

HOW TO EFFECTIVELY NUDGE FOR SUSTAINABLE BEHAVIORS ON COLLEGE CAMPUSES

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HUMAN BEHAVIOR & CHOICE ARCHITECTURE

Two systems rule our behavior—our automatic system and our deep-thinking system. Most actions are carried out by our automatic system and we don't even have to think about our actions. For example, when we hear our name, we automatically turn around to see who is calling to us. However, for some behaviors we employ our deep-thinking system--we slow down, analyze the situation, weigh the pros and cons, and make a calculated decision. For example, if you are mad at someone and you hear them call your name you could employ your deep-thinking system to weigh the pros and cons of turning around and giving them attention, and you can decide, for example, to put your guard up or to ignore them.



Choice architecture, or nudging, is a way of framing a decision-maker's environment to help them make decisions that better align with the decision that their deep-thinking system would choose. Choice architects can design environments that encourage, or nudge, the automatic-system to make the decision that our deep-thinking system would make if we took the time to slow down and make a calculated decision (Thaler and Sunstein 2008). Or, architects help people engage their deep-thinking systems to make a better decision, when they otherwise use their automatic system. Choice architecture concepts such as defaults, feedback, commitment, priming, salience, and others can be employed to impact decision making.

ORIGINS

Choice Architecture, also known as Nudging or Libertarian Paternalism, comes from a long line of thinkers and academics who wanted to preserve the freedom of choice, while helping decision makers make choices that the most rational versions of themselves would make.

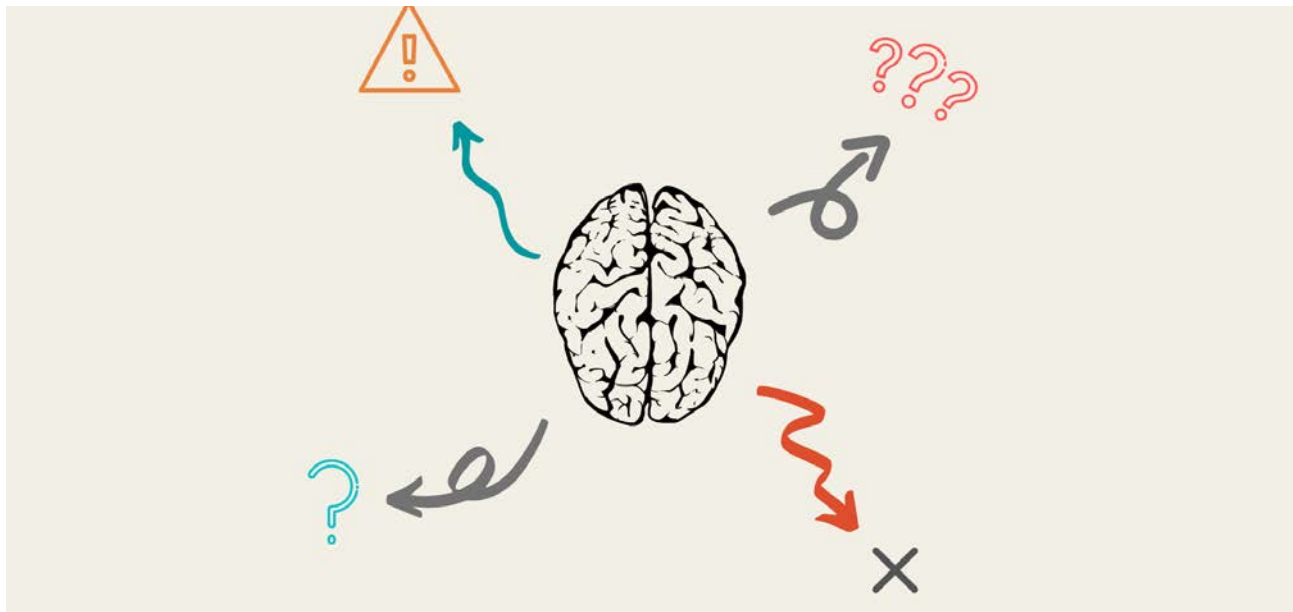
Great moments in the decision sciences



The above timeline (EAS 501.009 Origins Slide, January 9, 2020), shows the evolution of the ideas of Nudging through scholastic contributions. Starting with Rene Descartes, the timeline takes us from the 1200's to present-day behavior-change organizations, while highlighting Sustein and Thaler's book Nudge, which set off an explosion of interest in the field. More recently, policymakers have leveraged behavioral science to help their citizens make better choices for themselves. The United Kingdom launched the Behavioural Insights Team, while the United States had the Nudge Unit during the Obama Administration.

The concept of Choice Architecture has been woven throughout history and is built into many if not all designed choices for decision makers.

