WELCOME TO THE ENVISIONING CARDS.

A VALUE SENSITIVE DESIGN TOOLKIT

The Envisioning Cards synthesize the theory, methods, and practice of value sensitive design into a simple, yet versatile toolkit. A toolkit of depth, the Envisioning Cards support everyone who investigates, designs, or builds sociotechnical systems, including professional designers and engineers, design researchers, policymakers, and students. Designers and engineers often focus on the immediate context of use: How will a product be used by the person who purchases it? They rarely have the tools to consider the long-term and indirect effects of their technologies. We feel it is important to envision the long-term influence of new technology – as it affects the lives of different stakeholders, implicates time, raises issues that touch human values, becomes pervasive throughout society, and spans across generations.

The Envisioning Cards are designed to evoke consideration and discussion of such concerns within the context of design and engineering research and practice. They have been used by thousands of graduate and undergraduate students, hundreds of professional designers, policy makers, and more. Used skillfully, the Envisioning Cards help expand our moral and technical imagination in envisioning new possibilities for tools, technology, policy, processes, infrastructure and beyond.

All of the Envisioning Cards share a common structure that includes an *image*, *title*, *theme*, *design activity*, and one of five *envisioning criteria*.

Image

Title

Title

Envisioning Criterion

Each Envisioning Card is associated with one of five envisioning criteria: *Stakeholders*, *Time*, *Values*, *Pervasiveness*, and *Multi-lifespan*.

Theme

Describes the theme of this Evisioning Card.

Design Activity

Suggested activity for exploring the theme of this Envisioning Card.

THE ENVISIONING CRITERIA

The Envisioning Cards are built on a set of five envisioning criteria intended to raise awareness of long-term and systemic issues in design.

Stakeholders

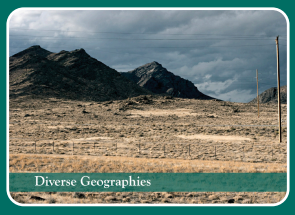
The Stakeholder criterion emphasizes who or what is impacted by a technology. In value sensitive design, stakeholders are broadly conceived: they can be people, groups, neighborhoods, communities, organizations, institutions, or societies, and can also include past and future generations, nonhuman species, superorganisms, the Earth, social robots, and other entities such as historic buildings or sacred mountaintops.

Time

The Time criterion emphasizes the adoption of a tool, technology, or system over time, including the initial phases of novelty (weeks and months) as well as the later phases of appropriation and integration into society (years and decades).

Values

The Value criterion emphasizes the impact of technology on human values. In value sensitive design, human values refer to "what is important to people in their lives, with a focus on ethics and morality." In designing systems, we have found values of interest to include (among others): autonomy, community, cooperation, democratization, dignity, environmental sustainability, expression, fairness, inclusivity and exclusivity, informed consent, justice, ownership, privacy, self-efficacy, security, trust, and universal access.

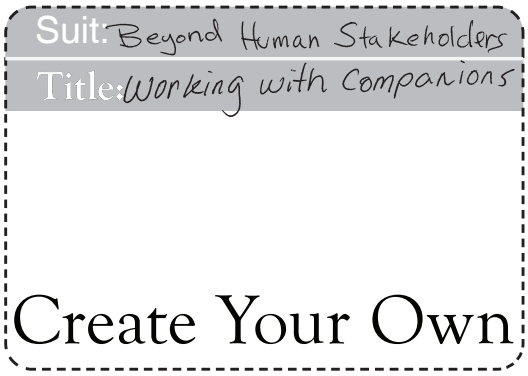


Pervasiveness

The Pervasiveness criterion emphasizes systemic interactions that follow from the widespread adoption of a technology. Technologies can become pervasive with respect to geography (e.g., city navigation software use within urban areas), culture (e.g., text messaging within the deaf community), demographics (e.g., online social networking sites among teenagers), and other factors.

Multi-lifespan

The Multi-lifespan criterion emphasizes design thinking with a very long time horizon that reaches beyond a single human lifespan. Multi-lifespan predicaments include: Genocide, HIV/AIDS, famine, habitat destruction, species extinction, and forced exodus. These types of problems entail widespread losses to human beings, to other sentient beings, or to the natural world. Moreover, their structure and their solution spaces require long periods of time to unfold. In turn, these problems call for designers to take a more proactive and long term approach to how we envision and design technology.



Create Your Own Cards

The Envisioning Cards set comes with a "Create Your Own" card template for making your own Envisioning Cards. Choose a suit, an evocative image or photo, and combine it with a title, theme, and design activity that supports your theme.

