Visualizing the Housing Crisis in Richmond, CA through Data Storytelling

INFO 247 Final Project Writeup

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(MIMS Capstone Team)

Project Link: http://housingcrisisviz.github.io/

Project Goals

The goal of our final project is to create a data-informed narrative to educate the general public about the housing crisis in the Bay Area and beyond. The case study of Richmond, CA provides a compelling story: Richmond's current housing environment, which is considered "highly segregated" by the Othering and Belonging Institute, is the product of policies dating back to World War II. Visualizing this history to contextualize the current state of housing in Richmond, this project strives to create a tool that informs the general public on the history of housing inequality and how these race-based practices have continued to manifest today as the "Affordable Housing Crisis."

Team members Ian and Gareen began this work as part of a Final Capstone Project for the MIMS 23 cohort. The team focused on building off of and on the work of the capstone team to center visualizations and descriptive text as the Final Project for INFO 247. The intended audience of this visualization is the general public, though this tool will be useful to activists and policymakers in this space. We want to generally support "community political education" (an idea from our partners at RichmondLAND), in which we work on informing the general public to motivate for individual action and change in this field.

Furthermore, we hope this product illustrates an alternative to the current status quo of discussions on the Affordable Housing Crisis. Our project pairs a compelling narrative with interactive visualizations to illustrate what solutions can look like in the housing space while simultaneously representing how complex this problem is in terms of various participants and actions. The hope is to represent the complexity of the issue in its totality and inspire positive action through education.

Related Work

Our work pulls significantly from Richard Rothstein, an academic studying housing and policy, who wrote the 2017 book "The Color of Law." Rothstein discusses the current state of racial disparities in housing as the outcome of processes of both de jure (by law) and de facto (by fact) segregation, ranging from racial restrictive covenants to redlining and disinvestment in

communities of color. Rothstein uses Richmond specifically as an example for how public housing projects, zoning, and racist policy pushed Black shipyard workers into subpar living conditions when they came to the city en masse during the Great Migration and World War II.

As most of our team did not have prior experience in city planning, we also did some literature review regarding housing legislation and issues in the space. We pulled heavily from groups such as California YIMBY, which tracks and explains state legislation about housing, as well as Holland & Knight Law, which summarizes recently passed housing laws in California. Karen Chapple, from University of Toronto and UC Berkeley, wrote a "White Paper on Anti-Displacement Strategy Effectiveness" that forms a large part of our solutions discussion, which looks at preservation, production, and protection as a tool to support neighborhoods.

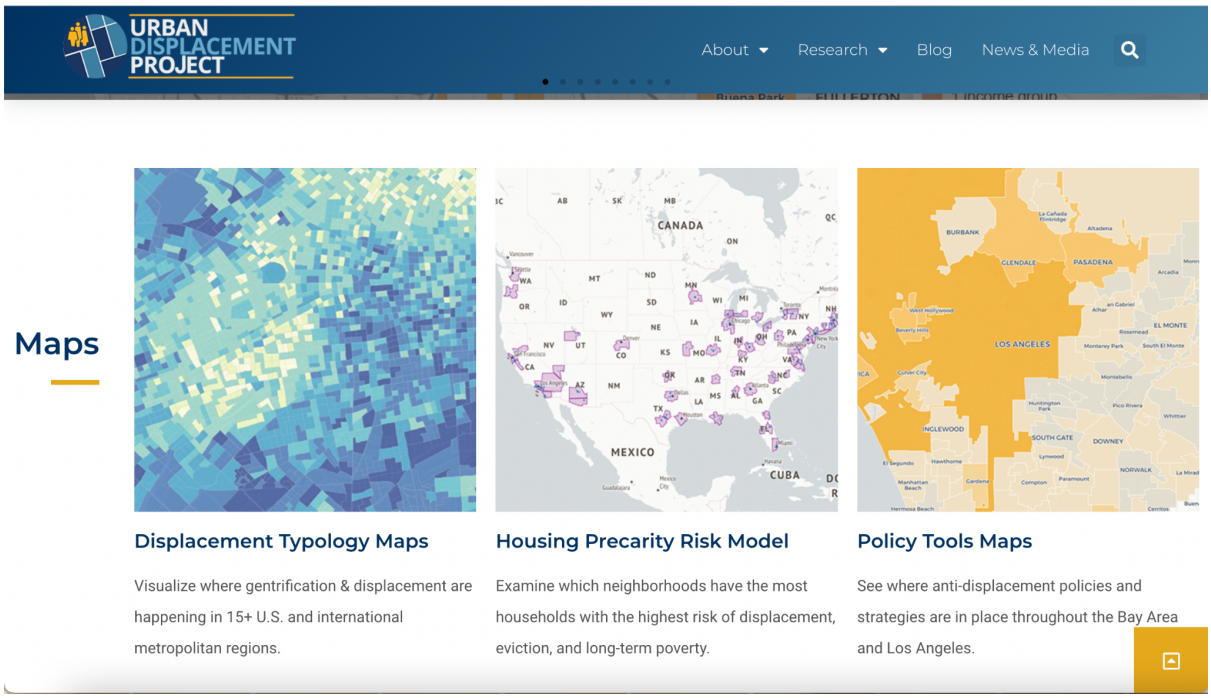
Beyond this work, our group has connections to the Othering and Belonging Institute, a group that studies segregation and disparities in zoning. OBI has produced a large amount of significant literature on zoning issues in the Bay Area, whose research and data we use and cite. The other connection we have is the Eviction Research Network of the Urban Displacement Project, which collects data on evictions and generates racial predictions to understand the demographics and drivers of eviction. We cite the group's work on how evictions are racially unequal in urban areas (including the Bay Area, Seattle, Baltimore, and other regions) and connect Richmond's disparities to their work.

Individually, each team member was inspired by certain visualizations both from the housing space and from other noteworthy sites.

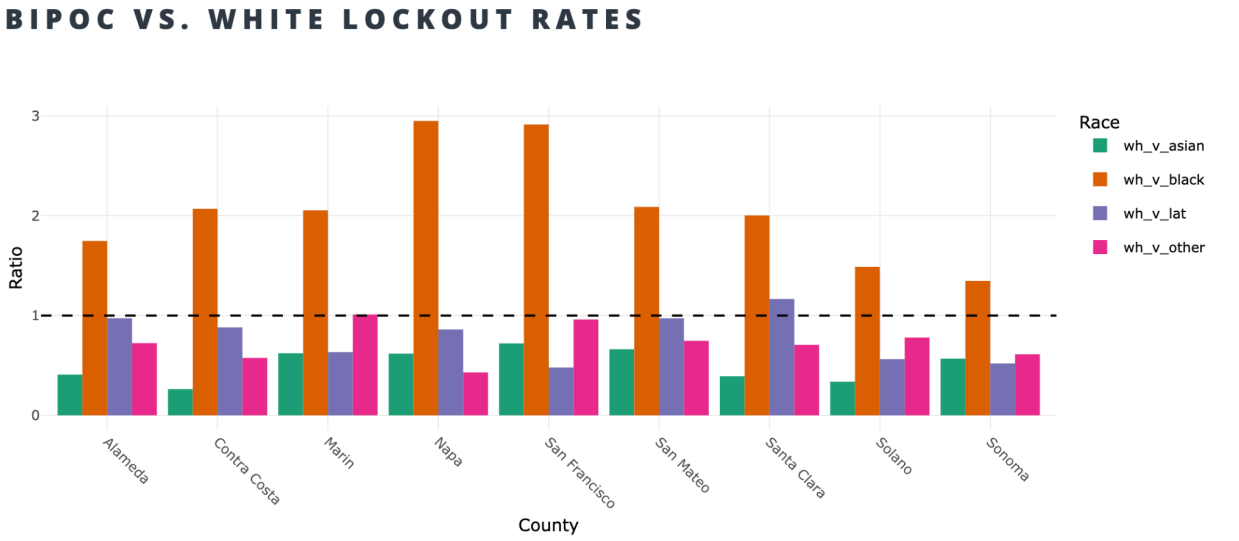
Ian's Inspiration

I primarily looked at visualizations made by researchers in the housing space, including my lab's past work (the Urban Displacement Project), the Anti-Eviction Mapping Project (which uses data-focused methods to advocate for policy change in housing and tenants' rights issues), and various journalistic outlets that have done significant stories on issues in housing (such as the SF Chronicle). I tried to understand how these groups balanced

the use of maps to represent geographic distributions with other visualizations and marks to emphasize the inequalities that exist in this space.

