DIFFUSE

Thesis Progress Report: Diffuse

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Theft is a big social problem in NYC. In Manhattan alone, a reported 4,134 bikes were stolen and rising 10.5% annually according to NYPD statistics. Experts on bike theft claim the number of thefts is really much higher. Transportation Alternatives, a bicycle advocacy group in New York City, estimates more than 100,000 bikes stolen in NYC alone. These numbers are outstanding because most people never report it to the police, FBI claims on 5% do.

I've staked-out used bike and bike-parts shop in the hopes of meeting one, but these exchanges happen quickly on the streets. It is almost impossible to tell who really owns their bike since hardly anyone registers or keeps information of rightful ownership on them. Sometimes, the stolen properties exchange many hands before it ends up at a used bike and bike-parts shop. I can't impact thieves because they won't take a meeting with me. I want to curb bicycle theft in Manhattan by declining the stolen bike/bike parts market. Like any cyclist, it all began when my own bike was stolen, I wanted to understand the realm of this issue, investigate from all sides, and look under every stakeholder's rug, sort to speak.

I started out researching different aspects and stakeholders of the Bike world. I spoke and interviewed them. These stakeholders include police officers, bike-theft experts, bike-commuters, bike-shop owners and employees, and regular pedestrians. With thorough research, I kept filtering my notes to see what worked, and what didn't. It didn't take long before I realized the reason why this was happening was no sense of agency in the bike-theft system (Figure 1 & 2) .

"I want to curb bicycle theft in Manhattan by declining the stolen bike/bike-parts market."

Bikes were considered toys, not a main means of transportation. The police considered it a low-priority. The act of bike-theft is hard to distinguish and to know for certain who was in fact stealing, or retrieving their property from the public. I went to places where the stolen bike-parts most likely ended up, flee-markets, Craigslist & E-Bay and pawn-shops, but these were dead-ends. Once bikes and parts reached those places, it was too late to determine if they were stolen, because there was no working system to verify ownership. Thieves exchanged and switched parts around on bikes, so no one can recognize the stolen ones and which ones were rightfully owned.

Once a bike is stolen, there it went, gone from the owner's hands on to the thief to eventually the new potential buyer on the streets. I concluded there won't be any change, unless this system has a way to connect them to all the stakeholders in some way. I started asking more questions, specifically to cyclists. I was very interested to know how they felt about this whole experience, how they felt about the thieves.

Figure 1.

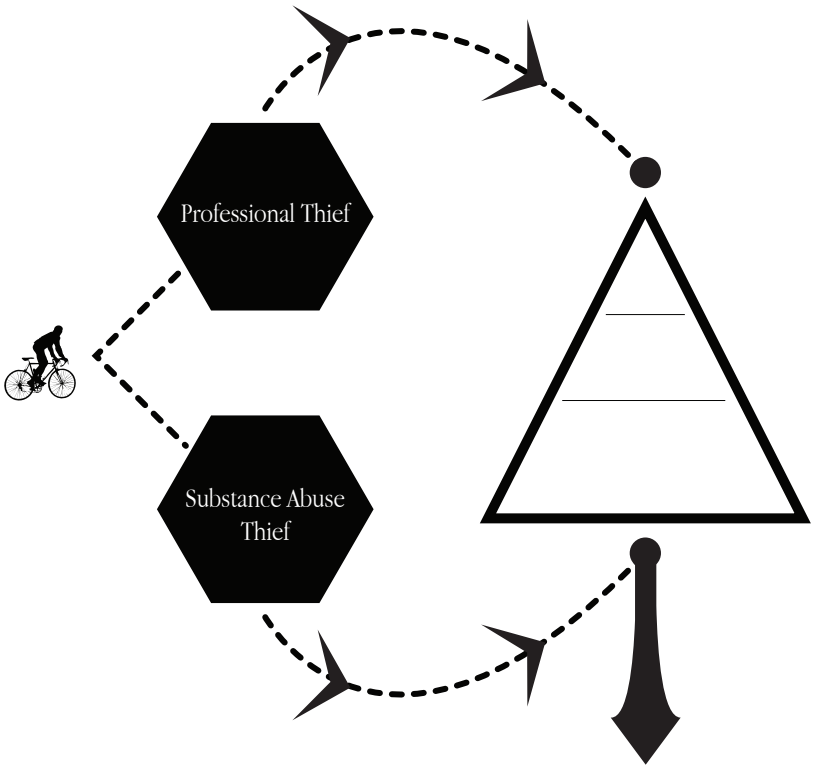
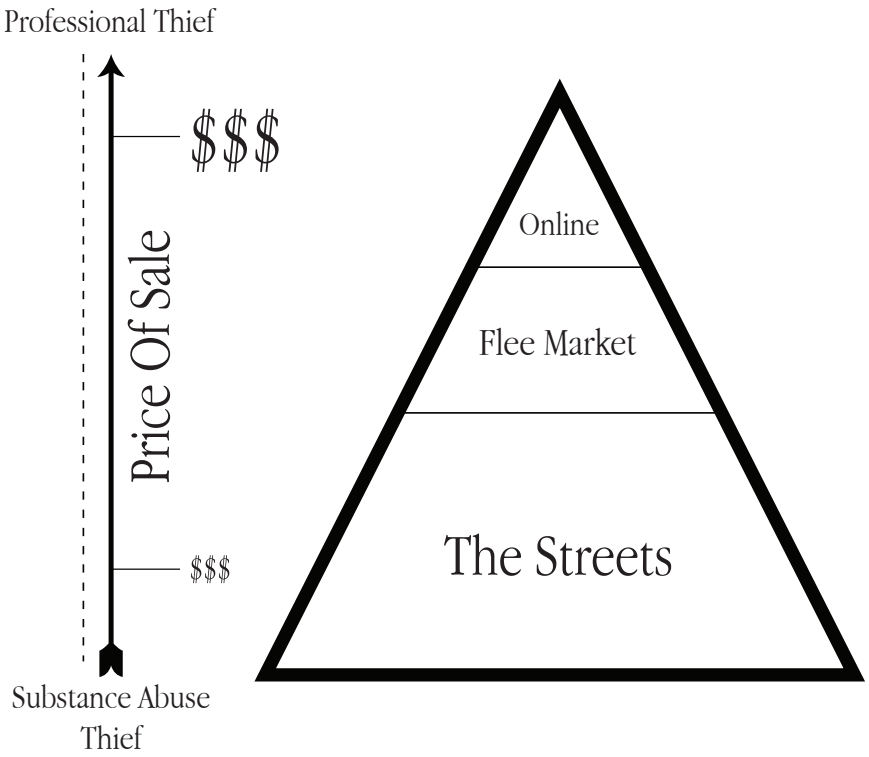