We encourage you to create new cards that represent people, ideas, and concerns that are unique to your design practice, such as:

- Unique local places or social groups
- Local social or political issues
- Lessons and insights from past projects
- Demographic data about your users
- Potential use cases for a product

Create Your Own Suits

In many instances, when creating your own Envisioning Card one of the existing five suits will work well with your new card. Other instances might benefit from an additional suit. For example, when creating a small collection of cards around a particular topic or design situation.

Possible additional suits could include (but are not limited to):

Accessibility – Cards which address different abilities and impairments that manifest across societal contexts and technologies.

Beyond Human Stakeholders – Cards which expand the design space to better account for the nonhuman in sociotechnical systems.

Environment – Cards which foreground concerns about the environment, ecosystems, and natural planetary systems.

Notes for Use

The Envisioning Cards can be used in a wide variety of situations. To get started, you may wish to explore each of the cards. As a set, the Envisioning Cards cover many issues and concerns related to the design of sociotechnical systems. The cards may also be extended and adapted to match your specific context. By skimming through the cards, you may encounter both familiar and unfamiliar themes. Here are suggestions for using the Envisioning Cards:

Got three minutes? Even with a short period of time, such as three minutes, the Envisioning Cards can help stimulate your moral and technical imagination. Select a card, set a timer for three minutes, and generate as many ideas as you can based on that card's theme and activity. When the timer is up, move on to another card. Do this for as many cards as you find useful or fill the time that you have available.

Keeping stakeholders and values present. During the design process, identify cards that represent stakeholders and values specific to your project. Pin them up in a visible place. As you go through the project monitor your progress, keeping an eye out for concerns, priorities, and opportunities suggested by the cards. You might wish to annotate the cards using sticky notes, or by writing next to them.

Soliciting clients' concerns. Allow your clients to spend some time with the Envisioning Cards. Ask them to consider the issues raised by the cards, and to indicate their concerns to your design team. You may wish to look at the cards together with your clients or leave the cards with your clients to explore on their own.

Connecting with the local environment. Choose cards that represent your primary concerns. Take a camera and explore your office, work site, or other relevant location, and take photos that correspond to these cards. Print the photos and place them alongside the original cards to tie these cards to your local environment.

Getting unstuck. When your design team feels stuck on a specific problem, choose a random card from the deck and perform its activity. Once you feel you have made progress on issues raised by the card, draw another card or return to solving the problem.

Constructing shared language. Do one pass through all the cards sorting them into two piles, one of cards that seem relevant to your project, another of cards that seem less so. Focus on the pile of relevant cards. In your team, review each card in this pile paying attention to the concepts and language of the card. From the perspective of your project, cluster related cards. Post the clusters on the wall. Then discuss key terms to reflect each cluster and tag each cluster accordingly. These tags form the basis of shared language going forward. Be alert to changes in your understanding of the terms and in the project; adjust the key terms as appropriate.

Designing with stakeholders. There are multiple purposes and places for integrating the Envisioning Cards into design activities with stakeholders[iii]; in the early ideation phase to *stimulate new ideas*; in the midst of low-fi prototyping to *assess gaps and opportunities* to further a design; near the end of a design process to reflect on and *assess* final design directions or proposed outcomes. You can select cards to support and scaffold specific design activities or use the cards for more general inspiration.

Expanding design and engineering specifications with values. Design specifications identify different metrics with which to assess the quality of sociotechnical systems. Choose one or more cards relevant to your project. Drawing on the card's theme, description, visuals, and/or activity develop metrics which could be included in your project's design specification. Brainstorm how you might measure, track, and evaluate your progress addressing the metrics.

About the Envisioning Cards

This second edition of the Envisioning Cards brings together under one cohesive design the original set of 32 Envisioning Cards published in 2011 including the four suits—Stakeholders, Time, Values, and Pervasiveness—with the supplementary set of 13 Envisioning Cards published in 2018 with the Multi-lifespan suit. The second edition preserves all the cards. In the second edition, all five suits now appear on each card and slight changes have been made to the text on some cards; the images are unchanged. On some cards the examples of stakeholders have been broadened beyond human beings (e.g., humpback whales, oceans, space). There is now a single "Create your Own" card which supports making new cards for any of the five suits as well as opens the opportunity to create your own suit.

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Further Reading

Friedman, B., and Hendry, D. G. (2019). *Value Sensitive Design: Shaping Technology with Moral Imagination*. Cambridge, MA: The MIT Press.

