2009 Columbia University Capstone Project:
FDNY Property Saved Indicator

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EXECUTIVE SUMMARY

Recommendation

Our task was to develop a property saved indicator for the New York City Fire Department (FDNY). We suggest implementing a statistical method that is based upon the current data collection of the FDNY, so it can be easily added to the current reporting system. We estimate that the FDNY saves around $3.1 billion of property in New York City annually.

Background

In order to become a nationally recognized benchmark, the indicator had to be credible, user-friendly and low cost. This set of criteria drove the development and evaluation of our model. We started from the four alternatives recommended by last year's project and pursued an in-house, disaggregated data model based on a fire spread probability methodology.

Analysis

Property saved is calculated as a product of number of square feet burned and the cost of rebuilding this area. We developed an intuitive risk-based concept rooted in field expertise and guided by three main questions:

(1) What is the risk that a fire would have spread further?

(2) How many square feet would have burned if the fire had spread?

(3) How much would it have cost to rebuild this potentially damaged area?

We derive the answers to the first two questions from data already collected and reported in the Fire Department's database, NYFIRS. The number of square feet saved is founded on the probability distribution of fire spread and on the average proportion of units burned. The most important factors influencing this model are building type and floor of origin. For the third question, we use the January 2009 building valuation data provided by the International Code Council (ICC). The method we produced assesses property saved on a fire-by-fire basis, allowing for different levels of aggregation. This method estimates that the FDNY $3.1 billion of property in 2008.

Immediate Action

In the report, we suggest a few key elements of the implementation plan. Included are recommendations for internal communication about the indicator, an implementation timeline, and a proposal for the integration of the indicator by the vendor.

INTRODUCTION

The Fire Department of the City of New York (FDNY) performs a wide range of responsibilities in executing its mission to protect life and property in the city. These include fighting fires to save life and minimize property damage, providing pre-hospital emergency medical service, preparing for quick responses to acts of terrorism, investigating causes and origins of fires, enforcing NYC public safety codes, and conducting fire safety and public health presentations and events.[1]

The fire department delivers these services through the efforts of more than 11,400 fire officers and firefighters under the command of the Chief of Department; over 2,800 emergency medical technicians, paramedics and supervisors at the Bureau of Emergency Medical Service (EMS); and about 1,200 civilian employees. Administered by the Fire Commissioner, the FDNY today protects more than 8 million New Yorkers in an area of 320 square miles.[2]

The public widely respects the FDNY for its bravery and efficiency in responding to numerous emergencies in the city. However, the current set of indicators employed by the department comprising response times and fatalities do not project explicitly the added value in terms of how much property is saved by the actions of the fire department each year.

To make this more tangible with regards to property saved, our workshop was assigned the task of developing an indicator that reflects a more accurate assessment of the FDNY's fulfillment of its responsibility to protect property. In consultation with the department, we decided that a positive indicator of 'saved' rather than 'lost' property should be formulated. Over the course of the project (January – May 2009), we designed an approach to calculate the magnitude of property saved from structural fires. Given that no such indicator has existed so far, with fire departments across the country generally reporting unreliable "guesstimated" statistics of property lost, this new indicator of the FDNY is a significant breakthrough and holds enormous potential to set a national benchmark.

Prior to our project, a previous Columbia University Capstone group in spring 2008 explored the feasibility of three new performance indicators for the Fire Department's Performance Management Initiative that had been launched in 2007.[3] Their work resulted in the development of the lives saved/rescued and EMS customer service indicators, which are now in the final stages of implementation by the FDNY. The third indicator for property lost/saved was not formulated, although substantial research was conducted to highlight drawbacks of various

[1] FDNY Annual Report 2007: Building for a 21st Century New York.

[2] http://www.nyc.gov/html/fdny/html/history/fire_service.shtml

[3] Report of the Spring 2008 Capstone Workshop on *FDNY Performance Management System*.

approaches used by other fire departments in this area. We utilized much of this information to refine our own options in building a credible, user friendly and low-cost approach to measuring property saved.

Ultimately, we designed an approach based on an intuitive, risk-based concept of property saved as expressed by firefighting professionals, taking into consideration the specialized skills and expertise that they bring to the field. Using real data on structural fires from the FDNY database, we derived a probabilistic model that estimates the size of saved property in square feet by taking into account the risk of fire spread and proportion of surface burned. Multiplying this size of saved property by the dollar per square foot value gives the total value of property saved in dollars.