ANATOMY OF A DECISION



DEFAULTS

People often choose options that require the least effort, i.e., the path of least resistance. All else equal, default options are chosen more often than other options, and even more so when the default is the normal or recommended action. In choosing a default, choice architects make de facto decisions for decision makers. While this may seem manipulative, there are many benefits to using a default. First, presenting a set of choices without a default is often burdensome, leaving the chooser with a difficult task. Moreover, there often must be a rule that determines what decision makers receive if they do nothing, and the choice architect must provide that option (Thaler and Sunstein 2008). For example, in the absence of a decision, a default phone background could either be a picture of earth from outer space, or a black screen. One may give the viewer a sense of wonder, while the other may not tip off the viewer that modifying the background is available. Usually, when the chooser does nothing, the default is that the status quo persists. For example, if your television is on, the next episode will play after the current one, and will not turn itself off. However, if your laptop is on and sits idle, a screen saver may pop up, and eventually it will sleep. This helps the user by prolonging battery life (Thaler and Sunstein 2008). Choice Architects may also pursue self-serving goals, like an e-retailer that by default opts new users into their marketing emails.

ANATOMY OF A DECISION

METACOGNITION OF DEFAULTS

Metacognition is a person's social intelligence in a given situation. "Marketplace metacognition" is the understanding of marketing behavior, and the how and why marketers manipulate consumer decisions (Brown & Krishna 2004). This concept is important to keep in mind when designing choice architecture interventions, especially defaults. If the targeted population believes that their architect is trying to exploit or take advantage of them, they will be less likely to choose the encouraged option.



Metacognition can be a helpful tool! For non-experts, a default is seen as the manufacturer's or designer's suggestion. This can help people unfamiliar with the choice be guided to a decision that is in their best interest, made by the expert. To design a nudge that does not invoke a sense of "marketplace metacognition" skepticism, the architect should select the default that is most likely to best serve the decision-maker. For example, when renting a car, a rental enterprise might include full coverage insurance as a default, which would most likely best serve their customer if they get into an accident. Another example would be if a landlord installed a low flow device on their faucets, and set it to low before a new tenant moved in. This might suggest to tenants that water is scarce and the suggestion by the designer is to save water, while at the same time saving money for the tenant and community resources at the same time.

ANATOMY OF A DECISION

COMMITMENT

Commitments rely on voluntary, self-imposed restrictions to achieve behavior change. We need internal cognitive consistency, whereby thoughts, beliefs, and attitudes must align, otherwise anxiety and discomfort occurs. A result of this idea is that when we commit to something, we follow through, otherwise we can feel guilt, shame, or other negative emotions (Baca-Motes et al. 2013). Using this idea, architects can present options that encourage people to voluntarily commit to an action and make clear the consequences of not following through. Consequences can be either immutable (fixed) or mutable (inconsistent) or more generally, avoidable or unavoidable. When decision-makers are conscious of both commitment and consequence, they are more likely to commit. If the action does not hold sufficient importance or the consequence not salient enough, the commitment device may fail to change behavior (Rodgers 2014).

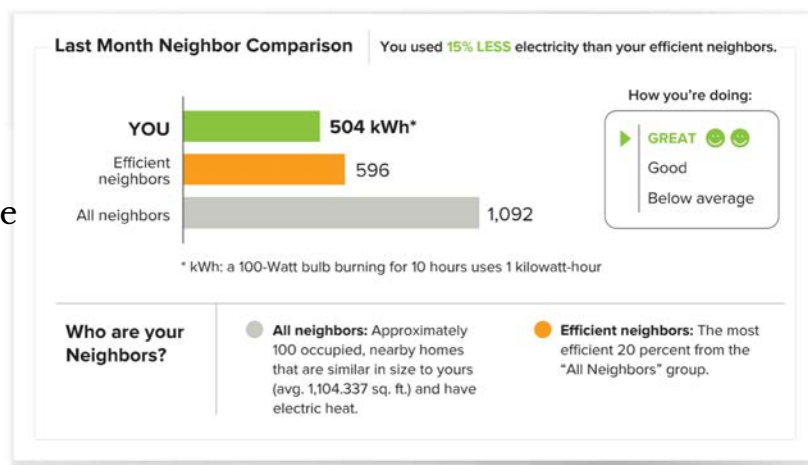
FEEDBACK

Feedback can tell someone how behavior led to an outcome. Often, direct effects of an action are ambiguous, making it difficult to know if the action helped or hurt progress toward a goal. People can use feedback, though, to adjust their actions.

One common example of this is to give households regular energy use reports, including monetary costs and associated carbon dioxide emissions. With feedback on their energy use and spending, consumers can adjust behavior to reduce their energy consumption.

Well done!

On utility bills, householders who are told they use less electricity than their neighbors will often increase their usage — unless they also see a smiley face to let them know they're doing a good job.



