Code Enforcement Abatement Tool

A NOLAlytics Project
Client: Code Enforcement
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Context of Blight in New Orleans

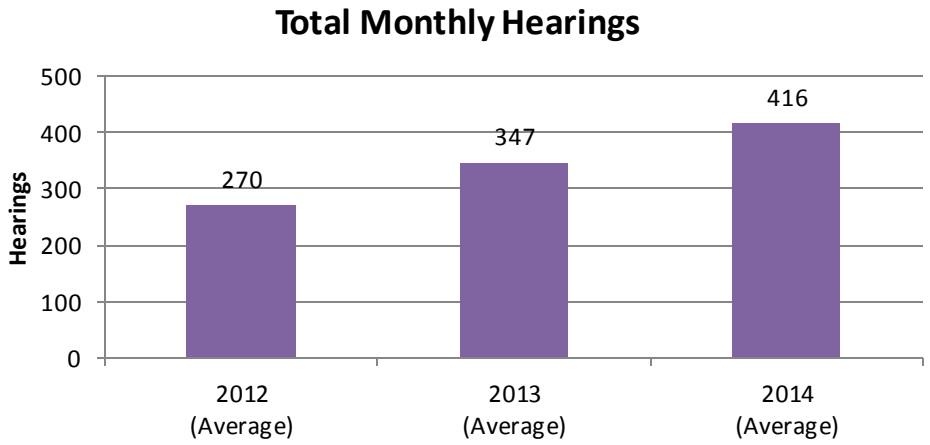
- Major progress has been made in reducing blight in New Orleans. The city has over 15,000 fewer blighted addresses in February 2015 than it did in September 2010.
- However, blight continues to a major impediment to quality of life, economic development, and public safety
- Continued progress requires efficient, smart code enforcement operations

Background

- In 2014, as in years past, the New Orleans Code Enforcement conducted over 4000 hearings against owners of blighted properties
- Over half of all property owners found guilty do not bring their property into compliance, requiring additional action from the City
- Code Enforcement may choose to:
  - Facilitate a sale of the property, or
  - Demolish any blighted structures on that property.

Problem

- Code Enforcement ramped up productivity in inspections and hearings without concurrent productivity improvements in the abatement decision process, creating a large backlog



- No documented criteria on how abatement decisions were made
- Only one person was reviewing and making abatement decisions

Abatement decisions are high-stakes and involve many factors

- Real estate market
- Condition of the structure (including roof, envelope, and foundation)
- Historical significance of the area
- Contribution of the structure to the streetscape
- Amount of blight in the area
- Others

Project strategy

- Allow delegation of abatement decision review
- Ensure abatement recommendations are transparent, rigorous, consistent, and criteria-based
- Leverage modern data science methodologies to create a recommender tool to facilitate decision making

Approach

1. Interview case reviewers to determine salient decision criteria
2. Build a testing framework using those decision criteria
3. Collect data through scoring a sample of blight cases on the decision criteria
4. Model data to find patterns between decision criteria (independent variable) and the recommendation to sell or demolish a blighted property (dependent variable)
5. Use model to create a weighted scorecard in the workflow tool
6. Iterate as more data is collected

Data

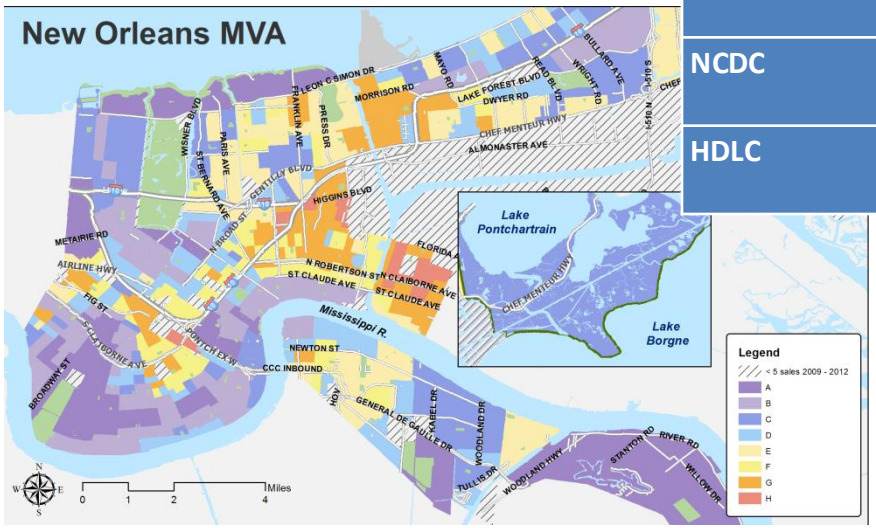
- Subject matter experts evaluated 603 parcels on these parameters