Using this formula, we were able to estimate that the FDNY saved $3.1 billion in property in 2008, accounting only for building fires and damage caused by fire. Conservative on several counts as detailed in the main report, the property saved estimate is still significantly higher than the fire department's annual operating budget of $1.53 billion. Highlighting the value added of the FDNY in this clear and tangible manner can give the department a better negotiation and communication position with other agencies and the public.

In the rest of our report and appendices, we explain in detail the processes and logic behind this approach to calculating property saved, provide critical analysis of the results as well as impact assessments, and make suggestions for the implementation of the indicator.

SECTION 1: THE STARTING POINT

The New Indicator Had to be Credible, User-Friendly and Low Cost

At the outset of the project, three main criteria guided the development of a performance measure relating to property for the FDNY. To become a nationally recognized benchmark for positive and credible external and internal communication regarding the work of the fire department, the property saved indicator had to be credible, user-friendly and low cost.

Any new model must be easily defendable and sensitive to public opinion. To meet the credibility requirement, we emphasized that the indicator should be consistent and rely on both well-respected external data sources and the FDNY's own database, NYFIRS. Additionally, the data and information used in the indicator should be complete and comparable across boroughs and other city divisions. Finally, the indicator should be protected from outside influences or shifts that could render the comparative aspect of the indicator obsolete.

The user-friendliness and low cost requirement drove the structure of the model. In difficult economic times, a premium is placed on keeping cost down for municipal services. The FDNY cannot implement a property saved indicator in a short amount of time if such implementation is burdened by training and other costs. To maximize the chance that the FDNY effectively adopts the indicator developed by this project, the model must be user-friendly and keep additional resources required to a minimum.

For example, at the field level the data collection needs to be simple and realistic, not adding to the already thorough reporting found in NYFIRS. At the compilation level the tool needs to be as automated as possible; calculations and updates to the system have to happen without individual chiefs' intervention. Finally, we sought a model that would be generally intuitive and therefore accepted by the employees of the FDNY.

Considering our mandates, we also made some important initial choices about the method we pursued. First, we decided to only look at structural fires, as they offered the most complete data and are responsible for a huge loss to New York City annually in terms of property damaged by fire. Second, to emphasize the positive communication aspects of the project we decided to focus on the property that was saved, rather than lost. This provided a unique challenge as no other fire department is currently providing such a statistic.

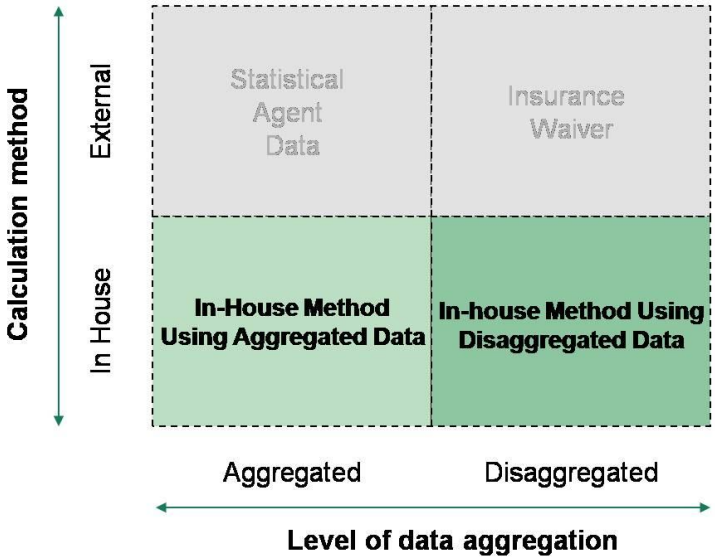
We Built on a Recommendations by Last Year's FDNY-Columbia Project

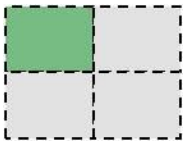
Evaluating last year's cooperation between Columbia University and the FDNY helped us to quickly define the above mentioned cornerstones of our approach: credibility, user-friendliness and cost-efficiency. Four alternatives that could be pursued in the development of the property saved indicator emerged from the beginning.

For clarity we structured the main recommendations of last year's project into a matrix. On the one hand, the FDNY could develop its own calculation of property saved or adopt an external one. This choice is reflected on the vertical axis of figure 1. On the other hand, the agency could use more aggregated or more disaggregated data sources. This choice is reflected on the

horizontal axis of figure 1. One obvious drawback of the previous project was its insistence on property lost. Nevertheless, we still chose to use the same analysis to decide on the overall methodology for property saved.