ANATOMY OF A DECISION

SALIENCE

Salience is a broad term used in psychology to mean distinctive, prominent, or obvious. In choice architecture, salient information is readily available and will receive disproportionate weight in judgments. For example, non-profit websites are often designed to encourage people to donate, and they will prominently remind website visitors of the impact that their donations will have to help increase donation frequency and amount.

PRIMING

Priming is when subconscious information and sensory cues influence behavior (Byerly et al. 2018). Words, sights, or smells can prime decision-makers to elicit memories that can influence the processing of new stimuli (Dolan et al. 2012).

For example, the smell of roasted nuts on a street corner may prime passersby to purchase them. Priming is a relatively low-cost and easy-to-implement behavior-change intervention. It can be complemented by other interventions to make information salient.



MESSENGER

The person who delivers information can sway decisions (Quigley 2013, Byerly et al. 2018). A messenger is more effective at influencing behavior they share demographic or other characteristics with the decision-marker, or when the messenger is an expert interventionist or is physically attractive (Durantini et al. 2006; Kondylis et al. 2016; Landry et al. 2006). When designing behavioral interventions for sustainability, messenger effects may prove important tools for inducing behavior change.

ANATOMY OF A DECISION

DESCRIBING CHOICE OPTIONS AND FRAMING

How choices are framed can influence decisions. What information is presented, or precisely how it is shared, can ultimately alter decisions. Given that presenting choices is an inherently biased activity, using informed and deliberate phrasing when presenting options to a targeted population can improve decision outcomes.



It is impossible to assess all possible outcomes presented by any given decision. The unlimited nature of decisions may overwhelm a decision maker, resulting in inaction. Architects must balance providing enough options to prevent from choosing for the decision-maker, yet still limit alternatives to prevent cognitive overload. To strike this balance, architects should consider initially offering four or five options, with the flexibility to add more that coincide with a decision-makers' internal preferences (Johnson et al., 2012). To account for this, choice architects can highlight less visible choices that may benefit decision-makers. The placement of products on grocery store shelves is an example of deliberately crafting options. Brands often must pay extra to get the shelf space at eye level, which enhances the products salience. In cases of uncertainty or time constraints, consumers will likely pick options that are made most visible.

ANATOMY OF A DECISION

TRADITIONAL INCENTIVES: EDUCATION AND FINANCIAL INCENTIVES

Traditional behavior-change interventions, such as financial incentives and education, target the cost-benefit calculations of the deep-thinking system (Byerly et al. 2018). We can compare these traditional interventions with the aforementioned contextual interventions, which aim to change behavior through the automatic system. (Byerly et al. 2018).

Financial incentives are when people or organizations offer money to encourage certain behavior. These incentives can motivate behaviors that may not have otherwise occurred, as they provide external motivation rather than internal motivation. Financial incentives have been shown to be effective in a number of different areas including health, conservation, and work performance (e.g. Mitchell et al. 2013, Sutherland et al. 2008, Byerly et al. 2018, Jenkins et al. 1998). When financial incentives are removed, however, people may revert to earlier behavior; thus financial incentives may not suffice to create lasting behavior change (Gupta and Shaw 1998).