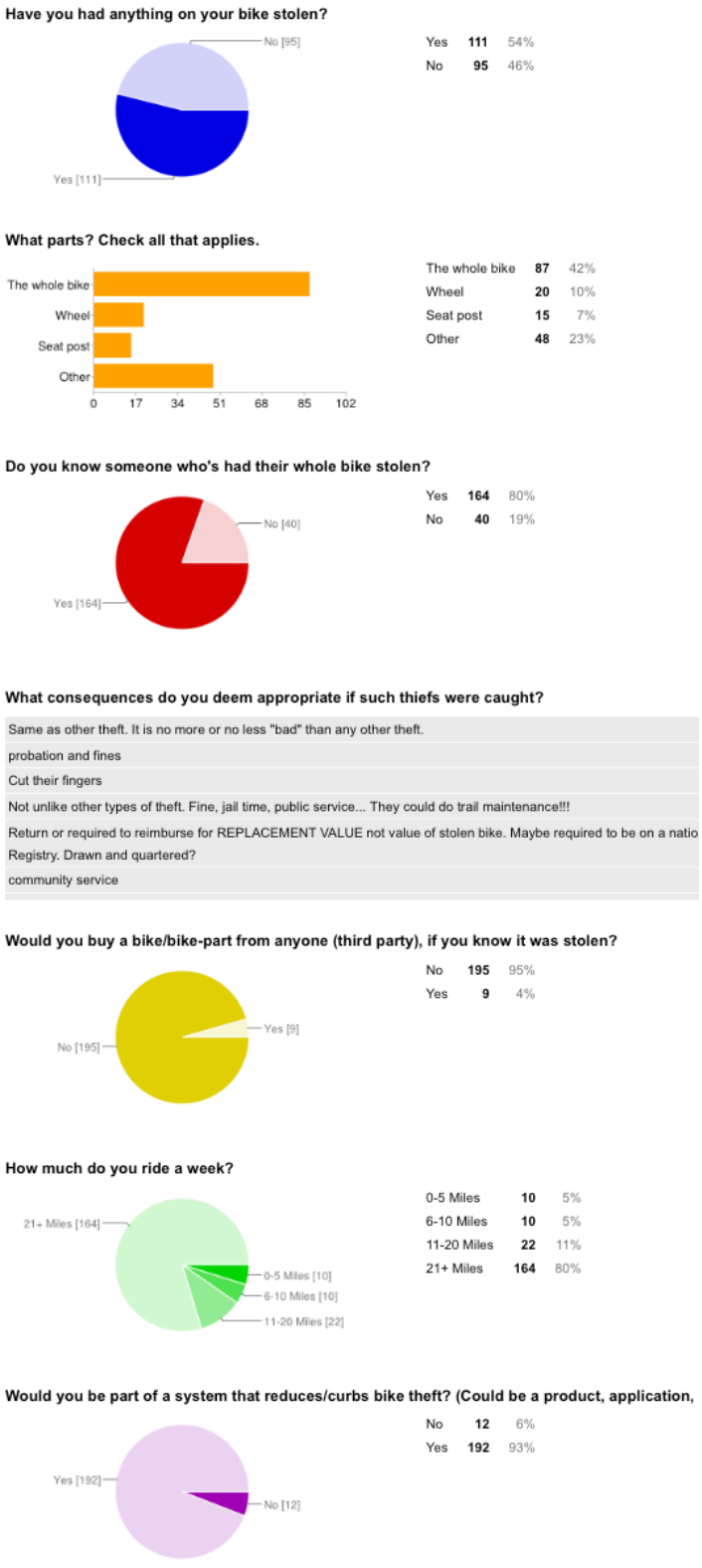
Figure 2.



I created a short survey. This survey, which ended up getting over 210 cyclists involved, gave me a doorway to bike-theft experts and amazing stories. One interesting story was how one angry bike-theft victim put flyers where he had his bike locked up and stolen. This bike-parking space posting caused attention because others claimed to have lost their bikes in that space as well, leading to the building's management to cut down a bush. This tree bush the management cut down served as a shield for the thief to feel comfortable to steal bikes constantly. Since 82% of them experienced a part of their Bike stolen, it was very interesting to read their experiences, and if they were willing to do something about it. One question included in the survey asked "Would you be part of a system that reduces/curbs bike theft?" 93% of 210 cyclist said yes. When asked "Would you buy a bike part if you knew it was stolen" 94.85% of 210 said no. On top of stories, the survey established a network of people in the bike theft world, a company that makes "We kill Bike thieves" T-shirts and a better understanding of my thesis' stakeholders and the journey a stolen bike makes.

"...victim put flyers where he had his bike locked up and stolen."

Figure 3.



