications and entering the industry. A combination of efforts to attract students from various educational institutions, as well as skilled individuals from the construction trades appears to be warranted. These efforts must be accompanied with competitive wages, job security and ample benefits. Once the next generation of code professionals begins to enter the industry, efforts must be made to adequately train and mentor, preferably by way of the experienced professionals soon to exit the industry. Any effort to prolong the careers of those soon to retire will likely increase the likelihood of preserving the industry's current level of knowledge and expertise. New technologies are expected to play a role in the future of the industry, either as a means of improving the quality of the work, or simply improving efficiency and allowing the industry to accomplish more with less. This research shows that inaction by the industry will quickly lead to a shortage of qualified professionals. If appropriate action is abruptly taken, a sufficient amount

of time exists to avert a potential crisis, and in the process preserve important industry knowledge and expertise.

## **6 STRATEGIC UTILIZATION OF THE AGING POPULATION OF CODE PROFESSIONALS IN UTAH**

### **6.1 Introduction**

Code professionals perform the duty of ensuring that buildings are constructed in accordance with applicable construction codes and safety regulations. The Code Professional Industry is made up of a variety of professionals such as inspectors, plans examiners, building officials and permit technicians. In the state of Utah the estimated number of construction and building inspectors totals less than one thousand (Bureau of Labor Statistics 2013). In Utah, licensing data shows that over 58% of licensed inspectors will reach retirement age within the next 15 years. As a result, this small and rather specialized industry will experience a significant regeneration in the next 10-15 years.

Concern over the aging Code Professional Industry is not a phenomenon unique to Utah. The International Code Council (ICC) recently explored the issue by partnering with the National Institute of Building Sciences (NIBS) which conducted an industry-wide survey and gathered responses from all 50 states and three foreign countries (NIBS 2014). The respondents of the NIBS survey were asked a series of 25 questions related to demographics such as age, compensation level, education, professional background, time spent within the industry, and anticipated retirement timelines. This survey appears to have been among the first academically structured investigations into the Code Professional Industry as a whole. The NIBS (2014) survey found that over 80 percent of code professionals expect to retire within the next fifteen



years (NIBS 2014). This research was initiated to investigate whether similar conditions exist in Utah.

The majority of code professionals approaching retirement have spent more than 25 years in the construction industry (NIBS 2014). Code professionals develop specialized skills and technical expertise gradually over the course of their careers. The pending departure of many of the industry's most tenured professionals will be dramatic unless efforts are made to ensure the next generation of code professionals is adequately prepared to assume responsibility over building safety. Replacing an experienced group of professionals in such a short period of time will require a significant contribution of time and resources. Efforts must be made to transfer knowledge and expertise through strategically utilizing the population of aging code professionals. In order to be effective, a sufficient amount of time must be provided to ensure the outgoing population of code professionals is able to interact and exchange job knowledge with the next generation of code professionals.

The purpose of this research was to investigate the mass departure of aging code professionals in Utah and explore potential methods for capturing industry knowledge. Failure to respond to this issue will likely have negative impacts on the Code Professional Industry, and the construction industry as a whole could also be affected. A reduction in the number of code professionals would likely hamper construction as permitting and inspection processes slow. An inexperienced population of inspectors could lead to lower quality inspections, potentially resulting in rework and other indirect costs. In order to compensate for the inevitable decline in the number of code professionals, the industry must actively pursue new entrants, and make efforts to retain the services of current code professionals for as long as possible.

## 6.2 Methodology

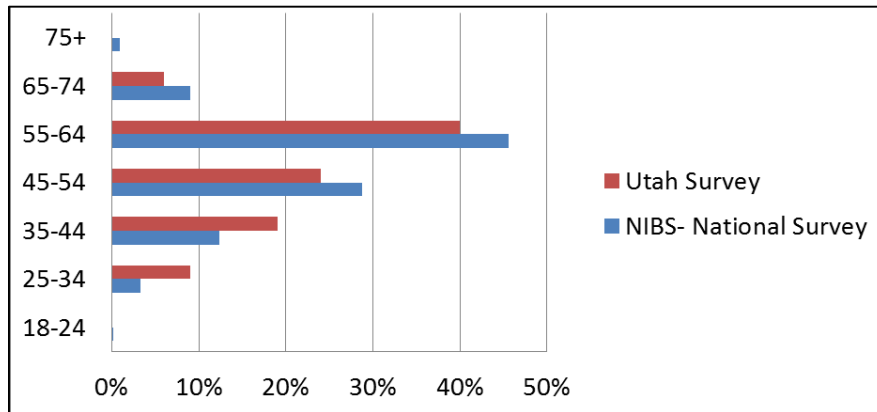
In order to quantify age demographics and project retirement timeframes, a statewide survey of code professionals was conducted. The survey consisted of 16 short questions with conditional branching, meaning the number and type of questions varied based upon a person's response to each question (see Chapter 4). This study was modeled after research by the ICC in conjunction with NIBS, and focused on gathering data related to age, projected retirement timeframes and preferred retirement models. This research captured local concerns related to the state of the Code Professional Industry in Utah.

In order to be of value, the survey needed to be adequately distributed within the local industry to a known population. The survey was distributed to 512 out of the 615 licensed inspectors in the state of Utah. Survey participants were selected through a convenience sample based entirely on the number of licensed building inspectors with valid accessible email addresses. A total of 303 survey participants responded, representing over 49% of the total population. This response rate resulted in a confidence interval of  $\pm 4\%$ , providing an accurate representation of the Code Professional Industry in Utah.

## 6.3 Retirement Projections

In this research study, survey participants were asked to identify their age, how long they had been working as a code professional, and provide an anticipated retirement timeframe. This information would be used to quantify the pending departure of code professionals within the next 10-15 years. As seen in Figure 6-1 a total of 46% of the local industry is made up of individuals over the age of 55. When compared to the NIBS (2014) national survey, Utah appears to employ a slightly younger age demographic. This suggests that the local industry may

have more time to strategically respond to the approaching wave of retirements. This additional time may allow for more purposeful training and mentoring programs to be implemented.

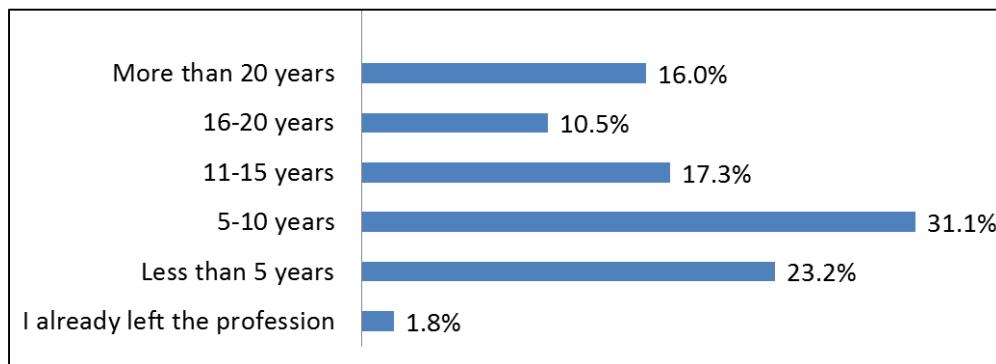


**Figure 6-1: Ages of Code Professionals**

The research study found that 40% of the code professionals in Utah are between the ages of 55 to 64, whereas less than 10% are under the age of 35. In a specialized industry where experience is of utmost value, the lack of younger code professionals is a concern. The data shows a disproportionate population in the 56 to 64 age range. The survey results also indicated that the professionals in this age range had on average over 20 years of experience in the Code Professional Industry. Before these experienced professionals exit the industry, additional code professionals must be found, obtain necessary qualifications and receive training and mentoring.