Friedman, B. and Hendry, D. G. (2012). The Envisioning Cards: A toolkit for catalyzing humanistic and technical imagination. In *Proceedings of CHI '12* (pp. 1145-1148). ACM Press.

Nathan, L. P., Friedman, B., Klasnja, P., Kane, S., and Miller, J. K. (2008). Envisioning systemic effects on persons and society throughout interactive system design. In *Proceedings of DIS '08* (pp. 1-10). ACM Press.

Yoo, D., Logler, N., Ballard, S., and Friedman, B. (2022). Multi-lifespan Envisioning Cards: Journeying from design theory to tools for action. In *Proceedings of DIS '22* (pp. 557-570). ACM Press.

Acknowledgments

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Direct Stakeholders

Create

People who directly interact with the system are known as *direct stakeholders*. They have unique perspectives, skills, and concerns. In what key roles will individuals interact directly with the system (e.g., for a medical application: intake receptionist, physician, insurance agent)? Direct stakeholders can also include other human and nonhuman entities (e.g., groups of people, companies, birds, sacred mountains).

Create a list of the system's direct stakeholders. For each stakeholder role, note at least one concern specific to that role. You may refer back to these roles throughout the project.

Stakeholders · Time · Values · Pervasiveness · Multi-lifespan

Direct Stakeholders

Indirect Stakeholders

Generate

Some people may be affected by a system without directly using it. These people are known as *indirect stakeholders*. In what key roles will individuals be affected by the system while not directly interacting with it (e.g., for a law enforcement database: citizens, bystanders, lawyers)? Indirect stakeholders can also include other human and nonhuman entities (e.g., groups of people, companies, birds, sacred mountains).

Generate a list of 3–5 indirect stakeholders. For each indirect stakeholder role, note at least one concern specific to that role. You may refer back to these roles throughout the project.

Stakeholders · Time · Values · Pervasiveness · Multi-lifespan

Indirect Stakeholders

Non-targeted Use

Identify

Identify three roles that involve non-intended use of the system.

Technologies are not always used in ways that the designers intended. Who might use the system for unplanned or nefarious purposes (e.g., frustrated stakeholder or an identity thief)? In what ways?

Non-targeted Use

Stakeholders · Time · Values · Pervasiveness · Multi-lifespan

Consider Children

Develop

Stakeholders · Time · Values · Pervasiveness · Multi-lifespan

Consider Children

Children often appropriate systems originally designed for adults. How might this system influence a child's social and moral development?

Develop a scenario that portrays a seven-year old interacting with the system. How might the system influence the child's learning or play with other children?

Variation in Human Ability

Describe

Sight. Hearing. Touch. Speech. Motor control. Emotional control. Attention. People experience different physical, cognitive, and emotional abilities. Abilities can also be affected by situation (e.g., listening to a cell phone on a busy street). How might the system account for and accommodate variation in abilities?

Describe one type of human ability. Now consider people with limitations in that type of ability interacting with the system. Envision 3-5 breakdowns that may occur.

Variation in Human Ability

Stakeholders · Time · Values · Pervasiveness · Multi-lifespan

Changing Hands

Design

A single product can change hands once, twice, or more times during its lifecycle. It may be passed among family members (e.g., coming of age gift) or across town (e.g., consignment). How might use of the system change as the technology changes hands?

Design a scenario of your product changing hands. Imagine a specific challenge an individual, a family, or a community might face when wanting to shift ownership. What features might make this process smoother?

Stakeholders · Time · Values · Pervasiveness · Multi-lifespan

Changing Hands

One Person, Multiple Roles

Sketch

Sketch a description (1–2 paragraphs) of an individual who at one point in time is in the role of a direct stakeholder with the system and at another point in time is in the role of an indirect stakeholder.

The same individual can interact with the same system at times in one role, at other times in a different role (e.g., with electronic medical records, a person might access the system in their workplace role as a nurse and, at another point, as a patient). Individuals can also shift between direct and indirect stakeholder roles.

Stakeholders · Time · Values · Pervasiveness · Multi-lifespan

One Person, Multiple Roles

Future Stakeholders

Role Play

Role play a scenario exploring how future stakeholders born 10, 20, or 50 years from now might encounter your system.

Stakeholders—humans and nonhumans—born 10, 20, or 50 years in the future will encounter systems that are being built currently. In this way, systems built today will shape the context in which those not-yet-born will live. Longer-term design thinking challenges us to consider how our designs might impact these and other future stakeholders.