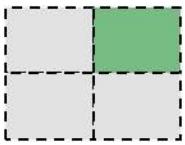
Figure 1. Options Matrix





Option 1: Statistical Agent Data Method

The statistical agent data method would estimate property lost through reports on compensation paid out by insurance companies. This data can be obtained from collaboration with New York State Insurance Department (NYSID) or the Insurance Services Office (ISO). This option is based on external sources and the expertise of insurance companies. Employing this option would require no extra data collected from the field and there would be minimal labor costs associated with maintaining and reporting using this method. There is a lag-time in getting updated data between 1½ to 2 years. Furthermore, because the data does not include the uninsured it makes the model very risky in terms of its credibility. Ultimately, the incompleteness of the data led us away from the idea of using statistical agent data.



Option 2: Insurance Waiver Method

A waiver system is also a product of a partnership with the insurance industry. It too is based on the expertise of the insurance companies, but can be broken down and reported on a case-by-case basis. The external, disaggregated option allows the FDNY to look at actual payout amounts broken down into incidents. This is positive because the Fire Department would be able to analyze individual fires and re-aggregate them according to the agency's reporting needs. A crucial aspect of this method is that it would require homeowners and renters to sign a standardized waiver allowing the FDNY to have access to their compensation information.

Again, the drawback of this methodology is its exclusion of the uninsured and the insured that choose not to comply with the waiver system. Also, we would have to deal with non-standardized data requiring the creation of a position at the FDNY to manage and reconcile the data to ensure its usefulness for comparison and aggregation purposes. Finally, this model is very labor intensive, requiring a heavy workload of following up with the multiple insurance companies on the various cases to gain accurate data.

Option 3: In-House/Disaggregated Method

This method uses external property value data ($ per sq. ft) to generate in-house statistics on property loss. There is no estimation of damaged contents, which is positive in that assigning value to contents is a subjective process that can create vastly different results based on who is analyzing their worth. The parameters of an in-house model can be based on external sources and experts. At the same time, it maintains a degree of flexibility due to the immediate availability of data taken from the field via NYFIRS. With the possibility of multiple levels of aggregation, e.g. via zip code, this method also requires little updating since it is based on internal data that is already being updated and used widely by the agency.

An alternative method that can be seen as a sub-option in the category of in-house/disaggregated option also uses NYFIRS data. Last year's project considered that this method was considered would be immediately available as it was based on internal data and parameters. The approach would use NYFIRS data to report property lost or saved statistics, though without assigning a monetary value. Property saved could be reported in percentages rather than in a dollar value. Additionally, information on indirect losses and saves based on the displacement of families and businesses data could be obtained. This method is low cost and largely based on data collection that is already being done in the field for NYFIRS. The communication value of percentages is arguably weaker than reporting property saved in a dollar amount. It could be difficult for the public or other government agencies to understand the value of the efforts of the FDNY if they are not given a very tangible and easily understood statistic.

Option 4: In-House/Aggregated Method

The in-house and aggregated data method was not reported in the 2008 project but, is our natural addition to complement the project's recommendation options. This method generates in-house statistics of saved property using average property value data at the zip code level from external sources, combined with the probability of fire spread. Dollar values would be reported only on an aggregated and not case-by-case level. One aspect of this approach that makes it more difficult and nuanced is the task of estimating the likelihood of fire spreading from the origin and beyond.

For the next step in creating a model, we took the options and, comparing them to the mission statement with the core components of credibility, user-friendliness and cost efficiency, the feasibility and attractiveness of the options became clearer. This evaluation left option 3 as the clear choice to pursue in meeting the demands of developing the property-saved indicator though over time there have been aspects of option 4 that have been incorporated into the model. In the end, the method we pursued in an in-house, disaggregated model that considers fire spread probability as a major component of our formula.

Why wasn't insurance data used in the final model?
Insurance data is not an accurate estimate of lost/saved property in New York City because up to 40% of renters have insurance. Using insurance data would mean excluding those cases of fire where an uninsured tenant or owner is involved and therefore greatly underestimating the value added to the city by the efforts of the FDNY.