Age is not the only determining factor when projecting retirement rates. As manifest in Figure 6-1 many code professionals remain in the industry beyond the typical retirement age of 65. In an effort to establish a more accurate projection of retirement numbers, survey participants were asked when they planned on exiting the industry due to retirement or to pursue other opportunities. The results of this survey question are shown in Figure 6-2. Over 73% of the

respondents indicated that they plan to leave the industry within 15 years. Based on the current population of 615 licensed inspectors, the projected losses within 15 years may include 451 licensed inspectors. This percentage is slightly less than the national projection of 82% (NIBS 2014). However, with a national population of approximately 41,000 code professionals with ICC certifications (Porter 2014), this would represent a potential loss of 33,000 certified professionals. These figures outline the magnitude and urgency associated with code professionals leaving the industry.



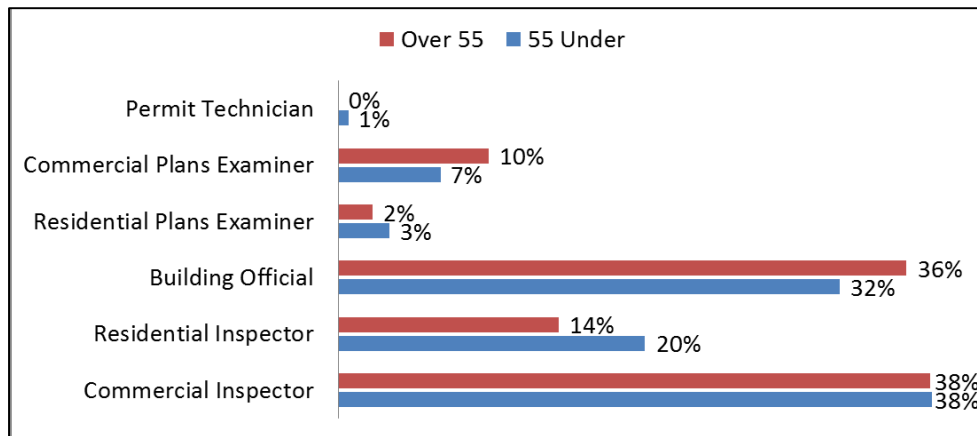
**Figure 6-2: Projected Retirement Timeframes**

The current influx of new code professionals does not appear to be sufficient to meet the outgoing demand. The industry is focused on finding and attracting new entrants and continues to stress this need amongst its members (National Institute of Building Sciences 2015). Such efforts are warranted and necessary, but only provide a partial solution, as new entrants will require substantial on the job training once they have entered the industry. Little emphasis has been made on ensuring that the next generation receives sufficient training, or more importantly who will provide such training. As a result, additional efforts must be made to prolong the

careers of experienced code professionals in order to provide a strategic, gradual departure and allow time for valuable mentoring and one-on-one training to occur.

#### **6.4 Job Responsibilities**

Part of this research involved not only quantifying the number of code professionals that would be leaving the industry and projecting when these losses would occur, but also determining what specific skills might be lost. In the national study (NIBS 2014) participants were asked to identify all of their applicable roles within the industry, which resulted in an unclear determination of specific job responsibilities. In order to understand the local code community the survey asked participants to identify their primary role within the industry (see Fig 6-3). The intent of this question was to identify their principal day to day responsibilities. A majority of respondents indicated that their primary roles were building officials and commercial inspectors. However, feedback regarding this question suggested that selecting a single role within such a complex and diverse industry was difficult. This data suggests that involvement in residential inspections, residential plan reviews and commercial plan reviews generally occur as a secondary job function. However, this data also indicates that a fairly equal distribution of code professionals exist between those over and under age 55 regardless of primary responsibilities, signifying a reasonable level of continuity.



**Figure 6-3: Primary Job Roles**

### 6.5 Impact on Small Communities

The State of Utah has 242 municipal governments, of which only ten have populations in excess of 50,000 residents (U.S. Census Bureau 2007). As a result, a vast majority of building departments service small communities and consist of a limited number of people. Small populations don't always indicate a low level of construction activity, so the survey asked participants to indicate the size of the building departments they work in. Of those who responded to the survey, 50.6% worked in building departments consisting of only 1 to 4 people. An additional 14.3% worked in departments of 5 to 7, 15.4% in departments of 8-10, and 19.7% departments of more than 10 individuals. This data shows that the majority of code professionals work in small departments. These small departments will be dramatically impacted by the retirement of staff members, as each individual represents a large percentage of the total staff. Small building departments have very little elasticity, and are generally only minimally able to temporarily absorb the workload of any one individual. In some cases due to difficulty in hiring code professionals, some municipal governments have elected not to replace outgoing code professionals due to a perceived ability of the remaining professionals to maintain the workload.

With the volume of projected retirement approaching, this does not appear to be a sustainable practice.

As most of Utah is made up of small communities, any proposed response to the mass departure of code professionals must also be viable for small building departments. Small communities are less likely to have the time, personnel and other resources to train inexperienced code professionals. Small building departments require versatile and competent professionals, as each individual fulfills multiple crucial roles. There are many roles that exist in the building department, which in small communities are filled by only a few individuals. It could be argued that larger departments are better suited for training younger professionals; however, only a limited number of these larger departments exist. This challenge of finding and training new professionals for smaller departments is not new, but might be magnified by the increased demand for code professionals. With limited budgets, smaller communities are less able to absorb the costs associated with training new code professionals. As a result, they may only be able to afford such training costs for short durations of time; however, training the next generation of code professionals may take a considerable amount of time.

When asked to estimate how long new hires would need to obtain a state issued combination inspection license, 70% of the local industry indicated a period of 1 to 3 years and an additional 17% responded with a period of 4 to 5 years. Training the next generation of code professionals will be a length process requiring foresight, planning and a substantial investment of resources. However, this data also indicates that there is sufficient time to utilize the experienced professionals to actively participate in this training process. Although all building departments will face these types of challenges, it seems that smaller building departments will require a more strategic approach.

## 6.6 Industry Concerns Regarding the Future

There is likely no better group from which to solicit solutions to the problems that face the industry than the current body of code professionals. In an effort to gather the ideas of local code professionals this research solicited opinions and feedback from participants, related to the future of the Code Professional Industry in Utah. A summary of responses from 101 of the research participants are recorded in Table 6-1, and the complete list of comments are provided in Appendix B. This section discusses the concerns that were repeated most frequently.

**Table 6-1: Summarized Survey Responses**

28%	Reinforced the Need for Additional Training Opportunities & Programs
27%	Acknowledged the Current Lack of Qualified Individuals
24%	Highlighted the Need for the Industry to Attract New Entrants
24%	Stressed the Need for Increased Public and Government Awareness Regarding the Industry as a Whole
23%	Voiced Complaints Regarding Need for Higher Salaries
18%	Expressed Concerns Regarding Supply vs. Demand in the Industry
6%	Expressed Negative Views Toward ICC and the Certification Processes
4%	Shared Concerns Regarding Inadequate Staffing of Building Departments by Municipalities
4%	Recognized Trends in the Industry Towards 3rd Party Providers
3%	Expressed Concerns Regarding Appropriate Code Cycle Durations
3%	Shared Opinions Related to a Lack of Unity Within the Industry
3%	Voiced Concerns with Respect to a Lack of Soft Skills/Intangible Skills Within the Industry
2%	Complaints Regarding Permit Fees Staying in the Building Department
1%	Voiced Concerns Regarding a Need for Flexible Work Schedules

The primary concern of the industry revolves around the need for additional training opportunities and programs, as was indicated by 28% of respondents (see Table 6-1). Those working in the industry appear to understand that local governments are reluctant to fund training opportunities, and seldom facilitate training and mentoring new code professionals. As a result, the industry appears to be looking for an outside source to provide such training. It seems that trade schools, colleges and universities would be a logical source of additional training, in order to prepare individuals to enter the Code Professional Industry. However, another question in the



survey asked participants to identify the source of the next generation of code professionals. Historically, about half of code professionals have originated from the construction trades (NIBS 2014). In this study a total of 60% of the survey respondents expect the next generation of code professionals to transition from the construction trades, 18% from technical and vocational schools, 10% suggested that municipalities will simply train from within, and 8% from community colleges. Only 3% of survey respondents expect future code officials to be university graduates. This data suggests that the industry believes the future source of code professionals will continue to primarily originate from the construction trades.