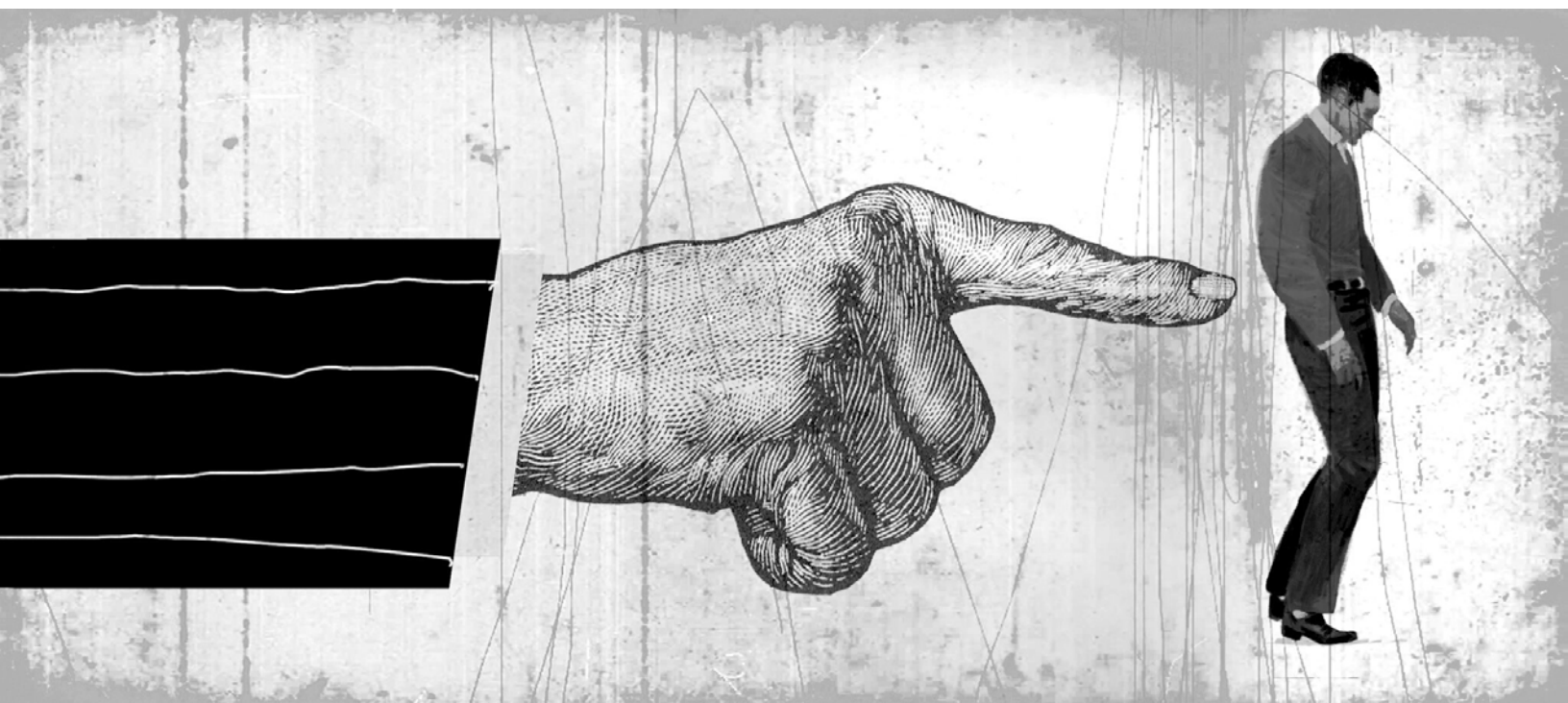
Education provides people with knowledge, awareness, and skills to change their behavior (Arlinghaus and Johnston 2018). Education is an important part of decision-making and behavior change, however it may not be effective alone (Arlinghaus and Johnston 2018). For education interventions to be effective, people must employ their deep-thinking system to make decisions. Traditional incentives, financial and educational, are effective when the deep-thinking system trumps the automatic system.

ETHICS

Choice architecture can easily be entangled and questioned on the ethics of its use -- is it manipulative? Can people still choose? Certain principles should be followed to ensure people neither are egregiously manipulated nor is their freedom to choose dampened. There are three principles that can guide ethical interventions (Thaler 2018):

- All nudging should be transparent and never misleading.
- It should be as easy as possible to opt out of a nudge, preferably with as little as one mouse click.
- There should be good reason to believe that the behavior being encouraged will improve the well-being of those being nudged.

Choice architecture interventions are contextual. Therefore, it is important to check for power imbalances to ensure these principles are followed, and this is especially true when nudging minority, low-income, or otherwise vulnerable populations. When nudging a new community, it is best to develop interventions with the community to ensure cultural responsiveness and sensitivity. Community participation is an essential part of creating effective and ethical choice architecture that will benefit the community within which the intervention has been designed. *Who* nudges and *who is* nudged both matter.



SUSTAINABILITY CASE STUDIES

a look at successful choice architecture at the University of Michigan

The University of Michigan (“UM”) has devised and implemented several nudges that encourage sustainable behavior. Such examples are described below, including efforts to encourage recycling and composting; reduced energy use; and sustainable transit and procurement of food and compostable materials.

CASE STUDY 1: Using Choice Architecture to Reach UM's Food Sustainability Goal



UM established a goal to purchase by 2025 20% sustainable or local food. UM defines local as grown and processed in Michigan, or within 250 miles of Ann Arbor, but excluding food from concentrated animal feeding operations. Food that qualifies as sustainable must be third-party certified (UM Sustainable Food Guidelines). To encourage local and sustainable food purchasing, UM launched a local-food labeling initiative, adding “Go Blue, Eat Local” to food items when relevant. The initiative employs salience, reminders, and message framing that capture attention. The label identifies local food, reminds students to choose local food, and endorses choosing local food. UM studied the label’s effectiveness, finding that over 68% of students recognized the label, and 23% used it to make purchasing decisions. The study found that food labels should be self-explanatory and descriptive, include both text and universally intelligible symbols, be displayed consistently and accurately, and there should be further information regarding the meaning of food labels (Shriberg et al. 2012).



CASE STUDY 2: Recyclemania Competition

In 2015, UM generated 17,000 tons of trash. Of course, there are many efforts to encourage students, staff, and faculty to reduce waste by reducing consumption, recycling, and composting. The UM Office of Campus Sustainability's annual Recyclemania is an eight-week competition among universities across the U.S. and Canada. It is one example of nudging specific to recycling in which participating universities measure each campus building's waste diversion rates from landfill to recycling or composting.

