
Heroin

HARM REDUCTION BY DESIGN

BY

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INTRODUCTION

As of 2016, ninety-one Americans die every day from an opiate overdose.[1] The surgeon general, for the first time, released a report addressing substance use disorders. And in response to this report, Senator Markey of Massachusetts noted that it "fails to provide any detailed road map for how best to curb opioid addiction."[2] Drug overdose is the leading cause of unintentional death for Americans, exceeding that of car accidents and of firearms.[3] And it appears that no one in government knows exactly what to do about it.

The opiate overdose crisis is a wicked problem. In *Dilemmas in a General Theory of Planning*, Rittel and Webber define wicked problems as the societal problems that defy a scientific approach to solution. They are addressed by planners who decide on issues like "the location of a freeway, the adjustment of a tax rate, the modification of school curricula, or the confrontation of a crime."[4]

Rittel and Webber articulate ten distinguishing properties of wicked problems, the first being that wicked problems have no definitive formulation. For example, even with a consensus that the number of opiate overdose deaths should be decreased, does that mean the access to opiates needs to be decreased? Should this involve making more types of opiates illegal, rationing doctors' prescriptions, or making opiates more expensive? Would this type of intervention reduce addicts' use or simply increase their legal and financial hardships? Would the latter potentially increase the rate of overdoses? This manner of questioning could continue indefinitely. In the words of Rittel and Webber, "the formulation of a wicked problem *is* the problem!"[5]

Donella Meadows identifies drug addiction (along with war, poverty, and environmental degradation) as persistent problems because "they are intrinsically systems problems—undesirable behaviors characteristic of the system structures that produce them."[6] This is to say, drug addiction is not an entity which needs to be eradicated, but rather a discrepancy "between the state of affairs as it is and the state as it ought to be."[7]

The challenge then is not to find the fundamental cause of the opiate crisis. Rather, it is to comprehensively understand the system it afflicts. But, for a wicked problem, "the information needed to *understand* the problem depends upon one's idea for *solving* it… Problem understanding and problem resolution are concomitant to each other."[8] The people, objects, and interactions relevant to understanding the opiate crisis are those which might be influenced in some way, large or small, by attempting to solve it. For all wicked problems, the category of things one might influence is potentially boundless. "It is then a matter of *judgment* whether one should try to enlarge the available set [of potential solutions] or not. And it is, of course, a matter of judgment which of these solutions should be pursued and implemented."[9]

Though Rittel and Webber claim to be discussing issues of planning, they are also discussing design. At a fundamental level, designers research a given context to uncover opportunities for intervention. They then—implicitly or explicitly—level a social critique, judging if there is a discrepancy between the system's current state and a preferred state. Through various practices, methods, and approaches, designers work to bring a preferred state to fruition.*

To deal with the unbounded scope of wicked problems, it is essential for designers to work across disciplines—both across traditional design disciplines and across disciplines typically unrelated to design. Design is not a process exclusively available to a small group of experts, but to everyone.† Looking beyond traditional practices, designers can find inspiration from diverse precedents, conceptualize entire service offerings, and better balance the needs of diverse stakeholders.

Following in-depth research, the design project described here took the approach of

* This process, more commonly, applies to design projects that address problems of a smaller scale than drug addiction and overdose. Designing for a restaurant, for example, involves contextual research regarding the restaurant's needs, the clientele, and relevant regulatory measures. The social critique might suggest that the restaurant should increase their profits or that customers should have greater access to nutritional information. This then might be enacted through redesigning the restaurant's website.

harm reduction. That is, rather than exclusively encouraging opiate addicts to cease their drug use, design was employed to support addicts in making healthier decisions (even if they continue to use drugs). Prototypes included: a syringe exchange membership for the general public that would decrease stigma; the Good Samaritan Kit, which would help prevent and reverse overdoses; and, BlueGuard, a product-service system designed to protect drug users from overdose and connect them to counseling.

Designers must become leaders in addressing America's opiate crisis. The design-led project described here is one attempt at addressing this public health issue; undoubtedly other projects could take very different forms. But, more important than the specifics of their approach, they need to start soon.

† Ezio Manzini characterizes the situation as follows: "Everybody can run, but not everybody takes part in the marathon, and few become professional athletes... Similarly everybody is endowed with the ability to design, but not everybody is a competent designer and few become professional designers. Here lies the definition of a field of possibility for those who design, between the two poles of *diffuse design* and *expert design*..."[10]

THE CONTEXT

This is a summary of one potential understanding of the opiate crisis. Much more could be included and the things that have been included here could be characterized differently. This is not meant to be a definitive account, but rather a catalog of findings that helped uncover potential design opportunities.

History

The history of opiates in America is as long as the history of modern America itself. Doctor Fuller, a Pilgrim aboard the Mayflower, landed on Virginia's shores in November of 1620. His medicine chest included paregoric, opium in tincture form, and laudanum, opium dissolved in wine. Other than alcohol, opium was the only substance known to substantially reduce pain at the time.[11]

By the mid-1800s, some doctors referred to opium as "God's Own Medicine." Americans were, often unknowingly, addicting themselves and their children to opium-based patent medications like Mrs. Winslow's Soothing Syrup.[12] Many consumers were unaware of this, as no labeling regulations existed at the time. The average opiate user or habitué, as she would have been known at the time, was a Caucasian, middle or upper class woman in her thirties.[13] A woman of this era wrote anonymously,

> I am the last woman in the world to make excuses for my acts, but you don't know what morphine means to some of us, many of us, modern women without professions, without beliefs. Morphine makes life possible. It adds to truth a dream. What more does religion do? Perhaps I shock you. What I mean is that truth alone is both not enough and too much for us. Each of us must add to it his or her dream, believe me. I have added mine; I am really morphine mad, I suppose, but I have enough will left not to go beyond my daily allowance.[14]

Meanwhile, Germany witnessed the birth of heroin and what would become the modern pharmaceutical industry. Bayer Pharmaceutical released heroin, named for its "heroic" properties. Shortly after, the company released another painkiller, Aspirin. The two were aggressively marketed to doctors. The distribution of the "Bayer Bible" (as it was informally known) to every doctor in Germany was a particularly cunning marketing technique. This book contained pseudo-objective descriptions of all medications in use at the time, while touting Bayer products in particular. Their marketing efforts proved extremely effective.[15]

Around this time, American xenophobia was particularly focused on the Chinese. The Chinese Exclusion Act, signed into law by President Arthur in 1882, effectively halted Chinese immigration for ten years and prohibited Chinese immigrants from becoming US citizens.[16] The negative stereotype of the Chinese became manifest in drug policy as well. The San Francisco authorities learned upon investigation that "many women and young girls, as well as young men of respectable family, were being induced to visit the [Chinese] opium-smoking dens, where they were ruined morally and otherwise." The city, accordingly, adopted an ordinance prohibiting the smoking of opium in smoking-houses or "dens."[17] The nascent film industry reinforced these stereotypes as well. Thomas Edison produced a number of films that vilified Chinese opium users such as *Chinese Opium Den*, *Rube in an Opium Joint*, *Morphia — The Death Drug*, and *The Devil's Needle*, among others.[18]

Further, there is evidence that the medical community was starting to understand opiate addicts as contagions themselves. In 1916, a doctor stated that "a fruitful source of opium and morphine addiction is the presence of one mischievous person who is a confirmed habitué. I have known a whole neighborhood to be infected indirectly by a single individual of this character."[19] Richmond Pearson Hobson, after his Congressional career, was instrumental in creating images of the "Dope Fiend" in the public's mind. He wrote that, in order for an addict to supply his need, an addict will "lie, steal, rob if necessary, commit murder. Heroin addiction can be likened to contagion… Drug addiction is more communicable and less curable than leprosy. Drug addicts are the principle carriers of vice [and] diseases…"[20]

The beginning of the 20th century saw a substantial increase in American drug regulation. The passage of the Food and Drug Act in 1906, which prohibited the interstate commerce of adulterated and misbranded food and drugs,

established what would become the regulatory function of the modern day Food and Drug Administration.[21] The Harrison Narcotics Act went into effect in 1915, essentially limiting the sale of opiates to medical professionals. The law specified a doctor could provide opiates "in the course of his professional practice only." As addiction was not considered a disease, doctors were prohibited from prescribing opiates to addicts who were seeking to avoid withdrawal symptoms.[22]

So, instead, opiate addicts turned to the black market where, on one account, the cost of heroin went from $6.50 to $100 per ounce.[23] Addicts moved from intranasal use to intravenous use to achieve a stronger effect from the cheaper, adulterated heroin available on the black market. Partially in response to this, a law was enacted in 1924 that prohibited the importation of heroin, even for medicinal use. A professor of sociology, Alfred R. Lindesmith, wrote in 1940,

> Solemn discussions are carried on about lengthening the addict's already long sentence and as to whether or not he is a good parole risk. The basic question as to why he should be sent to prison at all is scarcely mentioned. Eventually, it is to be hoped that we shall come to see, as most of the civilized countries of the world have seen, that the punishment and imprisonment of addicts is as cruel and pointless as similar treatment for persons infected with syphilis would be.... The treatment of addicts in the United States today is on no higher plane than the persecution of witches of other ages, and like the latter it is to be hoped that it will soon become merely another dark chapter of history.[24]

Nevertheless, the strengthening of drug laws continued. In 1956, heroin was declared contraband.

Throughout the 20th century, doctors became increasingly wary of prescribing opiates as painkillers, a phenomenon which came to be known as "opiophobia."[25] This reluctance largely changed after 1996, when the pharmaceutical company Purdue released OxyContin, an opiate painkiller. Like Bayer, Purdue made a successful marketing effort directed at doctors. In 2001 alone, over seven million OxyContin prescriptions were written.[26]

In 2007, Purdue and three of its executives pled guilty to criminal charges of misleading regulators, doctors, and patients about the drug's risk of addiction and its potential to be abused. Purdue paid $600 million in fines and other payments; the three executives paid out a total of $34.5 million while claiming no responsibility for the "misbranding."[27] Needless to say, the court settlement (a small percentage of the total profits yielded from OxyContin sales) didn't put an end to opiate abuse. By 2012, an estimated 2.1 million people in the United States were suffering from substance use disorders related to prescription opioid pain relievers.[28]

History demonstrates how, paradoxically, one of America's most vulnerable populations is simultaneously one of its most vilified.

Acquisition, Usage, and the High

Opiates are acquired through a variety of channels, quantities, and forms. Prescription pills may be acquired from legitimate doctors' prescriptions. Some users seek out doctors who are willing to write prescriptions. (This process is known informally as "doctor shopping." Doctors who generate a large amount of prescriptions are known as "pill mills.") Many of these pills are then transferred to those not legally allowed to obtain them. This process, called diversion, may involve gifting, thievery, or sale.[29] Users may sell legally acquired prescription pills to purchase a greater quantity of heroin. Others may sell some of their pills as a means to afford the total cost of their prescription.

Both natural and synthetic opiates are manufactured illegally. For instance, some fentanyl (a synthetic opiate which can be highly potent and therefore more easily trafficked) is illegally manufactured abroad before being sold in America. By contrast, poppy seed tea can be made naturally and at a low cost.

Heroin is an inexpensive opiate purchased in the form of a black tar and, more commonly, brown or white powder. It may be mixed with cheap adulterants (such as sugar or baking soda), as this allows the dealer to reap a higher profit. Heroin may also be laced with fentanyl, creating an unexpectedly potent dose. Heroin is often sold in $5 to $10 units packaged in small bags, branded

with a unique stamp, or in vials with colored caps. The identifiers on the container allows users to differentiate batches and potentially find the supplier of a particular product. Opiates can be acquired on the dark web in exchange for cryptocurrency like bitcoins. On some online message boards, people exchange phone numbers to find new dealers.