Stakeholders · Time · Values · Pervasiveness · Multi-lifespan

Future Stakeholders

The Long Now

Envision

Stakeholders · Time · Values · Pervasiveness · Multi-lifespan

The Long Now

Your children. Your children's children. Growing up, interacting with, adapting to, and adapting the technology you are working with now. How might generations who come of age with this technology appropriate it for their own purposes?

Envision a 50-year old who has interacted with the technology over a lifetime. Sketch a series of snapshots at five-year intervals that highlights how interactions with the system shift over time.

Long-Term Health and Well-Being

Imagine

Technology may have effects on stakeholders' health and well-being. How might interactions with the system on a daily basis influence health and well-being?

Imagine that the system you are working on has been widely adopted and is part of daily life for direct and indirect stakeholders across society. Reflect upon 3–5 likely ways in which the system influences health and well-being after years of use.

Long-Term Health and Well-Being

Stakeholders · Time · Values · Pervasiveness · Multi-lifespan

Work of the Future

Stakeholders · Time · Values · Pervasiveness · Multi-lifespan

Work of the Future

The introduction of new technologies can change working habits, or even what it means to "do work." How might your system change the nature of work? How might it change what it means to be a worker?

Think

Think about ten years from now. Take a few minutes to brainstorm ways in which your system may change for the better the way stakeholders work. Then take the same amount of time to brainstorm ways in which your system may change for the worse the way stakeholders work.

Adaptation

Stakeholders · Time · Values · Pervasiveness · Multi-lifespan

Adaptation

People are inherently adaptive, changing themselves or their behaviors in order to fit current conditions. Technologies can facilitate adaptation (e.g., a device that displays home energy use may encourage a homeowner to turn out the lights) or hinder adaptation (e.g., a person may be prevented from adopting a useful new technology if it is incompatible with other currently used technology).

Visualize

Visualize one lifestyle change that could be supported by your technology. Consider whether your technology would inhibit any positive lifestyle changes.

Choosing Not to Use

Some stakeholders may decide not to use your system or may attempt to remove themselves from indirect impacts (e.g., choosing not to own a cell phone or disabling a digital sensor). How might deliberate non-use of the system affect a stakeholder's daily life (e.g., developing and maintaining social relationships, employability, accessing social services, receiving humanitarian aid, civic participation)?

Picture your system in use many years from now. Identify three ways in which a stakeholder's or a group of stakeholders' intentional non-use of the system might affect their daily life or the system as a whole.

Stakeholders · Time · Values · Pervasiveness · Multi-lifespan

Choosing Not to Use

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Appropriation by Cultural Groups

Contemplate

Different cultural groups will likely interact with your system in varied ways. How might a cultural group appropriate the use of technology to support their cultural practices (e.g., Muslim calls to prayer, Christian evangelizing, humpback whale songs)? How will use of the technology in turn affect these practices?

Contemplate ten years into the future. Consider 1–3 ways in which use of the system might influence specific cultural groups who interact with the system, or might influence interactions among cultural groups.

Appropriation by Cultural Groups

Stakeholders · Time · Values · Pervasiveness · Multi-lifespan

Invent

Obsolescence

Stakeholders · **Time** · Values · Pervasiveness · Multi-lifespan

For a variety of reasons, systems may become obsolete–outdated, no longer used, or no longer supported by their developers. How will obsolescence affect those who continue to use the system?

Invent a future storyline in which the system you are developing is no longer supported. Consider how obsolescence affects normal use of the system, and how problems with the system may be resolved.

Reappropriation

Envision

Stakeholders · Time · Values · Pervasiveness · Multi-lifespan

Reappropriation

In some cases, after a system has reached widespread use, it is later reappropriated in novel ways by the same community (e.g., use of telephone wires to deliver Internet service).

Envision 2–3 ways that the system might be reappropriated. Consider how this reappropriation might affect both the community in which it originated and new communities of use.