Registration systems seemed like the most logical way to curb theft. I looked further into the registration systems available. There was a reason why it was done to death and has not made any changes, because there are just so many! With hundreds of registry organizations to contact when your bike is stolen, this created an influx of places to contact and look. So an example: if you've had your bike stolen and were lucky enough for a police department to recover it, they would check their database to verify registration. But, since each police department has their own database, chances are you've not registered to all of them, and unfortunately without registration, the bike would be auctioned off. These reasons surfaced as I looked further. Because there were no unifying action being taken, or enforcement, it is basically the wild west of a system. Japan has one unified system where it's compulsory to register your bike(s) (like the automobiles in the US). Bike theft is treated seriously in Japan because it is considered a vehicle and a main means for transportation for their citizens.

I asked myself if registration is a strong way theft can be curbed, how I could leverage the mechanisms and values of registration into a more tangible human-scale utility. How would it look like if those very mechanisms and values were between children? What's the primitive version? How can this make the most impact?

Figure 4.

"...Because there were no legislative actions being taken."

Because of the lack of understanding I had with the bike thieves and no interactions with them, I wanted to emulate that experience, I researched thoroughly how thieves snatch a bike in minutes, but I never seen one in the act. I knew what tools they used so I went to the model shop. The technicians said they had the tool: the angle grinder, so I bought the most commonly and most trusted brand and product people use to lock up their bikes, the heavy duty level 4 lock-chain by Kryptonite, and brought my camera to film the whole experience, stealing a bike in a public bike-parking space in the SVA bike-parking space (Figure 4). It surprised me how easy it was, literally took seconds, 23 seconds to be exact, with student onlookers enjoying a spectacle as they eat their lunch. Of course bike theft is prevalent, it took me 23 seconds to cut through a 100$ chain, not only was it easy the angle grinder went through it like butter, on top of that no one said anything. Who would comment, as far as they know, you invested your time to take a grinder because I wanted to release my rightfully owned bike. This experience was just too easy, I took the bike, but the act didn't have any obstacles. Being a bike thief, you're on a mission to steal the bike, the thoughts in your head are "I hope no one thinks I'm taking this, I'll let them assume it is my bike." . Under this "safety blanket" of assumption on an on-lookers point of view they don't worry, or feel the urge to report the action. Interestingly enough, the same "safety blanket" is also working on the thief's part. He's invested in the same assumption, he feels this is a low-risk operation, his investment on the assumption works to his advantage because he's confident about any confrontation by anyone or the police to be notified, he feels safe. I asked myself how could I remove that, where can I intervene here, how can I turn this around and expose myself when I'm stealing this bike.

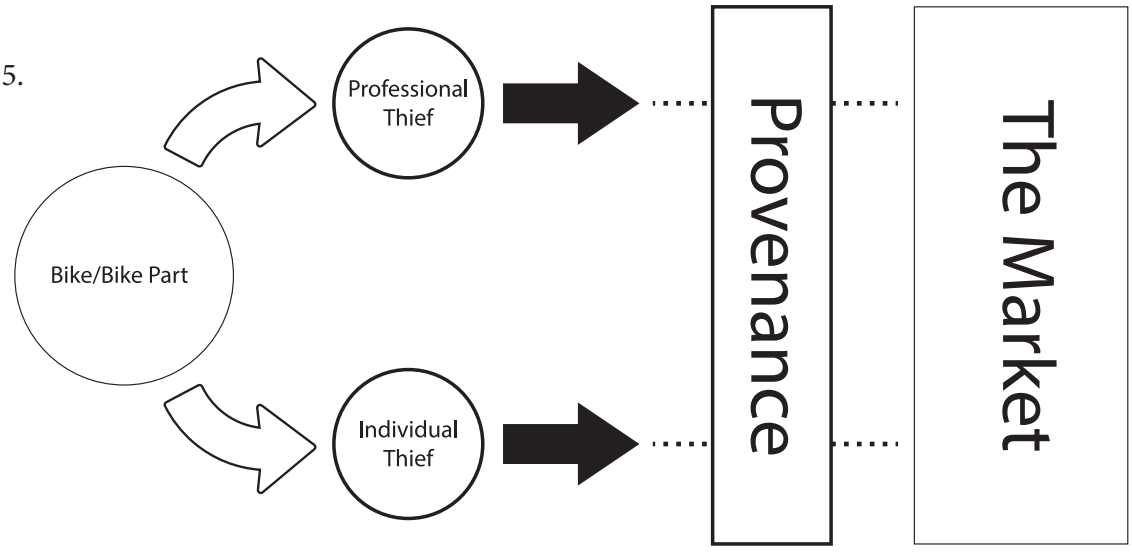
I looked at objects that are held in great importance, which is at a high risk of being stolen: cars, guns and art. What the three had in common are a lineage of ownership. In order for you to drive a car you had to have it registered, as well as a gun. If any of these were stolen, there was accountability. There was Provenance. Provenance could be an interesting take on shifting behaviors to shift people from buying stolen bikes and bike parts. Provenance has been successful in Art, and firearms. I'm excited about this insight because not only does it revolve around ownership but it is also empowering the cyclist, for when he's participating and asking for Provenance, the individual is simultaneously fighting against theft (figure 5). Also, immediately putting the idea of thefts to mind at all instances in any transaction of used bike and bike parts, creating a new perspective of what it means to be buying a 2nd hand bike or bike part. "Don't buy anything that's stolen unless you want yours stolen next."

After a brainstorming sketching session of sketching 100 potential ideas on paper, I came up with interesting conceptual ideas. I speculated if registering isn't sustainable in curbing bike theft, what if I can create a catalyst that amplifies those instances of theft. Could I highlight the action of theft?

"...completely abolishing this "safety-blanket" causing exposure."