There are a wide variety of opiate drug dealers. Someone may coordinate the transportation and sale of large amounts of fentanyl internationally, while another might share legally acquired pills with his or her romantic partner. A heroin dealer might find new customers on the internet. And pain doctors with questionable ethics might legally provide prescriptions to patients they know will not be their ultimate user.

Seventy five percent of heroin users started by using prescription opiates.[30] Opiates can be consumed orally, snorted intranasally, or injected intravenously. Users may build up a tolerance to oral consumption and then move to snorting or injecting drugs. First time intravenous user may have a friend or a trusted confidant (who might be paid) inject for them.[31] Intravenous users face additional health risks. For instance, reusing needles makes them dull and sharing needles carries a significant risk of transmitting disease.

To prepare for intravenous injection, it is best practice for heroin users to mix their tar or powder in water, boil it, and then draw it into a syringe through a cotton swab. This process, which can be done with a spoon and a candle, kills bacteria and removes impurities from the mixture. Users may temporarily limit blood circulation with a belt (or a similar tool) to make veins more visible. This belt is then removed, typically with one's mouth, just before injection.

The high induced by opiates, sometimes described as "nodding out," sedates the user by causing respiratory depression. Side effects from opiates include nausea, vomiting, itchiness, constipation, and the inability to achieve an orgasm.

Michael Clune, English professor at Case Western Reserve University and former heroin addict, describes his first high as follows:

> A single cloud moved through the blue sky. I was on my back looking up. My eye was a glass box and inside it there was no time. I kept the cloud inside it. I wish I could show it to you. I never imagined this could happen. A breath entering my nostrils coiled over the nerves, losing all dimension. This was the end of desire. The end of wanting. The end of fear. The end of desire...[32]

Addiction and Withdrawal

Many users experience strong cravings for more opiates after they use them for the first time. For Clune,

> The addict, alone among humans, is given something that is always new. It's not the feeling of doing the drug that stays new. The drug high starts to suck pretty quickly. Pretty soon it sucks so bad you quit. Never again. Then you see a white top. Or even imagine you're seeing one. And it's the first time you've ever seen it. Addiction is a memory disease. Memory keeps things in the past. Dope white is a memory disruption agent.[33]

Physiological withdrawal symptoms include vomiting and diarrhea. Though withdrawal cannot kill, these symptoms can lead to dehydration which can, in extreme situations, cause death.[34] Clune describes withdrawal as follows:

> The purely physical symptoms of withdrawal are unpleasant, but they don't come close to explaining the relapse rate. Just try to put yourself in my shoes. You do the last of your dope and barricade yourself in your shitty apartment, saying "Never again!" About ten hours later your sense of who you are goes. A couple hours later your sense of where you are breaks down. Then your sense of why the hell you're kicking disappears. Plus you feel like you've got the flu.[35]

Opiate users who wish to reduce or stop using may first use maintenance drugs, such as methadone or buprenorphine. These opiates are available legally through clinics in some locations throughout the United States, but access is

limited and wait lists can be long.[36] Methadone and buprenorphine are also sold illegally. Kratom is a natural opiate substitute sometimes used to palliate withdrawal symptoms.

Overdose and Reversal

If taken in excess, the respiratory depression caused by opiates can lead to death. Overdoses can be identified by the opioid overdose triad, consisting of pinpoint pupils, unconsciousness, and respiratory depression.[37] Because overdoses resemble a strong high, they are sometimes difficult to detect. When an overdose occurs from the use of prescription pills, paraphernalia may not be present. In this case, an inexperienced observer is even less likely to understand that he or she may be witnessing a life threatening situation.

Opiate overdoses can be unexpected, as the appearance of a substance does not make evident its potency. It is a best practice among users to take a test shot (i.e. an injection of a very small amount) of a new product to gauge its strength. But, some synthetic opiates are so potent that even a small amount can be fatal. Heroin purity tests are available for purchase online. These tests involve adding a drop of a chemical to a measured amount of the substance in question. The mixture will then turn orange, with a deeper shade of orange indicating higher potency. It is currently unknown if these successfully test for all synthetic opiates.

Risk of overdose increases when opiates are used in conjunction with other depressants such as alcohol. Environmental factors have an impact as well; use in an unfamiliar place makes opiates effectively more potent.[38] Anecdotally, some attribute an episode of increased rates of overdose to former Mayor Giuliani's closure of New York City flop houses, as addicts were forced to use in new environments.

Opiate overdoses are reversible. A sternum rub can, in less dire situations, bring someone back from overdose. However, if the victim of overdose remains unconscious, naloxone, available as an intramuscular injection or a nasal spray, can be used to reverse the overdose. The chance of naloxone successfully reversing an overdose decreases rapidly with the passing of time.

Naloxone access varies across America. EMTs and firefighters are trained in its use. In some municipalities, firefighters are reversing overdoses more frequently than fighting fires. In certain states, naloxone is available from pharmacies over the counter. Philanthropic efforts have been made by the Clinton Foundation to donate and distribute thousands of doses. In states where naloxone is illegal to purchase, it is distributed by underground syringe exchanges and safety-conscious users. Naloxone can also be purchased on the "dark web" with cryptocurrency. (Some "dark web" marketplaces don't collect a fee from these transactions as they, like drug dealers, have a financial interest in the survival of their customers.)

Experiencing an overdose reversal with naloxone is not pleasant. Physiologically, it is as if someone is being put instantly into withdrawal. The discomfort is correlated to the amount used. Anecdotally, experienced users and underground syringe exchange workers are more likely to use small doses of naloxone and repeat if the person remains unresponsive, whereas EMTs will "blast" those they believe are overdosing. The discrepancy is sometimes attributed to a potential resentment on the part of the emergency responders.

A myth pervasive among some users is that injecting milk will reverse an overdose. And a myth spread among the general public by the press regarded "Narc me" parties. In these parties, addicts would allegedly use more recklessly knowing that a friend with naloxone is present.[39] There appears to be no corroborating evidence of such a trend and an understanding of the physiological effects of naloxone makes the suggestion of its use for recreational purposes highly suspicious.[40]

Broader Implications

The effects of opiates, large and small, can be seen across many socio-economic aspects of America. As discussed in the introduction, the opiate crisis is a systemic issue. Accordingly, the relevant context is potentially boundless.

For instance, the children of parents who have opiate addictions can suffer immense consequences. Lucas County in Ohio is aiming to more than double its number of foster families to cope with a 20% increase in the number of children removed from parental custody in 2016 alone. Opiates are the main cause of this increase when measured state-wide.[41]

Meanwhile, those educating the next

generation of dentists grapple with how best to teach their students the appropriate situations to prescribe opiates. Dr. Elliot Hersh, a professor of pharmacology and oral surgery at the University of Pennsylvania School of Dental Medicine, regularly brings in a retired narcotics officer to address his class of dental students. Hersh says, "I've been teaching my students that you have to be really, really careful with these drugs… that if you write too many of these prescriptions, for either good or bad intentions, either the state dental board and/or the DEA [Drug Enforcement Agency] is going to come down on you."[42]

Purdue, the pharmaceutical company that created OxyContin, sponsored content on *The Atlantic*'s website titled "A Brief History of Opioids" in what was presumably a public relations effort. This interactive timeline featuring thoroughly sourced research tells a different story than the one presented here. In the 1990s, they claim, "the undertreatment of pain was the catalyst for clinicians and pain societies to successfully lobby for increased use of opioids for all pain types, including non-cancer pain."[43] That Purdue's own efforts—like those behind this literal rewriting of history—played a part in the successful lobbying efforts is conveniently omitted.

As OxyContin sales began to fall in 2011 due to public health concerns, the Sackler family, which owns Mundipharma (an international network of pharmaceutical companies including Purdue), began pushing more vigorously into international markets. While the U.S. Surgeon General Vivek H. Murthy warned his peers abroad to "be very careful" and learn from America's "missteps," a video from Mundipharma stated that they are "only just getting started."[44]

International Comparison

Regardless of how one feels about American exceptionalism in relation to public policy, it is difficult to dispute the value of seeking design inspiration abroad. Though other countries may have very different drug use patterns, social norms, and economic circumstances, they make clear that there are many other ways to approach the opiate crisis than America's current strategies.

For instance, the United Kingdom is looking into following the footsteps of many other countries by opening a supervised injection site. Here, opiate users could inject with sterile equipment under the supervision of a trained nurse. As heroin can be legally prescribed in the United Kingdom, users would be able to procure drugs with a confidently known potency and purity, along with easy access to counseling services.[45]

On the other hand, in Burma, one of the world's top producers of opium, heroin is very inexpensive and use is rampant. In the Burmese village of Myitkyina, a vigilante group of anti-drug Christians forcibly takes addicts to rehabilitation centers that enclose them behind high fences and barbed wire.[46] This group, with the assistance of local police, has entered into violent confrontations when attempting to destroy poppy fields. Their opposition consists not only of villagers, who rely on the crops to sustain themselves, but potentially of military forces as well.[47] Similar to the situation regarding marijuana in America, public and private stakeholders disagree both between one another and among themselves, leading to very unconventional situations. Economic, religious, moral, political, and legal factors all contribute to the complexity of this issue.

THE SOCIAL CRITIQUE

Insofar as the context articulates one understanding of the system, a designer must then level a judgment upon the system when deciding how to intervene. In other words, to echo Rittel and Webber, a designer must not only have an understanding of how the world *is*, but also how it *ought* to be.

Critiquing this particular context is, in some sense, relatively easy. Unlike, for example, leveling a critique of capitalism (which might first require clarity on its definition and the imagining of alternatives), it is rather easy to imagine what one means by "drug abuse" and what a world without it might look like. In other words, it's easier to get consensus that "the opiate crisis is bad" than "capitalism is bad."

But, beyond this point, complexities are revealed and consensus becomes difficult to achieve. Reducing overdose deaths may be a generally agreed upon goal, but it is not evident whether this requires an increase in naloxone access, greater law enforcement, or something else altogether. Even these possibilities require greater specificity to enact, and those specifics

may result in unintended negative consequences as well.

For a designer, the social critique need not be a comprehensive, rational argument that reduces a complex problem to its root cause. Nor must it be a compromise between the different stakeholders within a system. Rather, a designer's social critique is an articulation of principles which guide his or her research and the making process. The following articulates a social critique which was embodied in this project and, as with the context above, is just one of many that could be brought to bear on this wicked problem.

Health Issue or Criminal Issue?

When assessing the current condition of this topic (from a historical, international, or ethnographic perspective), America's failure can be summed up rather easily: the opiate crisis is a healthcare issue that is currently being treated as a criminal justice issue. Those struggling with addiction need to be cared for, not arrested. This is not to say that those who commit crimes when attempting to satisfy their addiction are innocent. Rather, these crimes might be avoided altogether if, for instance, access to opiate maintenance therapy were increased.

During the most recent Presidential campaigns, this was actually a point of agreement among the Democrats. Bernie Sanders said outright, "I would recognize that substance abuse and drug addiction is a health issue, not a criminal issue."[48] Hilary Clinton's platform included a more qualified version of a similar sentiment: "Prioritize rehabilitation and treatment over prison for low-level and nonviolent drug offenses and end the era of mass incarceration."[49]

By contrast, the ultimate victor of the 2016 presidential election, Donald Trump, felt that illegal immigration was at the root of the problem:

> Not only will a wall keep out the dangerous cartels and criminals, but will also keep out the drugs, remember New Hampshire, and the heroin poisoning our youth. Our youth is being poisoned before they get a chance.[50]

Trump's views are in keeping with the predominate strategy currently employed by the American government: supply reduction. Supply reduction involves law enforcement officials, and occasionally military personnel, attempting to disrupt the manufacture and distribution of illegal drugs with force. Many have deemed this "war on drugs" a failure.[51]

The criminal status of opiate use, sale, and possession—as well as the possession of paraphernalia—has compounded the stigma surrounding this issue. To help a heroin user is, literally, to help a criminal. (Not all are deterred by this. Some outreach workers offer their services in prisons.)