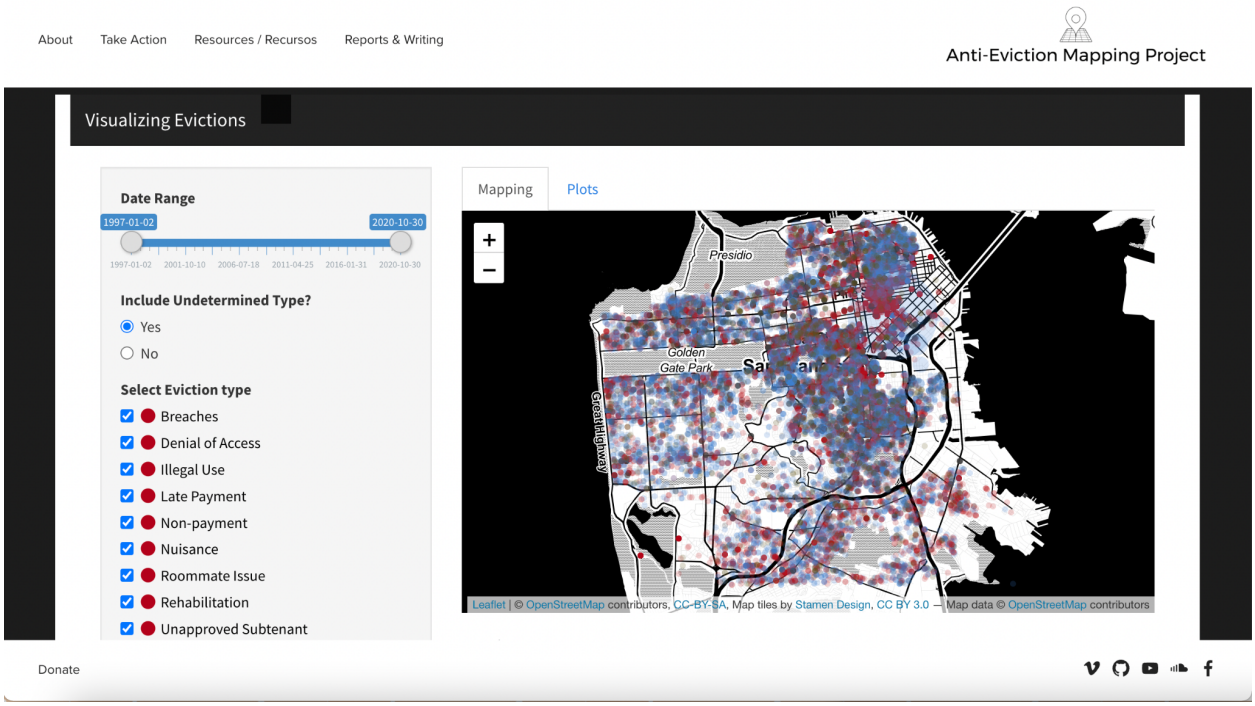


(UDP)

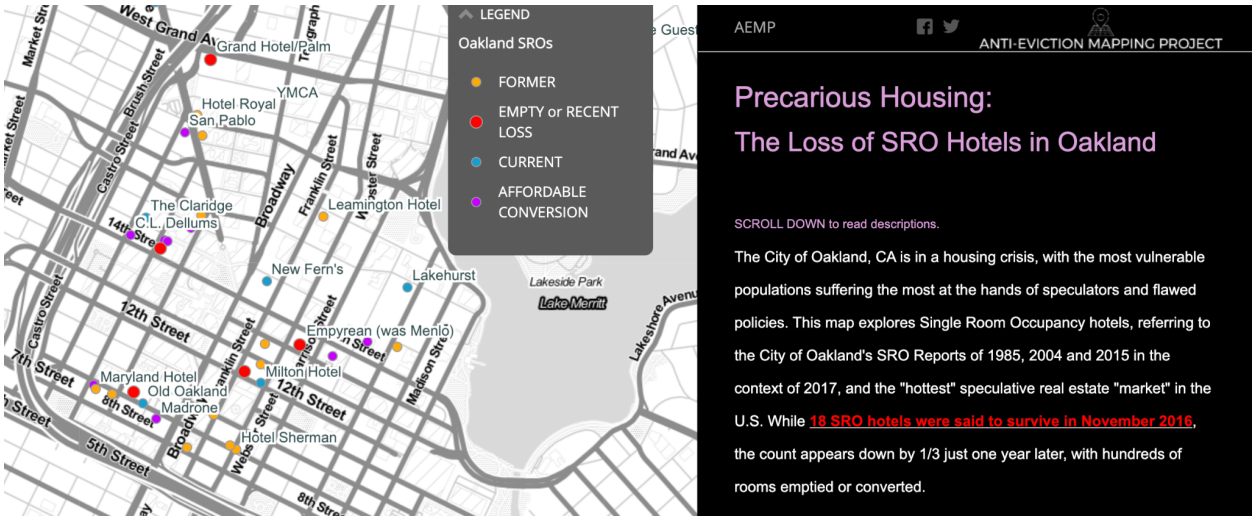


(ERN)

Regarding evictions, we used similar tools as the UDP and ERN which focus on using choropleth maps juxtaposed with other items such as bar charts to show geographic and quantitative inequality. Speaking with the research director of the ERN, Tim Thomas, we used Census tracts as the aggregate level because it generally represents neighborhoods in Richmond given its population density, but we acknowledge that there are possibly block-level differences that a choropleth does not specify. However, by having additional visualizations as the lab does, we're able to represent additional variables (such as time) that the map cannot necessarily show.

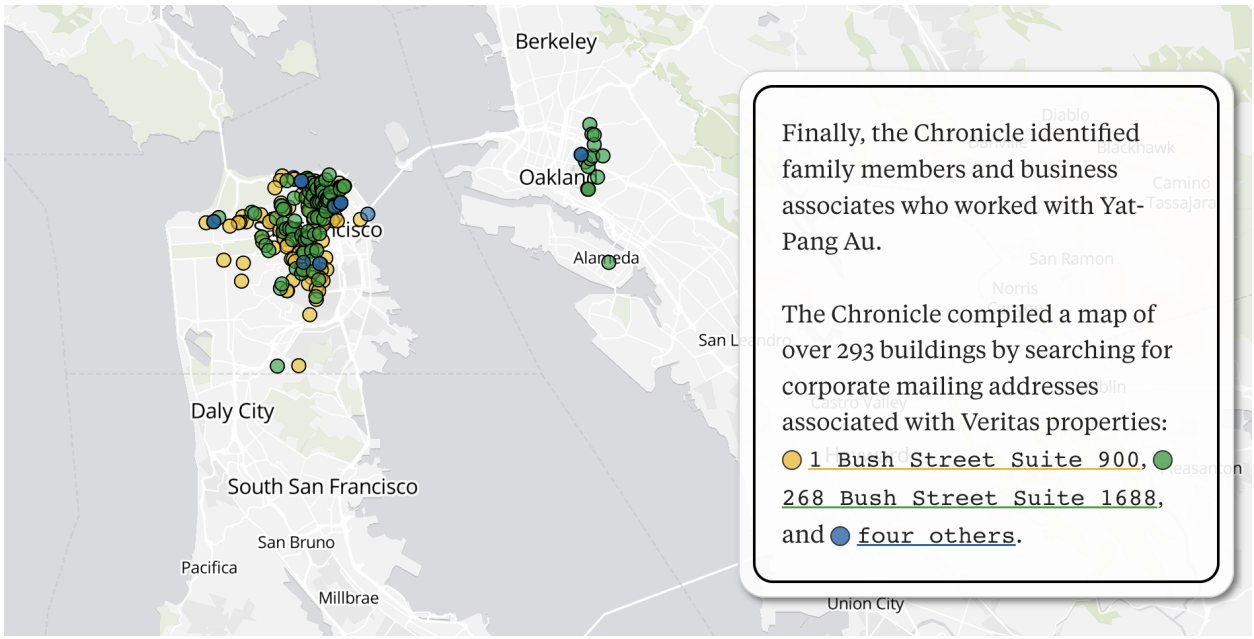


(AEMP)



([AEMP])

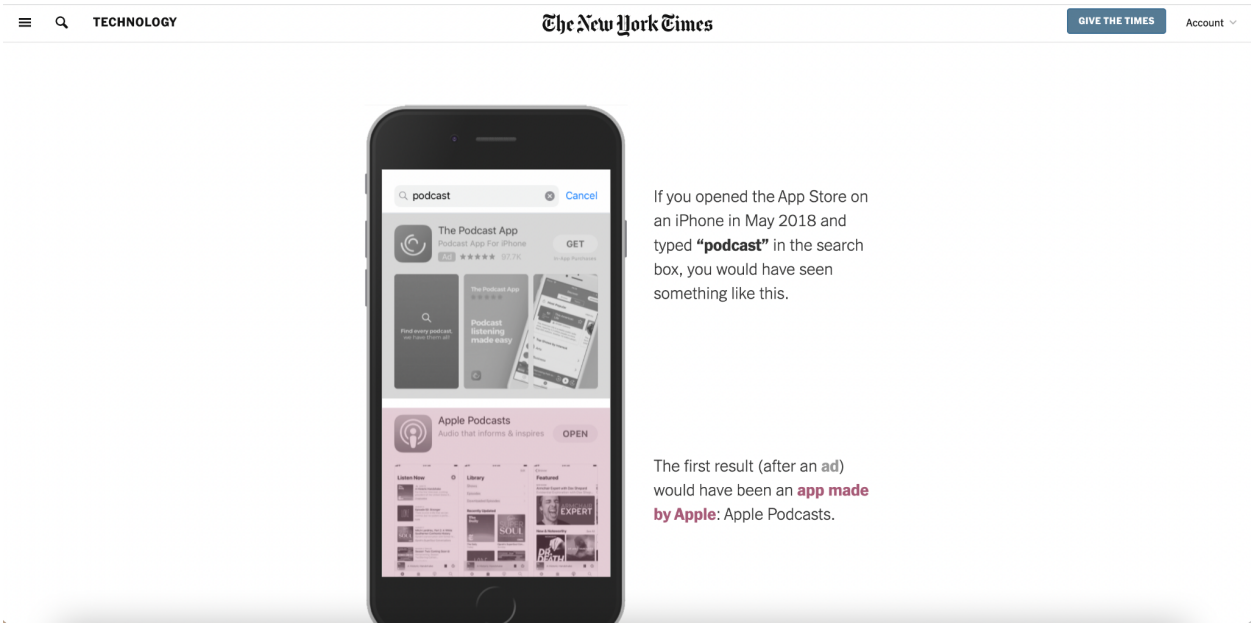
One large player in this space is the Anti-Eviction Mapping Project, which works with a variety of community partners to look at issues such as affordable housing, eviction, corporate landlord ownership, and more. They use a variety of different mapping related tools, ranging from choropleths to interactive maps and points to represent various categorical variables in this space. For our maps, we used similar marks as well as overlays to represent disparities on similar issues.