Sustained Friendships

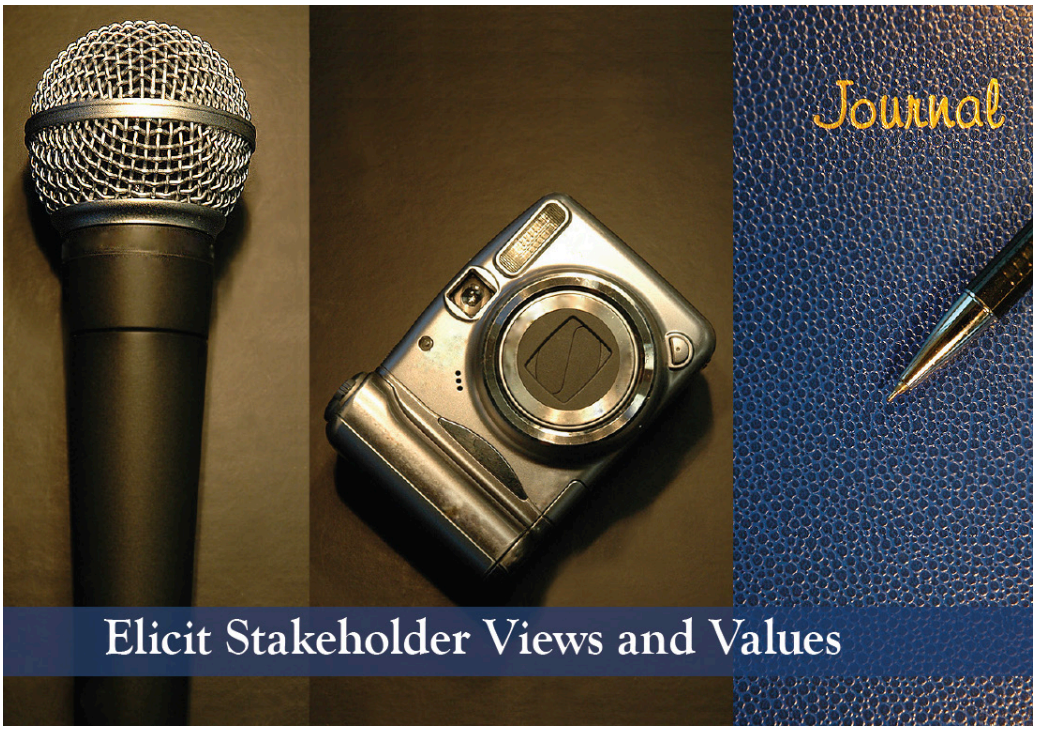
Imagine

As we integrate technologies into social lives, they may affect or be affected by relationships among stakeholders (e.g., among people, among other creatures, among people and other creatures). How might the system influence how different stakeholders make and sustain friendships and family relationships?

Imagine five years out from now and consider 3–5 ways the system might influence friendships and family relationships.

Sustained Friendships

Stakeholders · Time · Values · Pervasiveness · Multi-lifespan



Elicit Stakeholder Views and Values

Elicit Stakeholder Views and Values

Stakeholders · Time · **Values** · Pervasiveness · Multi-lifespan

Both direct and indirect stakeholders may hold values that are different than those of the designers.
What views and values do stakeholders bring to a system?
What tensions among values do stakeholders experience?

Inquire

Inquire. When interacting with direct stakeholders (i.e., during usability or user experience studies), include at least five questions or activities about values and value tensions. If possible, also present these questions or activities to at least some indirect stakeholders.

Consider Key Values at Stake

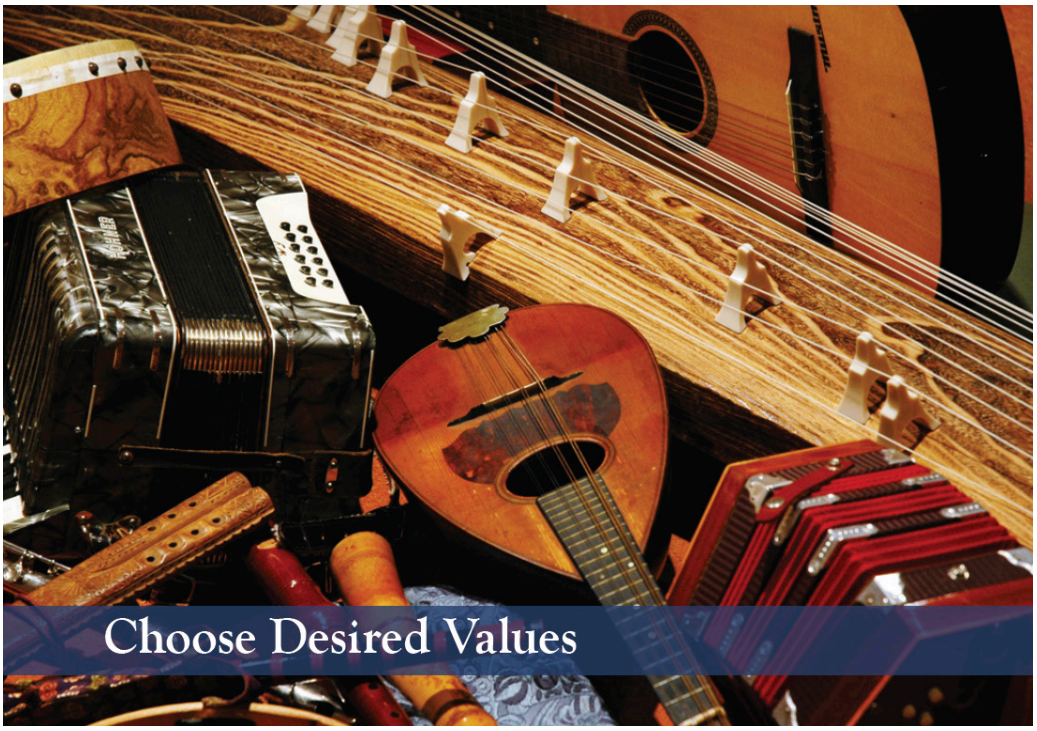
Generate a list of as many potentially implicated values as possible in five minutes (your list may contain some or none of the values suggested here). Then, briefly discuss each of the values on your list.