By understanding drug use as an issue of healthcare, the case for legalizing drugs might be better understood. Some might expect drug legalization to result in a bacchanalian riot erupting in the streets. But people do not partake in many illegal activities for reasons other than their legal status. Further, the criminalization of drugs does not make them disappear; rather, it creates a system that cannot be regulated. Perhaps an even worse effect of criminalization is that those addicted to illegal substances are fearful of accessing support because of the substance's illegal status.

By critically reframing this issue as one of healthcare rather than criminal justice (even though the law does not reflect this), opiate addicts can be understood not as hedonists recklessly seeking pleasure, but as vulnerable people in need of medicine to treat the sickness of withdrawal. A user of methadone receiving his or her supply from a government-sanctioned clinic may be considered a patient; someone who purchases methadone that has been illegally resold from that same clinic is a criminal.

Why would someone knowingly *choose* a life in which they are burdened with an expensive addiction based on a physiological dependency? One might take the Platonic view on the matter: no one knowingly pursues what one thinks to be evil over what one believes to be good.[52]

Harm Reduction

A shift in perspective—from understanding opiate addiction as a health issue rather than a crime—is concomitant with a shift in understanding users themselves as being in need of healthcare rather than being morally destitute. Once this shift is made, another complicated series of questions arise regarding how specifically one might operationalize this.

A member of the Coast Guard protects contraband seized during an interdiction in the Caribbean Sea.

Throughout American society, the disease model of addiction is prevalent. That is, addiction is understood as pathology, like diabetes or pneumonia, which might be treated or, ideally, cured. Though this understanding of addiction is certainly better than that of moral failure, there is now an effort to promote a different understanding. Rather than seeing substance abuse as an illness that afflicts some but not others, one might instead understand anyone's use of a substance on a scale that captures the level of impairment or distress the use is causing. This change in perspective is best captured by an update to the *Diagnostic and Statistical Manual of Mental Disorders*, the American Psychiatric Association's classification and diagnostic tool. The manual's fourth version listed "substance dependence" and "substance abuse" as two discrete disorders. In 2013, the fifth version of the manual was released in which these two diagnoses were replaced with "substance use disorder" which involves a severity spectrum.[53]

This shift in perspective has important implications for counseling strategies. Under the disease model of addiction, a focus on abstinence makes sense; once addicts stop using substances altogether, they have been effectively cured of their disease. This might occur due to a user's sheer force of will, social pressures, counseling, or some other type of intervention. The focus is on whether someone is ingesting a substance and less on the broader circumstances this use might be occurring in (or the consequences of this use). For instance, Narcotics Anonymous, an abstinence-focused organization, emphasizes the amount of time their members remain "clean."[54]

But if one understands harmful substance use outside of a binary, there are many more opportunities to encourage healthier practices among drug users (beyond encouraging the cessation of use). This alternative perspective is known as harm reduction. The National Harm Reduction Coalition defines harm reduction as "a set of practical strategies and ideas aimed at reducing negative consequences associated with drug use. Harm Reduction is also a movement for social justice built on a belief in, and respect for, the rights of people who use drugs."[55] Other than supporting users who wish to abstain from use, some goals of harm reduction (in relation to opiates) include:

- Reducing the spread of disease
- Preventing and reversing overdoses
- Reducing the amount and frequency of use
- Encouraging safer methods of use
- Increasing access to counseling services
- Encouraging proper vein care
- Reducing the stigma surrounding opiates

As a strategy, harm reduction assumes that drug users are not always engaging in the safest or healthiest behaviors because they lack the necessary resources (educational or otherwise). Generally, drug users (and their suppliers) do not want themselves or others to be in poor health. The harm reduction approach not only provides a more holistic understanding of drug users' lived experiences, but it also opens up many potential opportunities for design.

Racial Justice

The "War on Drugs" has been deeply interwoven with racial justice issues in America. Opiates have earned much of their stigma for being associated with the "Yellow Peril," a xenophobic ideology prominent in the early 20th century that suggested Asians were a threat to Western culture. Also, one longstanding theory suggests that cannabis was dubbed "marijuana" by narcotics agents so that it would sound more Mexican and, therefore, more sinister.[56] And until 2010, federal penalties for crack cocaine were one hundred times harsher than that of powder cocaine. Although they are pharmacologically the same drugs, the former (cocaine with added water and baking soda) is more predominate in minority communities.

History aside, statistics show that the "War on Drugs" is still disproportionately affecting racial minorities. As the Drug Policy Alliance clearly articulates: "Although rates of drug use and selling are comparable across racial lines, people of color are far more likely to be stopped, searched, arrested, prosecuted, convicted and incarcerated for drug law violations than are whites."[57] It is sometimes difficult to establish a causal relationship between racist motivations and drug policy, but recent history has made it a bit easier.

In the last decade, 90% of people who tried heroin for the first time were white.[58] It is only after this demographic shift that

politicians are beginning to take notice and more compassionate policies are rolling out. In Gloucester, Massachusetts, for example, heroin users who go to the police station to request help, even with drugs and needles in their possession, are no longer arrested.[59]

"It is hard to describe the bittersweet sting that many African-Americans feel," writes Ekow N. Yankah, a professor at Yeshiva University, "witnessing this national embrace of addicts."[60] Carl Hart, associate professor of psychology at Columbia University, puts it bluntly: "let's be clear, "rural" means we're talking about white folks."[61]

Accordingly, the relationship between issues of race and issues of drug use have only become more complicated. For instance, racism has, in some ways, actually mitigated this public health crisis for some minorities; studies show that doctors are less likely to prescribe painkillers to minority patients, worrying that they might sell them or become addicted.[62]

Both drug policy reform and design for drug users will inevitably have racial implications. It is crucial to remain sensitive to these considerations. In doing so, not only might interventions be more successful, they might also help to achieve greater racial justice throughout society.

Economic Justice

History has also demonstrated that the profit motive of pharmaceutical companies played a large role in the recent increase of opiate addiction and overdose death. Between 1990 and 2011, prescriptions for opiates increased tenfold.[63] Yet, there is no evidence of a corresponding increase in need for painkillers over this time period.

Unrestrained corporate greed can have deleterious effects on society, and this can literally become a matter of life and death when it is involved in the healthcare system. Even as government regulation and public health efforts successfully inhibit overprescription in America, multinational pharmaceutical corporations can simply shift their efforts to markets where they will be able to yield greater profit.

There are many alternatives to the present system. They need not be as radical as complete state-control of the medical industry. A government-provided health insurance option for the entire American population has been proposed recently, though its implementation seems unlikely for the time being. If universal insurance were to cover, for instance, methadone clinics and treatment counseling, providing these services might become more profitable. Paired with the policies that disincentivize the overprescription of opiates, market forces might be leveraged to benefit those struggling with opiate addiction.

Policy aside, designers ought to contemplate when and where a profit motive should be curbed due to moral considerations. This is true for both large corporations and individual "street" drug dealers. The social and moral decisions of individuals within corporate America are unique from the everyday and can lead to detrimental outcomes for the public.[64] The events leading to Purdue's guilty plea in 2007 are just one example of this. Yet, society typically does not vilify individual employees, as they do low-level drug dealers. Dealers (who may make little money and have few other opportunities for employment) are part of much larger international business operations.[65] Like the employees at Purdue, individually they have little agency over the workings of the broader system.

This is not to indict Purdue Pharma's janitor, nor to exculpate someone selling heroin. Rather, this is to encourage designers to make judgments regarding the value of individuals' work (independent of their salaries or legal status) and consider why they are performing such work. Designers will then be better equipped to decide which stakeholders they might partner with and potentially benefit when addressing this, or any, wicked problem.

Caregiving Through Making

Designers should not only make critical judgments about the world to guide their work, but also be critical regarding their role when intervening. After all, designers—through both their research and the deploying of prototypes—become a part of their target context themselves.

Designers might be understood as people who make things, whether this involves the actual fabrication of physical objects or, intangibly, "making things happen." Accordingly, they are put on a pedestal in the modern economy. A worker in a shoe factory (the modern version of a cobbler who would have crafted shoes of his or her own design) has a job that few would dispute deserves

compensation. A technology entrepreneur who automates processes that occur in these factories is essentially an industrial designer. He or she would be expected to receive a very generous compensation package. But as society looks towards a future with increased automation, society must also reevaluate what sort of work it values and why. David Graeber suggests society should move towards "a labor theory of value that starts with women's work, caring labor, as the paradigm."[66]

Caregiving might be understood as antithetical to making. Debbie Chachra, a professor at Olin College of Engineering, writes "The cultural primacy of making, especially in tech culture—that it is intrinsically superior to not-making, to repair, analysis, and especially caregiving—is informed by the gendered history of who made things, and in particular, who made things that were shared with the world, not merely for hearth and home."[67] The general sentiment expressed here is correct. But, more importantly, Chachra points out that it is possible to make things for the more personal realm, that which the "hearth and the home" symbolizes. In other words, to present caregiving and making as a dichotomy would be misguided.

Designers can make things explicitly for caregiving. Designing systems which automate jobs might ultimately allow society to be provided for materially while giving individuals more time to spend with their families. Design interventions might remind people to take better care of themselves and help them do so more effectively. Designers might help individuals build strong connections between people who care for one another, and provide them with resources they might need to do so. These examples are meant to illustrate the principles motivating this design project and, hopefully, more design projects in the future.

PRACTICES, APPROACHES, AND METHODS

Harm reduction involves providing opiate users with care, even if they do not cease their use. For this reason, harm reduction is sometimes positioned as opposed to abstinence. But this would be mistaken; ceasing use would typically reduce the harm a substance use disorder inflicts upon a user. Accordingly, if harm reduction can be understood as a broad strategy that includes abstinence as one among many goals, a crucial debate centers around what practices, approaches, and methods might be used to achieve such goals.

A study of history and the experiences of opiate users suggests it is impossible to create a disincentive to thwart drug use that is stronger than the grasp of opiate addiction. If this is the case, rather than employing force and ostracism, society must ask how opiate users might best be cared for. This is the question that the design project described here set out to address.

This design project roughly followed the UK Design Council's Double Diamond model.[68] In the first, generative discover phase, in-depth research was conducted across as many aspects of harm reduction and opiate use as possible. This was performed without an intention to discover solutions, but rather to gain the most holistic understanding of the system as possible. In a define phase, the project focused more specifically around the experiences of opiate users themselves and opiate overdoses. A variety of design concepts were developed through prototyping and online surveying. Learnings were then incorporated into the delivery phase, which resulted in a proposal and functional prototype of a product-service system.

Secondary Research

Mind Map

Secondary research began with the creation of a mind map. A mind map is a diagram of concepts that visually organizes information. By laying out events, organizations, and concepts related to harm reduction visually, scarcity in areas of the map helped to identify gaps in understanding. Considering what might connect disparate clusters provoked novel lines of inquiry as well.

The mind map resulted in a number of research topics that revealed potential design opportunities. It also highlighted a relative lack of understanding around the experiences of opiate users from their own perspective. Books and online resources were identified to fill this gap, with particular interest in video ethnography and memoirs.

Historical Analysis

Secondary research included a focus on the history

of the topic, as discussed previously. Because designers operate in a particular moment in time, understanding the history of the context opens up new avenues of inquiry in the present and provides valuable design inspiration. (This is as opposed to mathematicians, who build on the work of others as well, but the date of publication on a piece of work may be less of a concern.)