([SF Chronicle])

As one of our goals was to discuss the housing crisis as a historical narrative, I looked to journalistic articles on housing to see how these authors combined data, text, and visualizations to discuss these larger social and policy issues. In 2022, the San Francisco Chronicle did a long investigative story on corporate landlord ownership which used interactivity, maps, and a scrolly-telly approach to highlight specific aspects of ownership. We followed suit by using text annotations to call out specific patterns in the visualization and trying to provide additional information sequentially as users scroll through the page instead of front-loading all the visualization.

Gareen's Inspiration

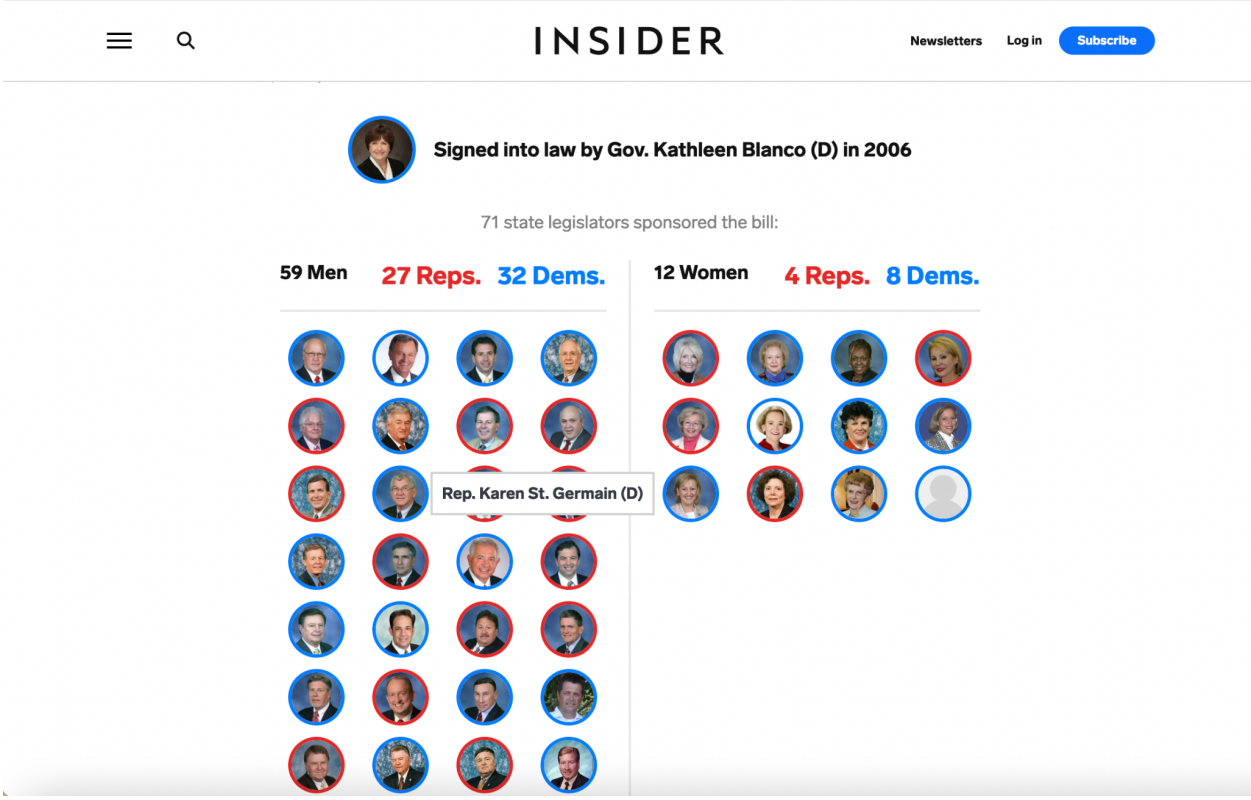


(NYT)

After looking at the article, "How Apple's Apps Topped Rivals in the App Store It Controls," in class, I was really inspired by how creatively this displayed the article information. Specifically, I appreciated how the text was spaced out in this visualization. From interviews and experience working as a Story Producer, it was apparent that the visualizations we created needed to be accompanied by text to better guide the reader through the narrative. Since I knew I would be working on a lot of the narrative for this work, and I tend to write a lot, I knew that I needed to pay attention to formatting of text, and I felt this article did just that, and I was constantly referring this work throughout the semester.

(NYT)

I found this article while searching for mapping visualizations and I felt this one was a great example of what Ian and I, plus our team, were trying to work on. The article, “Where New York’s Asian Neighborhoods Shifted to the Right'' served as an inspiration for our work because the visualizations and graphs in this article are similar to the ones that we eventually created. I came into the class, and my team's capstone, with little experience in visualizations that centered mapping and used multi-track data. In doing individual research to find visualizations that were really related to mapping, I felt this example was aspirational for myself and the work of my team.



([Insider])

This visualization was made by a former colleague of mine and I liked how it conveyed information in such a seemingly easy and intuitive way. Breaking down all the information like this, it makes written words and seemingly simple statistics so much more interesting and engaging. This is the type of visualization I am accustomed to in the world of service journalism I came from— I wanted to incorporate this into our design.

Project Description

Walkthrough Video

Our final product consists of a multimedia “scrolly-telly” webpage combining text, maps, photographs, and data visualizations. Our work uses the case study of Richmond, CA to tell the overall story of the Affordable Housing Crisis. Keeping in mind the narrative’s intended audience is the general public, we focused on writing a narrative with an approachable yet informative tone;

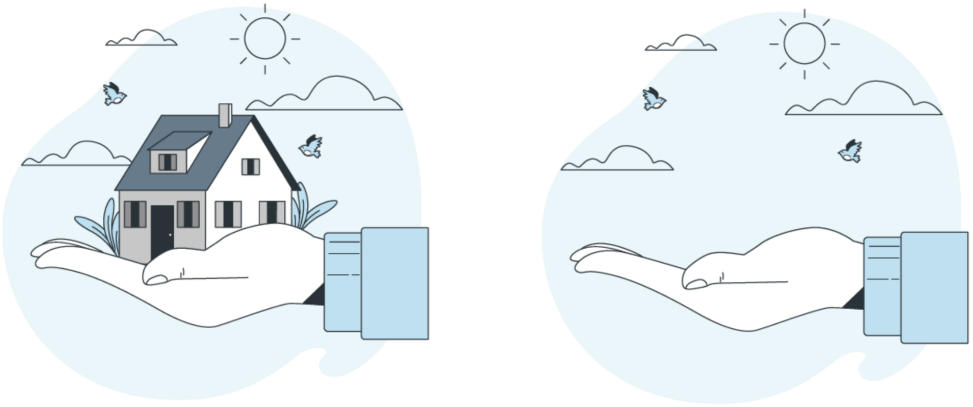
specifically, intentional use of contractions, second-person point of view, and rhetorical questions as headers made the text digestible for a wide audience.

This visualization is broken into sections that walk the audience through the narrative. Below, we present each section. Each header below is a section of the narrative— underneath is a brief description of what is included in the referenced section and how it was created. Screen captures of the visualizations pertaining to each section will be included as well. You can also view the website here.

Visualizing the Housing Crisis

This section serves as the introduction. It is informed by the informational interviews our broader capstone team conducted, but written by INFO 247 team member Gareen. This section is meant to set up expectations for the audience for what to expect and a swift overview of what the ethos of this project, which is “everyone deserves housing.”

The visual for this section was conceptualized by INFO 247 team members. The imagery of a single-family home vanishing, we felt, represented the housing reality for so many in America. The interactive element of this design is meant to engage with the audience, captivating attention while conveying a message.



Welcome to Richmond, CA

The text in this section serves as an introduction to our case-study city and was informed by Richard Rothstein's "The Color of Law." Usability studies helped inform the iteration of this section- it proves important context to set up what the following visualizations will represent. The numbers visualized below are from census data— it was important for us to visualize these statistics in a compelling way that was not overwhelming. Utilizing Gestalt principles of similarity and proximity made these numbers engaging elements of our visualization.

Richmond by the Numbers:

116K
Residents

$79K
Median Household Income

13%
of Residents in Poverty

**statistics of 2021 Census*

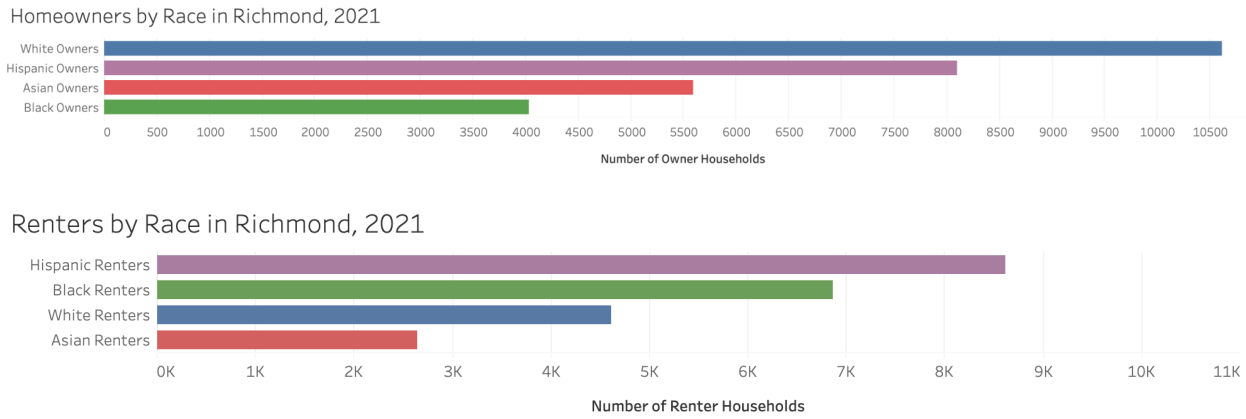
The photo in this section is meant to show what Richmond looks like; though not an element of data visualization, it adds to the illustration of the narrative.