Can I make this action of theft simultaneously trigger some kind of whistle-blowing component? These ideas, although abstract gave me foresight to my final product. Aha! The ability for paint to dispense when a bike part is stolen, because bike-part thefts happen even more commonly then a complete bike theft, because of the accessibility. Stealing a bike part involves using one tool, it is completely silent and easy. The easiest part to steal off a bike is the front wheel and the seat-post, which is also attached with the seat. I chose to focus on the front wheel because there are more instances of front-wheel theft. This device creates evidence that an act of theft has occurred, establishing a sense of accountability between the thief and the bike. This product can enhance the volatile act of theft happening. The exposure created from the explosive exertion of paint, knocks down the "safety-blanket" which is the assumption that this may be this thief's bike during the act, something a thief relies on, a take-away I learned from stealing my own bike earlier.

Figure 5.



This device plays an interesting role from a passer-by/onlooker point of view because he/she knows they are witnessing a theft, or else why cause all this mess with paint, when he could have easily taken out his wheel with the proper tool. Furthermore, after the act has taken place, the "scene of the crime" has been stained similar to a chalk-line when someone has deceased at an environment. This product may provide proof that theft has been active for at least at the moment that paint was dispensed, which can inform bikers in changing where they park, and where better bike-parking facilities should be implemented. This device raises awareness in bike thefts, which neighborhoods are high in thefts and safe parking spots. Displaying the problem of bike theft to the community is necessary because when others are warned it sheds light to the issue, and asks to be confronted, such as moving the bike parking bars elsewhere like I described earlier. The residue plays a memorial role.

As a product designer, my next steps were looking at mechanisms and devices that "dispense" or exert some form of liquid.

I researched possible mechanisms and was settled on a spring-loaded style dispenser. There was a lot of issues and restrains, but I confront them as they came, which they soon did as I made rapid prototypes (Figure 6.). One issue with the springs was that it took way too much room, meaning this would dictate the form. I did not like the physical interaction the springs created in my earlier prototype because you needed to wind the device to exert paint, this experience needed to be minimal and effortless. After prototyping and noticing all these issues, I had to find an alternative. I went back to researching different methods of exerting mechanisms.

Figure 6.

I took this time to visit some of the experts I've been in contact with during this thesis process: Daulton Kao a Senior Product Engineer at Skip Hop & LVMH, Daniel Kim, product and development consultant & engineering expert and Dave Marin, the Director of modeling and facilities, and an Assistant Professor of Product Design at the New School.

Daulton, as a Product Engineer saw the same issues I did, the spring-loaded method would prove to lead my product to end up a big heavy thing. We spoke about other mechanisms. Daulton brought to mind, if springs were used, mass-manufacturing would be expensive, resulting with an expensive final product for users. I decided to discard the spring-loaded prototype.

My meeting with Daniel was very pleasant, he gave me access to resources on 3D printing and modelling. We spoke about the service of my potential product. Danny has experience with products for the blind so he has a user-friendly and accessibility centered point of view. He looked at some of my sketches for the product and recommended I see Dave Marin.

Dave Marin gave me access to his Lab, which includes modeling-technique examples that show an eclectic collection of models that provide exertion. I brought my physical model, made with springs and rubber and he saw right away that it was basically a gun. I asked if he had anything gun-related in his lab, which he did, a CO2 powered BB gun. Eventually, I had a CO2 cartridge in my hand, and instantly got excited, this will save so much more space! I headed home excited to see how I can further implement this idea quickly.

I went home and to my dismay I found out CO2 canisters accompany too many issues (Figure 7.). These issues include containment the cartridges in my product, and reloading when the CO2 is empty or leaks. And another interesting fact, since the CO2 cartridges work by expanding from liquid to gas which creates the pressure it provides, it also exudes chilling temperatures at the same time, resulting in potentially damaging hardware. CO2 cartridges also run a chance of becoming loose and slowly dispersing air residually. So potentially if a rider goes through bumps and loosens the cartridge, the CO2 version of the device may result in a useless device on your bike. But it did lead me to the paintballing world. Looking through paintball products I decided what better way to contain paint but with paintballs, this uses up minimal space.

I looked through other devices and then finally came across Paintball grenades (Figure 8). As soon as I found the paint-grenades, it was almost like a message sent from the thesis gods. Paint-grenades saves more material and space then the CO2 and a whole lot more than the spring loaded version. Because the paint-grenade's mechanism are compacted into one, both the paint and the power. I instantly started drawing up plans, and made some rudimentary models (Figure 10) and made a working prototype out of aluminum (Figure 9). This device works by housing & protecting the front wheel, so it is not easily stolen. This device protects the wheel by creating an obstacle, no longer is it just an easy task but something you need to dismantle. When the user properly opens the housing it will open without exerting paint. If it is improperly opened, to access the hardware to take off the wheel, it dispenses paint, but also when it is pulled or ripped out. This device sits as a hardware between the bolt and the nut (Figure 11).

Figure 9.

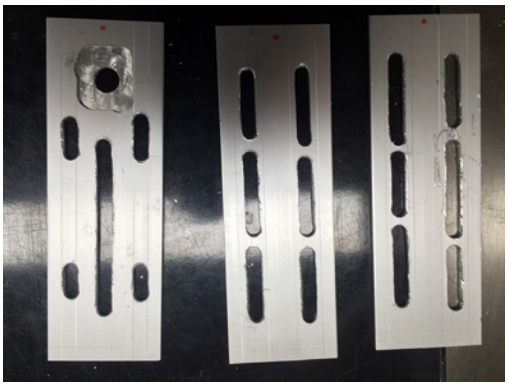


Figure 8.

Figure 10.

