Nic Stark DVIA Fall 2017 Final Proposals

1. Visualizing exponentiality: Use a multitude of retinal variables including movement scale and position to demonstrate the powerful effects of exponentiality and explore the real world examples of exponential growth.

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As more systems and industries become digitized we must recognize that what were once linear growth patterns will turn to follow the exponential trend of digital technologies. Extrapolating the current state to an exponential growth pattern can be difficult to conceptualize. Just as the advances in mobile technology awed an audience in 2001 when the first iPod was introduced, here a decade and a half later we are carrying with us mobile systems that include GPS, VR capabilities and contain the entirety of our personal and public lives. Recognizing that the next 15 years will not only represent an equal rate of growth but an even quickening pace of innovation will be critical to navigating the investment landscape and business strategy.

Very few aspects of the natural world operate in an exponential growth curve. Cell division rates (the human population), sociological phenomena such as memes and the spread of news, subatomic physics such as nuclear chain reactions grow exponentially. But these numbers and systems are abstract and operate far outside the scale and scope our brains developed in pre-agricultural society.

The goal of the project is building a means for the reader to better comprehend the impact that exponential growth will have on a variety of industries. Solar panel installations, computing power and data generation all have significant impacts on our future but the extent to which or the speed at which they will have a measurable impact can be better understood with a more concrete perception of exponential growth. Addressing the human tendency to underestimate exponential growth would be the first step in opening the audience's mind to reassess what exponential growth actually looks like. Starting with a short survey, the web app would ask them to predict the number of solar panels in 15 years, the computing power and number of people who will be online. The app will then plot their answers on a graph projecting exponential growth based on current metrics. To further drive the point home, the app will step through examples of retinal variables representing the rapid growth of an exponential curve and then that growth to natural processes.

Example 1: A bar that takes 1 year to complete a single revolution, followed by a bar that only takes 182 days, 90 days, and so forth until 20 iterations in the bar is spinning about 1 revolution per minute and 6 after that wherein the bar is spinning once every second.

Example 2: A circle that duplicates every second, where each child also duplicates. Demonstrating the exponential growth of cell division the audience would watch as what started as a single dot would fill the screen in the matter of minutes.

Example 3: To demonstrate the period in exponential growth in which it is easiest to underestimate the coming acceleration a graph linking an exponential value to a brightness value to show the seemingly glacial change in the beginning and the rapid change at the knee

of the growth ramp, perhaps accompanied by a sine wave sound ramping up a low frequency to quickly outperforming our auditory capabilities.

Each of these examples would relay back to a real world example of a natural process and an industry poised to ride an exponential growth curve.

2. Pulse of the city: Map noise ordinance call and police responses over time to look for daily and weekly patterns in volume and police response rate.

As cities grow and age, neighborhoods become repurposed, gentrified, fall into dilapidation, finding new life or aging with their residents. The every changing landscape of New York City presents its fair share of moral and quality of life issues. One of the most common complaints is a violation of a noise ordinance. Thank to publically available noise complaint data from the city of New York we can provide a portal for users to explore the relationship between census data (including economic income and average resident age) and registered noise complaints for each neighborhood in the city. Is there a correlation between where resident age discrepancy is highest? What about the borders between highly affluent and lower-income communities?

The map will include toggles to layer different data points on the map. Individual points to represent instances where a noise complaint was lodged. Larger points represent multiple complaints to the same address. Shape will indicate whether the issue has been marked resolved or not. Color will dictate the type of establishment, be it restaurant, residential or music venue, etc. A sidebar will tally the neighborhoods with the most and least complaints. A timeline along the bottom of the page will map the peak call time for complaints on a daily and yearly basis.

As much as we like to party, a noisy environment can be detrimental to education and early childhood development. This tool would offer residents a way of determining whether a neighborhood would be suitable for raising a child or those shopping for real estate with noise sensitive services such as a film sound stage. As there is 7 years of data another possibility is to chart the change in number of complaints in certain neighborhoods over the years in order to determine whether certain types of development or lack of development predictably results in an effect.

3. Air quality trends: Use an exaggerated simulation of air quality in New York City to demonstrate changes over time and under different weather conditions.

Air quality is a major issue across the developed world and especially in developing nations which lag behind in environmental protection laws. This issue needs to be confronted not only from an environmental perspective but a financial and moral repercussion as well. Healthcare costs of asthma related illnesses rose to $50.1 billion in 2007. All too often it takes that first fresh breath of countryside air before you recognize how polluted your everyday

intake can be. Sulfur dioxide, nitrogen dioxide, fine particulate matter such as rubber, heavy metals, exhaust from engines and nearby industrial plants have been linked to increased asthma rates amongst children in the Inner-City Asthma Study by the National Institute of Allergies and Infections Diseases. Although we recognize air quality is an important health issue it can be difficult to reiterate the importance of such an intangible physical property. The metrics alone, parts per million, deal in scales that are problematic for the average citizen to meaningfully quantify.

This project would act as an interactive visualization allowing the audience to overlay transportation, economic data and asthma rates over a map of New York City in order to discover which neighborhoods are most affected by airborne pollution. The user would be able to toggle separate data overlays in search of trends. The city of New York has made available neighborhood air quality data detailing a yearly average of various chemical compounds and asthma rates. As a visual aid a simulated cubic foot of air from that neighborhood would be rendered using the relevant data. Exposing the composition of the air through representative particles for sulfur dioxide, ozone, nitrogen dioxide, nitric dioxide and fine particulate matter.

A map of the five boroughs with rollover points would trigger a simulation for each neighborhood, clicking would slot the neighborhood in at the bottom the the screen allowing the user to compare two different neighborhoods side by side. To demonstrate the variability of air quality an example of an upstate town's air quality will allow the audience to compare metropolitan versus country air. An infographic section below will outline the main contributors of each type of airborne pollutant.

Outlining means to reduce the amount of airborne pollution through electric vehicles, new sustainable forms of energy production and limiting combustion vehicle traffic within high density urban areas can give citizens the solutions to demand from their representatives. An extension of the site would allow users to toy with the correlation between the prevalence of various pollution emitters and the air quality in their neighborhood. I.E. Sliding down the number of cars permitted within the city has an immediate effect on the amount of fine particulate matter in the air.