Who owns homes in Richmond?

Using data from the American Community Survey, we visualize the disparities in home ownership in Richmond by race using Tableau. This visualization is accompanied with text to break down the importance of home ownership as a form of wealth accumulation for future generations.

By juxtaposing ownership with rentership with similar axes of count, the aim is to emphasize the difference between the ranks. Notice how Black residents own the least homes at ~4,000, but rent at ~7,000, which is the largest difference of all racial groups.

Initial models aimed to include other variables related to wealth and homeownership. However, it proved to be too complicated and lengthened the project unnecessarily, so we decided to leave it out. We acknowledge that there is the larger discussion surrounding if single-family homeownership is a sustainable model for the United States, which is a theme and question that came up in our expert interviews with city planners such as USC PhD candidate Ben Toney from the nonprofit CORO NorCal.



Who faces eviction?

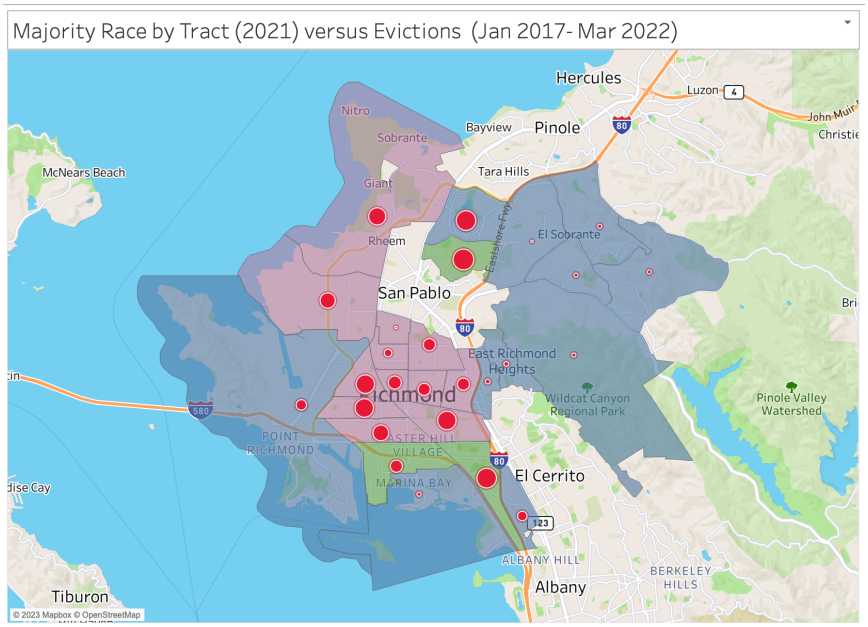
Based on research and data from the Eviction Research Network, this section introduces the issue of evictions as a form of displacement, and why displacement as a process has negative impacts. This visualization of this section was made using Tableau. Iterations focused on best representing the demographics on the map and focusing on a consistent color scheme.

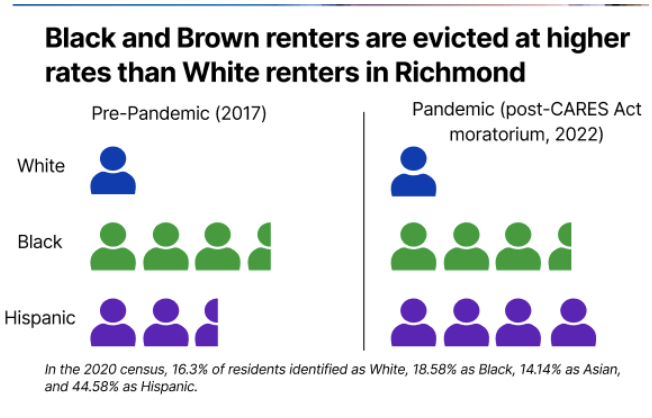
Within this section, we also addressed the impacts of COVID-19 and associated policy interventions, such as the eviction moratoria. To do this, we used isotypes to represent rate differences and additional line plots created in Tableau to show change over time by demographic.

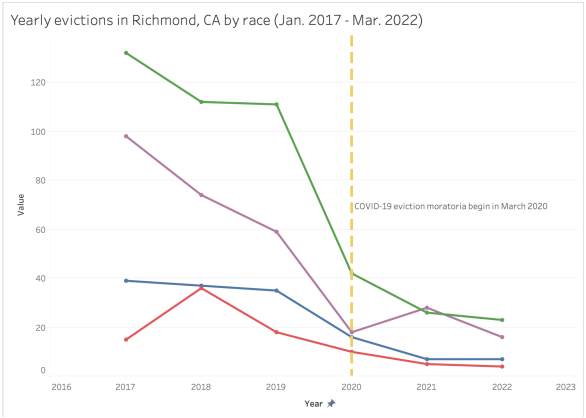
The map aims to show both how segregation exists in Richmond, and how eviction patterns follow the trend of segregation (Black and Hispanic tracts experience the most evictions). We experimented with different ways to represent the number of evictions, but ultimately settled on mark area as this

was the easiest to notice among users. We tried colors and dual encoding, but these seemed too difficult to notice - especially for some tracts - or were too confusing.

Like with work by the ERN, we also included other graphs that show different but related variables for housing. In this case, we used a line plot to show that evictions are racially disparate, and that while the COVID-19 eviction moratorium reduced the number of evictions, the disparity still exists. The isotype chart clarifies this disparity and the change before and after the start of the COVID-19 pandemic.







The inclusion of the isotypes in this section is based off an iteration of the work team members of the INFO 247 final project did for the Infographic Narrative assignment.

How did we get here?

This section does not include any visualizations, but it is important for the overall flow of the narrative. This section sets up the timeline portion of the narrative— the text introduces the concept of redlining and provides other relevant definitions that will be necessary in the following section's reflection. Upon usability testing, this section was iterated on to be more concise. The text that made it through the edits is essential to understanding but does not make the reader pause or feel overwhelmed.

The visual components of this section include two historical images. They are meant to engage with the audience but are not composed of elements we discussed in INFO 247.

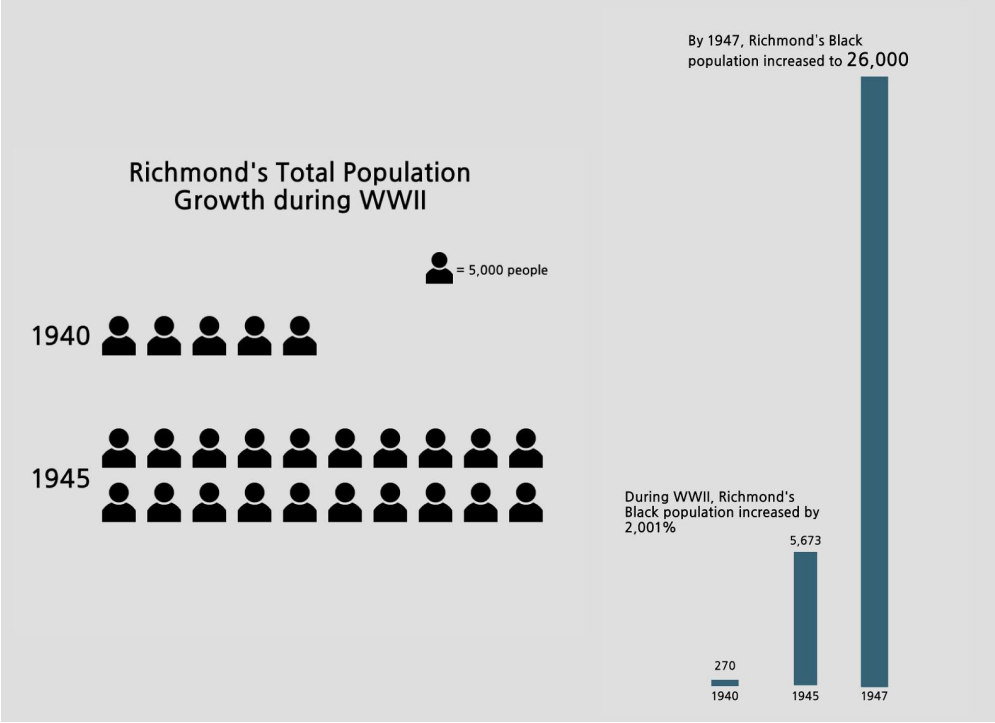
Let's go back in time

This section consists of an interactive timeline. Our team utilized a timeline creation tool from the Knight Center.

This section underwent multiple iterations— the content was informed by the literature review and took time to craft. After creating a list of historical events that were extremely long, the list was edited to be more concise and more relevant. The dates and text accompanying went through an intense copy-editing process. Visualizations included in this section are historical images or data visualizations created by our team.