The primary benefit from such design research is not, as one might assume, to verify whether a particular design concept is original. Rather, as the saying goes, "history repeats itself." So one might discover not only past successes, but also attempts to intervene in this system that have resulted in unintended or undesirable consequences.

Further, a historical understanding of a topic helps one become more open minded about social possibilities. Social stigma is an integral piece of this topic; this stigma has become so deeply ingrained in modern society that it can be difficult to imagine a situation otherwise. But social conventions change, and learning about alternatives from the past can provoke ideas that might help public opinion change in the direction desired by the designer.

Trend Analysis

In the same way that looking back in time might make one more creative when considering social possibilities, looking forward helps a designer consider what new opportunities might be unlocked by imminent technological advancements. An opportunity may have only recently become technologically feasible, and it may not have been employed in a particular space simply because no one has yet to pursue it.

Given that most technological advancements are first implemented in the private sector and military, emerging technologies are typically the slowest to be adopted in underserved communities. Many design opportunities, relevant to the opiate crisis and beyond, might be uncovered by taking this perspective.

Precedents

When approaching broad social issues, choosing how to intervene can be daunting. Rather than indefinitely continuing design research until a perfect solution is identified (as it likely never will), precedents help identify concrete paths forward. As mood boards typically offer aesthetic inspiration to graphic and fashion designers, precedents for projects not confined to a particular discipline can inspire the form a project might take and how it might seek to intervene in a system.

Precedents in Harm Reduction

Syringe Exchange

In 1984, Amsterdam's Municipal Health Service began providing clean needles and syringes to intravenous drug users in exchange for used ones. This, in conjunction with other efforts, successfully reduced the spread of hepatitis B and AIDS.[69] This model has since been replicated internationally. Syringe exchange programs will typically also offer other paraphernalia to support safer use, as well as mental health and substance use counseling.

Syringe exchanges are perhaps the paradigm of service design for harm reduction. There is nothing essentially novel about the materials used by these organizations. They are simply coordinating efforts to provide opiate users with the resources they need to enable healthier behavior. Yet, despite the scientific evidence that demonstrates the efficacy of such programs, they are still met with resistance by those who believe that they encourage use.

Supervised Injection Site

Supervised injection sites, such as Insite in Vancouver, offer a legally-sanctioned space where users can inject drugs under the supervision of a trained nurse.[70] Like syringe exchanges, these locations typically offer clean paraphernalia, counseling services, and treatment referrals.

Due to stigma, however, these facilities are even more rare than syringe exchanges. Currently, none exist in America, though some are being considered in various locations including Ithaca, New York and Seattle, Washington.[71] Similar to the illegal predecessors of syringe exchanges, spaces where users regularly inject (dubbed "shooting galleries") already exist in America. Legal supervised injection sites simply strive to replace those existing spaces with safer environments, controlled by healthcare providers.

Precedents in Healthcare

Condom

The condom is a barrier contraceptive, used during sexual intercourse, to decrease the probability of

pregnancy and sexually transmitted infections. Typically just a single piece of latex, the condom has existed in some form since antiquity. Various manuscripts document King Minos of Crete's condom use in about 3000 B.C.[72]

Condoms are simple, inexpensive, and effective. Like syringe exchanges, condom use reduces the spread of disease (a rather uncontroversial goal) while being connected explicitly to an activity that carries social stigma. Accordingly, increasing access to and use of condoms (like naloxone) is a challenge currently being addressed by large philanthropic organizations such as the Gates Foundation.

Talkspace
Founded in June of 2012, Talkspace is a technology start-up that offers "therapy for the way we live today."[73] The value proposition they advertise on their official website reads, "With Talkspace online therapy, anyone can get therapy without traveling to an office — and for significantly less money than traditional therapy."

The service may be discomforting. It, in some ways, may embody one's fears that technology is replacing genuine human interaction and empathy, symbolized by an in-person therapy session. But there is a growing body of scientific evidence to suggest that therapy delivered over the internet is effective.[74] Mental health and substance abuse is a pressing public health issue in America. If leveraging telemedicine is an effective channel to improve access to care, it could be dangerous to discount it on aesthetic grounds.

Women on Waves
In 2002, the Dutch Health Minister gave permission to Rebecca Gomperts, MD and her crew to offer abortion pills to pregnant women aboard her ship. Her organization, Women on Waves, has since been dedicated to providing non-surgical abortion services to women in countries with limited reproductive rights by taking them to international waters, where Dutch laws are in effect aboard the ship.[75] They have been met with resistance by various governments, including Guatemala, where the army has prevented them from docking.[76]

By leveraging international law, Women on Waves is able to deliver healthcare services that would otherwise be illegal for women in certain parts of the world. (While laws are geographically situated, people and medicine are not necessarily bound to particular locations.) Women on Waves has also managed to create an impact that spread far beyond the reach of their boats. Through various publicity efforts, they have achieved greater awareness of issues surrounding international reproductive rights.

Philips HeartStart Home Defibrillator
This defibrillator, designed for home use, features voice instructions (including CPR coaching), requires no set up, and automatically assesses heart rhythms to provide appropriate guidance and prevent user error. It continuously tests itself and can be put into a special mode for user training.

This product has an unusually high level of attention to user experience for a biomedical device. Like naloxone, the home defibrillator may need to be used by someone with no prior training in a life threatening, emergency situation.

Finsbury Health Centre
In 1938, Finsbury, a poor inner-London borough led by socialist Alderman Harold Riley, constructed the Finsbury Health Centre. The space consolidated many different health services to a single building, made healthcare free at the point of delivery, featured spacious waiting rooms, and used high quality materials.[77] Notably, the building was the first Modernist design ever commissioned by a public client with a political constituency. The design was selected in spite of its being the most expensive option presented by the architects.[78]

Lead architect Berthold Lubetkin famously proclaimed "Nothing is too good for ordinary people." This sentiment, coinciding with the Public Health Act of 1936 and the general political climate at the time, led to the center's construction. This project demonstrates that governments are able to (and, in rare cases, actually do) provide high quality services to the public.

Life Alert
Life Alert is a product-service system that helps the elderly contact emergency services. A pendant worn by the user has a button that calls a dispatcher when pressed. The pendant then becomes a speaker phone, allowing the user to inform the dispatcher about his or her situation

(even if he or she unable to reach a phone).

The simple, single button interface is usable for even the least technologically savvy user. It offers benefit to the user outside of emergency situations as well; ownership offers peace of mind to those who know they have easy access to assistance should they need it, allowing them to live more autonomous lives.

Precedents in General

Prodega

Prodega, a Transdisciplinary Design thesis project from 2015, is a service design that sought to incentivize the sale and consumption of healthier foods at bodegas in New York City. By improving the packaging of fruits and vegetables, more customers were likely to purchase and consume produce, while also increasing the profits of the store owners.

Surrounding this basic touchpoint of improved product packaging, the project included a proposed suite of services that could reinforce the designers' desired change to the food supply system. These services included a tool for customers to pre-order produce of their choice and a delivery service, among others.

CitiBike

CitiBike is New York City's bicycle sharing program. Opened in 2013, the system involves bicycles, stations with kiosks, a mobile app, a website, a 24-hour support line, valet services to ensure availability during peak hours, and more.

This design intervention does have healthcare implications vis-à-vis fitness and reduced carbon emissions (as Prodega does vis-à-vis nutrition). But it's primarily of interest for its complexity as a product-service system, funding model as a public-private partnership, and high quality user experience design.

Ethnographic Interviews

Interviews were conducted with Sharon Stancliff, MD, the medical director of the National Harm Reduction Coalition, and with a volunteer from an underground syringe exchange in New Orleans. Given that both participants work on the subject of interest and are not opiate users themselves, these interviews might be classified as stakeholder interviews.

But the interview method was intentionally ethnographic. Though some questions were prepared in advance, priority was always given to topics that appeared to be of more interest to the subject, even if seemingly tangential. Though both participants knew more facts on the subject than the interviewer, anecdotes from working in the field and their subjective opinions were of primary interest. In other words, the interview subjects were approached not as experts who might be leveraged collaboratively to identify design opportunities (though this did happen) or as resources from whom facts might be extracted. Rather, they were treated as actors in the system with their own unique perspectives and as individuals who might be assisted by design themselves.

Online Ethnography

Online ethnography is an increasingly valuable tool for conducting design research. This is true for many reasons: internet access is becoming more diffuse; "digital natives" are becoming a larger share of the population and involved in more diverse lifestyles; increasingly complex digital interfaces are allowing for more nuanced online communication; and, many people are very comfortable sharing personal details online.

Message boards and chatrooms dedicated to particular topics of interest make access to marginalized populations possible where it may not have been before. Communities dedicated to particular subcultures can be observed and highly qualitative aspects, such as what is considered humorous or pitiable among the group, can be studied. Researchers can participate in the discussion themselves or conduct private interview outreach.

The following research was conducted across multiple message boards that were explicitly on the topic of opiates primarily throughout the last quarter of 2016.

Observations

Observations from this research have been categorized into various types below. These categories are not explicitly indicated by the message board platforms, but rather based on an informal analysis of hundreds of posts. On one of these message boards, someone posted his own analysis of the message board's content, excerpted here:

> On one hand, you have the "trying to get clean" and "I've been clean X amount of time" posts and almost everyone is supportive! It's great really. Despite the stereotype of junkies, everyone here is really friendly and supportive. People usually reply with good job, keep it up, don't throw it away, etc. So on the one side, people here really seem to support the idea of others getting and staying clean.
>
> On the other hand, there's the daily porn posts, the pick-up posts, and the general hustlin' lifestyle posts. The general attitude and replies to these posts are people in the game, hustlin' day to day, and the last thing they're thinkin' about is getting clean.
>
> Like I said, it's not that these two attitudes contradict each other. I mean, you can be balls deep in the game but still support or like the idea of getting clean. I just find it interesting because usually [online message boards] are more homogeneous. Like one post can be someone goin' away to rehab and all the replies will be positive and good intentions. The next post could be a line of ECP on some titties praising JJ and all the replies will talk about their latest pickup. Just an interesting combination of people and experiences.

Like all communities, opiate users are more diverse than any pervasive stereotypes would lead one to believe. This diversity has been evident in this study. (This holds true even while acknowledging the selection bias inherent in studying the opiate users that would not only visit online message boards, but actively engage with them.) The following characterization of these diverse online communities is only one; designers wishing to work in this space are strongly encouraged to conduct ethnography of their own. A distillation of these observations into succinct insight statements would be a disservice given that the nuances expressed in the posts are where the most valuable qualitative information can be found.

One type of post common to some online opiate-related communities is a fentanyl warning. To help others avoid overdosing, users who have identified drugs they have purchased to be of a dangerously high potency, presumably for its being laced with fentanyl, will post details online. These details typically include the location it was purchased and other identifying factors like the stamp on the bag, its color, or its consistency. This information is often added to a list by community members and the moderators will often promote these posts such that they are more visible to the community. Users often discover the dangerously high potency of a substance by overdosing on it themselves. Comments on these posts most commonly express gratitude.

Other messages can be characterized as porn posts. These consist of photographs taken by users of the drugs they have procured. These photographs may be of pills in someone's hand, small bags of white powder, or a syringe prepared for injection. The posts are typically captioned with a description of the substance or its context. For instance, one post with a picture of a syringe and a spoon holding drugs is captioned, "Well its 8:06am and it is that tine again. My gfriend got 8 xanny bars(2mg) and i have another .2 of dope for later! Happy nods my fellow users." Comments on these posts often express empathetic excitement and jealousy.

Some share their abstinence progress. Some users will be proud to discuss their shift to a maintenance drug for a month, whereas others discuss how they've successfully restructured their entire lives over the course of years. Others share stories of their relapses. Not a single comment was observed in the course of this research that was unsupportive of a user's desire to escape addiction, regardless of their success. (Though users will sometimes accompany their support with an expression of skepticism regarding the author's ability to succeed.)