Incorporating an Added-Value Perspective

As the FDNY is a pioneer in defining the type of property indicator, we had to initially define what this indicator aimed to measure. This step was critical in setting the direction for building the formula. Did the indicator aim at measuring what would have happened if firefighters had come later than the average response time? While this idea was tempting, we found several limits to this way of thinking. First, this is not specific to a fire, as the FDNY needs to arrive fast for most of its interventions, including medical emergencies. Second, it does not measure the very particular core skills and expertise that truly make the difference when the FDNY goes to a fire.

A data analysis (see Appendix B) showed that response time is actually only one variable among many others, and that its impact is limited by the fact that the time when the alarm was given varies a lot more. Only considering response time as a sole added-value of the FDNY is therefore too narrow. Last by not least, it is focusing on a mean (arriving fast), not the end of the intervention (extinguishing the fire), and response time already belongs to measured statistics the department has at its disposal.

What then truly defines the added-value of a Fire Department in terms of property protection? To answer this question, we had to consider what firefighters bring compared to mere civilians who would try to extinguish a fire themselves. First, firefighters are brave. They are trained to think on the spot and under deep duress. Second, firefighters are experts and professionals of fire extinction. They have accumulated experience on strategies to fight against a fire, and they have a deep knowledge on what usually works given certain fire characteristics. Third, firefighters are physically trained to handle the stress of fighting fires and they are in overall excellent physical condition. Last, they use the best equipment available to carry out their duties.

The indicator therefore wishes to capture the added-value of all these talents (specialized expertise, bravery, physical condition and equipment), which is a much broader perspective than only measuring the impact of response time.

SECTION 2: BUILDING THE INDICATOR

The Logic of the Indicator is Derived from Field Intuition

Central to our approach of estimating the amount of property saved by the Fire Department is capitalizing on the intuition that comes from the field.[4] In other words, our method is, at its core, informed by the knowledge and experiences of FDNY professionals, who work each day to save lives and property from fire and other emergencies in New York City.

Deputy Chief Daniel F. Donoghue from Division 3 in Manhattan once said to the team, "When a bed has burned, I want to say we saved the room. When the room has burned, we saved the floor. When two apartments have burned, we saved the building. And so on." This view is practical and realistic as it implies the need for certain parameters to be established in order to arrive at an estimate of how much property has been saved by the efforts of the FDNY.

This intuitive risk-based concept permeates our overall formula for property saved and ultimately delivers a dollar amount of property saved for any given fire.

Our approach to estimating these variables requires three questions to be answered. To determine the size of property saved in square feet, we ask:

(1) What is the risk that a fire would have spread further?
(2) How many square feet would have burned if the fire had spread?

To obtain the dollar value per square foot we ask the third question:

(3) How much would it have cost to rebuild this potentially damaged area?

The method and tools to answer these questions include: (1) a table of risk of fire spread that is estimated from the FDNY database, NYFIRS; (2) the building dimensions (surface, number of floors) collected and reported in NYFIRS, multiplied by an estimated proportion of burned surface if fire had spread; and (3) a table of rebuilding costs per square-foot based on external, expert valuation. These methods and tools are explained in further detail in the following sub-sections and a detailed step by step statistical method of reading the final numbers is described in the appendix.

[4] Since we limit our analysis to structural (building) fires, property saved does not include other types of property nor does it include property that has been saved from non-fire damage. In total, approximately 4000 fires per year are included in the analysis.

Question 1 – What is the risk that a fire would have spread further?
To determine property at risk or the risk that a fire would have spread further than its point of ignition, we develop a table listing the probability of fire spread at various levels. This table is derived from 2008 NYFIRS data that takes into account whether fire spread is confined to object of origin, floor of origin, room of origin, building of origin, or spread beyond the building for each incident. This is further estimated according to building classes 1 to 4, i.e. fireproof, fire-protected, non-fireproof and wood frame structures. The following table summarizes the risk of fire spread.

Table 1: Risk of Fire Spread

	From object to room	From room to floor	From floor to building	Beyond building
Fireproof	67.8%	24.2%	26.7%	12.5%
Fire protected	66.7%	35.1%	36.2%	11.8%
Non-fireproof	77.1%	45.9%	52.7%	13.4%
Wood frame	84.0%	60.3%	70.9%	21.1%

The probability of fire spread for different types of building as presented in this table reflects patterns observed in the field by fire personnel. It shows a clear link between building class and fire risk, namely that non-fireproof and wood frame structures are more at risk than fireproof and fire protected structures.