Gamification of recycling and waste reduction has led to a substantial increase in both over time. In keeping with the tenets of choice architecture, the competition does not eliminate choices--people on campus are still free to generate waste. After seven weeks of results in 2020, 42 of 70 UM buildings improved their diversion rates from trash to recycling. The Wolverine Tower building diverted 57% of its waste compared with the previous year, the most of any UM building during the 2020 competition.



We can make conjectures about the underlying mechanisms that drive these results: salience, information provision, and peer effects. First, the existence of the game serves as a reminder about the importance of diverting waste for reducing our environmental impact, making these issues salient to university community members. Second, pictures on the lids of recycling bins explaining what materials qualify as recyclables is an example of information provision. Third, the competition aspect of Recyclemania is an example of peer effects. When people are made aware that the social norm is to divert trash away from landfills, they are more likely to follow that norm.

CASE STUDY 3: Zero Waste, Compost Campaigns, Messaging and Procurement



Zero Waste Events are among UM's choice architecture success stories. UM's goal to reduce landfill waste by 40% by 2025 relies heavily on increasing composting. At the time this document was published (April 2020), UM met 3% of this goal.

The Zero Waste campaign provides composting bins and offers sustainable purchasing guidance. The Zero Waste Initiative is mainly focused on composting, but also encourages event planners to reuse materials and reduce waste.

Research suggests that commitments can encourage people to waste less food (Rubens et al. 2015). UM's Zero Waste initiatives use commitment devices in the form of goal setting and public statements of adoption to reduce waste. Event planners hosting Office of Campus Sustainability ("OCS")-



sponsored Zero Waste events commit to using an OCS-provided checklist that helps planners commit to self-imposed restrictions to help meet their stated zero-waste goals (Rogers et al. 2014). However, OCS does not penalize event planners if they fail to meet goals. In addition to the checklist and guidelines, OCS provides compostable tableware (plates, cups, utensils), compost boxes/liners, compost signage and removal (if not already provided by the building), event-host training, and a list of Zero-Waste-friendly caterers.

Similar to recycling bins, UM compost bins have pictures that show users what items are compostable. Moreover, the UM sustainable purchasing list highlights what products are compostable. Through priming, each of these uses cues that

Simple Steps Toward Making Your Event Zero Waste

Your effort supports U-M's waste reduction goal: Reduce landfill waste by 40% by 2025.

Each day there are dozens of events on campus which create an enormous amount of waste. With a bit of thoughtful planning, much of that waste can be reduced, recycled, or composted. The Zero Waste Events Program is here to help.

Planning the Event:

- Order compostable materials, signage, liners, collection bags, and compost collection service from the Office of Campus Sustainability if needed: umzero@umich.edu.
- Make an accurate estimate of attendees to minimize waste and cut costs.
- Coordinate with your caterer to ensure what is compostable and what is recyclable at U-M.
- Identify and train volunteers to staff each waste station to reduce compost contamination.
- Communicate with your caterer (see "What's Compostable?" below).
- Avoid waste by promoting the event electronically. Choose digital options for sharing materials. For instance, ask presenters to share materials electronically instead of printing notes.

When placing food order:

- Let the caterer or vendor know you are working toward a zero waste event and ask for their support by not bringing containers or items that are not recyclable or compostable.
- Ask for menu options with minimal packaging, such as food provided in aluminum trays and containers or bulk food. Plated dinners or buffets generally result in less waste.
- Avoid non-compostable wrappers or accessories such as paper-lined food trays. Recyclable packaging includes cans and plastic bottles, plastic tubs, and aquatic containers. Anything else should be a compostable version or avoided.
- Order for bulk rather than individually packaged items (e.g. chips, sugar for coffee, water, condiments).
- Specify if you need plastic cutlery or not needed.
- If possible, use reusable dishes. If not, request biodegradable Products Institute (PI) certified compostable serving materials from the caterer. If the caterer cannot provide compostable items you can bring them through the Zero Waste Program.

Day of event:

- Take compostable (biodegradable) and biodegradable to event room.
- Place liners into cardboard boxes.
- Set out compostable signs, liners, bin and table-top signage identifying your zero waste effort.
- Assign zero waste goal to attendees and let them know what is compostable and where to place it.
- Have a volunteer monitor each station to help people place items into appropriate bins and avoid contamination.
- Take cutlery and share with us at: umzero@umich.edu.
- After the event, take compost bag(s) to loading dock and place in the cart labeled Compost.
- Return the cardboard collection box to its storage location or keep for future use. If absolutely necessary, it may be composted or recycled.
- Reuse remaining compostable ware or use for future events.