Although the Code Professional Industry expects the next generation to come from the construction trades, there is also a common industry sentiment that experience in the trades alone will not serve as adequate training. This may suggest that the transition from the construction trades to the Code Professional Industry is becoming more difficult due to the growing complexity and continued evolution of codes and regulations. Additionally, it would seem that experience in a single trade provides a limited scope of experience, whereas a majority of code professionals require expertise in multiple trades. However, regardless of experience in the construction trades, the industry is suggesting that additional training is necessary to obtain licenses and certifications. This suggests that the “need for additional training opportunities” expressed in this research is more closely tied to training specifically geared toward acquiring necessary certifications and licenses.

The second most common response acknowledged a lack of qualified individuals available to hire (27% of respondents; see Table 6-1), suggesting that the industry is already experiencing the initial effects of losing experienced professionals. This concern was reinforced by an additional 18% of respondents who voiced concerns regarding supply and demand.

Together the lack of qualified individuals available to hire and associated supply and demand concerns suggests that open positions are going unfilled (see Table 6-1). Of those surveyed, 4% specifically commented about inadequate staffing levels in building departments (see Table 6-1). This could be due in part to the limited availability of qualified professionals, or could also reflect potentially understaffed building departments. These three common responses indicate that challenges related to hiring qualified individuals will continue to grow.

The industry appears to have been able to attract a sufficient number of code professionals in the past with minimal effort. However, a total of 24% of respondents voiced concern that the industry needs to actively attract new entrants (see Table 6-1), suggesting that additional efforts will be required in order to replace the outgoing generation of code professionals. The industry must be able to compete with other disciplines within the construction industry in terms of compensation, job security, benefits and working conditions. Responses supported these concerns as 23% reported a need for higher salaries (see Table 6-1). Another apparent challenge commonly attributed to a lack of interest in the Code Professional Industry is associated with becoming a certified code professional. A total of 6% of survey respondents expressed negative views towards the International Code Council and the certification process in general (see Table 6-1). Obtaining certifications and state licensure are seen by many within the industry as a deterrent to attracting interested individuals. These ideas indicate that attracting new entrants into the Code Professional Industry will require a combination of better outreach programs, compensation packages and efforts to help new entrants to qualify for necessary certifications and licensure.

Another theme, expressed by 24% of respondents, suggested the need for increased government and public awareness with respect to the industry as whole (see Table 6-1). An

increase in awareness of the Code Professional Industry may lead to greater exposure to potential new entrants, and increased support from local governments to sufficiently staff building departments. This increased awareness must include an understanding of the value provided by code professionals. The need for increased government awareness is valid, as many municipalities appear to only have a marginal understanding of the importance of code compliance, the complex nature of the industry and specialized training requirements. Increased awareness must come through a collaborative effort from individual code professionals, local code and trade organizations as well as industry leaders on a national level.

#### **6.7 The Code Professional Career Cycle**

The survey associated with this research resulted in various findings related to a number of separate issues within the Code Professional Industry. In order to clearly illustrate how each of these findings are interrelated, the Code Professional Career Cycle was generated (see Figure 6-4). The Code Professional Career Cycle displays an optimal career path for code professionals, based on industry feedback as indicated by survey responses.

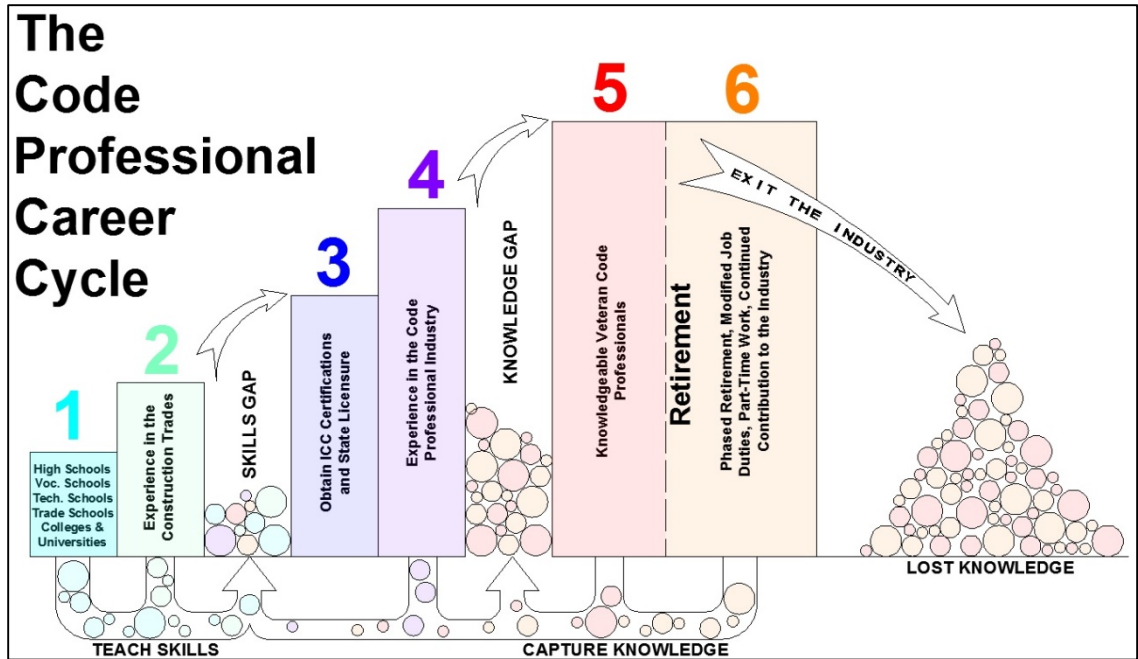


Figure 6-4: The Code Professional Career Cycle

Level 1 represents common sources of new entrants into the Code Professional Industry, including high schools, various vocational schools, as well as colleges and universities (see Figure 6-4). The survey indicated that 39% of code professionals believe these sources will produce the next generation of code professionals. In order to be a viable source of new entrants, these types of educational institutions must expand their involvement in code related training programs, as appropriate. Although educational institutions serve as a logical starting point for individuals interested in becoming code professionals, the vast majority of the industry believes the source of future code professionals will come from the construction trades, as was indicated by 60% of survey respondents and indicated as Level 2 (see Figure 6-4). As a result, it appears possible in some circumstances to replace formal education with additional experience in the construction trades; however, the optimal progression would include a combination of both.

Following Level 2, potential code professionals are faced with what this research refers to as the Skills Gap (see Figure 6-4). The Skills Gap signifies the lack of industry specific qualifications (i.e. ICC certifications and state required licenses) that would enable someone to enter, or transition into, the Code Professional Industry. The Skills Gap serves as a substantial obstacle for those entering the Code Professional Industry. A total of 28% of survey respondents emphasized the need for additional training opportunities, which essentially closes the Skills Gap and helps interested people enter the industry. The process of obtaining ICC certifications involves a series of exams, which may be intimidating for those unfamiliar with the process and those unaccustomed to taking tests. Those that have completed some level of formal education may have an advantage in this regard, with respect to study for and taking tests. On the other hand, many of those in the construction trades have developed knowledge and skills that don't necessarily translate into a classroom environment or adequately prepare them for certification exams. As a result, the Skills Gap effectively limits the number of potential new entrants into the Code Professional Industry.