For instance, if we take a fire in a building classified as Class 3 (non-fireproof structure), we would expect that if an object is on fire, there's a 77.1% chance that it will spread to the room; if a room is on fire, there's a 45.9% chance that it will spread to the floor; if a floor is on fire, then there's a 52.7% probability that it will spread to the building; and if the building is on fire, there's a 13.4% probability that it will spread to other buildings.

Question 2 – How many square feet would have burned if the fire had spread?
To answer how many square feet would have burned in the event that fire had spread, we take into account the building dimensions involved (surface, number of floors) for which data is already collected and reported in NYFIRS. We then multiply the dimensions (sq-ft) with an estimated proportion of burned surface if fire had spread from one level of ignition to the next.

The assumption we make here is that if fire is confined to the room, then 100% of the room will in fact burn; however, if the fire spreads beyond the room of origin, we can no longer assume that the entire floor or building will always burn. This means that an average fire confined to the floor of origin, for example, will only spread to approximately two thirds of the floor, rather than the entire floor. These percentages are also estimated on real NYFIRS data and detailed tables per building type, level of fire spread and, in some cases, floor of origin, can be found in Appendix 1.

Therefore, depending on how far the fire spreads, we evaluate that number of square feet burned:

= 100sq-ft x 100% if fire spreads to the room

= (width) x (length of main floor) x (average proportion of floor burned if fire spreads to the floor)

= (width) x (length of main floor) x (# of floors) x (average proportion of building burned if fire spreads to the building)

= (width) x (length of main floor) x (# of floors) x (average proportion of building burned if fire spreads beyond)

Question 3 – How much would it have cost to rebuild this potentially damaged area?

In order to arrive at a dollar value for property saved, we use a table of rebuilding costs that lists average construction costs per square foot according to building type and occupancy. This table is based on the January 2009 building valuation data provided by the International Code Council (ICC) and updated every six months.[5]

The ICC codes strengthen the credibility of the formula because they are used at the state, national and international levels and are developed by experts. Since New York City is one of the most expensive real estate regions in the country, there is no danger of using inflated values since the ICC reports are national averages. If anything, New York's costs of rebuilding, especially in some wealthy parts of Manhattan, will exceed the ICC estimates. However, we prefer to err on the safe side. Furthermore, because the dollar values are uniform within the divisions, comparison across boroughs is easily done. This also ensures that an engine company in the Upper East Side, for example, is not getting advantage by virtue of their location over an engine company in the Bronx. The inherent fairness of the statistic therefore minimizes its misuse against divisions or engine companies that are based in less wealthy boroughs.

ICC classification of building types and occupancy listed in Appendix 3 is similar to the codes used in NYFIRS. Some adjustments have been made to the original table to make it completely compatible with NYFIRS for use in our calculation of

Why wasn't market value used to assign a dollar value to property saved?

An update of the research findings of market values, especially in light of the recent housing slump, showed how unreliable and volatile market values can be. Moreover, these dollar/square foot valuations are vastly different between boroughs. Using market value as a means to gain the dollar amount would make comparing the property saved per borough impossible. By focusing on rebuilding costs, which are reported as a national average by the International Code Council (ICC), we neutralize the effect of the constant shifts in the housing market and focus on a more stable estimate that can be compared across borough.

[5] http://www.iccsafe.org/cs/techservices/pdf/BVD200902.pdf

property saved. These adjustments have been made in consultation with the FDNY's Bureau of Fire Prevention, and with reference to literature explaining ICC construction types and building occupancy and use.[6]

While another option for dollar value for property was to take the market price per square foot, we decided against this for a number of compelling reasons. The real estate market is volatile, especially in NYC, with property values fluctuating in short periods of time. There is also a great deal of variation in market value across neighborhoods, within and across boroughs.[7]

For instance, the average price of building property in Manhattan in January 2009 (aggregating all kinds of property) was $1,190/sq-ft, whereas in the Bronx the average price was $198/sq-ft, and in Brooklyn $285/sq-ft.[8] Such factors make it undesirable to rely on market value in calculating a dollar amount for property saved, as it does not provide a dependable basis of comparability across boroughs.

[6] International Code Council (ICC): *2006 ICC International Building Code (IBC)*, 2006.

[7] The Furman Center for Real Estate and Urban Policy: "Trends in New York City Housing Price Appreciation" in *State of New York City's Housing & Neighborhoods*, 2008.