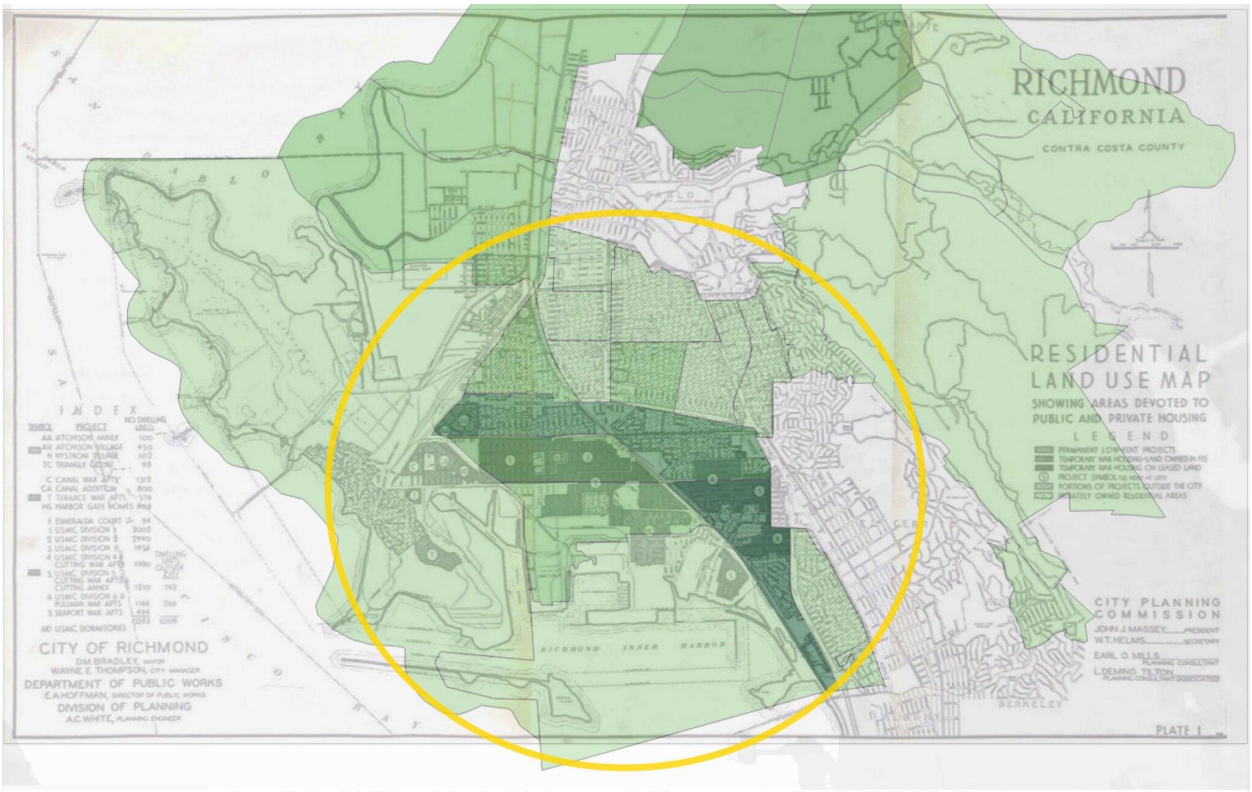
In general, our timeline tells the story of Richmond's population change and industrial and neighborhood development to provide context to the current issues of segregation that we discussed above. We begin with the founding of the city being closely tied with Chevron's establishment in the area.

With World War II, Richmond saw incredible population growth, which is mostly due to Black workers from the American South coming for economic opportunities at the Kaiser Shipyards. The isotypes and barcharts below highlight the change in only seven short years.



During the war, there was such large and fast population growth that the city did not have enough housing for all of its workers. The city and federal government built temporary war housing projects for some of these workers (who are predominantly Black), but many still are homeless or live in subpar housing conditions. These are some of the first clearly segregated zones in Richmond, and the legacy of these zoning policies follow closely the geographic distribution of Black residents in the city today, as seen in this overlay map.

This design, as well as some of the eviction data visualizations, are an iteration from the Infographic Narrative assignment from INFO 247. Both the use of isotypes and bar chart created in Figma are informed by the introduction to the narrative power of Infographics this team perfected from work in INFO 247.

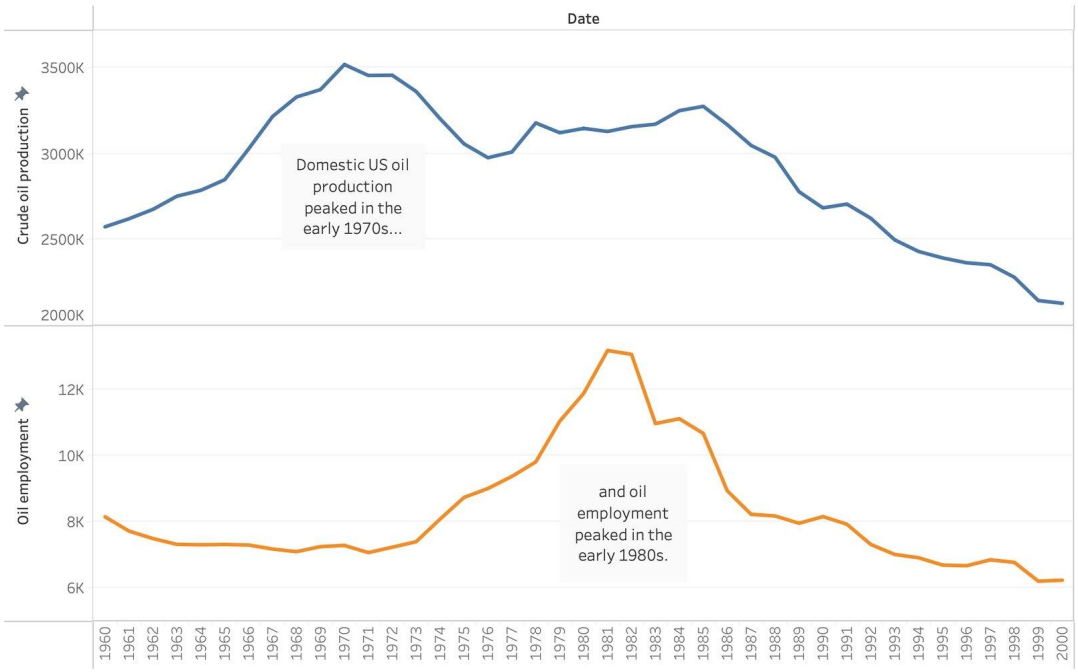


The neighborhoods in Richmond where the federal government built temporary war housing projects in World War 2 remain predominantly Black more than 70 years later in 2021.

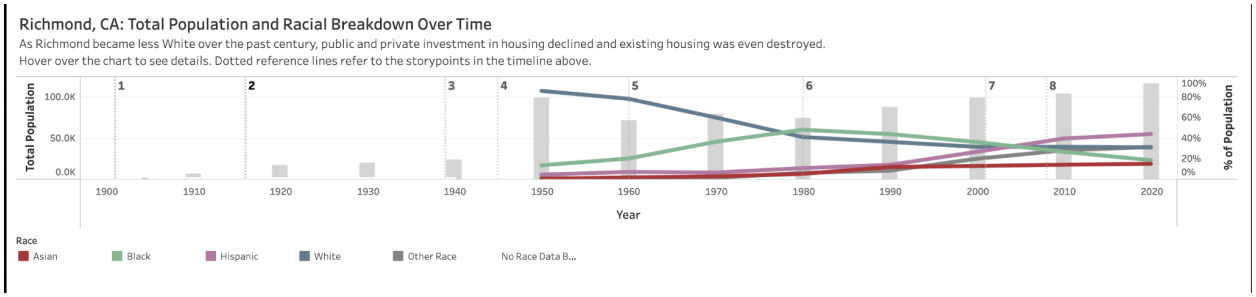
The map is a zoning map from Richmond's 1950 Master Plan. Dark zones represent public housing projects. The overlaid darker green census tracts have higher numbers of Black residents in the 2021 American Community survey.

In the post-war era, Richmond experienced significant disinvestment in its Black community, located in neighborhoods such as Downtown and the Iron Triangle. However, Chevron became the main economic force in the area and in the country as a whole as American domestic oil production peaked in the 1970s, followed by oil employment in the 1980s. The line plot below shows the country's trend to represent the rapidly growing economic output of companies like Chevron in this time.

United States Oil Industry Over Time (Source: Bureau of Labor Statistics)



We end the timeline on two main trends: first, we talk about Chevron's history of large industrial accidents that disproportionately affect minority neighborhoods that are spatially located closer to the factories. This leads to a large environmental justice activist movement in the city and shapes Richmond's politics even today. Second, there is the Great Recession, in which 12% of Richmond homeowners lost their homes - most of whom were Black or Latine, targeted by subprime loans - shifting the city from a majority homeowner city to only a plurality. This provides context to the patterns we discussed earlier in the project.



Following the timeline is a combination line and bar plot that represents the change in Richmond's population over time. Each number represents a significant event in Richmond's history on the timeline. We received

feedback regarding the use of dual axes in this section: although the dual axis may be confusing, the aim is for the bar plot is to help readers to notice how the city's population increases significantly after World War 2, with a slight dip after 1950, and the line plot with percentages is to show how "white flight" occurs post-war as Richmond becomes a predominantly Black city. After attempting to work on a way to make the dual axis more digestible, we were unable to make significant changes. Another issue we had is that the Tableau embedding has a large amount of white space and unnecessary scrolling in the final HTML that we could not remove. Members of the INFO 247 final project team spent significant time with the rest of the capstone team, however a definitive fix was not achieved. In addressing this confusion, we hope to illustrate our attention to detail and highlight this area as a place to continue work in the future.

So then, what's the fix?