Efforts to minimize the Skills Gap are represented by the flow of information from Levels 1 and 2 into the gap as shown in Figure 6-4. For instance, possibilities include exam preparation courses from the educational sources in Level 1 or similar training offered by local chapters of the ICC or other trade organizations. Private sources may be interested in developing materials; however, with the limited population of code professionals this seems unlikely. The need exists to help interested people obtain the necessary certifications and licensing, but as will be highlighted later in the cycle, the industry has other training needs of its own that generally take precedence. Lastly, there are some in the industry that are in favor of modifying or eliminating requirements for state licensure, which essentially removes the Skills Gap altogether.

However, this approach could be problematic as it lowers the minimum level of competency and overall professionalism. Prior to modifying licensing requirements, efforts must be made to close the gap through adequate training opportunities.

In Level 3 code professionals obtain ICC certification and state licensure (see Figure 6-4), which generally allows for employment in the Code Professional Industry. In Utah, such employment is most frequently through a municipality, as indicated by 80% of survey respondents. The data also shows that 15% are employed by third party providers, 5% by school districts and 3% by other means. This suggests that various employment opportunities exist for recently certified professionals. Without obtaining necessary certifications and licenses, it is impossible for an individual to advance further within the Code Professional Cycle.

Level 4 is reached once employment in the industry is secured. Due to the daily tasks involved in being a code professional, the likelihood of obtaining additional ICC certifications generally continues as familiarity with the codes increases. This is the case because many employers encourage further certification and often pay for study materials and the cost of certification exams. This can result in progression toward becoming an experienced and knowledgeable code professional; however, another sizable obstacle exists which is referred to as the Knowledge Gap.

The Knowledge Gap represents the time necessary to achieve an understanding of all that a code professional must know (see Figure 6-4). In order to overcome the Knowledge Gap each code professional must individually gain knowledge and experience over an extended period of time, or the gap can be filled more efficiently as knowledge is passed down from other experienced code professionals through mentoring and on the job training. Such knowledge may include a vast amount of irreplaceable institutional knowledge and an in-depth and global

understanding of the body of codes. As a matter of comparison, the Skills Gap can be bridged in a variety of ways as previously discussed, whereas the source for closing the Knowledge Gap must originate from the industry's most experienced code professionals.

Level 5 represents the most knowledgeable and experienced code professionals in the industry (see Figure 6-4). The preferred model would involve code professionals reaching this level as quickly as possible, enabling their contribution to the industry to be more substantial and occur over a longer period of time. Many of those that will soon be exiting the industry can be categorized as Level 5 code professionals. This means that the industry must develop processes to effectively transfer and retain this knowledge while these experienced professionals remain in the industry. In addition to capturing knowledge in efforts to fill the Knowledge Gap, this group of experienced professionals could also be utilized to help bridge the Skills Gap. Outside sources for solving the Skills Gap appear to be possible; however, the Knowledge Gap has no apparent sources from outside the Code Professional Industry. This research shows a large portion of the industry likely consists of Level 5 professionals, providing opportunity for training and mentoring to occur. This effort would more effectively fill the Knowledge Gap allowing for additional code professionals to reach Level 5 status. Without this systematic progression, overcoming the Knowledge Gap will become increasingly hard. In order to minimize the Knowledge Gap the industry needs to maximize the contributions of Level 5 code professionals.

The final level within the cycle (see Level 6 in Figure 6-4) occurs beyond retirement age, and is an essential step in securing an adequately trained population of code professionals for the future. Retirement age is a static point in the career of a code professional; however, it does not represent a forced exit from the industry. One possible solution is to delay exiting the industry in an effort to capture the knowledge and expertise of those that will soon be retiring and use it to

fill the Knowledge Gap. They will result in a larger population of more adequately prepared code professionals, continuing the legacy of the Code Professional Industry.

## **6.8 Potential Methods for Capturing Industry Knowledge**

The approaching retirement of the baby boomer generation has been anticipated for many years. The construction industry is not immune to the inevitable retirement of its workforce. Being that the approaching retirement of the baby boomer generation cannot be stopped, possible solutions include delaying retirement, adjusting job duties to accommodate older workers and flexible work schedules to encourage phased retirement (Silverstein, 2008, Arnone, 2006, Burtless and Quinn 2002). The following sections outline potential methods of most effectively utilizing aging population of code professionals, and explore the affect these alternatives might have on the industry as a whole.

### **6.8.1 Delaying Retirement**

Many researchers have concluded that the current workforce may need to stay on the job longer, and postpone retirement in order to soften the pending losses of large numbers of skilled professionals (Silverstein, 2008, Arnone, 2006, Burtless and Quinn 2002). The number of people planning to put off retirement beyond the age of 62 rose nationally from 35% in 1998 to 55% in 2004 and is likely increasing (Silverstein 2008). Delaying retirement may alleviate current needs within the Code Professional Industry; however, such actions must be accompanied by efforts to find, train and employ the next generation of code professionals. Such a delay could potentially alleviate an abrupt loss of professionals and allow the industry to adequately respond to the potential crisis through additional training programs, mentoring and recruitment efforts.



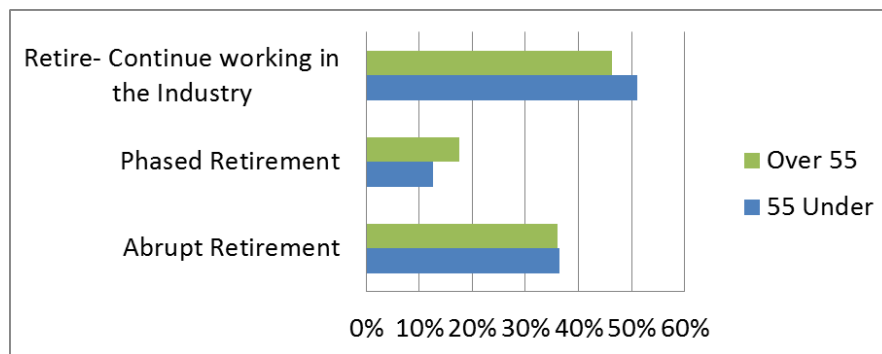
Based on this research, it appears that a sizable population of post-retirement age code professionals exists and will continue to grow. Survey responses indicated that 9% of code professionals over age 55 planned on remaining in the industry beyond retirement age. The value in delaying retirement comes from the opportunity this creates for the industry's most experienced professionals to personally train the next generation of code professionals. An extended period of overlap between the new generation of code professionals and the outgoing generation would be of great value, as knowledge could be exchanged and hard-earned lessons could be passed on.

### **6.8.2 Phased Retirement**

The National Institute on Aging conducts a Health and Retirement Study every two years. The study has consistently shown that three out of every four older workers have said they would prefer to reduce hours gradually rather than retire abruptly (Silverstein 2008). Studies have shown that only 11% of companies are considering hiring retirees as consultants or contractors, or using on-call pools of retirees (Arnone 2006). The code professional industry must be creative in finding methods for allowing a phased retirement, such as flexible hours, part-time contracts, as-needed contracts, and similar methods of ensuring that those retiring still have viable options to contribute to the industry. Based on this research, only 15% of licensed inspectors work for a third party provider. This suggests a limited market for part-time or contract code professionals. However, as the industry continues to lose professionals, opportunities in the third party market may grow. In addition, Utah law prohibits participants of the state retirement system to resume working for local government for a period of one year following retirement (URS 2014). This appears to be a hurdle if the industry desires to extend the careers of the retiring code professionals. By limiting their ability to re-enter the industry, age will become the determining

factor when it comes to retirement plans. Age projections suggest a very abrupt loss of professionals (see Figure 6-1). If efforts can be made to extend the careers of even a portion of each age demographic, a more gradual transition into the next generation of code professionals could be achieved.