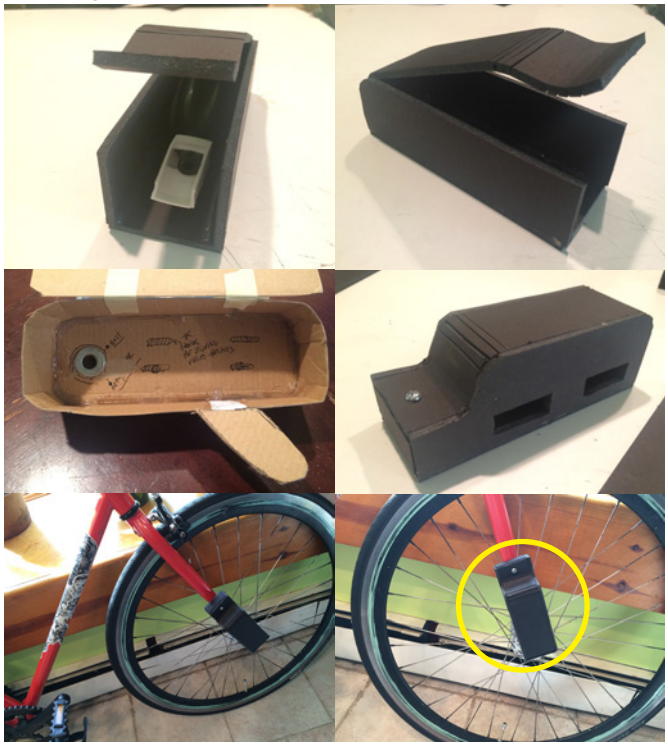
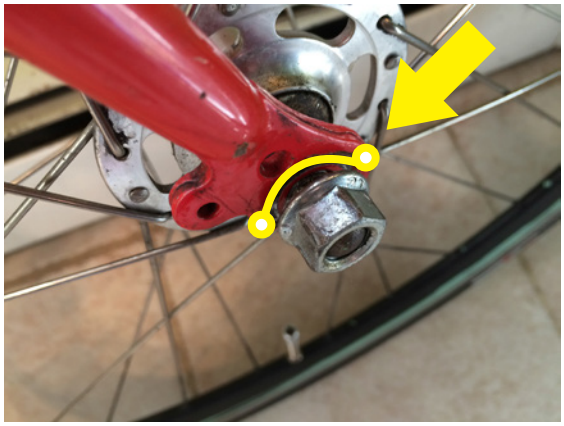


Figure 11.



I was very lucky for someone who happen to recently have taken my survey to recommend me and make an introduction to a bike-theft expert. Previously, I had no luck getting an e-mail or phone response with an expert on this subject, but behold I had access to that person by introduction, Lulu Li- a bike theft expert and researcher. Lulu started the now very popular and successful Bikenapped.com as a grad student at Harvard (Figure 12). She started Bikenapped in Mass., and California, this site provides a platform where people can plug in where and when an occurrence of a bike-theft happened and maps it out on a map for anyone to see. You could instantly see where & when places were deemed dangerous to store or park your bike. Lulu let me hang out with her and pick her brain on some thoughts and where I am at with my thesis. She gave me great feedback and said this was a great tool, solving a problem she had with her product: how to engage the community without actively involving (or pressuring) them, because my product creates environments of theft that you stumble upon. The issue with her product was that this site was only used by people who have already lost their bikes and wanted to do something about it. My product engages you, and makes you want to find out more. If a person doesn't know what the stains are or mean in the city streets, he/she will certainly want to find out.

Figure 12.

PUBLISHED : December 9 2012

Bikenapped: Harvard student creates website to track bicycle thefts

Lulu Li grew up with the luxury of leaving her bike on the lawn in her hometown of Bridgewater, Mass. But after she left the nest, she learned the hard way that bike thefts are all too common. How did she cope? By creating 'Bikenapped.com' to keep tabs on bike bandits.

Recommend 0 Tweet 0 +1 0

After Harvard graduate student Lulu Li had not one, but two of her beloved bicycles stolen, she decided to take action.

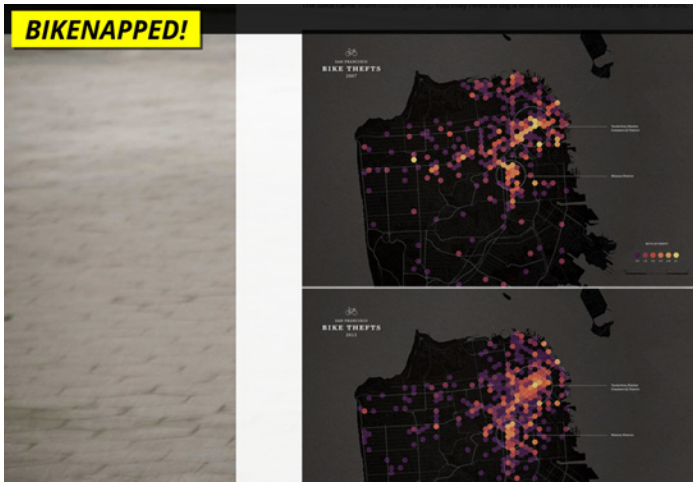
A little over a week ago, the 25-year-old design student launched Bikenapped.com, a website that allows cyclists to map the locations of bicycle thefts and share their stories. Scorned cyclists can also print a "Bikenapped" flyer to post at the location of the theft, warning other riders to take precautions.

"They steal everything from $3,000 bicycles to $20 beater bikes, but there is a sentimental value beyond the monetary value of a bike," said Li, who described her bike thefts as "traumatic."

Her first bike swiping happened when she was an undergrad at Yale University years ago. A thief made off with a bicycle her father had given her while in fourth grade.

"It was too big for me back then, but (my father) said I'd grow into it. I had it all those years and then it was just taken," she said.

On March 27 - yes, she remembers the exact date - now a Harvard grad student, her three-week-old bicycle was stolen.



"...You could instantly see where & when places were deemed dangerous to store or park your bike."

After creating a complete working prototype out of aluminum, I wanted to test out the different factors this plays with pedestrians. I staged a few “Bike Theft” instances in public. All of these staged thefts occurred in highly populated areas, two in Times Square, one in Herald Square and one in Columbus Circle.