Humor is an important aspect of all cultures, and this subculture is no exception. Memes, images with large text overlays meant to be shared online, capture the subtle and relatable moments among opiate users that may not be remarked upon in a traditional interview. For instance, one meme and its popularity demonstrated that a common experience among some injection drug users is dealing with a parent's suspicion of the users' wearing long

sleeves in warm weather. Another, a picture of Samuel L. Jackson from the film *Black Snake Moan*, is captioned to express incredulity regarding a television advertisement that purports to have a cure for addiction.

Many members come to these online communities with questions and seeking advice. One post asks, "I just moved across the country and know nobody that uses. where is the first place you would go when looking for a new connect?" Another asks, "Help! Can't cum when I take my Oxy!! Drives my girl crazy she's gonna leave me!! What do I do?" And another user discussed how he is a professional scuba instructor, that he finds diving to be a great method of coping with withdrawal, and asks if anyone else on the message board has experience with scuba diving.

Other members share anecdotes without giving the community a specific prompt for response. Some of these involve overdose, be that of one's own or that of a fellow user. Others lament the hardships in their lives, some relating to romantic relationships or eviction, with their drug use playing an implicit or explicit role. Again, comments are overwhelmingly supportive, empathetic, and sometimes sympathetic with the person sharing his or her story.

Design is occurring on these message boards as well. For example, one user proposed a bot that would post to the message board for help if a user was unresponsive after drug use. Another organized a buddy system, to pair online community members with one another for regular check-ins. And another user shared a photograph of the kit he put together that contains all of the materials he could acquire for safe heroin injection.

These categories are not exhaustive. Miscellaneous posts include: a musician seeking feedback on an original composition; a flow chart to help analyze opiate reagent test results; and, a discussion of a chart published by *The Economist* comparing the harm caused to oneself and to others by twenty different drugs. (Notably, this chart lists heroin second only to alcohol. The ensuing discussion mostly disputed heroin's rank above crack cocaine and methamphetamine.)

Ethical Considerations

Ethnography involves many ethical considerations, and online ethnography is no exception. As the researcher is not physically present during observation and need not announce oneself, it is not yet established whether the study of message boards is more akin to eavesdropping or the study of published written material. Participant anonymity is also more difficult to maintain, as search engines allow for the discovery and rediscovery of much of the internet based on small text phrases. Relying completely on paraphrased material would lose much of the valuable nuance that qualitative ethnographic research provides. Neither the American Anthropology Association's most recent Ethics Statement nor the American Sociological Association's Code of Ethics make any explicit mention of online ethnography.

In light of these considerations, quotes have only been included from message boards which rank highly on search engines, as they are—in a sense—more public. Comments on these message boards indicate that at least some users consider the possibility of outsiders browsing (with a primary concern that these outsiders are law enforcement officials). Usernames and URLs have been intentionally omitted, such that a user might retain the ability to alter or delete their internet presence (archival services and platform cooperation notwithstanding). These considerations have been made explicit here in an effort of honesty and transparency hoping to forward the conversation on this topic, one that the academic community seems not to have yet established a consensus on.

Survey

On one of these online message boards, a link was posted to a digital survey built specifically for the research phase of this project. In approximately one week, over 125 respondents provided a total of 1,686 rating across 12 design concepts (with some ratings including comments). Additionally, 17 respondents answered at least one question to the concluding questionnaire. Given the method of distribution and the responses received, it is likely that a majority of respondents were opiate users themselves. Though the primary interest was in the responses of opiate users, responses from anyone who would browse this message board was of interest as well.

The intention of the survey was primarily for design research—not scientific research or concept validation—and it was designed

SURVEY DESIGN

http://www.DesignForHarmReduction.com

DESIGN FOR HARM REDUCTION

What do you think of these ideas to help opiate users be safer?

Purity Testing Device

This device could indicate the potency of the opiate added, so that less might be used to prevent an overdose.

What do you think of this idea?

Not great. Awesome!

Good idea? Bad idea? Why?

SEE THE NEXT IDEA »

If you are seeking support, find local resources here.

This is part of a graduate student design research project. Contact Us.

accordingly. The survey is titled “What do you think of these ideas to help opiate users be safer?” and users are prompted “What do you think of this idea?” with twelve design concepts presented in succession. The interface for the responses consisted of a slider, ranging between “Not great.” and “Awesome.” and a text box prompting “Good idea? Bad idea? Why?” After the final design concept, respondents were presented with a questionnaire including seven prompts.

The design concepts were presented only with a title, simple illustration, and one or two sentences of description. The ambiguity of the design concepts was intentional. Accordingly, nearly every concept received at least one very positive response and one very negative response. A negative score for a concept and comments indicating issues (relating to desirability, feasibility, or viability) could be interpreted as design challenges should the concept be pursued literally. One respondent, for example, remarked “What about Tar? I’d bet it’d be difficult to test to that. There’d be hot spots and then filler spots” in response to a purity testing device.

Both positive and negative feedback illuminated broader design considerations for designs not necessarily related to the prompt. A comment on a usage tracker, “try telling a junkie to moderate and watch the results lol. we are acutely aware of how much we use already,” articulated a consideration that would be relevant to many other design interventions.

Further, by building the survey around design proposals, it naturally encouraged co-design. Some comments included suggestions for details not included in the prompt. For example, on the concept titled “Wearable Overdose Monitor,” a respondent commented, “if you could determine this automatically why not have it automatically inject narcan?”

The questionnaire was presented after the final design concept was rated, under the assumption that a respondent would be more likely to fill out the questionnaire after having spent time on the website. All of the completed questionnaires were from self-reported opiate users with the exception of one respondent who identified as “not a drug user but have close family and friends who use.” Notably, every respondent felt that opiate users are misunderstood (barring one respondent who neglected to answer this question). Also of interest was the appearance of the phrase “self-medication” across different responses, indicating a perception of use as avoiding the negative consequence of withdrawal symptoms, rather than a hedonistic desire for euphoria.

Inspiration for the design of the survey was drawn from games and activity books. For example, an animated progress bar and a brightly colored button were included to encourage users to move through as much of the survey as possible. A positive user experience was prioritized over scientific rigor. For instance, the slider defaults to a position of 50%. Because participants in the survey could not distinguish a non-response from a response of 50%, some ambiguity was introduced to the responses. Removing this ambiguity was deemed less important than reducing the number of interactions a user would need to perform when completing the survey (as a lack of engagement from a voluntary internet activity was understood to be a primary challenge for this mode of research). And, regardless, the aggregate ordinal ranking of the concepts was of primary interest, not the proportional differences between the scores.

SURVEY RESULTS SUMMARY

Harm Reduction Kit

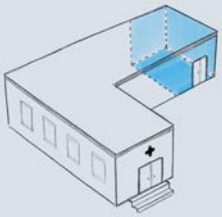
This kit could include opiate purity testing kits (to prevent overdoses) and naloxone (to reverse them).

AVERAGE RATING: **85%**

Purity Testing Device

This device could indicate the potency of the opiate added, so that less might be used to prevent an overdose.

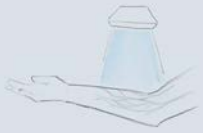
AVERAGE RATING: **78%**



Hospital Safe Injection Space

A space in hospitals could be designated for intravenous drug users to inject under the supervision of nurses.

AVERAGE RATING: **77%**



Vein Detector

This device could illuminate users' veins, helping them ensure veins aren't missed during injection.

AVERAGE RATING: **74%**

Syringe Exchange Membership

for the General Public

The general public could become a member of a syringe exchange. This group could also petition lawmakers.

AVERAGE RATING: **72%**

Harm Reduction Hotline

A hotline could provide substance use and mental health counseling, legal advice, and direction to other resources.

AVERAGE RATING: **70%**

Usage Tracker

This device or app could allow users to keep track of how much they are using and help set realistic use reduction goals.

AVERAGE RATING: **58%**

Wearable Overdose Monitor

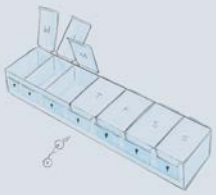
This device could notify 911, trusted friends, and/or family members of a users' location in the event of an overdose.

AVERAGE RATING: **58%**

Travelling Nurse

A registered nurse practitioner could be summoned by phone or app to provide healthcare and counseling services, as well as provide equipment for safer use.

AVERAGE RATING: **54%**



Stash Box

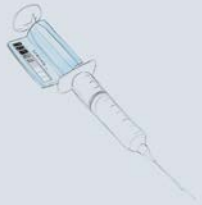
This stash box could have individually filled compartments that unlock daily. This would keep substances hidden while also encouraging use reduction.

AVERAGE RATING: **53%**

Digital Connector

It's safer to use drugs in a group than alone. This device or app would bring users together online.

AVERAGE RATING: **50%**



Syringe Timer

This syringe attachment could encourage users to pause before injection, helping to highlight their self-control.

AVERAGE RATING: **39%**

Workshop

A presentation, discussion, and brief workshop were conducted with the Boredom, Mental Health, and Substance Abuse Lab of the New School for Social Research Psychology Research MA program. Participants included a former research fellow with the Drug Policy Alliance, a woman who has a family member with an opiate addiction, multiple mental health and substance abuse counselors, and academic psychologists.

As in the survey, visual elements (in this case, large posters) were generated to present ambiguously articulated design concepts for discussion. By this stage in the design process, research was primarily focused around the experience of opiate users, so the workshop was pursued as an opportunity to explore the effects of opiate addiction and overdose from the perspective of friends and family who are suspicious of their loved one's use, as well as the perspective of treatment professionals. Accordingly, three posters (each with a different design concept's title and illustration) contained prompts regarding the desires and concerns from each of these two perspectives. An additional poster was designed to capture points of interest which did not correspond to the design concepts, with spaces for ideas, thoughts, questions, and challenges. Custom decks of inspiration cards, each with images of ambiguous meanings, were provided in an effort to stimulate more divergent thinking from the discussion.

A wide array of topics was touched upon during the workshop. A family member of an opiate addict pointed out that her and her fellow family members' concern wasn't as much about drug use, but about the general lifestyle of her family member and the people her family member associates with because of addiction. The group felt positively about the trend towards telemedicine in mental health treatment, citing greater access and a generational shift towards its acceptance.

Design concepts were proposed by the group, such as an instructional poster on how to act when witnessing an overdose. By designing it in the style of a CPR poster, this has the potential to also reduce stigma through its presence in a variety of public spaces. HIPPA (Health Insurance Portability and Accountability Act of 1996), which regulates the use and distribution of medical data, was cited as a potential challenge for design interventions. Many other topics—directly and indirectly pertaining to design—were discussed as well.

WORKSHOP POSTER DESIGNS

HARM REDUCTION
by design

GENERAL FEEDBACK

THOUGHTS	QUESTIONS
IDEAS	CHALLENGES

Smart Syringe
DESIGN CONCEPT #1

FROM THE PERSPECTIVE OF A
FRIEND OR FAMILY MEMBER
SUSPICIOUS OF THEIR LOVED ONE'S DRUG USE

DESIRES	CONCERNS
What would I want this to do? What would I want this to be like?	What would I not want this to do? Why might this not be viable?

FROM THE PERSPECTIVE OF A
TREATMENT PROFESSIONAL

DESIRES	CONCERNS
What would I want this to do? What would I want this to be like?	What would I not want this to do? Why might this not be viable?

Overdose Monitor
DESIGN CONCEPT #2

FROM THE PERSPECTIVE OF A
FRIEND OR FAMILY MEMBER
SUSPICIOUS OF THEIR LOVED ONE'S DRUG USE

DESIRES	CONCERNS
What would I want this to do? What would I want this to be like?	What would I not want this to do? Why might this not be viable?