As part of the state-wide survey the industry as a whole was asked what form of retirement they would prefer, of which the results are cross-tabulated in Figure 6-5. The results show that regardless of age, those in this industry overwhelmingly support a retirement option that allows them to continue working in the industry after retirement. On the contrary, only 36% of those surveyed preferred an abrupt retirement. If the industry can adjust to a model that enables retired code professionals to continue to contribute in their later years, an opportunity exists to capture much of the knowledge and expertise they possess.



**Figure 6-5: Retirement Preferences**

In addition, survey respondents who indicated that they preferred to retire yet continue to work in the industry were asked how many hours they would prefer to work. All of those surveyed indicated that a part-time work schedule consisting of 10 to 30 hours per week would be desirable. This result provides a basis for local governments to design employment opportunities that meet the needs of this aging population.

### **6.8.3 Modified Job Duties**

Those in the Code Professional Industry have a wide variety of job duties. This research has indicated that code professionals continue to engage in all aspects of the industry regardless of age. As people age, cognitive capacities gradually diminish, although there is no clear cut formula to determine to what extent or at what point in life it will occur (Silverstein 2008). In order to best utilize the current population of older code professionals and encourage them to remain in the workforce beyond retirement age, it will likely be necessary to adjust job duties according to their abilities. For example, a code professional may transition from performing field inspections to examining plans. Studies have concluded that performing multiple tasks or holding multiple items in working memory are especially sensitive; however, many functions are “crystallized,” which means they are effectively preserved with age (Silverstein 2008). The job duties of code professionals often involve complex thought processes and memorization of thousands of individual code sections. Although on the surface these tasks may appear to be vulnerable to the effects of age, it is not unusual for code professionals to continue to work well into their 70’s, suggesting a similar “crystallization.” This research found that in Utah there are currently 18 individuals over the age of 70 that have active licenses. This suggests that code professionals may be retained well beyond retirement age and that delaying retirement is a viable option.

In order to retain older code professionals, slight modifications to their job duties may be necessary. Although the cognitive functions may be intact, the physical duties of code professionals may exceed the capacity of some older workers. The American Association of Retired Persons (AARP) suggests that if employers are to reap the benefits of the work ethic and experience of older workers, they must design the workplace of the future to meet their needs

(Silverstein 2008). This applies to the code professional industry as inspection duties such as climbing scaffolding, entering crawl spaces, and walking steep pitched roofs are not typically conducive to an older work force. Studies have concluded that workers in poor health, or who work in physically demanding jobs are typically first to retire (Burtless and Quinn 2002). There are many aspects of the code professional industry that are not physically demanding, and through modifying job duties the industry could extend the careers of many of its older professionals. The NIBS (2014) survey concluded that a majority of code professionals perform a combination of inspection, plan review and administrative duties. As a result, a move towards more specialized and strategic roles within building departments may be necessary to fully utilize older workers beyond typical retirement age.

#### **6.8.4 Mentoring and Training**

Few trends are as predictable and irreversible as the aging of the American population. Researchers have examine how organizations respond to their aging workforces and how they plan on transferring “business wisdom” defined as, “*value that is uniquely derived from experience alone*” (Arnone 2006). As the Code Professional Industry plans for the future, there is much business wisdom that will be lost through the pending mass retirement; this type of phenomenon is also referred to as talent gap or brain drain (Arnone 2006). The Code Professional Industry is in great need of programs that facilitate the mentoring of younger workers. Many code professionals primarily work alone and relatively unsupervised; as a result the opportunities for more experienced professionals to pass along business wisdom to less experienced professionals is very limited.

The cost of training the next generation of code professionals will likely be substantial. While entry level employees result in lower compensation costs, the decrease in productivity

during training can result in substantial cost increases (Arnone 2006). In the Code Professional Industry, providing avenues for the exchange of industry knowledge will involve a large amount of one-on-one training, both within the building department as well as in the field. Capturing the knowledge of experienced code professionals will be best accomplished through personal interaction between the mentor and the pupil. In most cases this will result in two professionals completing the work normally performed by a single individual. With such training comes an increase in cost and a decrease in productivity; however, this must be viewed as a necessary short term cost, and an investment in the future.

## **6.9 Conclusions**

The Code Professional Industry in Utah will inevitably face a significant regeneration within the next 10 to 15 years, primarily due to an aging population of code professionals soon to exit the industry. Over 55% of licensed building inspectors intend to leave the industry within 10 years, representing a pending need for over 338 individuals. Many of those soon to exit the industry are amongst the industry's most skilled and experienced professionals, adding to the challenge of finding equal replacements. The industry must respond quickly and appropriately to ensure that sufficient quantities of certified, licensed and trained professionals are available to replace the outgoing generation.

As the industry prepares for its future needs, data shows that a majority of code professionals in Utah are employed by small jurisdictions and working in building departments consisting of 1 to 4 people. The approaching mass departure of code professionals will be acutely felt by smaller jurisdictions, which due to limited resources will likely have difficulty finding qualified professionals, providing adequate training and absorbing the workload of outgoing professionals. The industry is aware of the need for new entrants, and has made it clear that

additional training opportunities are needed. The primary challenge appears to be bridging the Skills Gap, which involves obtaining necessary certifications and licenses. This gap must be filled through a collaborative effort between educational institutions, the construction trades, and members of the Code Professional Industry. Once certified and licensed, additional training and mentoring is needed to capture industry knowledge, and advance code professionals beyond the Knowledge Gap to a level of expertise comparable to that of the outgoing generation. This can only be accomplished through strategic planning as efforts must be made to extend the careers of many of the industry's most experienced professionals through delayed or phased retirement, modified job duties and emphasizing the need for mentoring of less experienced professionals. Extending the careers of the outgoing generation will enable additional time to train less experienced professionals, pass along industry knowledge and secure sufficient numbers of qualified professionals. Failure to act will undoubtedly result in an abrupt loss of industry knowledge, as the new generation of code professionals will likely lack adequate training, and those best suited to provide such training will no longer be part of the industry.

## 7 CONCLUSIONS

The Code Professional Industry is approaching a necessary period of regeneration in the next ten to fifteen years, primarily due to an aging population of code professionals. Over half of code professionals in Utah plan to exit the industry within the next ten years, resulting in an urgent need for new entrants, additional training opportunities and a passage of knowledge from the outgoing generation of professionals to those who will soon take their place. The purpose of this study was to evaluate the impacts of losing half of the building inspectors in the State of Utah. This research was designed to quantify the population of code professionals and determine what portions would be exiting the industry, and when such changes would occur. A determination of what skills would be lost was necessary in order to adequately replace the outgoing generation of code professionals with similarly qualified, yet less experienced replacements. Ultimately this research established a method for evaluating the Code Professional Industry, highlighted available data sources and established viable methods of collecting industry data through the survey process.

Prior to this research an approaching mass retirement was feared, yet not quantified. The study concluded that the Code Professional Industry in Utah is made up of a very limited population consisting of roughly 917 individuals. This is of great value as it serves as a benchmark tied to a specific point in the evolution of the industry. Within the limited population is a smaller population of 615 licensed building inspectors, of which only 275 are licensed as

combination inspectors. With quantities established, the study went on to determine that 55% of licensed building inspectors intend to leave the industry within 10 years, representing a potential loss of 338 licensed inspectors.

Quantities of inspectors certified by the International Code Council (ICC) were determined in each of 79 individual categories. Within each code discipline similar percentages were calculated related to those intending to exit the industry within 10 years, pin-pointing areas that will be most affected. A majority of commercial and residential inspection categories will lose upwards of 50% of their professionals, with the combination inspection categories posed to lose around 60% of respective professionals. In addition, over 60% of Certified Building Officials will also exit the industry. Together the combination inspectors and Certified Building Officials represent a combination of the most experienced and highly qualified individuals in the industry.