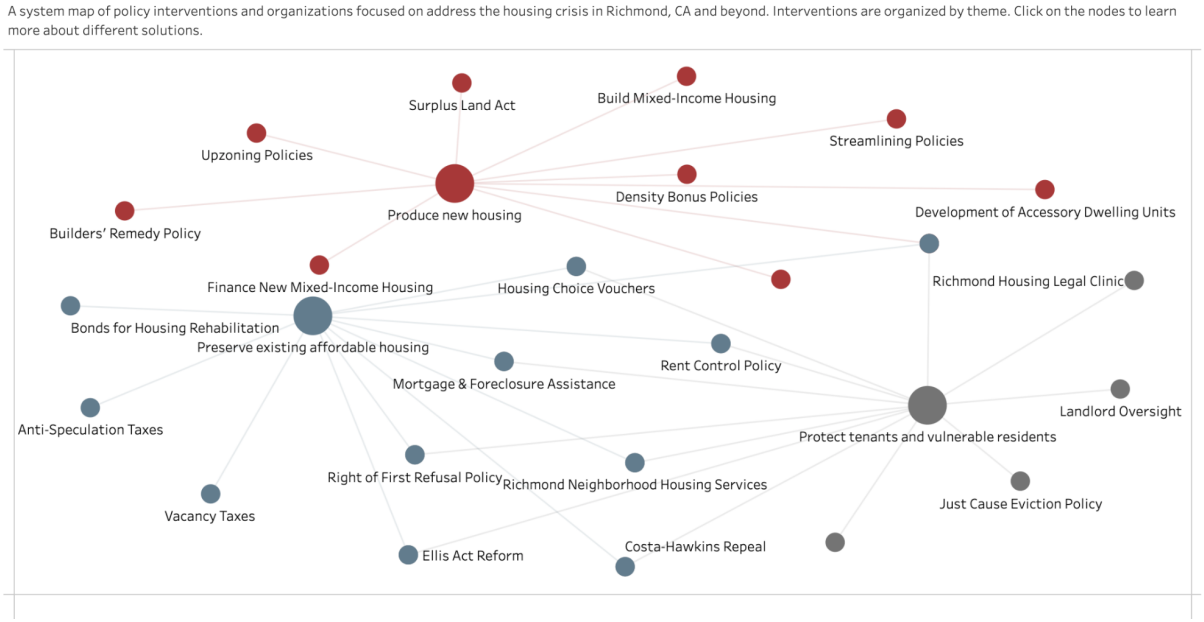
This section consists of a network visualization about interventions– primarily policy and organizational programs – being leveraged by the affordable housing crisis, made using Tableau. By using a network, the visualization aims to show how the same solutions can affect different outcomes. We categorized the solutions into the "3 Ps" ("preserve", "protect", and "produce"), a common framework in city planning by scholars such as Professor Karen Chapple of the University of Toronto. Because the Tableau network does not have a legend itself, we added the related colors of each P to the explainer text above to further highlight these themes.

The detail in this section is informed by the expert interviews our team conducted and the policy literature review. Iteration on the visualization focused on making the different elements (dots and their captions) legible and connecting interventions to overall themes. Additional care was put into ensuring links out to literature were present in the interactive element of this visualization so that additional resources are available to users.

Below is a progression of the iterations in developing the chart. Angela Liu, a capstone teammate, built the final network visualization in Tableau, and this is a key element of the final capstone work. We think it is important to note that while we did not work with Angela on actually creating the tool in

Tableau itself, we designed and prototyped the network structure as a group, with Gareen and Ian providing significant research on the solutions and their relationships to the themes and Gareen copy-editing the text.

As a team, Ian and Gareen debated whether or not we should include this visualization in our final for 247. In the other sections, they eliminated visualizations we did not significantly contribute to— in this instance, they decided that this visualization was important to represent the ethos of both the capstone project and the final project for INFO 247 we had both contributed to. Therefore, we want to provide Angela with the proper credit for her work in Tableau and use the inclusion of this visualization as an invitation to reflect on the general theme of our capstone project, which has even more fantastic visualizations.



Let's imagine a better future

This is the concluding segment of our visualization. The focus here is to bring the audience back to the ethos of this work: everyone deserves housing. The purpose of this section is also to inspire further action, articulating that education is the first step to make positive change. Specific attention to this copy made iterations on keeping the visualization of taking a journey into the housing space continuous throughout this section.

The visualization that accompanies this section is inspired and created in conjunction with the INFO 247 team and the larger capstone group. The idea was initially conceptualized by an INFO 247 team member as a staircase, each step being a hyperlinked action. The decision was to focus on a specific visualization, a multifamily housing unit, and have “next steps” be a part of the windows of the building.

The inclusion of this type of visualization is inspired by the last section of this course, focusing on animation and interactivity. The house is a multi-family housing unit, meant to visualize a future of affordable housing. Each window responds to a hover, which reveals a general action item a user can take, and a click, which leads to a popup that explains more and links to further work and resources in the housing space.

The idea for this visualization was a product of an iteration from an initial prototype theorized by INFO 247 team member Gareen and capstone 247 team member Rui Li. The text is written and edited by 247 team member Gareen and capstone member Rui and focused on representing specific action in a concise manner. Similar to the inclusion of the visualization in the previous section, we hope to acknowledge that this visualization was a product of significant efforts between both the INFO 247 team and the capstone team. The inclusion of this creative visualization was informed by feedback from the usability tests to show the “personality” of the narrative. Ian and Gareen both contributed to its evolution and felt that it was important to include in the narrative for the final of 247.

Data

Our project pulls from a variety of data sources from public sources and our own research labs. From our partners, the Othering and Belonging Institute, Eviction Research Network, and RichmondLAND, we were able to use information on zoning (including racial breakdowns and other relationships by zone), address-level evictions with racial estimations, and shapefiles on parcels and other geographic data.

In terms of publicly available data, we use information from the US Census Bureau, including decennial census (for population-level data) and American Community Survey (for neighborhood-level demographic, race, and economic data). For information on Richmond's history, such as neighborhood development or qualitative neighborhood information, we used a variety of secondary sources such as news outlets including Richmond Confidential, local libraries, and city documents.

Tools

We used a variety of tools to create the visualizations – first, to analyze these datasets, we used ArcGIS, Python, and R. This allowed us to wrangle data and calculate descriptive and inferential statistics for visualization and get general ideas of geospatial distribution.

After preparing the data, we mocked up prototypes for initial designs and user testing for both the websites and initial websites using Miro and Figma. We initially used Flourish for the solutions network visualization, but opted for Tableau instead.

The final data visualizations were designed primarily in Tableau or Figma. The website was created using HTML, CSS, and Javascript with Python, Flask, and Railway for additional functionalities.

One additional tool we also used was the KnightLabs's timeline tool, which is designed to make the generation of interactive timelines more accessible for journalists who may not have a strong coding background.

Research and Usability Tests

The research for the final project consisted of expert interviews and usability studies. Below, each research action is addressed in detail.

Informational Expert Interviews

Informational interviews formed a crucial element of our research. These interviews included both discussions on the domain (city planning, evictions, zoning, development, etc.) as well as input on usability, accuracy, and design of visualization prototypes. Below is a list of individuals we spoke to, their affiliations, and a short summary of their contributions. This list is consistent with the informational interviews conducted for the larger work of the capstone and is elaborated upon further in the capstone's final report. Ian and Gareen felt it was important to share this list, as these conversations were

integral to informing their creative thinking and how they understood the housing space.

Tim Thomas
Eviction Research Network- Research Director
As the Research Director of the Eviction Research Network, Tim Thomas provided our team with valuable insight into how we could create a tool with a meaningful impact. Thomas's background in zoning and segregation research paired with his current work in eviction research made his perspective extremely valuable. Tim discussed ways to visualize the eviction data in the map with rates. He also provided key feedback on how to utilize his group's data, given issues in the methodology (e.g., undercounting) and the topic itself (e.g., using eviction counts instead of proportions or rates).

Samir Gambhir
Othering Belonging Institute- Director of Equality Metrics
Samir Gambhir is the director of the Equity Metrics Program at the Othering and Belonging Institute, where he manages projects that focus on fair housing, zoning reform, segregation, inclusion, and more. He provided insight on the scope of our project and how to include OBI research in the project. Samir provided sources and feedback on our discussion of zoning data.

Steve Fadden
Google/UC Berkeley- UX Research
Steve Fadden teaches User Experience Research at the University of California, Berkeley, School of Information. He supported our team's UX research approach, providing feedback on our discussion guide throughout our process to obtain useful insights from interviews and user tests.

Kaitlyn Quackenbush
RichmondLAND- Partnership for the Bay's Future Fellow
Kaitlyn Quackenbush works with RichmondLAND, the community land trust working in Richmond. As an expert in the housing and tenant advocacy space, she shared her experience in advocacy work, housing policy research, community organizing, and provided solutions to housing issues in the Bay

Area. This was particularly useful for the network visualization, as we used and categorized most of the solutions she suggested. She also provided feedback on areas of the narrative that were unclear or missing - for example, she suggested we discuss the 2008 recession as the reasoning for disparities in homeownership in Richmond.

Madeline Parker
UC Berkeley - Ph.D. Candidate, City & Regional Planning
Madeline Parker is a mixed-methods researcher who is focused on the intersection between housing, land use, and transportation policies. Our conversation covered her work at UC Berkeley, specifically with the Urban Displacement Project on displacement and mobility, and her previous work experience with the New York City government in affordable housing. She mostly provided background information and suggestions on how to discuss the issues in the text.

Jared Nolan
Eden Housing - Associate Director
Jared Nolan is the Associate Director at Eden House, a nonprofit whose mission is to create and sustain affordable housing communities for the advancement of equity and opportunity for all. In this conversation, we learned from Nolan's expansive work experience in the housing space - focusing on his previous and present work.