Each instance we also asked pedestrians to fill out a survey to see what they thought of the situation, without giving them any information about what we were doing. What happened was very interesting. In a few cases people just stood in front of the paint, wondering what this was about. In other cases people stared at the paint, trying to understand. It grabbed a lot of attention.

DIFFUSE


SANDWICH SHOP
TEE BAR
Not Just Tees.
TEE BAR
Not Just Tees.


SANDWICH SHOP
TEE BAR
Not Just Tees.
TEE BAR
Not Just Tees.


OPEN
LOOP
NEW YORK
366
SHUT

After observing reactions and recording videos and pictures, I analyzed the reactions. It was interesting to notice the urgency people had with the exertion of paint. People are used to having graffiti all over the city, yet when it is in an unfamiliar setting, people become curious. I took the pictures of the thefts I staged and the outcome and continued to try to spread my survey to all my bike cycling teams and organizations I've been currently reaching out. Because of the success of having over 200 responses in my previous survey, I was hoping I would reach close to that amount.

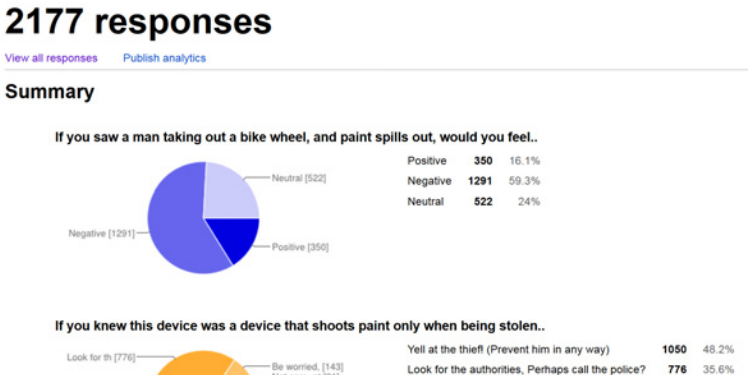
This new survey (Figure 13) included pictures and my design was more tangible and comprehensible to grasp. Because the Bike community felt strongly about theft, I always had unbridled responses I can depend on.

After 12 hours of sending out the survey online, it was viral and had over 2,100 responses. People all over were excited to see how this product could in fact do something in the field of bike theft. Some of them I physically asked pedestrians to fill out, but the chunk from the online popularity. It opened my eyes to just how needed this product is. It reached people internationally. My results very least enlightened the cycling community with the need for a different take on curbing bike theft, Diffuse. 59% of the 2100 said they believe the act they witnessed was a negative one, without any background of Diffuse. 83% claimed they would actively do something about it, from yelling at the thief to summoning the proper authorities, such as the police. When I told them, this product shoots paint when it's in the process of being robbed, 93% claimed they would be pro-active and do something about it.

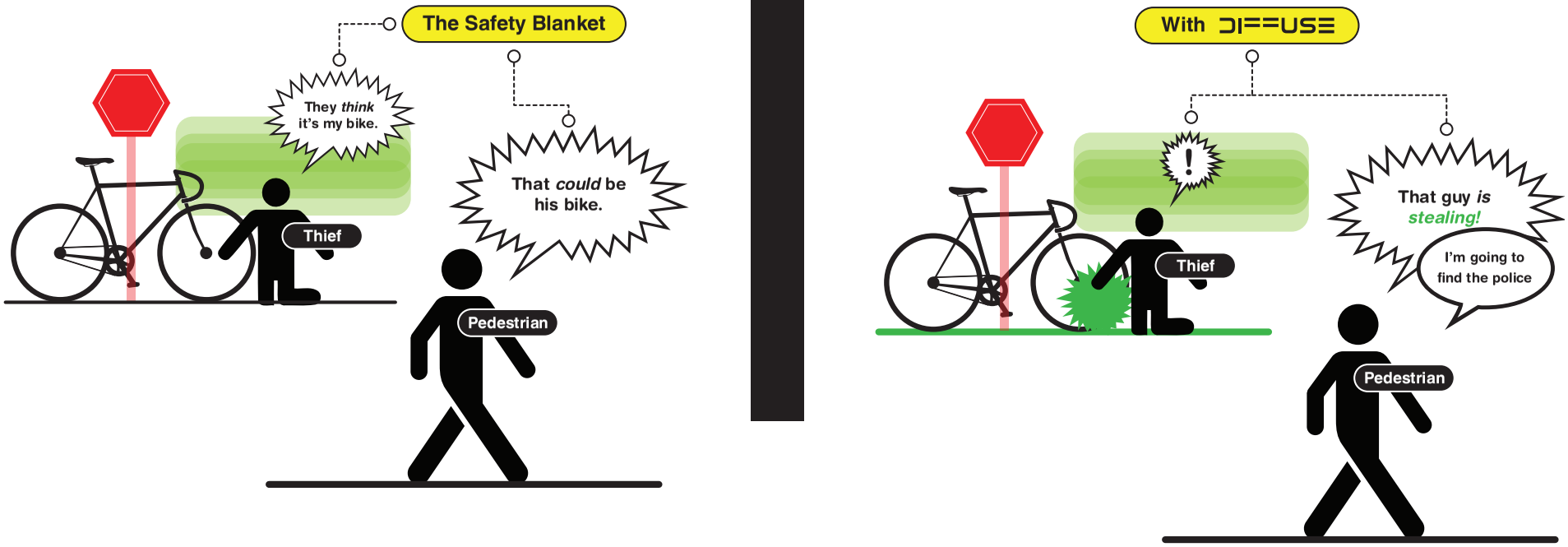
After the survey, I consulted with several bike shops in the city. I spoke to them a few times and kept them up to date with my project. But somehow, the store clerks and owners always seemed to not "get it" so I made graphics for them (***Included in the following pages)*** to better portray what Diffuse may have the ability to do. I've shown bike shops and authorized bike dealers and more than half claim they could see this in their shelves as an existing product.