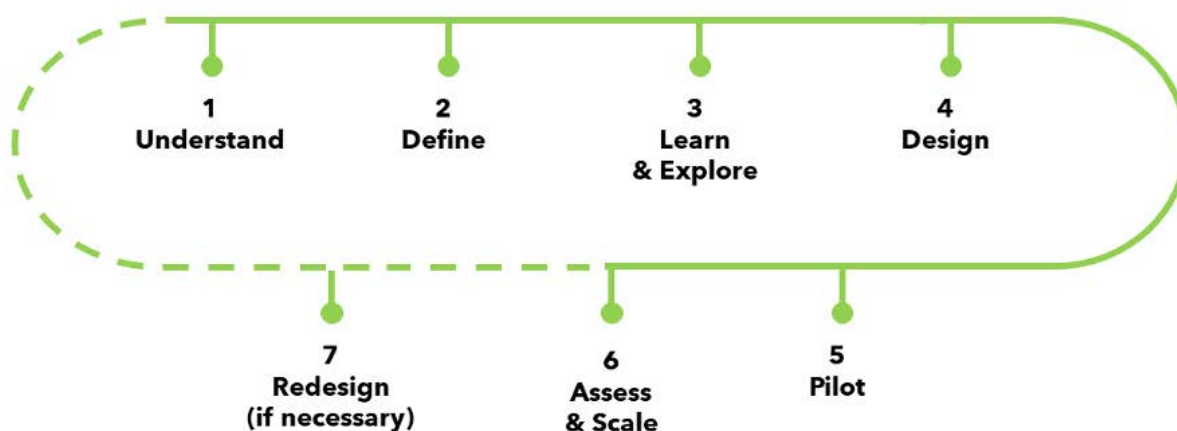
GET INVOLVED: ocs.umich.edu | [umich.edu/sustainability](https://www.umich.edu/sustainability) | [planet blue](https://planetblue.org)

can encourage users to increase their composting rates (Dolan et al. 2012). The brown color of compost bins provides consistent messaging across campus to help prime the community and makes more salient the decision to compost. Similarly, highlighting compostable products to use at events can encourage adoption and use of composting bins.



CHOICE ARCHITECTURE FRAMEWORK

Choice architects can use the below framework to conceptualize, implement and assess nudges or interventions. The diagram shows how these high-level steps are ordered, while the table defines each stage.



Phase / Step	Explanation
1. Understand	Learn what is important to the community (goals, interests and values), understand why a choice architecture intervention may be useful, and determine what kinds of interventions may actually work with the target population.
2. Define	Determine what problem needs to be addressed by behavioral interventions or choice architecture.
3. Learn & Explore	Determine how to leverage behavioral norms to create behavior change and translate them to behavioral objectives.
4. Design	Design a choice architecture intervention that will effectively address the problem in the context within which the behavior occurs. Quantify and document the expected benefits and costs to the proposed intervention. Later, compare these expected benefits and costs with actual.

5. Pilot	Test the proposed intervention in a discrete/controlled setting. The gold-standard is to implement a randomized-control trial (RCT) whereby the intervention is randomly applied across a target population and compared with a control group. In any case, the intervention's impacts to behavior change must be measured and analyzed.
6 a. Assess	<p>Evaluate the initial pilot phase and adjust the intervention as necessary. Understanding what would have happened in absence of the program is difficult; be sure to account for time or place-varying factors, such as seasonality or differing preferences across populations. Upon assessing the intervention, choice architects may need to return to the design or pilot phase before scaling the existing intervention.</p> <p>If possible, address any ethical or equity issues that arose. If not possible, consider whether to end the intervention. Analyze the actual benefits and costs during the pilot to help determine and consider if the results are expandable before scaling the pilot.</p>
6 b. Scale	Determine if and how the intervention could be expanded to cover a broader audience.
7. Redesign	Revisit goals as the intervention progresses.



A RECOMMENDED INTERVENTION FOR UM

Applying the Choice Architecture Framework

1. Understand

Only once a practitioner knows a community's goals, interests and values, they can then work hand-in-hand with community members to design effective choice architecture interventions.

Accessibility of local, fresh and affordable food is a problem faced by many people in the U.S. Michigan, however, has a strong local food identity due to its unique environmental attributes. As the Great Lakes State, Michigan has abundant freshwater, and with its diverse geography, it uses 10 million acres to farm and exports over 300 agricultural products.

Despite this, many people in urban areas, including student populations, are food insecure, with insufficient access to local, fresh and affordable food. Student barriers to food security include lacking awareness of, lacking transportation to, and high costs of local and fresh foods.

At UM, a Campus Farm provides fresh food during the fall at a one-time-only farmer's market on North Campus. Though they provide fresh, local food for much of the UM community, the Farm and North Campus farmers market are far from where most students live. 90% of the Campus Farm's production is sold to UM Campus Dining, and the remaining 10% is distributed to the Maize and Blue Food Pantry, various campus retail dining outlets, and Argus Farmstop. However, students who are not on a meal plan and do not regularly purchase food on campus may not be able to access food produced on the Campus Farm. Furthermore, there is little opportunity for students to purchase the Farm's fresh, affordable produce directly.