[8] Source: http://www.trulia.com/real_estate/New_York-New_York/market-trends/

SECTION 3: IMPACT AND IMPLEMENTATION

The Indicator Meets Our Criteria for Success

Before we can proceed, we must check that the formula matches the criteria for success that we set in section 1. These criteria were credibility, user-friendliness and low cost. This formula is derived from the 2008 NYFIRS data that was made available to us from the FDNY. Though the model is broken into building types, nearly all possible variables are taken into consideration by virtue of the fact that they are reported in NYFIRS. Exceptions are wind speed and other unmeasured factors that are difficult to determine at the time of the fire on the ground.

The formula is highly credible because it is based on actual structural fire data. New York City, its high-density population and high-rises present special challenges to a fire department and there are no data or estimates that could model the situation firefighters in this city face other than what is entered into NYFIRS. This data is credible, reported further to the state and considered reliable. Any errors made in the system can be fixed or cleaned. Over time, data errors will minimize with increased use of the NYFIRS reporting system and strengthen our model.

In terms of user-friendliness, the method of determining property saved requires no additional data be collected in the field. The only people who will have to work with this output are the statistician for the department and those Chiefs that use the data to communicate with the public or other agencies. The difficult equations are built directly into NYFIRS to minimize mathematical errors and reduce the time that FDNY officials will have to spend to get the dollar value of property saved to virtually zero.

The ultimate costs of implementing this program are negligible. While there may be some costs for implementation associated with an already scheduled major upgrade of NYFIRS, the biannual costs to update the system are minimal. The ICC tables for rebuilding costs are updated biannually and can be changed easily without requiring a time-consuming or costly larger upgrade. Only major events affecting the probabilities, such as a change to policy regarding building collapses, increasing cases of arson or a major change in building structures and classifications, may merit a major update in the future.

The Results Withstand Analytical Scrutiny

Understanding the model in terms of how it defines the added value of the FDNY's actions against fire is vital. The more likely a building is prone to fire spread, e.g. a non-fireproof structure is much more likely to burn than a fireproof building, the more value is placed on the actions of the department. Thinking logically, it is easier for the Fire Department to put out an oven fire in a fireproof (class 1) building with the first on scene methods of using fire extinguishers to contain the fire. In a the class 3 building that is non-fireproof, more exhaustive techniques and manpower must be used to contain the same kind of fire and thus, more property is at risk.

A fire contained to the floor of origin saves more property than a small fire contained at the origin because at that critical point more property is at risk. To draw an analogy, an emergency

room doctor treating a case of the common flu does help to keep the patient alive, but one would hardly credit the physician with saving a life for each fever and runny nose she treats. Yet, when a doctor observes and gives a diagnosis of a life-threatening disease she is much more responsible for saving the person's life. This is because the doctor has skills beyond the average person when it comes to finding and treating disease. However, if the doctor only discovers the disease beyond the critical point when something could be done to save the person, the doctor could no longer have a significant impact on saving the person's life. At best, she can make the patient suffer less and prevent other patients from being infected.

This analogy parallels the particular skill set of firefighters. Their full abilities are not utilized in small fires and thus the value they add to the situation is smaller compared to what they add in a situation where the fire is larger. The value of their expertise and training, however, is reduced once the fire spreads beyond a point where their impact is lessened. If a building is fully engulfed, the Fire Department can only work to save nearby buildings, but will have to watch the building of origin succumb.

The Indicator Should Evolve, but Communicative Purpose Kept

The property saved indicator as currently designed has a number of limitations that must be taken into consideration, given the aim of the indicator, the available data and the scope. It is first and foremost, an indicator that is designed to measure the added-value of the FDNY for a communication purpose, not as a management tool. A lot of variables are actually out of control for the firefighters (e.g. when the call came in, if it was arson, etc.). Given the limited number of fires every year for each engine company, it is more relevant to use the indicator at an aggregated level. Therefore, we believe using the property saved indicator for management purposes would most certainly lead to unfair analysis and judgments.

Emphasizing that the indicator is used for communication purposes will be paramount to its success in the field. If there is even a small fear that the indicator is used for management purposes, it is possible that Chiefs filling out NYFIRS reports might have incentives to subvert the system and improve the numbers. If they suspect that the indicator will serve to evaluate their own or their engine's performance, their incentives to tweak the system in their favor might be higher. In either case, we recommend that the FDNY does not widely publicize how the formula is calculated.