FROM THE PERSPECTIVE OF A
TREATMENT PROFESSIONAL

DESIRES	CONCERNS
What would I want this to do? What would I want this to be like?	What would I not want this to do? Why might this not be viable?

Counseling Connector
DESIGN CONCEPT #3

FROM THE PERSPECTIVE OF A
FRIEND OR FAMILY MEMBER
SUSPICIOUS OF THEIR LOVED ONE'S DRUG USE

DESIRES	CONCERNS
What would I want this to do? What would I want this to be like?	What would I not want this to do? Why might this not be viable?

FROM THE PERSPECTIVE OF A
TREATMENT PROFESSIONAL

DESIRES	CONCERNS
What would I want this to do? What would I want this to be like?	What would I not want this to do? Why might this not be viable?

Prototyping

The development of prototypes served multiple purposes: vehicles for research; provocations for conversation; tests of assumptions; tools to explore technological feasibility; and more. The making process itself forced a nuanced and detailed understanding of many aspects of this topic that may have been overlooked from a purely policy-driven perspective.

Syringe Exchange Membership for the General Public

This initial prototype consisted of the communication design for a syringe exchange membership geared towards the general public. The primary goals of this design intervention were to promote public awareness, destigmatize opiate addiction, and ultimately organize a social movement that could be called upon to support shifts in public policy. The concept was materialized by designing a brand which was embodied in a mock-up of a website and a membership card.

The main inspiration for such a membership was the card that is provided to syringe exchange participants in New York City. These membership cards grant its holder particular exemptions regarding drug paraphernalia charges, as otherwise the syringe exchange's eponymous activity would be illegal for participants. Anecdotally, some syringe exchange members love their card as it "protects them from police." Others syringe exchange members are afraid that someone to whom they have not disclosed their opiate use may find their membership card without permission.

Inspiration was also drawn from the IDNYC initiative pursued by the City of New York. This project provided official identification to all New York City residents, including undocumented immigrants who might not otherwise have access to official identification. Various benefits were provided to all cardholders, including those who already have official identification, such that widespread adoption would destigmatize its use.

By opening up membership in a syringe exchange program to the general public, participation in syringe exchanges might ultimately be destigmatized as well. The strategy here is to bring the general public into closer association with intravenous drug users who wish to remain safe, rather than the changing the behavior of those in this marginalized group to better align with that of the general public.

Establishing an appropriate brand for such a membership was a challenge. The goal was to have some counter-culture and anti-establishment influence, while not appearing to be an affront to law enforcement. Though, fundamentally, this would be a public health project, it should not look too much like a government initiative (such as one spearheaded by the Center for Disease Control). So inspiration was drawn from the branding of the Drug Policy Alliance and Black Lives Matter's internet presence. Choice of language, including a clear and appropriate call to action, was a challenge as well.

Feedback on this concept and prototype was generally positive. One concern surrounded the effectiveness of the incentive for non-users to join. Another concern was that a syringe exchange with a large percentage of its membership unengaged with its services would make the exchange appear ineffective in reports to state agencies that provide it with funding. Nevertheless, a syringe exchange membership for the general public scored an average of 78 out of 100 in the online survey, making it the fifth highest ranking concept out of 12. One comment on this concept reads, "Could be great if people could be that progressive."

Syringe Exchange Membership for the General Public

MEMBERSHIP CARD DESIGN

WEBSITE DESIGN

The Good Samaritan Kit

The Good Samaritan Kit strives to be the most efficient low-tech design intervention that could help prevent and reverse opiate overdoses. It contains heroin purity tests to help prevent overdoses, and naloxone, to reverse them. Information on the top of the inner case explains how to use both components. The instructions strive to be clear to those who might know nothing about opiates and overdose. The bottom of the inner case provides information regarding how to restock both of its components. A URL is provided to an online store which stocks heroin purity tests. A map of the states in which one can purchase naloxone from a pharmacy is also provided, with instructions on how to purchase them from the "dark web" for those who live states without access. A card with basic information on harm reduction, buprenorphine (a maintenance drug), and a number to call for counseling is also included in the kit. The kit might be distributed to users exchanging large amounts of syringes at syringe exchanges (indicating that they are conduits to larger communities of users) or online.

This kit's design was inspired by opiate users posting about the kits they've assembled for their own safe use. In these conversations, users frequently lament their lack of access to naloxone. And an online poll indicated that a majority of respondents would be interested in using heroin purity tests if they were accessible.

The concept was also inspired by the Drug Policy Alliance's wallet card with information on New York's Good Samaritan Law, a law that protects people from arrest and prosecution for drug possession when they call 911 to report an overdose. Originally, the concept was to pair naloxone with information on this law, intending to increase the likelihood that users would feel comfortable calling for professional medical assistance in the event of an overdose. Upon further research, the protections afforded by the Good Samaritan Law did not seem to be particularly effective in shifting mindsets. For instance, the law protects users from drug possessions charges, but not from arrest. The prospect of a court date is enough to keep many from involving authorities in emergency situations as, for instance, they may not want their parents to become aware of their drug use. Given that the law only protects from drug-related charges, there is a fear that—by calling authorities—someone might be implicated in another illegal activity and still end up with fines or jail time. Though information on the Good Samaritan Law was not included in the final iteration of this prototype, the kit's name was kept.

Feedback for this prototype was also generally positive. An underground syringe exchange volunteer reacted positively to the concept, citing that, in his experience, users do not want to get authorities involved if possible. A professional in the field agreed that increasing naloxone access is a good goal and, ideally, syringe exchanges would already be distributing naloxone with large amounts of syringes. The "Harm Reduction Kit" was the highest ranked concept on the online survey, with an average score of 85 out of 100.

There were also many design challenges left unresolved for this kit. For instance, if a user is willing to take the time to test their drugs and sacrifice some of his or her drugs to be used in the test, it is unclear what the user would do with the result. Because users have different tolerances, they would need to have used a tested substance before and have stored the color resulting from the test for an accurate comparison. If one does identify that a batch is dangerously potent, the draw of addiction may still be stronger than one's desire to be safe. Anecdotally, a supply of opiates that sends someone into overdose can be paradoxically appealing to addicts because it could provide a stronger high than the substances they're currently using.

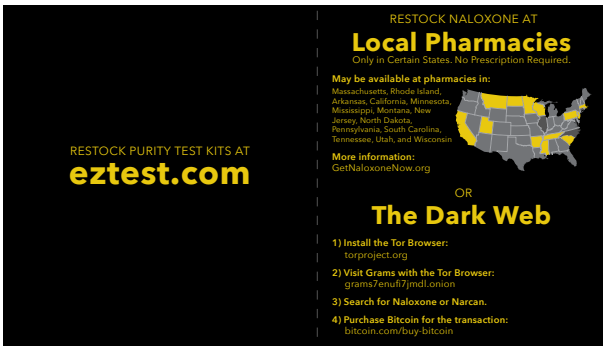
Also, it's unclear if the product and communication design of the kit is sufficiently clear to someone unfamiliar with opiates and overdose, especially during

THE GOOD SAMARITAN KIT

CASE DESIGN
OUTER, CLOSED

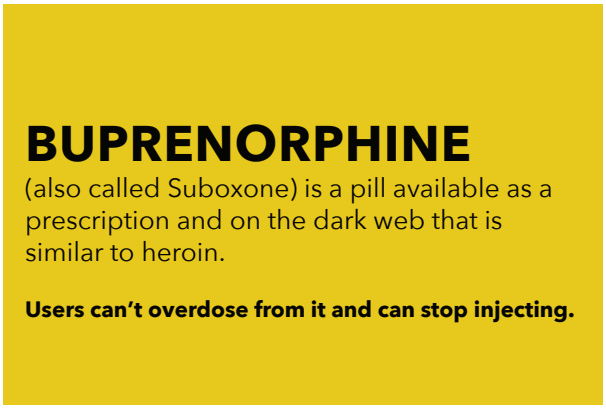
CASE DESIGN
OUTER, OPEN

CASE DESIGN
INNER, TOP



CASE DESIGN
INNER, BOTTOM

CARD DESIGN
FRONT SIDE



CARD DESIGN
BACK SIDE

an emergency situation. And, unlike a medical device like a defibrillator, the stigma associated with ownership of the kit may make it unrealistic for users to keep with them in a prominent and accessible place.

Cost and method of distribution are also unresolved issues. Because over-the-counter sales of naloxone are not yet legal in many states, and unlicensed resale is illegal generally, it might make sense to embrace the product's illegal status. In other words, if this kit were designed intentionally for distribution on the "dark web," it would be available to wealthier, more educated users who might be more likely to test their substances before use. There may also be an opportunity to adapt aspects of this design into the packaging for naloxone when it is being distributed through legal channels, such as the Clinton Foundation's philanthropic efforts.

BlueGuard

BlueGuard is a product-service system for opiate users that provides them with counseling services and protects them from overdose death. This design concept leverages the rapid decrease in size and cost of microcontrollers and wireless modems (often referred to as "Internet of Things") to help them connect to services while still retaining privacy.

The centerpiece of the offering is the BlueGuard Connector, a pocket-sized, internet-enabled device. The device's interface consists of an LCD text display, a buzzer, and a button. When the button is held, an overdose monitoring mode engages. At this point, the user would take his or her drugs and, minutes later, the buzzer on the device sounds. This indicates a timer has begun, counting down from thirty seconds. If the user doesn't press the button to deactivate the device in this time (to indicate that he or she has not overdosed), an emergency contact is reached with the user's GPS coordinates.

If the button on the device is pressed rather than held, the user receives a call from a BlueGuard, a harm reduction-trained counselor. BlueGuards would have access to a dashboard, providing them with all known information about the user they are speaking with as well as the ability to look up practical, localized information. BlueGuards could record tips from users, such as fentanyl warnings, in this dashboard. Machine learning could be implemented to suggest useful counseling tactics, anticipate desired resources, and predict the likelihood of overdoses. A BlueGuard would also contact a user one day after his or her device detects an overdose. On this call, the BlueGuard would record any relevant information about the incident and, most importantly, provide the user with counseling after what was undoubtedly a terrifying experience.

Users may be more receptive to counseling support provided in this manner than more traditional formats for a number of reasons: it is provided over the phone and, therefore, feels less committal than an in-person meeting; it requires only a single button press to request; the provider is associated with a device with which the user might already entrust his or her life; the counseling is non-judgmental and not abstinence focused; it is not explicitly called counseling (which might carry negative connotations for some); and, it is presented as an option every time the user turns on the device (which would hopefully be every time drugs are used). Other than promoting safer use, the BlueGuards' ultimate goal would be to create connections between users and local resources. This way, the BlueGuard organization could require fewer resources and users could build a larger support network to assist them in making healthier decisions.

The set up process would involve the user choosing a language, phone number (at which a BlueGuard could reach him or her), emergency contact information, and the message to be used in the event of an emergency. The set up process might encourage the user to set a professional EMS as the emergency contact. But, if the user fears involving officials in emergency situations, a trusted friend who has naloxone might be contacted with agreed upon codeword instead. This set up process could occur via phone call, website, SMS, or a wizard that appears when the device is plugged into the USB port of a computer.