"...half claim they could see this in their shelves as an existing product. "

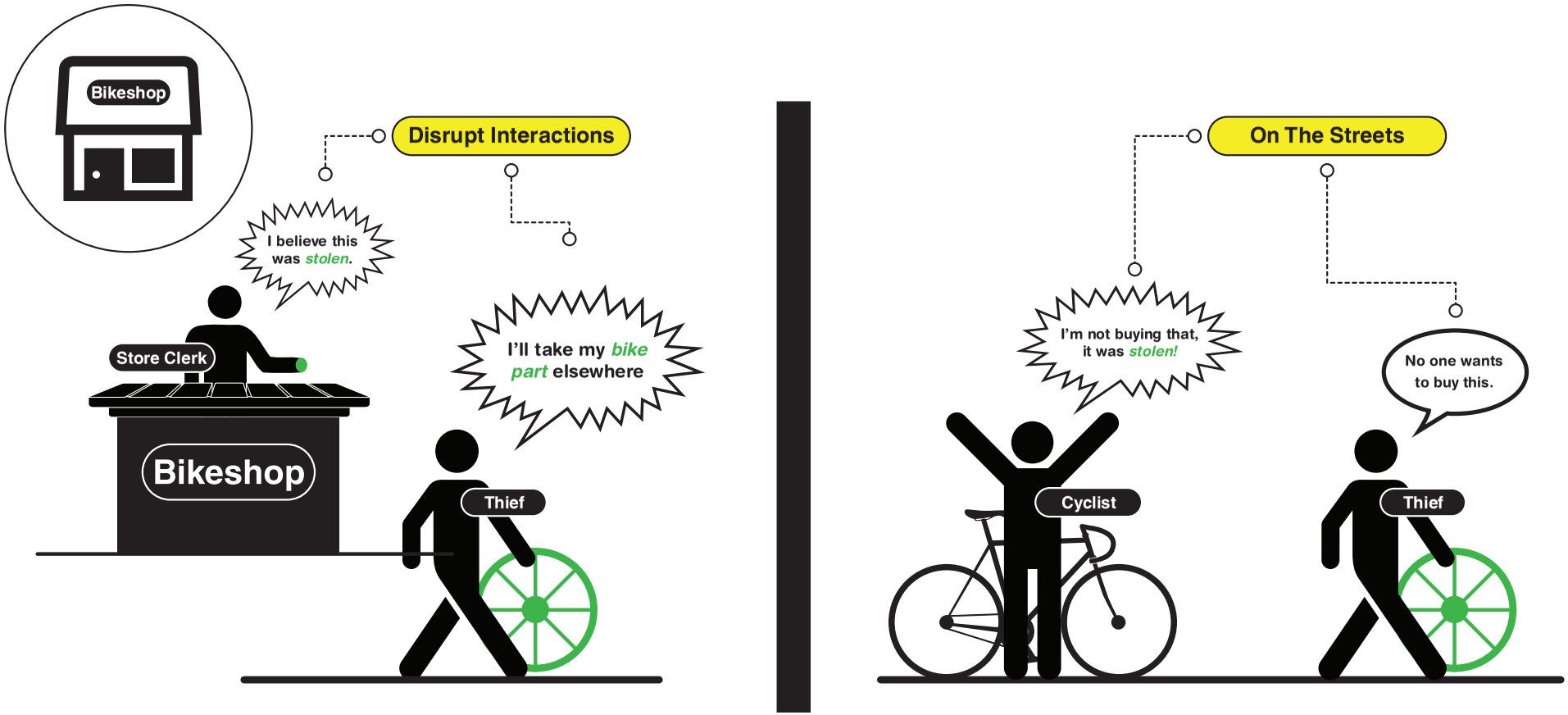
Figure 13.