Moreover, given that this is a first step toward assessing property saved rather than property lost—something that has not yet been done anywhere else in the country or internationally for that matter—it was important to start somewhere but, at the same time not overextend our approach. Instead of attempting to incorporate every possible variable, we limited the parameters within reasonable means to ensure that we had a statistically meaningful model that can be successfully implemented.

In particular, some interesting variables (e.g. whether sprinklers were present or not) could not be integrated in the model because the collected variables were not reliable enough, and large numbers of errors were found. Moving forward, significant improvements of the model could be reached if the data reporting on these critical variables could be audited and standardized.

In an effort to refrain from inflating the dollar value of property saved by the FDNY in order to withstand the credibility test from the perspective of various actors, we have been conservative in our approach to calculating the final product. By choosing to employ rebuilding costs per square foot based on national averages provided by the ICC in our calculation, the projected amount of property saved is likely to be an underestimation of what the Fire Department could save in dollar terms if another valuation method was used.

Additionally, the scope of the measurement had to be limited to one that was practical and doable in the time available to us within the confines of a school semester. As such, the measure of the property saved indictor for the FDNY has some necessary caveats as highlighted below.

For reasons mentioned already, our approach is limited to evaluating only structural (building) fires. Other fire incidents such as brush fires are not taken into account. This means that the amount of property saved by the FDNY from all fires will actually be much larger than what our current indicator captures. For instance in 2008, the FDNY responded to a total 473,335 fire incidents of which only 26,862 or 5.7% were structural fires.[9] We, however, believe that most property value is taken into account. Furthermore, since the indicator is designed as a communication tool, property saved in structural fires will be most interesting to the public.

Similarly, actual property saved by the FDNY each year can safely be assumed to be much larger than projected by this indicator since we only take into account fire damage (burned property). Damage to property caused by smoke, water and other elements are not included, because it becomes too complex to model and communicate.

FDNY Saved $3.1 Billion in Property Last Year

Starting again from the formula we can run an example to demonstrate the impact of the model. In a class 3 (non-fireproof) structure, the most common in Manhattan, a fire is contained at the room of origin of a 6-story building. The dimensions of the building are listed in NYFIRS as being 100 x 75 feet and the coded building use is 429, meaning that it is a residential/multi-family dwelling. The fire started on the fourth floor. Using the probability tables that were built from NYFIRS data for 2008 and 2009, we can determine the estimated dollar value of property saved is $4.7 million.

This data can be taken a step further and aggregated to different units of the FDNY. Ultimately, using the formula and the method on the 2008 data gives the result that through the special skills, talent and bravery of the FDNY, the department saved $3.1 billion in property last year alone. Having these dollar values to communicate to other government agencies and the public are crucial in helping those outside the FDNY understand the value of the work of the firefighters in the field.

FDNY Needs to Integrate the Indicator into NYFIRS

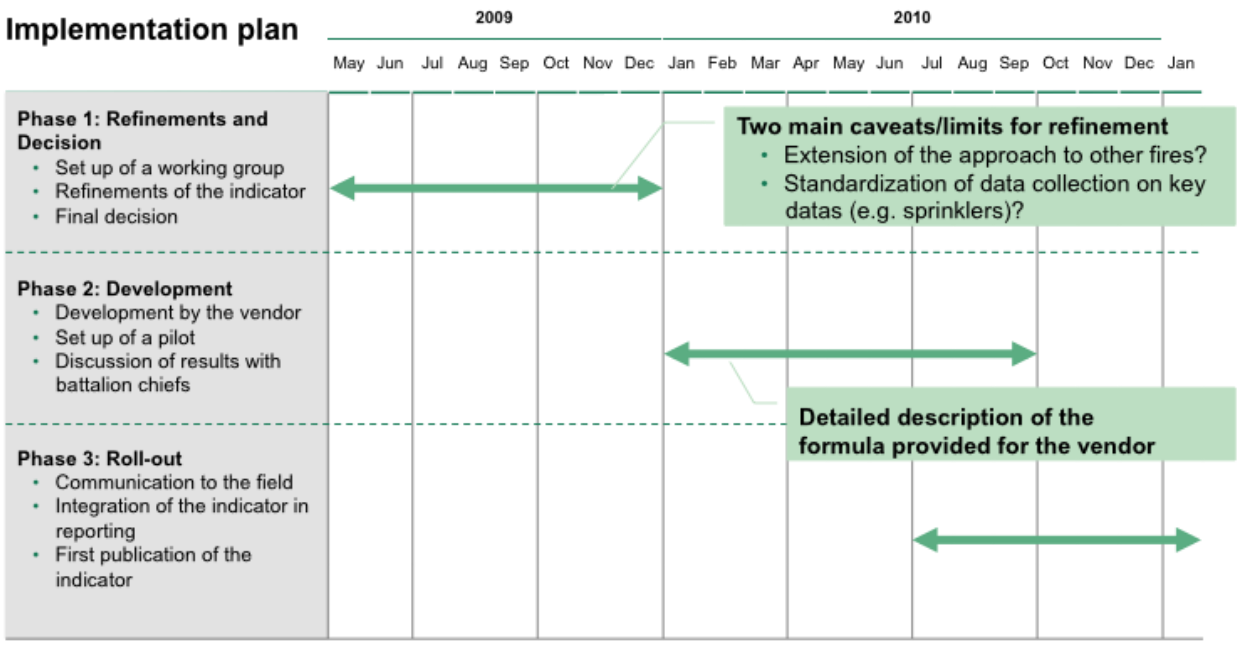
[9] Ibid.