Ben Toney
*Coro Norca*l - Ph.D. Candidate, University of Southern California
Ben Toney shared elements of his experience that were relevant to the work our team was hoping to produce. Additionally, he shared what he thought was missing in this space: the narrative perspective. Toney articulated that what is missing from the public discourse is "that real story of displacement." This conversation helped inform our team's commitment to centering the narrative of the housing crisis in our way. This convinced us to present information as an interactive timeline, which helps inform the longer term narrative as Toney emphasized.

Don Cape
Tharaldson Hospitality Management- Vice President Of Development
Don Cape is a developer with experience building in California. Our conversation with Don Cape gave our team the developer's perspective on the housing crisis. Cape shared the difficulties of getting multi-family housing units. This conversation was crucial in helping our team understand how housing policy shaped the developer's capabilities and motivations in the housing crisis, as well as contribute to some of the solution visualization. In user testing, he pointed out some issues with the interactivity of some designs, prompting us to add additional text nudging.

Victoria Beckley
University of California, Berkeley- Cartographer, City Planner, Graduate Student
Our team is very interested in the work of Victoria Beckley, a cartographer, city planner and graduate student at UC Berkeley. In our conversation, we learned about her work with RichmondLAND and projects such as acquiring vacant land for the city. As a map designer, she provided significant feedback on how to represent data spatially in ArcGIS and Tableau, particularly for the evictions and zoning information. This included color, removing dual encodings, and including additional labels and street information.

Taylor Tyson
Insider Inc.- Graphics
Our conversation with Taylor focused on gaining perspective and feedback on data visualizations in journalism. We asked for feedback on our approach for a scrolly-telly data narrative and learned about different tools commonly used by Tyson in her work as a journalist/graphics editor.

Usability Test

As part of a course requirement for INFO 247, our team of two conducted a usability test with an early iteration of our website. The following section will

discuss the research method of these tests, as well as breakdown the recruiting of participants, tasks for the participants, and findings.

Method

The research method for these usability tests is best described as a semi-structured qualitative interview. Informed by taking INFO 214 (User Experience Research) and from Gareen's work experience this past summer as a UX Writer that collaborated heavily with the UX Research team, the usability tests were crafted with the following structure: Introductions, Background on project, Warm-up Questions, Task 1, Task 2, Wrap-up Questions, Thank Yous.

Participants

Since the intended audience of our narrative is the general public (e.g., those without any or significant background in housing or related policy), the participants of this study were chosen to reflect this. The participants chosen did have some experience working in research and/or media. All participants were 25 and all were female.

These participants were recruited via word of mouth. Team member Gareen reached out to individuals within her professional network and scheduled three usability tests.

Each participant virtually signed the consent form and gave permission for their interview to be recorded and used internally. Participants were not compensated, each volunteered their time for the study.

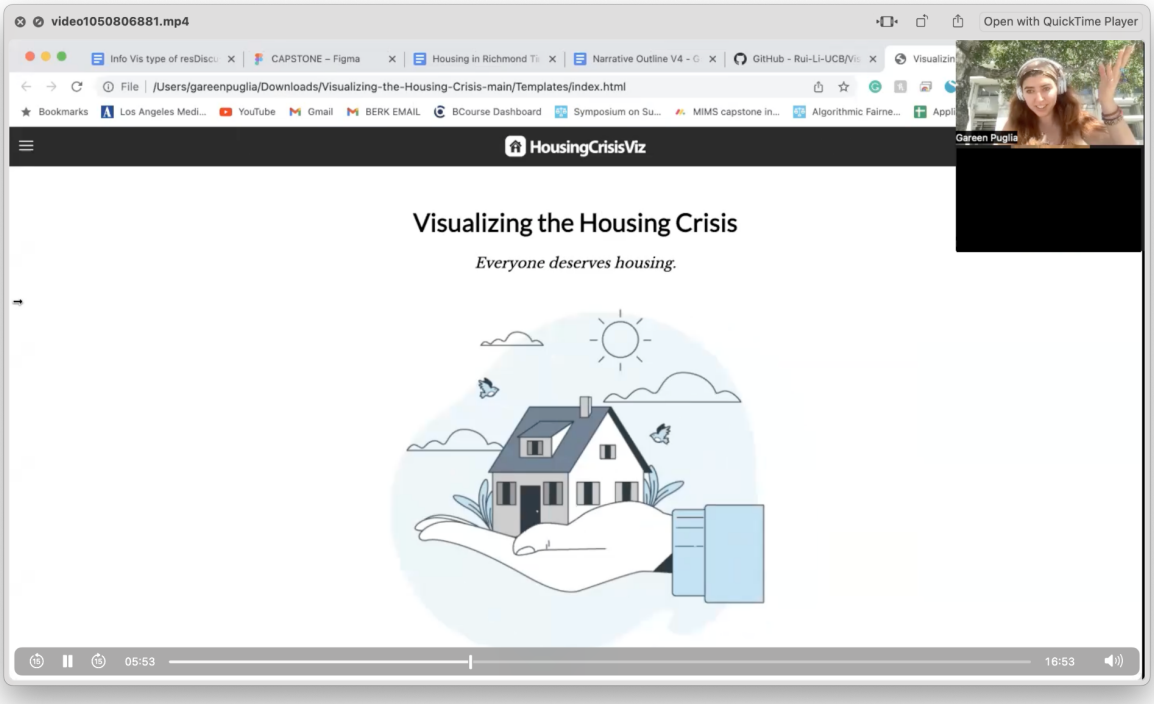
Below is a breakdown of the two tasks participants completed as part of the study. With the description of each task is the inclusion of a screenshot from the usability tests. Each participant's image in the screen shot is covered with a black square to respect their privacy.

Usability Task Breakdown

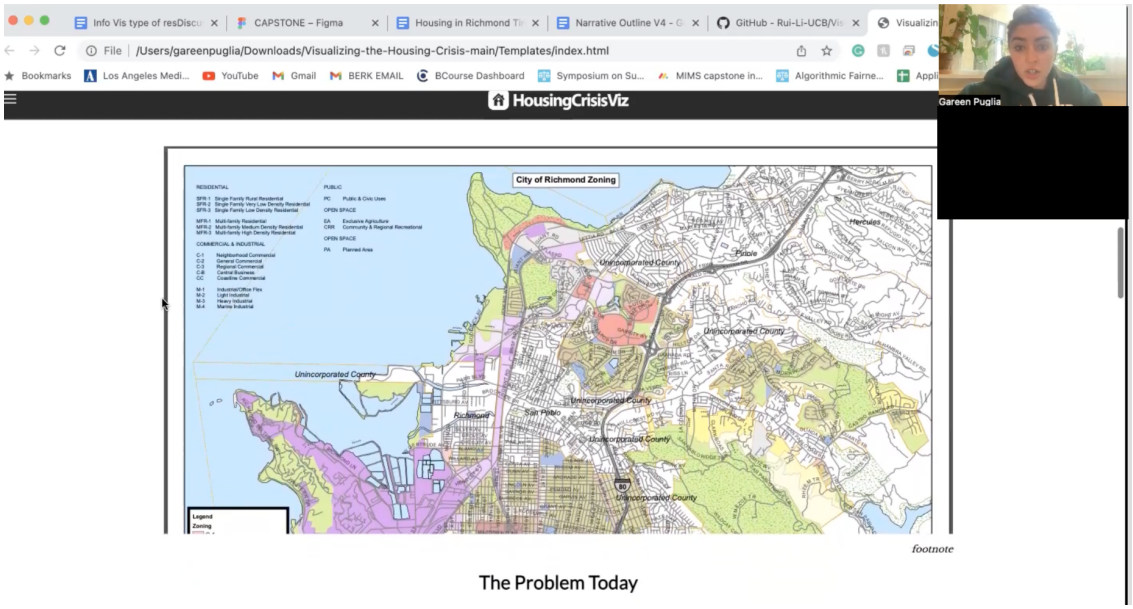
TASK 1

UX Researcher shared their screen and told the participant to “treat me like a mouse” and yell stop when they saw something in the visualization that they were confused by. Each participant then had to explain what about the element of the visualization confused them.

Next, UX Researcher prompted the participant to do tha same thing, this time yell “stop” for something that they liked . Once they yelled “stop”, the participant was instructed to explain their thoughts behind why they liked said element of the visualization .