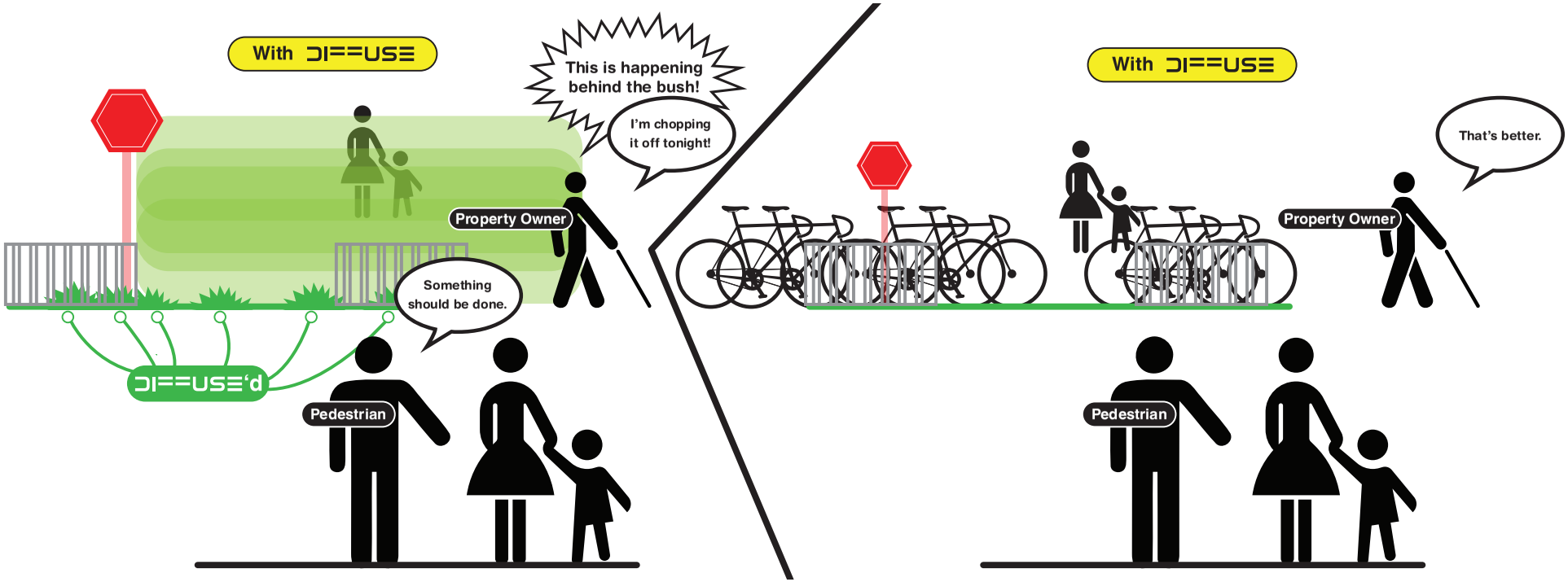


How it works


The Safety Blanket
They *think* it's my bike.
That *could* be his bike.
Thief
Pedestrian
With DIFFUSE
!
That guy *is* stealing!
I'm going to find the police
Thief
Pedestrian

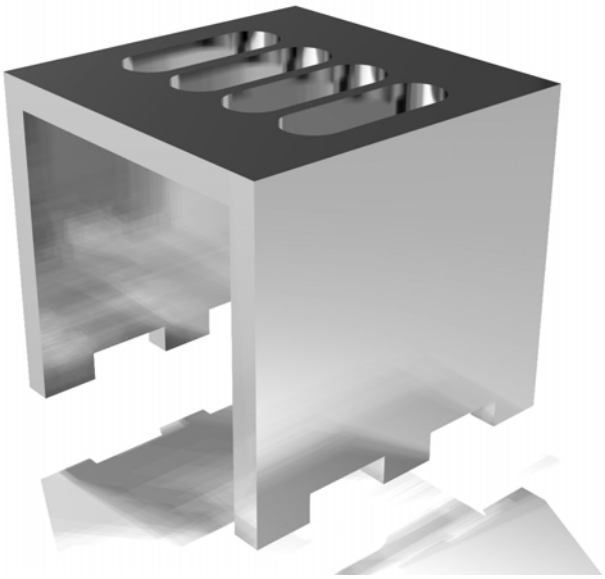
With DIFFUSE




With DIFFUSE
This is happening behind the bush!
I'm chopping it off tonight!
Property Owner
Something should be done.
DIFFUSE'd
Pedestrian
With DIFFUSE
That's better.
Property Owner
Pedestrian

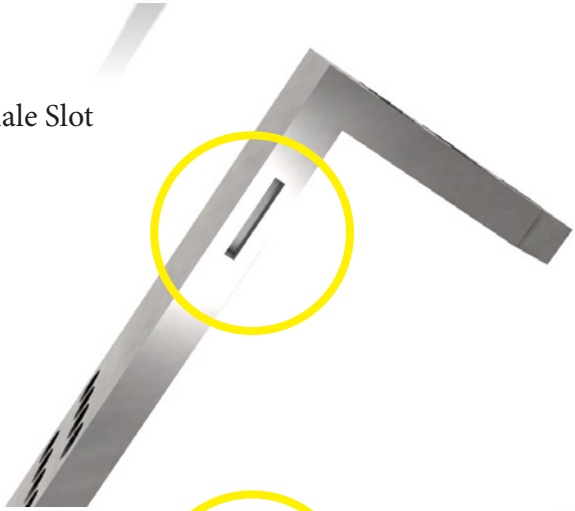
DIFFUSE

After using the product to steal the bikes there was some minor kinks to fix, such as how to make the exoskeleton (the part that's housing the paint-bomb) more smoothly in pulling the exertion pin from the paint-bomb without resistant. This needed me to design a hardware, an internal housing to position the nut and bolt that slides easily. (**First picture below**). This causes the mechanism to exert smoothly requiring even less force strength, comparing to before where one had to pull the door latch all the way down for the paint to be exerted, and this internal housing acting as rails.

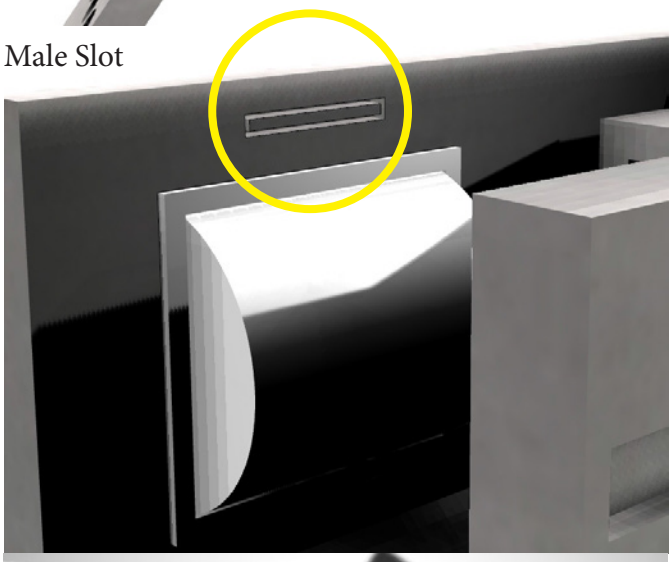


Other features I have included is a combination lock incorporated into Diffuse. Instead of using an external third-party lock. This lock works and is discreetly designed, it locks through the side.

Female Slot



Male Slot



DIFFUSE

This product has the potential to change the way we see bike theft, this takes a personal private problem into a public one, shared. To create change, and cause pro-active actions against it, which would otherwise not happen.