The property saved indicator requires a more vigorous upgrade of NYFIRS by the vendor than the life saved indicator developed by the Columbia team in 2008. Additionally, strong internal communication is needed to ensure understanding and buy-in within the FDNY, the government offices with which they cooperate and the general public once the figures are publicized.

The acceleration of implementing this indicator will be possible because relatively few actors are directly involved and since it does not affect data collection from the field. Furthermore, a review by a working group in the coming months cannot involve too many actors and will be facilitated by our team's detailed description of formulas and preparation of caveats/next steps.
Since a working group assigned with the task of preparing for implementation will likely be set up by June 2009, our team is only providing a few key elements of the implementation plan, including, a recommended timeline for implementation, recommendations regarding the integration of the indicator by the vendor and recommendation for internal communication.

Because the property saved indicator requires more integration work than the life saved indicator, we have created a calculation module included on a CD with all the deliverables prepared by the team. There should also be an allowance for an automatic update of the table of rebuilding costs two times a year. Yet, this upgrade is very minor as the formula is already developed by the team. The parameters have been given and there is an example of the calculation available in excel format for the vendor and the FDNY working group to use. Therefore, there should be no additional costs other than the opportunity cost for implementation.

The FDNY should discuss of the integration with the vendor as soon as the working group enters phase 1 to ensure that the integration is complete by 2010. To prepare for the Integration by the vendor, our deliverables include a step-by-step description of formulas and the aforementioned example of calculation in an excel format. We are also willing to set up a meeting with the vendor after the end of the project (until the end of June), as needed to communicate the technical aspects of the formula we have developed.



CONCLUSION

The property saved indicator is the first of its kind in the country, as well as internationally, making the FDNY a pioneer in assessing and reporting 'saved' as opposed to 'lost' property. Anchored on intution from the field and backed by real, objective data from NYFIRS, this indicator embodies the risk of fire spread and likelihood of property burned based on actual patterns in building fires; the use of expert, external valution of property to arrive at a dollar value for property saved further adds to its credibilty.

In terms of its implementation, a key initial step will be to ensure understanding and buy-in of the approach within the FDNY. This calls for strong internal communication for which we have several recommendations. The first is to develop detailed knowledge and know-how of those personnel who will be working directly with the data to produce the indicator.

The second recommendation is to develop high-level and practice-oriented knowledge and communication on the system of performance management as a whole, for those who will be the end-users of the indicator for communicaton (and other) purposes. The third recommendation is to create understanding of key principles and develop buy-in of others in the field who eventually benefit from the indicator, but are not directly involved in its employment—particularly in the early stages.

With regard to the indicator itself, it should be kept in mind that this is only a first step towards measuring the true extent of property saved by the FDNY. In the long run, it is possible to expand the scope of this measure. There is potential to do this without too much difficulty since the fundamental approach has already been defined. The incentive to following through on this potential in the future is compelling since much more of what the FDNY does in terms of protecting property from various kinds of damage apart from structural fires can be projected.

This in turn can add to the bargaining position of the department vis-à-vis budgetary issues and public communication.

As has been demonstrated for the year of 2008, the FDNY already saves a substantial $3.1 billion in property, even without accounting for non-fire damages and non-building properties. We can reasonably expect that this figure will increase if the fire department commits to increasing the scope of this indicator over time. This would naturally be in the best interest of the department as public awarness of the real worth of the actions of “New York’s Bravest” will grow tremendously.