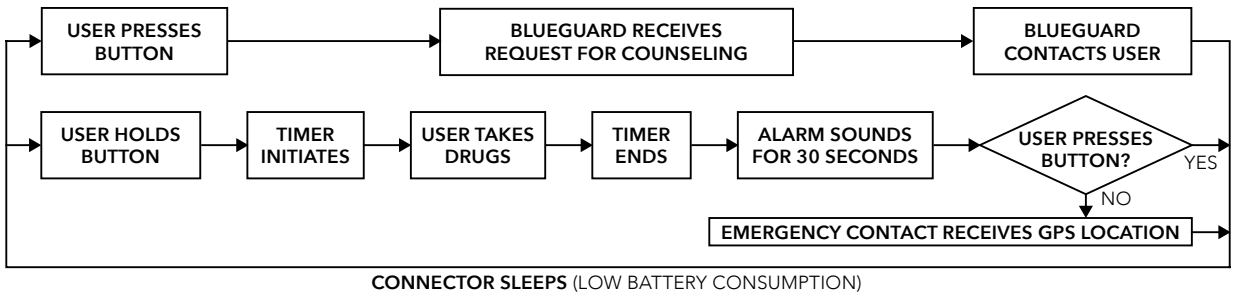
The process of developing the physical prototype involved breadboarding the electronics, drawing the schematic, soldering the components, designing and 3D printing the enclosure, painting the case, writing the firmware for the device, and writing the code for the server it communicates with.

The value of the device's overdose monitor functionality has been confirmed primarily through

BLUEGUARD

THE BLUEGUARD CONNECTOR

BASIC FUNCTIONALITY



CONNECTOR SLEEPS (LOW BATTERY CONSUMPTION)

SERVICE BLUEPRINT

FUNDING	MARKETING	DISTRIBUTION	SETUP	COUNSELING	OVERDOSE	COMMUNITY
Provided as gift Purchased by user	Word of Mouth Internet Print TV & Radio Outdoor Advertising	Counseling Centers E-commerce Syringe Exchanges Social Workers Clinicians **DURING DISCHARGE FROM HOSPITAL AFTER OVERDOSE**	❶ Language Selection ❷ Set Contact Information **OPTIONALLY, ADD PERSONAL INFORMATION FOR COUNSELING TO REFERENCE** ❸ Set Emergency Contact **INTERFACE SUGGESTS EMT TO BE CONTACTED WITH PLAIN LANGUAGE OR TRUSTED FRIEND WITH AGREED UPON CODEWORD** **CHANNELS FOR SETUP** PHONE CALL, SMS, WEBSITE, AND WIZARD ON USB CONNECTION	Requests counseling call from device	Device calls for help if needed	Online Community Local Chapters **"THE NARCOTICS ANONYMOUS OF HARM REDUCTION"**
				UPDATE SETTINGS **"FIND MY DEVICE" IF LOST**		
USER EXPERIENCE ^ OPERATIONAL v						
Philanthropy Government Health Insurers ❷	Targeted outreach to experts and "Thought Leaders"	Partnership Coordination E-commerce Platform and Fulfillment System	Hire and train BlueGuards to staff call center **ABOUT BLUEGUARDS** SUBSTANCE USE COUNSELING EXPERIENCE IS A PREREQUISITE TRAINING IN HARM REDUCTION STRATEGIES IS PROVIDED THE ULTIMATE GOAL FOR BLUEGUARDS IS TO CREATE SUSTAINED CONNECTIONS BETWEEN USERS AND LOCAL RESOURCES	BlueGuard responds using the dashboard **DASHBOARD FEATURES** CALLER INFORMATION AND HISTORY LOCALIZED RESOURCES ABILITY TO RECORD "TIPS" FROM CALLERS MACHINE LEARNING-POWERED SUGGESTIONS	Call to user one day after overdose alert Predictive algorithm to warn users of increased chance of overdose	Community organizing

BLUEGUARD

HYPOTHETICAL SCENARIO

USER PERSONA

Samantha

AGE: **19**
LOCATION: **Akron, Ohio**

Samantha, an only child in an upper-middle class family, developed a heroin addiction at age seventeen. Abstinence-focused counseling and rehabilitation services have proven unsuccessful for her.

USER JOURNEY

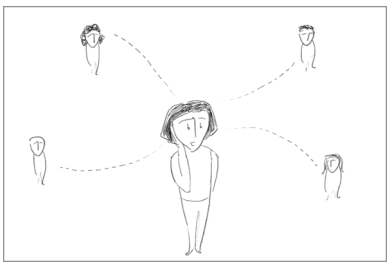
After her fourth trip to rehab followed by a relapse, Samantha is arguing with her father about what should be done next. She decides to move in with a romantic partner, deeming herself to be too much of a burden on her family.

Samantha's father realizes that he is unable to stop her. He doesn't want to abandon her so he searches the internet for something he could provide her with. He discovers BlueGuard.

Samantha's father gifts a BlueGuard Connector to Samantha before she leaves, explaining that her safety and well-being is his ultimate concern.

Because Samantha fears the authorities, she configures the device to use a friend as her emergency contact. This friend is also an opiate user and always carries naloxone.

One day, Samantha overdoses from a fentanyl-laced supply of heroin. The device contacts her friend who saves her life.



Samantha and her friend contact their community of users to warn them of the heroin provided from that dealer, potentially saving their lives as well.

BLUEGUARD

HYPOTHETICAL SCENARIO

USER PERSONA

Paul

AGE: **38**
LOCATION: **New Orleans, Louisiana**

Paul is a sanitation worker who was prescribed OxyContin after a work-related injury. He developed a dependency on opiates. This created a financial strain that ultimately led to his eviction.

USER JOURNEY

A syringe exchange outreach worker is packing her bag before a trip. She includes biohazard bins, clean syringes, and BlueGuard Connectors.

She finds Paul and has a conversation with him. After signing him up for the syringe exchange, she provides him with a pack of clean syringes and a BlueGuard Connector. She explains how BlueGuard works and helps him set it up in his native language.

A week later, Paul runs out of clean needles but wants to stay safe. He is aware that needles can be bleached before reuse, but wants to ensure he understands the process before trying it himself.

Paul contacts a BlueGuard and receives a non-judgmental answer. A longer conversation ensues in which Paul shares details about his situation.

A week later, Paul gets in touch with a BlueGuard without a specific question. They end up discussing housing options and the BlueGuard uses her dashboard to find locally-relevant information for Paul.

After a few more conversations, Paul is encouraged to visit a syringe exchange for in-person counseling. He goes there, explains that he's interested in stopping his drug use, and asks for support.

online ethnography. Multiple times and in various forms, opiate users on online message boards have suggested a similar dead man's switch. One developer built a beta version of an Android application with this functionality. It is available on the Google Play store, but the project appears to have been abandoned. Whenever a similar concept is discussed on these online message boards, users express concerns about viability and feasibility. But there seems to be no question that this is something that some opiate users desire.

In a sense, this prototype is an iteration on the Good Samaritan Kit. The access to counseling strives to prevent overdoses, as BlueGuards would suggest safe behaviors like performing test shots prior to using a new supply of drugs. And the monitor mode should increase the likelihood of overdoses being reversed.

An appropriate brand for a project like this would be crucial for its success. The brand proposed here strives to appear old, trusted, and high quality without creating associations with government services, technology start-ups, or sterility. Inspiration was drawn from the visual identity of CitiBank, Bud Light, ADT, and various cybersecurity firms.

Ideally, this brand could be utilized to form a national community. Narcotics Anonymous has built a strong brand, with awareness that extends well beyond its membership. Along with Alcoholics Anonymous, their successful organization has helped popularize abstinence as the standard strategy in substance use counseling. Harm reduction has no equivalent organization, and perhaps building one around a product-service system like this would be an effective way to seed such an endeavor. Through online communities and local chapters, more opiate users could be connected to health-related resources and stigma would be reduced.

Feedback on this prototype has also been generally positive. This prototype could be understood as a combination of two design concepts included in the online survey: the harm reduction hotline (which ranked 6 out of 12 with a score of 70 out of 100) and the wearable overdose monitor (which ranked 7 out of 12 with a score of 58 out of 100). BlueGuard also addresses some of the concerns expressed in the comments on these two concepts.

One concern surrounding this prototype regards its cost. If produced on a large scale, the components for each device are estimated to cost less than $20, and the cost of the wireless data usage is negligible (as each message only consists of a few characters). Note that this is approximately the cost of one or two pills of OxyContin purchased illegally. The cost of the counseling services would be substantially higher and difficult to estimate. In any case, implementing such a project would likely require support from governments or philanthropic organizations. The device might be purchased as a gift for a loved one, though it might be considered of higher value if users were incentivized to purchase it for themselves.

Another concern regarded the device's potential to be lost. Though this issue could never be completely addressed, it was considered that heroin use tends to involve more paraphernalia than that of other drugs, so users' possession of kits is already a common practice. Presumably, this device could be included in such a kit. Also, because this would be a standalone device (rather than, for instance, an application installed on a smart phone), it would have little or no resale value and thus could not be exchanged for more opiates in an act of desperation. Further, a device locating feature could be implemented—assuming privacy concerns were fully addressed—as it already has GPS functionality.

Even if this prototype isn't ultimately viable, the reasons as to why this is the case would be worth deep consideration. This could help develop a social critique regarding technology and caregiving in general. For instance, if there were no way to compensate the quantity of counselors that would be requested by the users of a product like this, wouldn't that also be a disturbing commentary on what the modern economy does and does not recognize as valuable? If receiving such care remotely and from a stranger appears inhumane, why would this be the locus of criticism and not the failure of communities to support one another on a local level? And if this counseling were somehow automated (by leveraging speech synthesis and machine learning, for example), it might appear to be from a dystopian work of science fiction. But if this were better for those in need than the dearth of support they are currently receiving, wouldn't that mean our present society is actually *worse* than this dystopian vision?

TRANSDISCIPLINARY DESIGN

Given the scope of the opiate crisis and the lack of progress in recent history, it is crucial for designers to work on harm reduction. Much more could be done; the only evidence of another design-led initiative addressing the opiate crisis uncovered during the course of this project was an online survey distributed by a group of industrial design students.

The attempts from traditional channels in addressing the opiate crisis, including those from public policy and law enforcement, appear to be, at best, largely ineffective, and, at worst, exacerbating the problem. Designers would bring a unique approach to this issue, and there no shortage of avenues for designers to potentially save lives. Further, although this is a large design space worthy of attention for its own sake, working on the opiate crisis reveals even more opportunities for designers to assist vulnerable populations where design has yet to make a substantial impact.

Why Designers?

John Heskett defines design as "the human capacity to shape and make our environment in ways without precedent in nature, to serve our needs and give meaning to our lives."[79] He acknowledges the challenges inherent to a holistic understanding of design, including the variety of the term's uses and the wide spectrum of design practice. Ezio Manzini discusses design as a mode, "a capability that we all possess and to which potentially we all have access."[80] From this perspective, psychologists and law enforcement officials, for example, might participate in design on a regular basis, whether or not they understand it as such.

Accordingly, to identify design as a crucial to harm reduction is difficult. If design is defined too narrowly—for instance, as only the creation of graphics—one might omit the creation of the first syringe exchange. But, if defined too broadly, every interaction a human has with his or her surroundings might be considered design. In that case, to speak of design's importance for harm reduction is to say virtually nothing at all.

Instead of positing yet another definition of design in an attempt to establish clarity on this point, a number of themes that emerged through this project are discussed here. They articulate the modes of thinking that current initiatives in this space frequently lack, but proved fruitful while approaching the opiate crisis with an intent to design.

Systems Thinking

Tackling a wicked problem necessitates one to think in systems rather than simply in individual actors and actions. Meadows understands systems as composed of elements, interconnections, and functions. Systems can be embedded in other systems and "out of one system other completely new, never-before-imagined systems can arise."[81]

Meadows uses drug addiction and crime to illustrate "one of the most frustrating aspects of systems," that "the purposes of subunits may add up to an overall behavior that nobody wants." She enumerates six different "combined purposes and consequent actions" that produce such a behavior, including "desperate people who want quick relief from psychological pain" and "governments that make harmful substances illegal and use police power to interdict them." [82]

Designers, then, might be understood as outsiders to such systems. This perspective can be an asset. It is possible, but more difficult, to gain such a perspective as an actor within a system. As Rittel and Webber observe, it is not surprising that the members of an organization tend to see the problems on a level below their own level. If you ask a police chief what the problems of the police are, "he is likely to demand better hardware."[83] A designer's naiveté allows for new understandings regarding where the bounds of the relevant system lie, the identification of novel opportunities, the consideration of large scale reorganizations of elements and interconnections, or the creation of new systems altogether.