The research also discovered that the rate of new licensure within the industry has not remained constant. Economic factors as recently experienced during the recession impact the number of individuals attempting to gain licensure. Based on historical licensing rates, and projected retirement numbers, the industry will not maintain its current population of professionals. In addition to struggles maintaining the current population, projected growth of 2.4% also presents a formidable challenge to the industry, resulting in a potential shortage of over 120 combination inspectors by the year 2025.

As the industry responds to an imminent loss of professionals, particular attention must be paid to the level of knowledge and experience that will be lost, not simply the level of certifications associated with the losses. The research concludes that efforts must be taken to capture and disseminate knowledge from the outgoing code professionals in an effort to preserve



industry knowledge that would be otherwise lost, through mentoring and training efforts. By strategically utilizing the outgoing generation of professionals, through modified job duties, phased retirement and other efforts to delay retirement, much of the industry specific knowledge could be preserved.

## 7.1 **Limitations**

Although the study research was successful in quantifying the number of professionals with various licenses and (ICC) certifications, certain limitations did exist. For the purposes of this research it was assumed that an individual's licenses and certifications at minimum, represented base-line knowledge; however, possession of a license or certification does not adequately measure an individual's knowledge or expertise with respect to a particular code discipline. For that purpose a more accurate method of measuring competence and expertise would be desirable in future research. Second, the duration an individual has spent within the Code Professional Industry is likewise an imperfect measure of knowledge and expertise, as the potential exists for a period of prolonged incompetence. Ultimately a method of testing individuals within the industry would prove a more accurate metric, but would likely limit the willingness of study participation.

Another limitation associated with this research was a lack of data related to the number of months or years necessary to obtain ICC certification and state licensure, followed by a comparable level of knowledge to those exiting the industry. This type of measurement would clearly vary from individual to individual, but would provide valuable insight into determining how quickly the new generation of code professionals can be expected to truly replace the retiring generation of code professionals.

Lastly, additional data from past generations of code professionals was not collected through the selected research methods. By selecting a sample from which to survey from the current population of licensed building inspectors, those who had let licenses expire, or exited the industry long before the study took place were not included in the research. The insights of this valuable population may have proven valuable, as they would likely offer a unique perspective related to what information they feel they were able to pass along, how they would have handled the retirement process differently, and what could have been done to extend their careers beyond retirement.

## **7.2 Advice for Future Research**

The Code Professional Industry serves as a largely untouched frontier of potential research related to the construction industry, the regulatory industry, and various management industries. As a result, a large volume of research is needed in order to better understand how the industry works and what it could potentially do better. Much research is needed with respect to exploring how new technologies could be used within the industry. As the industry expands in complexity, new technologies will likely become essential to performing the job duties of a code professional. The use of tablets as functional tools, as well as sources of invaluable reference materials must be explored. The ability to use BIM models for use in the plan review processes, as well as the inspection process deserves additional attention. Methods of better managing building departments through applying best practices from other industries can likely be found through additional research. In many ways modern building departments are organized in essentially the same manner as they have been for the last 50 or more years. Efforts to establish better ties between the Code Professional Industry leaders, and academic minds will be necessary in order to further progress in this field of study.

### 7.3 Conclusion

In order to respond to the challenges ahead the issues must be approached from multiple angles. Drawing new entrants into the industry must be of primary concern. No other method exists that provides a viable long-term solution to the pending crisis. If a sufficient number of new entrants can be located, trained, certified and licensed, the ground work for a solution will be intact. A new generation of code professionals will require training and mentoring. If the industry delays action, the new generation will not have sufficient interaction with the outgoing generation necessary to adequately glean from the many collective years of experience of those soon to retire. In essence, many years of experience and progress within this specialized industry could be lost.

The industry is aware of the need for new entrants, and has made it clear that additional training opportunities are needed. The primary challenge appears to be bridging the Skills Gap, which involves obtaining necessary certifications and licenses. This gap must be filled through a collaborative effort between various schools, the construction trades, and members of the Code Professional Industry. Once certified and licensed, additional training and mentoring is needed to capture industry knowledge, and advance code professionals beyond the Knowledge Gap to a level comparable to the expertise of the outgoing generation. This can only be accomplished through strategic planning as efforts must be made to extend the careers of the industry's most experienced professionals through delayed or phased retirement, modified job duties and emphasizing the need for mentoring of less experienced professionals. Extending the careers of the outgoing generation will enable additional time to train less experienced professionals, pass along industry knowledge and secure sufficient numbers of qualified professionals. Failure to act will undoubtedly result in an abrupt loss of industry knowledge, as the new generation of code

professionals will likely lack adequate training, and those best suited to provide such training will no longer be part of the industry.

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## **APPENDICES**

**APPENDIX A. THE SURVEY**

**Q1 How many years have you been a code administration or code enforcement professional?**

- Less than 5 years
- 5-10 years
- 11-15 years
- 16-20 years
- 21-25 years
- More than 25 years

**Q2 At what age did you become a code administration or code enforcement professional?**

- Less than 20 years old
- 20-25 years old
- 26-30 years old
- 31-35 years old
- 35-40 years old
- 41-45 years old
- 46-50 years old
- Over 50 years old

**Q3 What was the primary factor leading you to pursue a job as a code administration or code enforcement professional?**

- Salary/benefits
- Job security
- Respect for the profession
- Friend/family/colleague suggestion
- Engagements with code officials
- Exciting work environment
- Physical limitations
- Other \_\_\_\_\_

**Q4 Are you currently working in the Code Professional Industry?**

- Yes
- No

*Logic: Answer If Are you currently working in the Code Professional Industry? Yes Is Selected*

**Q5 What size community do you currently serve?**

- Population < 10,000
- Population 10,000 - 24,999
- Population 25,000 - 49,999
- Population 50,000 - 74,999
- Population 75,000 - 99,999
- Population over 100,000
- School District
- 3rd party provider
- Other \_\_\_\_\_

*Logic: Answer If What size community do you currently serve? School District Is Not Selected And What size community do you currently serve? 3rd party provider Is Not Selected*

**Q6 What size building department do you currently serve?**

- 0-4 people
- 5-7 people
- 8-10 people
- Over 10 people

**Q7 What is your age?**

- 18 to 24
- 25 to 30
- 31 to 35
- 36 to 40
- 41 to 45
- 46 to 50
- 51 to 55
- 56 to 60
- 61 to 65
- 66 to 70
- 71 to 75
- 76 or Older

*Logic: Answer If Are you currently working in the Code Professional Industry? Yes Is Selected*

**Q8 What currently is your primary job role?**

- Commercial Inspector
- Residential Inspector
- Building Official
- Residential Plans Examiner
- Commercial Plans Examiner
- Permit Technician

*Logic: Answer If Are you currently working in the Code Professional Industry? Yes Is Selected*

**Q9 What is your current job status?**

- Full-time
- Part-time
- Retired- Still Working in the Industry

*Logic: Answer If Are you currently working in the Code Professional Industry? Yes Is Selected*

**Q10 When do you plan on leaving the building regulatory profession either due to retirement or to pursue an alternative career?**

- I already left the profession
- Less than 5 years
- 5-10 years
- 11-15 years
- 16-20 years
- More than 20 years

*Logic: Answer If Are you currently working in the Code Professional Industry? No Is Selected Or When do you plan on leaving the building regulatory profession either due to retirement or to pursue other opportunities? I already left the profession Is Selected*

**Q11 What caused you to leave the Code Professional Industry?**

- Retirement
- Other Opportunities

*Logic: Answer If Are you currently working in the Code Professional Industry? Yes Is Selected*