Factor	Question	Response	
Vacant Lot	Is the parcel a vacant lot?	Yes No	1 0
Market Assessment	Please characterize the relative strength of real estate market where the parcel exists.	Very Strong Moderately Strong Moderately Weak Very Weak	1 2 3 4
Roof	What is the condition of the roof of the structure?	Good Fair Poor Very Poor	1 2 3 4
Exterior	What is the condition of the exterior of the structure?	Good Fair Poor Very Poor	1 2 3 4
Foundation	What is the condition of the exterior of the structure?	Good Fair Poor Very Poor	1 2 3 4
Overall	What is the overall condition of the structure?	Good Fair Poor Very Poor	1 2 3 4
Character	Does the structure contribute the to the neighborhood or streetscape	Yes No	1 0

Data

- Model also incorporated the following external data for each parcel:

Factor	Description	Response	Score
Market Value Analysis (MVA)	This analysis assigned values for geographic areas across New Orleans	A B C D E F G H	1 2 3 4 5 6 7 8
NCDC	N/A	Yes No	1 0
HDLC	N/A	Yes No	1 0

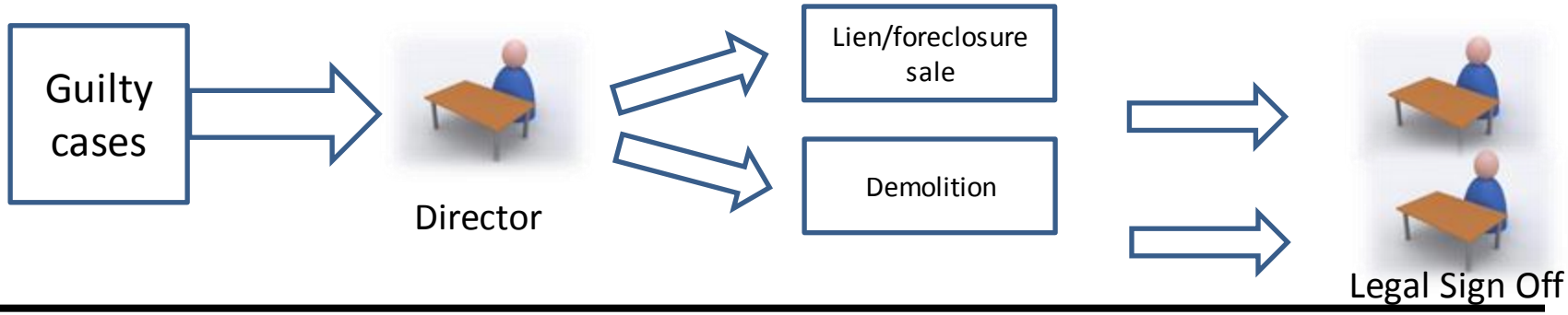


Creating the model

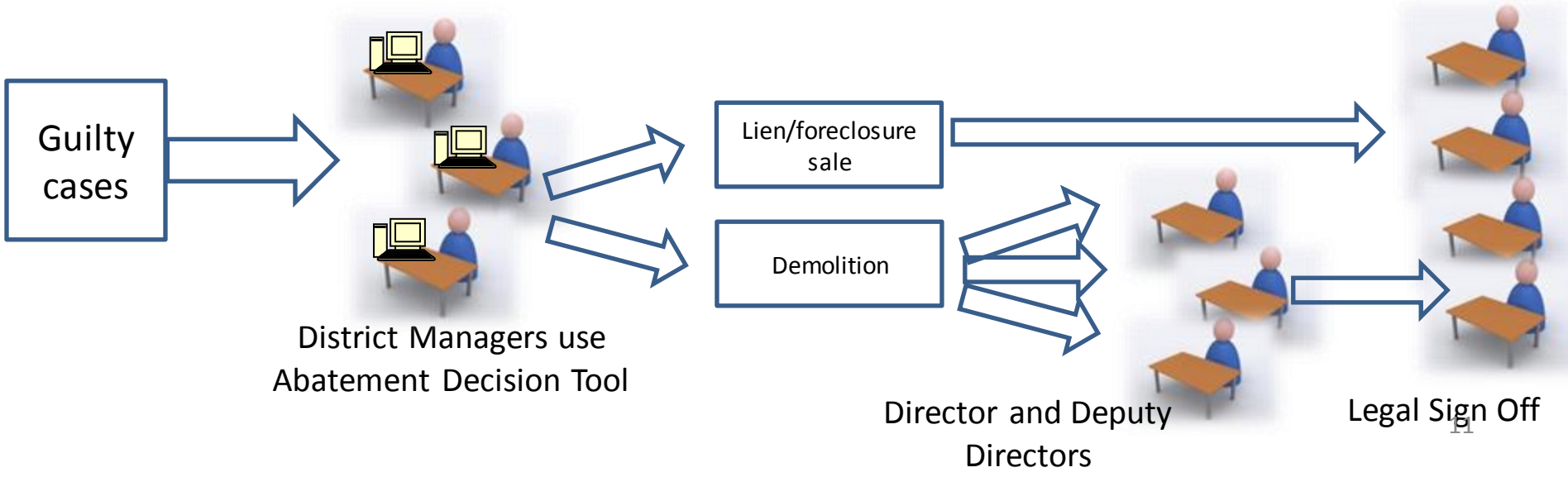
- Enigma.io data scientists tested different algorithms for best fit of independent variables (decision criteria) and dependent variable (abatement recommendation to sell or demolish). Candidate models were developed using five different techniques: decision tree, random forest, naïve Bayes, logistic regression, and an ensemble model of the previous four models
- A logistic regression model was chosen due to its precision and interpretability of coefficients
- A decision scorecard was configured into LAMA, Code Enforcement's existing workflow system
- Mid-level supervisors score properties according to criteria, and the tool produces a score of 0-100, where 0 is a strongly recommended demolition and 100 is a strongly recommend sale
- As more data is collected, will update the weights and model based upon additional reviews and final outcome
- See GitHub for analysis details: https://github.com/cno-opa/Abatement-Tool.git