User-centricity

User-centric design has roots in the study of ergonomics. This might be exemplified by a chair designer studying human anatomy to make design decisions, rather than solely relying on aesthetic considerations. Human factors beyond anatomy are integral to user-centricity as well. Arranging the controls of a stove's burners, for instance, in the same pattern as the burners themselves significantly improves usability.[84] This configuration reduces the amount of time

someone needs to operate the stove, even though it may not make the stove more efficient in terms of energy or space.

As contemporary design has increasingly focused on the needs of the end user, design research has begun to borrow methods from the social sciences, such as ethnography. In working to gain a deeper understanding of users and to build empathy, designers can more easily challenge their assumptions about the form that their outcomes should take. For instance, in studying someone unable to operate a stove due to a physical disability, it might be concluded that they would be better served by a well-designed food delivery program rather than a knob with superior ergonomics.

In current efforts to address the opiate crisis, considerations of the users' lived experiences are often neglected. This is particularly evident in legislative measures that punish those revived from an overdose.[85] The stigma surrounding drug use is undoubtedly a key factor as to why users have become so neglected. Designers, by virtue of their typical process and practice, may be better equipped to overcome this.

Affinity with the Arts

Design's relationship with the arts is a complicated one. Contemporary designers often attempt to distinguish themselves as more than those who improve the appearance of things with their elevated aesthetic taste. Whether this is a designer's primary role (let alone whether or not elevated aesthetic taste is even central to the arts) is a topic for debate.

But there is something to a designer's approach that has more of an affinity to that of an artist than the more solutions-oriented attitude of an engineer. To an engineer, contradictions and ambiguity are typically seen as enemies. But contradictions and ambiguity are what artists and, arguably, designers thrive on. This is where the value of qualitative research especially comes into play.

Addiction, for instance, might be considered irrational. Relying on conventional logic, opiate addicts can understand that their behaviors are self-destructive and impeding them from living an ideal life. Yet, they continue to use drugs. This is a situation that is likely to frustrate policy makers and law enforcement officials (who typically rely on an understanding of rational human behavior to base their decisions). By contrast, designers might see this as an exciting, novel parameter around which a new product or service might be created.

Making

Central to Heskett's definition of design is making. Outreach workers, counselors, and law enforcement officers are doing valuable work in the systems pertaining to the opiate crisis. But they only occasionally engage in design (understood here as modifying the system itself). For example, a new product or service might be added to this system which creates a novel connection between opiate users and naloxone suppliers. The unique value of a designer in this space is not their ability to make new things (as anyone potentially could), but that it is their responsibility to present a new creation to address the problem at hand.

In the process of making, designers are forced to contemplate the details of their concepts. This is unlike a legislator, for example, who might delegate the specifics of implementation to a regulatory agency. An understanding of details is crucial to successfully enacting change in the world. Materializing a concept inevitably raises a host of questions which may not have been considered earlier. Deciding on the size and shape of an object, for instance, may lead to considerations pertaining to the storage of the object. These considerations might have implications for the broader strategy of a design intervention and its potential for success.

On a more abstract level, the significance of making for design is essential. This, arguably, is what distinguishes design from other human endeavors categorized at this level of generality, such as philosophy. If a philosopher is understood as bringing a contemplative approach to bear on the world (with a primary focus on questioning), designers take an approach focused on interventions and solutions—critical design and speculative design notwithstanding. Philosophy and design are, of course, not mutually exclusive vocations, but are distinct modes of operating.

Pragmatism

Design practice resonates strongly with pragmatism, an intellectual movement that emerged around the turn of the century. Williams

James credited to Pierce "the principle of pragmatism" which James summarized as follows:

> The ultimate test for us of what a truth means is indeed the conduct it dictates or inspires… The effective meaning of any philosophic proposition can always be brought down to some particular consequence, in our future practical experience, whether active or passive; the point lying rather in the fact that the experience must be particular, than in the fact that it must be active.[86]

This approach was manifest in work across many fields, including that of Supreme Court Justice Oliver Wendell Holmes Jr., educational reformer John Dewey, and philosopher Paul Feyerabend. Feyerabend, dubbed an epistemological anarchist, contended that the scientific method does not have a monopoly on truth or useful results.[87] His work, though typically understood as a criticism of the "hard" sciences, like astronomy and physics, might also be interpreted as an elevation of the social sciences and their qualitative methods.

In other words, for a designer pragmatically intervening in the world, epistemological debates are not of particular interest. So long as the results of a designer's research are useful, they are valid. This is perhaps best encapsulated by design-led research, an approach in which "the aim is to utilize the process of design itself as a way to discover, reveal, and generate new forms of understanding."[88] Gaining knowledge through designing—as opposed to creating a replicable, falsifiable experiment—might be unacceptable in a traditional scientific setting. But, for a designer, it may be a crucial step in discovering and seizing upon opportunities to intervene.

Opportunities for Intervention

There are many opportunities for design to intervene in support of harm reduction. Many existing efforts in this space would be well served by incremental design improvements, such as updated communication design. But there are many opportunities for innovative design interventions as well. Designers should strive to create new connections between the wide variety of stakeholders relevant to this system.

These stakeholders include opiate users, treatment professionals, friends and family of opiate users, doctors, drug traffickers, pharmaceutical companies, and law enforcement officials, among others. Any of them, singularly or combined, might be the end users of a design intervention. And even this list is too broad in its categorization. Some opiate addicts may be fully employed with a legal OxyContin prescription while others are homeless and use heroin intravenously. Some law enforcement officials are employed by the DEA, while others police small towns in which they may have a loved one afflicted by an opiate addiction.

Further, there are myriad specific goals a design might strive to achieve within harm reduction. There are a variety of ways in which users might be provided with resources such that they can use more safely, or behavior change might be supported such that they are able to be healthier using the resources they already have. For instance, to educate more opiate users that mixing alcohol with opiates significantly increases one's chance of overdose would make for an excellent design brief.

The general public is in dire need of improved education on this topic as well. Many people are completely unaware of the severity of this public health issue. And, of those who are, many have misconceptions about addiction and opiate use. Reducing stigma among the general public might not only allow for much needed changes in legislation, but inspire more people to work on this issue themselves.

In the course of this project, many avenues for design research and intervention—large and small—went unexplored due to limited time and resources. One potential opportunity focused on the needs of drug dealers. By providing supplies, such as small bags, to those who sell directly to end users, additional materials might be included with information regarding safer use.

Another opportunity focused on the spaces of use. Inspired by safe injection sites, a design project might work to help users make their environments more conducive to safer use (whether these are private homes, "shooting galleries," fast food restaurant bathrooms, or otherwise). Creatively ambiguous cooperation

with the owners of semi-public zones might be required such that the owners would not become exposed to risk of litigation while supporting such a project. A review of literature on sensory ethnography and placemaking might support design research on such a project.

Designing for the Vulnerable

The gravity of the opiate crisis should be reason enough for designers to pay closer attention. But, in addition to benefiting those struggling with an opiate addiction, designing on their behalf also points to other areas in which professional design practice has yet to have a significant influence. Harm reduction itself is a concept that applies to not only substance use, but to many other topics like supporting the safety of sex workers.

Though design has a wide array of applications throughout healthcare, this project has particular relevance to those addressing addiction, any healthcare issue that is highly politicized, and users with mental or physical disabilities. All the while, it is worth keeping in mind that vulnerability is not the exclusive purview of those with classifiable health issues. Everyone is, to a one degree or another, vulnerable and in need of care.

Addiction

Addiction is a topic of interest to psychologists that extends well beyond that of opiates. Though heroin is generally considered to be the most addictive drug, other legal substances that have significantly less stigma attached to their use, such as alcohol and nicotine, rank highly in addictiveness as well.[89] Even caffeine can cause mild physical dependence, resulting in withdrawal symptoms.[90] And the phenomenon of addiction extends beyond substances to activities like gambling and hoarding. Some even express addictions to internet usage.[91]

Design projects might be pursued to assist users in behavior change that would combat addiction. And, from the perspective of harm reduction, one might design an intervention that could benefit someone with an addiction by taking their addiction as fixed parameter. In other words, although an addiction might be harmful to an individual, knowing that he or she will regularly partake in a certain activity suggests that successfully augmenting this activity with something to benefit his or her health should guarantee uptake.

Politicized Health Issues

Healthcare involves much more than just medicine. The specifics of service delivery, patients' adherence to prescribed regiments, and environmental factors all impact the health of a population. And even more broadly, economic and ethical concerns are inextricable from healthcare. Inevitably, political issues arise within healthcare and these can create both opportunities and challenges for designers wishing to work in this space.

In some cases, activists work to deliver healthcare services in violation of laws. This occurs not only through underground syringe exchanges, but also among those in support of reproductive rights. This is operationalized through the distribution of misoprostol, a pill used to induce medical abortion. In some cases, drones are being utilized to help deliver these pills across borders.[92] Access to hormone therapy for sex reassignment is also highly stigmatized and, accordingly, limited. A Baltimore-based artist has made efforts to genetically "engineer transgenic tobacco plants to produce gender hormones like estrogen and testosterone, allowing anyone to grow their own supplements at home."[93] And, extending this perspective, design projects that might support physician-assisted suicide in places that have yet to legalize it would, undoubtedly, be highly controversial.

Though there is no simple lesson to be learned from these examples, they do point out many spaces in which existing healthcare systems fail (insofar as they neglect to even attempt the provision of services). The health of all underserved populations might be supported by design not only in trying to alter the health-related regulations, but in coordinating care that is in contempt of current laws.

Universal Design

Designing for any stigmatized group—not only opiate users—runs the risk of compounding stigma rather than alleviating it. For instance, the British Ministry of Health provided Invacars, single occupant vehicles, free of charge to those with disabilities in the middle of the 20th century. The provision of these vehicles—named as a

portmanteau of "invalid" and "carriage"—were generally considered a success, but they generated stigma for their unusual size and appearance.[94]

To avoid similar issues, designers have embraced an approach known as universal design. Instead of designing unique options for those with special needs, designers create for the general population while ensuring that their designs can also be successfully used by those with disabilities. In doing so, the result is better for all users. This is often captured by the story of the OXO peeler; this vegetable peeler was designed for someone with arthritis, but the outcome included an improvement to the handle that was ultimately replicated across the industry.[95]

Considering the needs of those with drug addictions when designing in general contexts would be wise. But, more importantly, one should consider the benefits of making the services that drug addicts are especially in need of accessible to the general public. The value of preventative medicine is widely acknowledged, both for an individual's long-term health and for the economy as a whole.[96] But the provision of preventative mental health services in America is unfortunately rare. Stigma, undoubtedly, is a major factor here as well.

Like being a successful designer, supporting others' mental health does not require an advanced degree. Caring relationships have undeniable benefits on health and well-being. Studies demonstrate that the support of a loved one is beneficial in situations where one is faced with adversity and during opportunities for growth and prosperity.[97] The social-reproductive labor that cultivates such relationships—"women's work," as it is typically understood—is a requirement for a functioning society.[98] Perhaps because this work has gone unpaid for so long, society is losing sight of its value altogether.

As the designer Victor Papanek pointed out, only humans transform the world to suit our needs and wants.[99] With the growing scale of production in an increasingly interconnected world, individual designers can have a greater influence on the world than ever before. Accordingly, the values driving their work are especially important.

We know the future holds a world with greater access to technology. It is less certain that it holds greater access to care.

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