**Q12 If it were 100% up to you, what form of retirement would you prefer?**

- Abrupt Retirement
- Phased Retirement
- Retire- Continue working in the Industry

**Q13 In your opinion where will the next generation of Utah code professionals come from?**

- The construction trades
- Technical/vocational schools
- Community colleges
- University graduates
- I don't know
- Other (please specify) \_\_\_\_\_

**Q14 In your opinion, on average how long would it take a new hire to obtain a State issued "Combination Inspector" License?**

- Less than 1 year
- 1-3 years
- 4-5 years
- More than 5 years

*Logic: Answer If What caused you to leave the Code Professional Industry? Retirement Is Selected*

**Q15 If you were to retire yet continue working in the industry, how many hours a week would you want to contribute?**

- Less than 10
- Less than 20
- Less than 30
- A full 40
- 40+

**Q16 What are your thoughts on the future of the Code Professional Industry in Utah?**

- Comment: \_\_\_\_\_

## APPENDIX B. WRITTEN SURVEY RESPONSES

### What was the primary factor leading you to pursue a job as a code administration or code enforcement professional?

Survey Responses in "Other" category
Inspector in Navy
An opportunity that came along to me.
RIF from other job.
Was injured on the job as a contractor and could no longer preform those duties physically.
I was a police officer prior to becoming a code official. I became a code official due to better working hours, pay, and safer working conditions.
Bass at the time wanted people with this license
open positon
job assignment
All three, Salary/benefits, job security, and respect for the profession were equal deciding factors.
opportunity in fab shop
opportunity
NEW OPPORTUNITY
my work required me to be licensed
personal situation
4 out of the 6
required by employer
steady income
I didn't want to work with the tools any longer.
Help others through the process
I'm a licensed engineer (SE) that just happens to have seven ICC certifications in inspection & special inspection, and an inspector license, both for over 20 years. My employer at the time offered incentives for acquiring them and I thought it would be a good way to learn more about the industry in general.
Job fell into my lap
was assigned by jurisdiction
Expand my company's market
Job opening at company



Job security/salary/benefits
Associated with my job.
I retired from Teaching and there was a need in Enoch where I live so I got my certification and applied for the job
Situation came up
education in construction management
never planned to be hear, jobs just became available
Needed a new career
injury to back ordered by doctor to change occupation
benefits, but not salary
benefits
Just benefits- the salary sucked at the first jurisdiction. They did not pay for related experience.
Engagement with citizens
Advancement opportunity
I could near equally rank a few options.
Qualifications
required for construction contract
Job Function

## 5. What size community do you currently serve?

Survey Responses in "Other" category
Brigham Young University
STATE OF UTAH
Contract Code inspector / CWI, special inspector
I serve several jurisdictions.
Special Inspector
Utah, and surrounding area
part time & consulting
state of Utah

### 13. In your opinion where will the next generation of Utah code professionals come from?

Survey Responses in "Other" category
Lab Employees
watching a couple of this old dump videos would qualify as a master code professional on the job training and apprenticeship programs, 3rd party inspection agencies
I feel they should come from the construction industry. But I am not sure they will. We are tuned into certifications rather than common knowledge.
Construction trades and schools
construction trades, military, and tech/community col. / schools
Technical Schools as well. UVU has a Building Inspection Program that is principled by Fred Davis who has developed a very intricate program
I am currently recommending to younger professionals to stay away from the inspection industry. Contractors in our area have run amuck and the municipalities do a crappy job of code enforcement. When the intermountain area see's it's next big earth quake this will become apparent just as it did in the California Northridge event.
It's not clear. There are no viable training programs currently.
3rd party special inspector
Combination of above + we/industry need to better promote this as an honorable & respected career path.
Those smart enough to figure it out.
It should be a combination of the construction trades and some collage so there is a bit of common sense to work with.
Off the street people who will pass the exams to obtain licensure having no trade experience as can be seen now.
On the job training of those who move into Bldg. Depts. from other departments
I think one of the criteria for a code professional that they have at least 2 years as a contractor
It should be mandatory that they come from the construction trades min. of 6 years
all of the above
I think communities will promote and train from within.
other states that do not have requirements on certifications to be an inspector
Where ever we can get them.
an assortment of all of the above
Technical/vocational schools although this does not provide as well as my preferred back ground of the trades.
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## 16. What are your thoughts on the future of the Code Professional Industry in Utah?

### Survey Response Comments

Need to attract people to the industry. need to increase salary's

Not many journeyman level inspectors available / to take us into the future under paid and misunderstood

Coming from the construction trades. I believe that most the new inspectors will come from the trades. It would be good to advertise the rising jobs in our state and help people to know what to do to get involved.

I work in a smaller community in Southern Utah, so opportunities are limited. I can only seem to work part-time, and I have several certificates. I think there is a good future for the industry as building codes get stricter and stricter due to increased issues like seismic awareness and our legal system-lawsuits, energy conservation, etc. I feel there is a place in our society for code and building professionals.

I don't see the younger generation putting in the time or sweat required in becoming a journeyman in any of the construction trades a product of society certified but not qualified.

we are running out of inspectors; therefore, wages will begin to climb

I think we are becoming more educational based rather than educating the one willing to come out of the industry to become inspectors. Therefore we are becoming enforcers rather than co-workers in completing safe and quality projects.

From what I'm seeing the new generation of inspectors are more oriented on the completion of the project and have a better attitude towards the work. I've seen a lot of inspectors that have been in the industry for far too long and have become angry, bitter and to some degree, complacent. I don't see that in the new generation...yet

We need to encourage the trade schools to have those going through their programs to have them take the ICC certification tests

Good

Hope the state elected officials will recognize the importance and benefits of changing codes and regulations that will allow a safer and more efficient world.

Standardized codes are not followed or enforced by the governing agencies. There is no penalty and often not even notice that a violation has occurred. Third party inspection agencies often employ non certified people to inspect structures or accept anything. Most building departments don't know or don't care.

We need to make an apprentice level of certs. For younger want to be inspectors. Otherwise it takes too long and too much training/ expense for testing to certify. The younger people have no idea what it takes to get into the inspection field and then it takes too much time and money, we need to do something to get them interested in learning the field before they have 20 years' experience in it.

over worked, under paid

More need to get involved in this industry and assist in the building of safe efficient homes and commercial buildings. There3 needs to be a higher degree of commitment on the side of the builders to educate their workers as to the why

I can't find a fully certified inspector to hire!

I'm think it will continue to make building more expensive and more difficult.

I am concerned about how to get some inspectors in place before I retire. Two of us will retire in the next 3-5 years leaving one person on the job. /

The Cities need to keep the building permit money in the building dept.

I think it is a strong industry that will continue to grow with the state.

I wish University's or Trade schools offered more of an Inspector/Construction degree, so that jurisdictions could find qualified inspectors rather than trying to train unqualified people when time is of the essence. I'm just glad Doctors don't have to learn on the job like most inspectors do! If that were the case life would be pretty scary.

My hope is every new inspector would come from the trade's side of the industry because I believe experience has no equal in this field, but the pay is not commensurate with the experience needed.

I think it will shift more to private companies which is a shame. I do not feel they have the same dedication to your community as govt. building depts.

I see Utah's economy continuing to grow so inspectors will be needed.

Great

there is a need for inspectors that have experience in construction

I am very concerned about the lack of qualified inspectors it is hard to hire an inspector now as will be even harder in the coming years

Need better wages to attract people.

If inspectors were giving the same retirement benefits as fire men and police officers for protection of community's in life safety then you would see more interest in this profession.

Challenging to job seekers and employers.

There will be a shortage of code professionals due to low entry salaries being offered

There will be a shortage in 5 to 10 years

Better than average

There needs to be an associated emphasis in the construction management curriculum for the building codes.