To provide students the resources and opportunities that the community will use, UM should better understand students' needs, wants, interests, values, and goals. To do this, the University should create a committee comprising students, staff, faculty, and Campus Farm employees who can collaborate to formulate a set of shared food-related goals.

UM Office of Sustainability choice architects should study whether and to what extent students, staff, and faculty might make use of a regular Central Campus farmers market supplied by the Campus Farm. To complete this study, choice architects should design a survey to elicit interests, behaviors norms, values, and goals around local food consumption.

Understanding the Problem: Local, fresh and affordable food is plentiful in Michigan and at UM. To increase fresh food accessibility, a committee of students, staff and faculty should put their heads together to understand the needs, wants, interests, values and goals of the people who would benefit most from a food security intervention.

2. Define

Defining the problem establishes what decision makers hope to accomplish, what the objectives are, what stakeholders are included, and any specific constraints. This ensures the correct problem is being addressed and can be revisited at each phase for direction. Defining the problem helps to scope the size of the intervention, so it is appropriate relative to the problem.

In 2012, UM established a Campus Farm where students grow food year-round for themselves and the UM community. However, campus dining halls comprise a majority of the farm's sales, and off-campus students, faculty, and staff do not eat at these locations. The University can increase local food purchasing and availability to these populations by bringing a farmers market to UM Central Campus supplied by Campus Farm produce. While off-campus student food purchases would not contribute to UM's 20% local food goal, it would reduce individual greenhouse gas emissions and increase overall campus sustainability. Further, the initiative would promote local food consumption and educate the community.

Problem defined: A large portion of the university population is excluded from purchasing student-grown, local produce. Increasing the availability and salience of local food options will increase local food access for all campus populations.



3. Learn and Explore

One choice architecture intervention can be more appropriate and effective than another depending on the context. In some cases, multiple nudges can improve effectiveness. By identifying the right nudges for the given context, you can target and better define behavioral objectives.

From the Understand phase, it is important to see what behavioral norms your target population exhibits to identify appropriate choice architecture interventions. Key questions to learn are: What do we know about the target audience? How are current behavior and our target behavior related? What motivations connect them? Why do people do what they do? Where can we intervene?

For example, when looking at the campus community, you may learn of the following norms:

- Foot traffic on the Diag is high
- UM community has strong sense of identity
- Students are more likely to purchase socially responsible goods

To align with norms, you may wish to explore the following choice architecture interventions:

- Priming and salience: Explore different cues that can be placed in high traffic areas like the Diag to make local food options salient
- Messenger and framing: Showcase local options through messengers that also represent the campus community. For example, to showcase options and discuss the benefits of local food, student Campus Farm representatives can speak to students and Campus Farm staff can speak to other UM staff
- Feedback: Provide positive feedback about socially responsible purchases to encourage and sustain the behavior (see Maize Bucks in phase 4)



Behavior Learned and Explored: Through studying the UM community, we learned that the community has a strong sense of identity, students are likely to purchase socially responsible goods, and foot traffic on the Diag is high. We could potentially employ cues around campus to enhance priming and salience, utilize representatives to spread the word about local food, and provide positive feedback to those who purchase sustainable foods on campus.

4. Design

Interventions should be designed based on an understanding of behavioral science and the culture/community within which the intervention will occur. The design phase should incorporate findings from previous stages, particularly learn and explore.

With knowledge from previous phases, architects can now design an informed intervention. Given the difficult-to-access Campus Farm yet high Central Campus density, a UM farmer's market central campus can address the problem previously defined. This farmer's market should enable students and community members better access to local and sustainable food. The University should place the farmer's market in a central location that experiences a high level of traffic to



prime community members to visit the market. To incentivize purchasing, a payment system similar to Blue Bucks can be implemented. One idea is to introduce Maize Bucks, a program modeled after SNAP's that would allow dollars spent on local produce to double. Ease of payments coupled with this financial incentive may encourage students to shop at the farmer's market in lieu of less healthy and less sustainable venues.

The farmer's market should also be a forum to educate the UM community about local food, sustainability, and waste. This information provision could influence visitors' future choices. In addition, these booths could include cooking lessons, tasting opportunities, or recipe cards so visitors can learn how to incorporate these foods into their diets. Student Campus Farm representatives should convey this information to students, since messengers with similar demographic and behavioral backgrounds can create more behavior change. Additionally, Farmers Market marketing and signage should include prompts and reminders to make local and sustainable food more salient.

Solution Designed: Implement a UM Central Campus farmer's market to increase access to local and sustainable food. Offer education to encourage ongoing sustainable and local food purchasing behaviors.

5. Pilot

Rigorous testing will demonstrate an intervention's impact. It is ethically necessary to show how and why an intervention has improved well-being. In addition, this step can identify spillover effects, or unintended consequences.