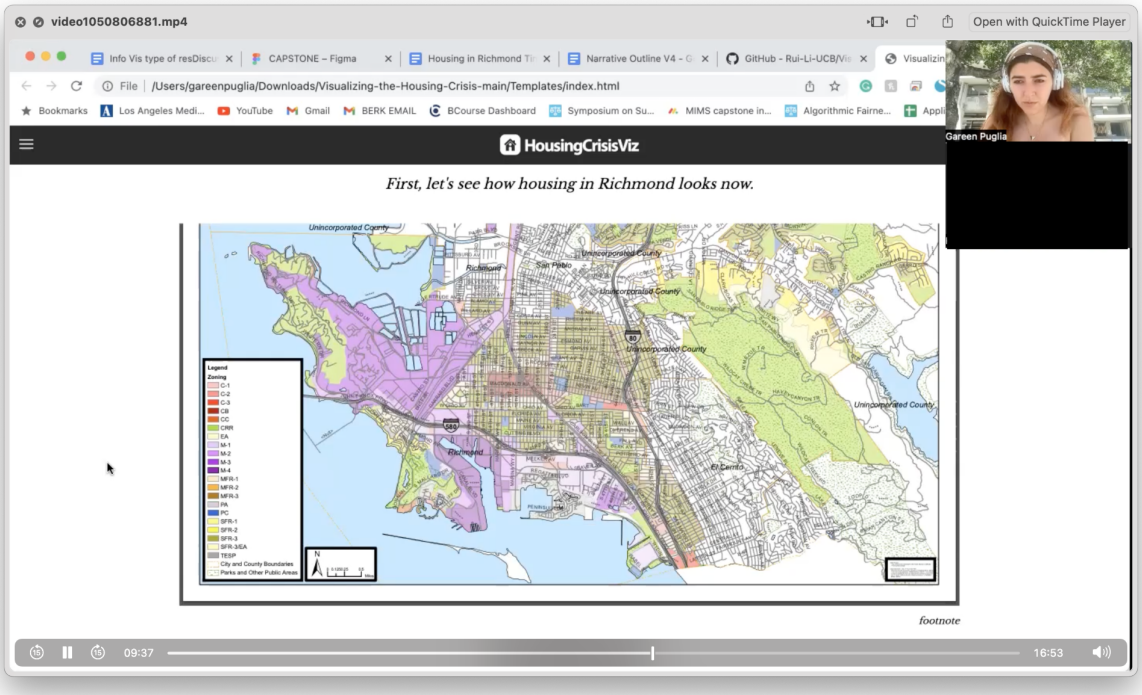
This screenshot shows an instance where the participant asked the researcher to scroll up to the top of the article again so they could make a comment. They were interested in seeing the imagery of the house at the beginning of the paper and shared that they liked this image, and would like to see more visual elements similar to this throughout the paper. As part of the task, this “stop” and go call out helped capture this type of feedback.



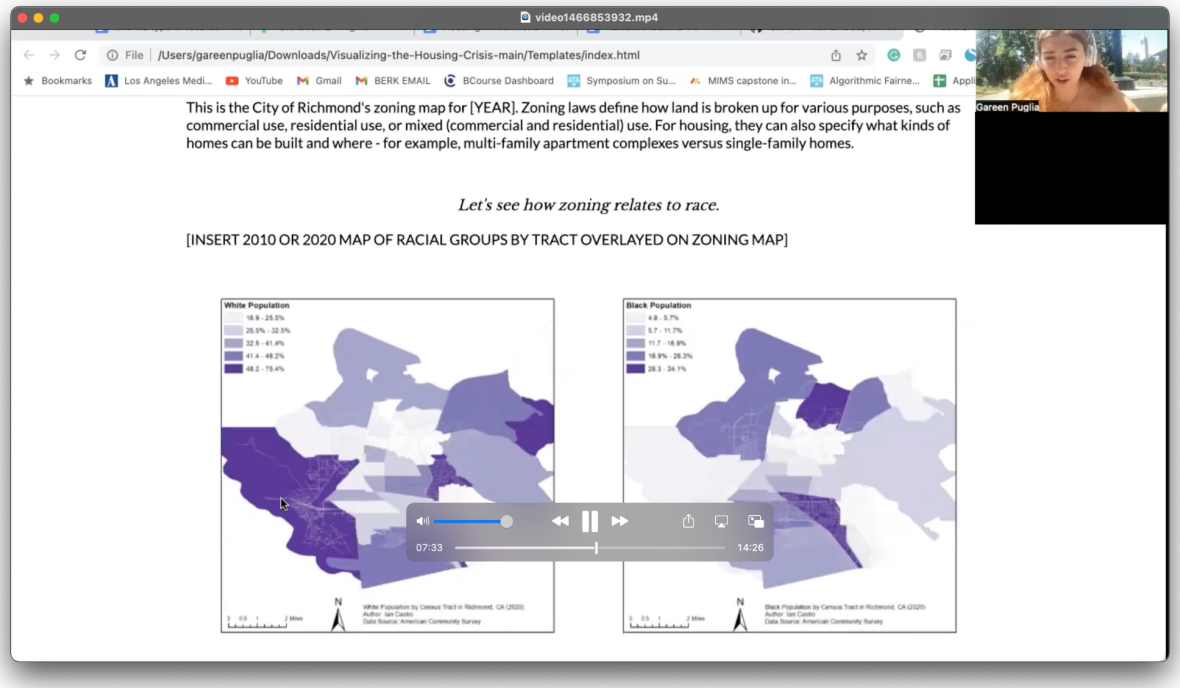
This screenshot is another example of Task 1. Specifically, the participant stopped at this section of the narrative. In this instance, confusion was expressed about the inclusion of this visualization. Based on the feedback provided from this participant, and similar notions from others, this visualization does not appear in the final version of our project.

TASK 2

UX Researcher instructed the participant to engage with the maps of our visualization. Specifically, participants were instructed to “think aloud” when they were interacting with each map— explain what they thought they were reading, discuss how easy it was to interact with each element, and how effective they thought it was.



As part of Task 2, this screenshot shows a participant engaging with the visualization above. As alluded to by the previous screenshot, this visualization cause great confusion for the participants. The consensus was that this was not digestible and did not support the overall goal of our project. For the visualization in this screenshot was not included in the final version of our project.



This screenshot is representing the same task taken on a different visualization, These visualizations were met with more positive feedback. Each was thought to be engaging and easy to understand. Iterations based off of the feedback provided from this task were to contextualize the visualizations further- though they were easy to understand, it was not as clear as to why there were different visualizations representing different demographics. Based on this feedback, the final project was only one of the visualizations from this set. The one that remains focuses on the Black population of Richmond. Additionally, the colors have been changed to be consistent with the rest of the narrative.

Results of Usability Tests

Results of this study that were most notable to the Final Project iterations were of a qualitative nature. Our team was interested in finding if our information was digestible or easily understood. Additionally, the team was concerned with how easy and intuitive the visualizations were to engage with. Below is a summary of the main findings from this study:

1. The text was compelling, but early iterations had too much– participants were interested in more concise copy.

2. The maps were engaging— participants felt compelled to take a closer look and felt they learned something from the maps
3. Some elements of the visualization were confusing— the visualizations were engaging, yes, but the first map created was a bit complex for the participants. They asked many clarifying questions and requested more context.
4. This tool was something they felt they could learn from! Participants expressed a general consensus that the tool was educational and they would turn to it to learn about the Affordable Housing Crisis.

Relevant Quotes

Below are participant quotes from the study that underscored the findings. Our team of two referenced these for inspiration and guidance.

 “This reminds me of a New York Times article” - Participant C

 “I don’t really know where to put my focus first, I feel like there should be a little headline at the beginning...cause it’s a little overwhelming”- Participant B

 “I think most people know that there’s a housing crisis, but if they are looking for more in-depth knowledge about where the housing crisis occurs in a case study of Richmond... it is an example of how the housing crisis affects a certain area.”-Participant A

Iterations Based On Usability Findings

The Task section of this report briefly breaks down some of the interactions made based off of the usability findings. This section will list out the major changes made, based on the feedback acquired from the participants we interviewed.

1. The text was edited to be more concise. Though the content was appreciated, the overall consensus was to provide more context, while being mindful of how the formatting looked on the page. This was done with intentional edits, keeping what was necessary to support understanding in conjunction with the visualizations. “Fluff” was eliminated when necessary.
2. Visualizations included in the narrative were easily digestible. Through iterations based on the feedback, all visualizations included in the final version keep in mind the general audience we are trying to reach. We cut many unnecessary, confusing, or repetitive visualizations. The visualizations seen in the usability screenshots were either edited to meet the needs of the audience, or were eliminated based on user feedback.
3. We leaned into the creativity. The usability studies showed there was a great appreciation for elements of the visualization that were creative, and reminded people of a “New York Times Graphic.” The iterations were to include creative ways to break up a page (the red line to introduce the section about redlining, for example). This attention to detail elevate our work as a whole.

Conclusion

This project is a tangential to the work of the larger capstone team; that being said, the sections of this project are team members Ian and Gareen’s effort to combine what they have learned from their capstone team and incorporate their skills from INFO 247. This project is meant to visualize how complex and overwhelming the Affordable Housing Crisis is. Finding and combining the relevant data, working it into our visualizations, and writing a comparable narrative throughout the semester shaped the final project into something

that is testament to our time in INFO 247. Together we were able to create a tool that educates and inspires action.

As part of the larger capstone group, there is so much work that needs to be done in understanding the affordable housing crisis and fighting for a more equitable future. Our team is honored to have played a small role in working towards solutions in general and shining a light on the realities of housing specifically in Richmond.

Acknowledgments

As this final project stemmed from the work of our capstone team, we wanted to thank our team for exceptional teamwork and support.

Thank you to Professor Hearst, Chase, and Astoria for a fantastic semester. This project is a result of your instruction and guidance.

Appendices

The discussion guide created and referenced during the interviews can be found here.

Team Contributions

Team Member	Contributions
Ian Castro	Evictions data (100%), homeownership (100%), historical/background research (50%), timeline text + viz (maps) (60%), final report (50%), literature review (100%)
Gareen Puglia	Usability test + writeup (100%), timeline text + viz (isotypes) (40%),

	solutions research + text (70%), final report (70%), copy editing (100%), literature review research to inform writing (100%)
Capstone Team (Rui, Angela, Shahan, Aiste)	The research, visualizations, and text was created in collaboration with the capstone team. For the sake of this project, we only included sections and elements that Ian and Gareen worked predominantly on. However, we want to respectfully acknowledge the collaboration and teamwork with our whole team throughout the entire semester. Note that the final capstone project expands on this work in a fuller sense, with additional sections explaining general policy and process issues, zoning, and inequality.

Thumbnail

Related Software, Datasets, etc.

247 project version: http://housingcrisisviz.github.io/

GitHub repo: https://github.com/HousingCrisisViz/HousingCrisisViz.github.io