New process unclogs bottleneck, enhances rigor and transparency

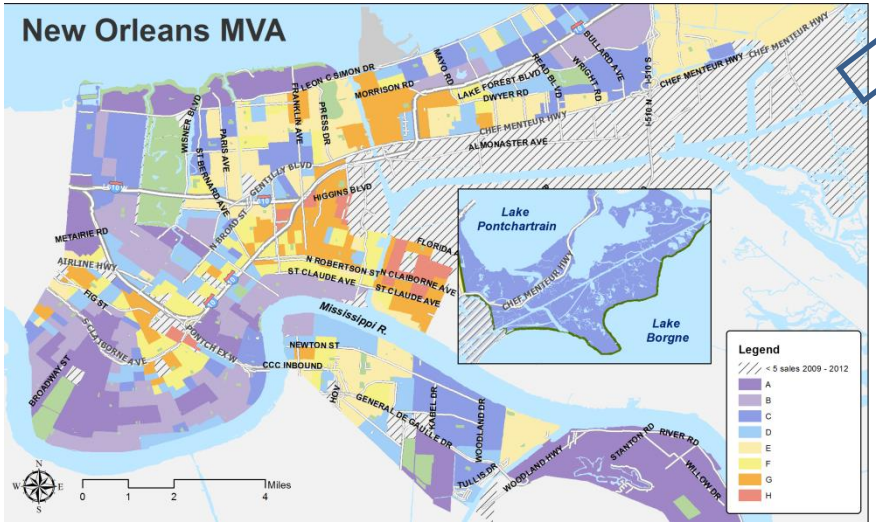
Past Challenge



Solution

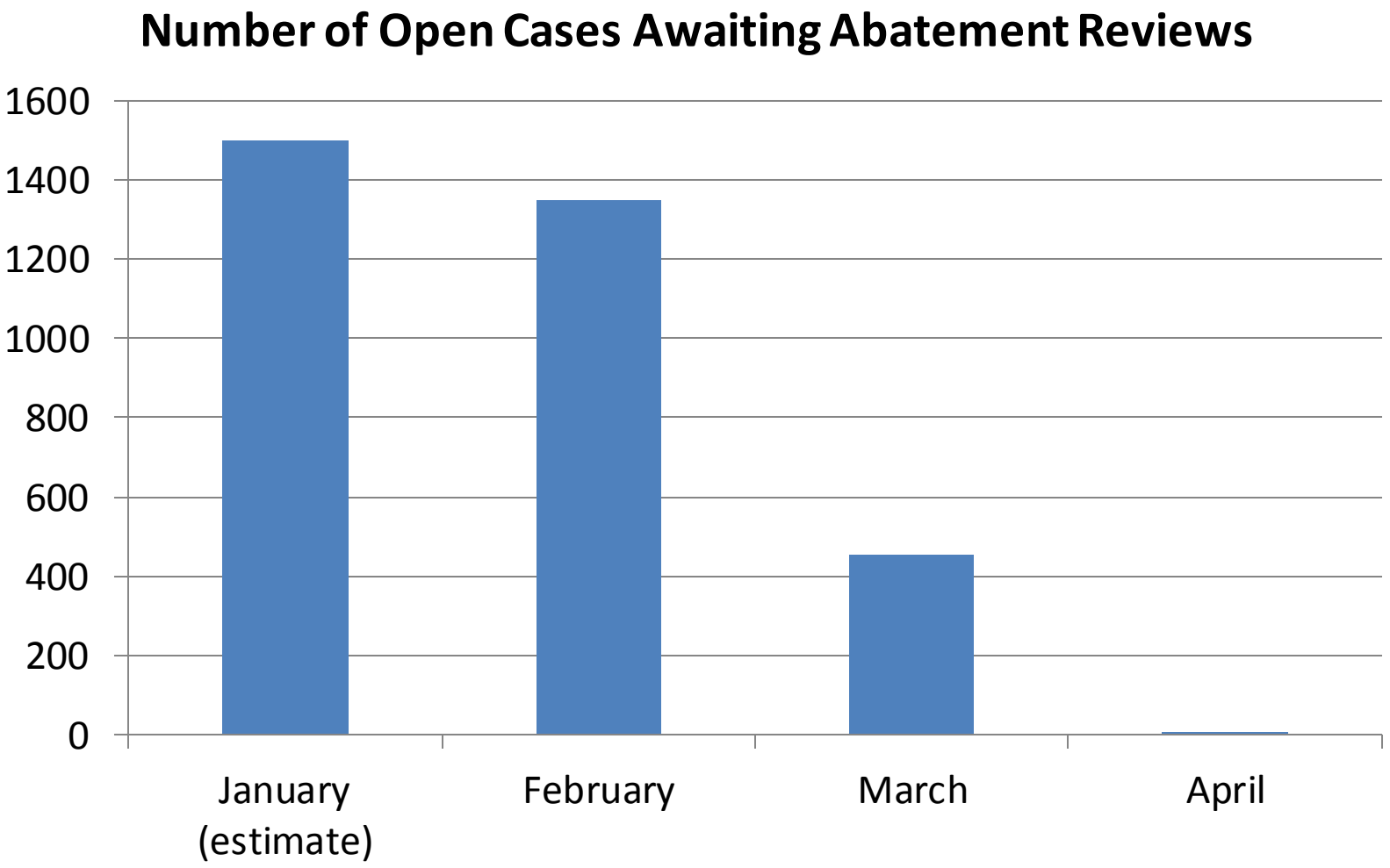


Abatement Scorecard In Action

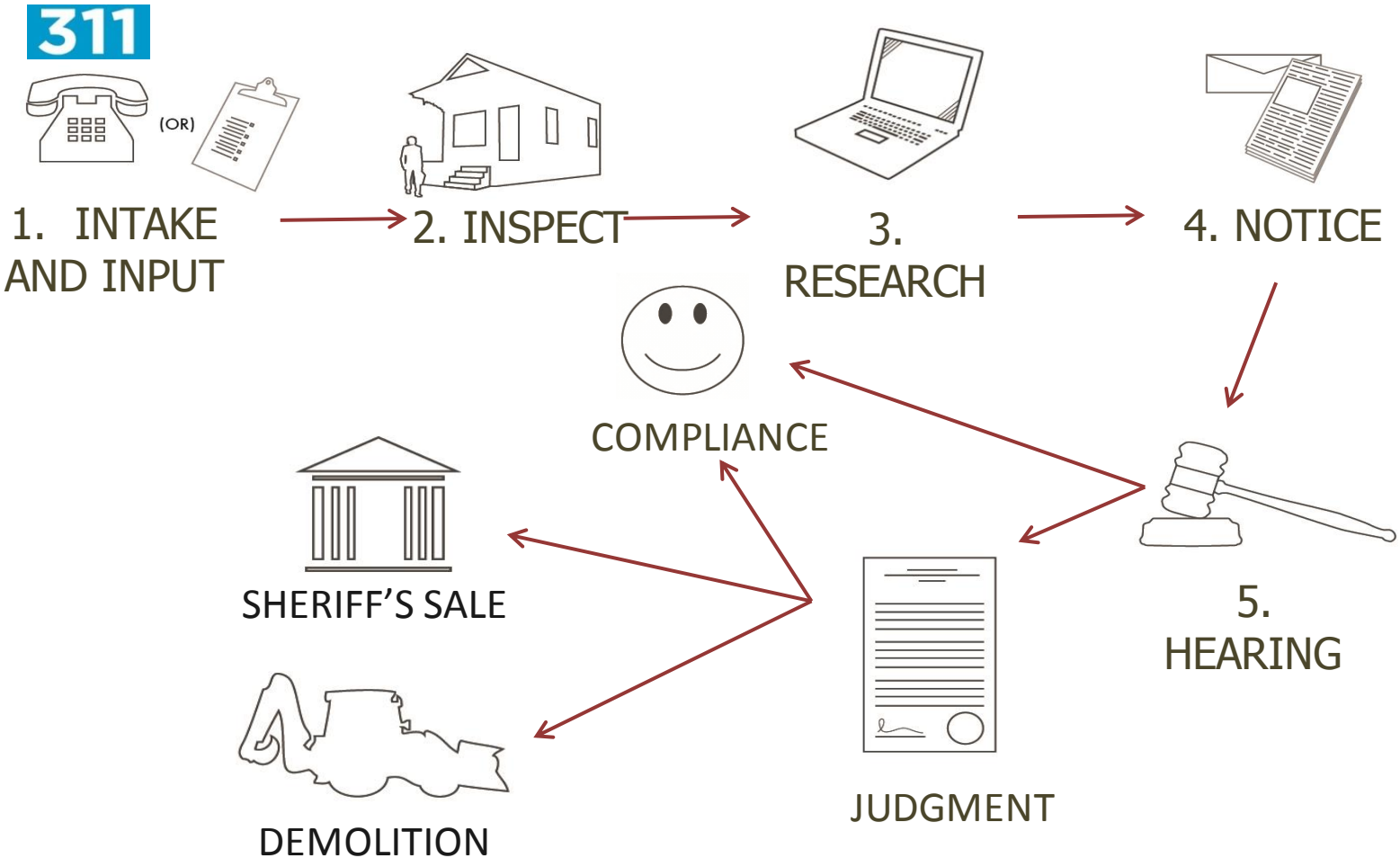


Property	Value
Is the property occupied?	NO
Is this a vacant lot?	NO
If vacant lot or occupied property, save and close Details	COMPLETE SCORING
Please characterize the relative strength of the real estate mkt.	Moderately Strong
ROOF condition	Very Poor
EXTERIOR condition	Poor
FOUNDATION condition	Fair
OVERALL condition	Very Poor
Does the structure contribute to the neighborhood or streetscape?	NO
Characterize the amount of blight on the same block	Low
Check to save scores	☑
Sell Score	3.20

Result: Eliminated Review Backlog within 3 Months



Reference: Blight Enforcement Process



Sources

- New Orleans Market Value Analysis: https://data.nola.gov/Economy-and-Workforce/New-Orleans-Market-Value-Analysis-Final-Report-3-2/kex2-vq3e
- Abatement Tool Model Creation: https://github.com/cno-opa/Abatement-Tool.git