It is necessary to prove our designed intervention helps make locally sourced, sustainable food more accessible and salient. To do this, a pilot test must be implemented. Collect data before and after the intervention so that it can be assessed in Phase 6.

Ideally the pilot would involve three separate efforts: piloting a Central Campus farmer's market, offering education programming, and then combining them so that individual and combined effects can be measured against a control of no interventions. In addition, it would be ideal to implement this test over a longer time period (1 of 2 years) to ensure large enough sample sizes and control for other effects that might occur. For example, seasonality of produce and produce consumption, and differences in population levels due to the academic calendar, (e.g., fewer students in people) could impact the intervention's success. To measure costs and benefits accurately, collect data before, during, and after the pilot interventions to show their impact.

Piloting Solutions: A Central Campus farmer's market should be deployed and data should be gathered to understand the impact of this intervention.



6a. Assess

To have the largest possible impact, choice architects will want to broaden their intervention to a larger audience or to the same audience but with greater intensity. However, these interventions may require significant personnel and financial resources, so it is critical that architects can show that the piloted interventions were worthwhile before committing additional resources to scaling up. Architects must also consider the manner in which they scale their interventions, realizing that they may not be as effective in a new context or under new conditions, such as a different audience, time, location, etc.

With the pilot completed, architects can analyze the pilot's success. How many students purchased produce from the farmer's market compared with expectations, considering the pilot's size? How does this outcome compare to a day without a farmer's market Central Campus? Would students have gotten their produce from other grocers or farmers markets, or would they have eaten non-produce items? How much in carbon emissions was diverted by establishing this pilot, because customers ate produce instead of meat? Or because it saved customers a drive to the grocery store? How much waste was avoided because customers didn't shop for food that with significant packaging, often found at grocery stores? Sum up these benefits, as well as the costs of the program to evaluate effectiveness.

Architects should also consider how a subsequent pilot could be more effective. Would different or more advertising have helped? Longer hours of operation? A more prominent location? More or different vendors? A different time of year? Day of the week? Different price points? Consider additional contextual or financial incentives as described earlier in this document, if not initially considered. How can the intervention be more salient, increase priming, or use additional sensory cues or different

messengers? If necessary, conduct another pilot to test these tweaks. Consider, too, reverting back to the Design, or even the Understand phase to modify the intervention, depending on your assessment. Once you feel your intervention was successful because it caused sufficient behavior change, consider scaling the intervention to grow its impact.



6b. Scale

Before you scale, consider whether your expansion will target new communities, and if they will have differing attitudes or reactions to your intervention. Consider what locations, times, populations etc. would benefit the most from scaling up. Might UM North Campus or the Flint or Dearborn campus benefit most? Obtain as good an understanding of your expanded target populations as you did during stages 1 through 5. Revisit those five stages to understand how an expanded program might differ from the initial pilot.

Consider how to generate economies of scale when scaling up the intervention such that you are operating efficiently, and are not duplicating work. Make sure there are sufficient resources to staff the expanded program.

Assess and Scale Up: Review the results of the pilot intervention and analyze ways to make the intervention more effective. Once a successful intervention is defined, consider larger target audiences and ways to expand the program to scale up your intervention.

7. Redesign

As you begin to see how your intervention aligns with your goals and fits within the community, you may need to redesign certain elements to ensure the intervention you have designed is effective to achieve your goals. Redesign the intervention along the different stages as necessary.

At each step of the choice architecture process--brainstorming, designing, implementing, testing, and deploying--architects should consider how this intervention aligns with the goals and needs of the community being nudged. If at any stage the intervention does not align with stated goals or is found to be ineffective, choice architects should revisit stages of the framework.

Intervention Redesigned: Revisit previous steps and redesign the intervention within the framework as necessary.

RECOMMENDATION

UM is in a unique position to better serve many populations, including students, and make its campus more sustainable, through researched behavioral methods. Food insecurity is a nation-wide, and in fact world-wide, issue that needs creative solutions. We hope that the UM Campus Farm bringing a farmers market to Central Campus, our proposed choice architecture intervention, will help reduce food insecurity among the community.

CONCLUSION

Choice architecture is a powerful tool, and it is important for designers to carefully consider what contexts are most in need for intervention and the likelihood of its effectiveness. There are a number of different choice architecture strategies that can be effective to nudge people to make more sustainable decisions. The framework above outlines specific ways in which organizations, such as the University of Michigan, can design successful choice architecture interventions to promote sustainability. We hope that other organizations can apply this framework to design interventions that will create a more sustainable world.

ACKNOWLEDGEMENTS

We would like to thank Victoria Campbell-Arvai for all of her guidance, knowledge, and support. We could not have put together this guide without all of her help!



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UM Zero Waste Events <https://ocs.umich.edu/programs/composting/zero-waste-events/>

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