We need more young men and women to look at this carrier. Most of us are at the age to retire with no one to follow are footsteps.

wages need to be more in line with responsibility

On the job training and mentoring will be a strong aspect of the industry future

I believe as the construction continues to prosper so will the code professional.

I think we need to concentrate on consistency in the profession, along with a 5yr code cycle instead of a 3 yr. code cycle. We are getting better, but another thing that will be important for us is to work better in the area of customer service.

Jurisdiction's will need to increase pay greatly to get qualified tradesmen to join the ranks of inspectors. Benefits are given at most places of employment now days, but it's the take-home pay that matters most to a young man raising a family. The pay has to be increased.

We are seeing it now, with the number of job openings and nobody to fill the positions.

I think it is dire. Until code enforcement becomes serious and building departments quit accepting "good enough" as the status quo. We all need to be worried. Structural Steel Codes are largely ignored in Utah Thanks to the AISC.

Many inspectors are reaching retirement age or have retired. / A program to encourage inspectors needs to be made by both government and industry.

Increase the pay for inspectors. The best people in the industry do not become inspectors they stay in the private sector. Until Utah decides that a building inspector is a very important role in every community, the inspectors will continue to be sub-par and generally come from people who couldn't make it in the private sector.

There used to be after hours formal training for building inspectors where they could learn all the codes cover to cover and prepare for the exams simultaneously. No shake-n-bake schools. The State decided to not fund DATC for their courses years ago; SLCC offers almost nothing. So we have no pool of inspectors to hire. And it takes too long for an inspector to study on his own and pass 8 exams to really benefit his employer. We need more training available.

The industry lacks inspectors

It's hard to say for sure but I don't have a lot of faith it have a good future. Our local staff was cut in half to limit our enforcement. I feel there is some City and counties that have a similar attitude.

Experience Needed...We are Hiring...

Code enforcement in my city is in the building department. It is a very important arm of regulations because inspectors focus on current codes and work in a permitted boundary, Code has a large area of existing/work w/out permits, and property evolution that is a different mindset, also yards and land use. Good luck, it is a great field.

We need to become more involved in our profession.

As inspectors are becoming better informed, it seems that engineers and architects are trying to petition control into the hands of the under educated contractors. Rather than getting legislation to widen the gap of construction professionals it would be better that laws were presented that build on the goal of better construction standards. And an equality within the construction providers and services.

It's tough to keep up with the code cycles let alone having enough personnel to enforce it all.

I feel it is becoming a "fox guarding the hen house" scenario with the increasing number of Contractors, Land Developers, and others that benefit directly from manipulating or amending code requirements that would, otherwise, cost them money without considering the effects on the community they serve.

it's not looking good - need to raise salaries and find competent people

It is necessary to have the inspector and I hope we have plenty of honest people to fill the positions so the consumer continues to be protected and represented. We need this for the betterment of the building industry.

I left the commercial inspection for industrial (refinery, mining, etc.)Inspection. The reason I left is I was able to double my wage. If want replacement commercial inspector, the commercial wages will have to increase. With that said, I have had issues with commercial inspectors switching to the industrial environment.

It is a great career for individuals with knowledge of the building trades. preferably former contractors

There needs to be a defined career track available for code inspectors offered as a two year

building inspection technology program offered through community colleges or through the applied technology centers. Building inspecting is more technically complex and requires more in depth courses than simply passing the code exams. It's about understanding building sciences as well as contact administration, legal aspects of construction and code enforcement. A developed course of study in building inspection technology would also benefit superintendents, project managers, quality control professionals and architectural design professionals.

Hard to find good help.

The lack of support from the state leaders it would be better served if the codes were kept at 3 years not to extend them to 9

We are already experiencing a shortage of inspectors, especially combination inspectors, which is what we try to hire to eliminate multiple trips to a site.

I think we need to get younger people involved who care about the profession and doing it for all the right reasons, not just a paycheck.

Unless legislation regarding the use of building permit revenues for building department operations only are not created and enforced the industry will collapse, move to the private sector or at least be so poor quality that the public safety will be in question.

Need more certified guys

Our industry is in trouble (see previous page); if we don't do a better job of promoting ourselves/profession the politicians may try to find ways around state mandated plan reviews and inspections.

All the old heads are about to retire! We need new blood. Our industry has changed greatly in the last 20 years. I expect it to do so in the next 20.

I think that the public needs to be aware of the responsibilities that the code officials have. There needs to be more options available to the younger generation, somehow it needs to be appealing as a career.

Too many ICC tests may limit interest in the industry. I already have heard this from people that were looking into this industry.

The vocational schools offer a great program, but I think those in the construction trade think it's an easy government job. Either way, the next generation of code officials will be well trained.

It will become more privatized

it is the future

construction is getting more technical all the time

Need experience contractors not book learned only.

Most people close to my age that become inspectors end up leaving the industry within 5-10 years to pursue other careers that pay more money, or at least have the possibility of making more money. To be honest, I kind of worry about the future of code professionals in general. I feel like the industry should shift its focus and create a university, or at least a college degree program, to attract people wondering around the engineering side of things. I feel like the "old dogs" were guys that had been in construction doing the work for years until their bodies broke down and they went to inspections as a default.

It is a necessity.

I believe there needs to be more opportunity to train and get certifications through trade

schools and college.

Unless you have built something you can't inspect it properly and understand the why and how it needs to be put together you don't learn this in a class room.

There is no one left in the state that is qualified to do inspections.

The salary for a building inspector is not enticing enough to make a person want to put away their tools and work in enforcement.

It's going to get tougher. Increased regulations with budget constraints.

We need more people with the trade background to understand the way that buildings are put together and not just the book side.

When the economy is doing well we do not have enough city inspectors, and contract to private firms to fill the gap. When the economy is flat then we scramble to stay employed. One must get certified to get a foot in the door.

We as code professionals need to do a better job of getting the public and city officials to understand that code enforcement is a very technical field and code professionals are highly skilled people

I'm a licensed engineer (SE) that just happens to have seven ICC certifications in inspection & special inspection, and an inspector license, both for over 20 years. I have not ever really performed inspection or plan review work for a jurisdiction, and for owners only on very rare occasions. I maintain the certifications and license partly for the different perspective it offers, a slight advantage in my primary occupation in some situations, and just to say I have them.

Enforcement officials will have to become far more technology proficient.

There is no question that some recruiting of some younger individuals is important. But it is the low wages that seems to be the biggest issue with those that I have talked with about a career change.

I have a firm belief in the Code Profession and would like to see it continue to grow unfortunately I worry that a few are pushing for too much one way or the other and not compromising and trying to get a win for both sides. This I fear will lead to the profession getting phased out by legislators.

In jeopardy of needs rising above the available pool of certified inspectors.

I'm afraid that if we do not encourage young people to pursue this career we will have unqualified and inexperienced people conducting inspections. The public safety will be compromised.

It will take a few years to bring up the number of certified inspectors to match the demand of growth in the construction industry

I think the industry is in demand due to the length of time it has taken to hire and fill vacant positions. There is definitely a shortage in qualified applicants.

The legislature does not support the building life safety industry due to lobbying by trade groups that seek to minimize industry standards.

If wages don't increase it will be hard to lure younger generation away from high paying jobs (even though we typically have good benefits)

Great opportunity, decent wage, tough business

I do believe in the next five to ten years there will be a high demand for qualified inspectors needed in the state of Utah.

Since I've always worked for a private inspection company I'm not sure how the cities find trained people.

There might be shortage code professionals in the future.

Vanishing profession unless State and Local municipalities combine efforts or expend time & money to continue training new and existing employees. Adjustment/Increase in starting salaries to entice credible applicants.

I think we need to have more programs in schools to prepare new inspectors

We need an inspector in training program