A technology can support certain values and hinder others (e.g., a shared online calendar system can support community, but impinge on privacy). Possible values include (but are not limited to): autonomy, calmness, community, democracy, environmental sustainability, fairness, human dignity, inclusivity, informed consent, justice, privacy, self-efficacy, and trust.

Generate

Stakeholders · Time · **Values** · Pervasiveness · Multi-lifespan

Consider Key Values at Stake



Choose Desired Values

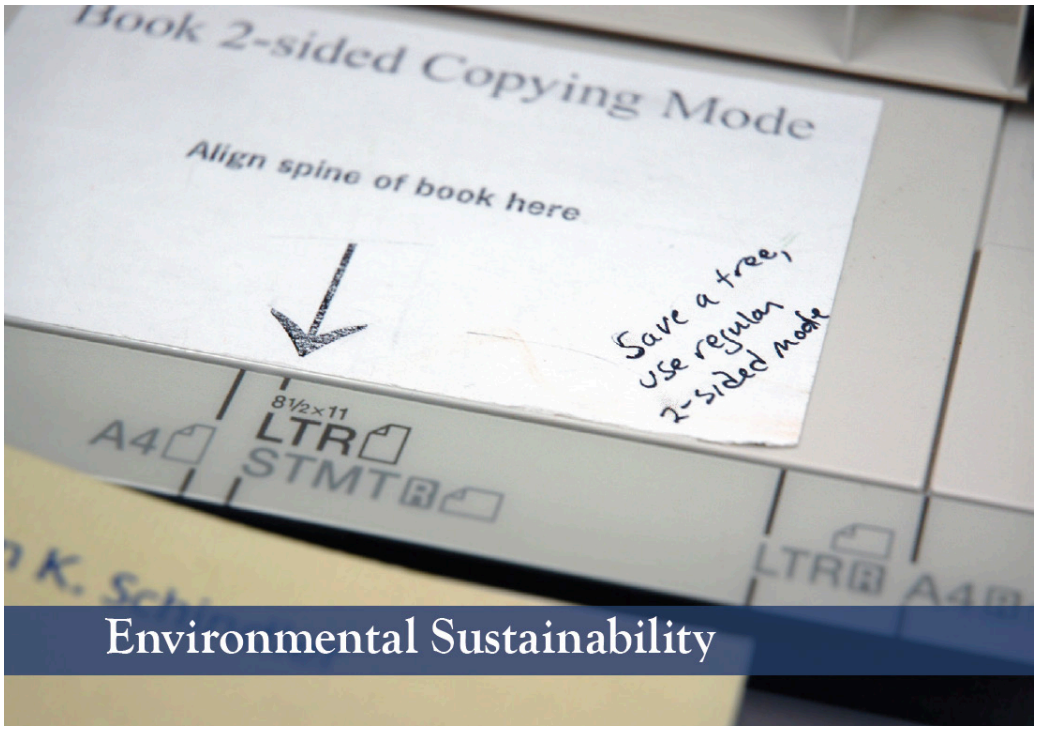
Deliberate

Deliberate on and then designate three primary values the system ideally would support.

Often systems are intentionally designed to support specific values (e.g., to facilitate community, to protect privacy, or to enhance trust).

Choose Desired Values

Stakeholders · Time · **Values** · Pervasiveness · Multi-lifespan



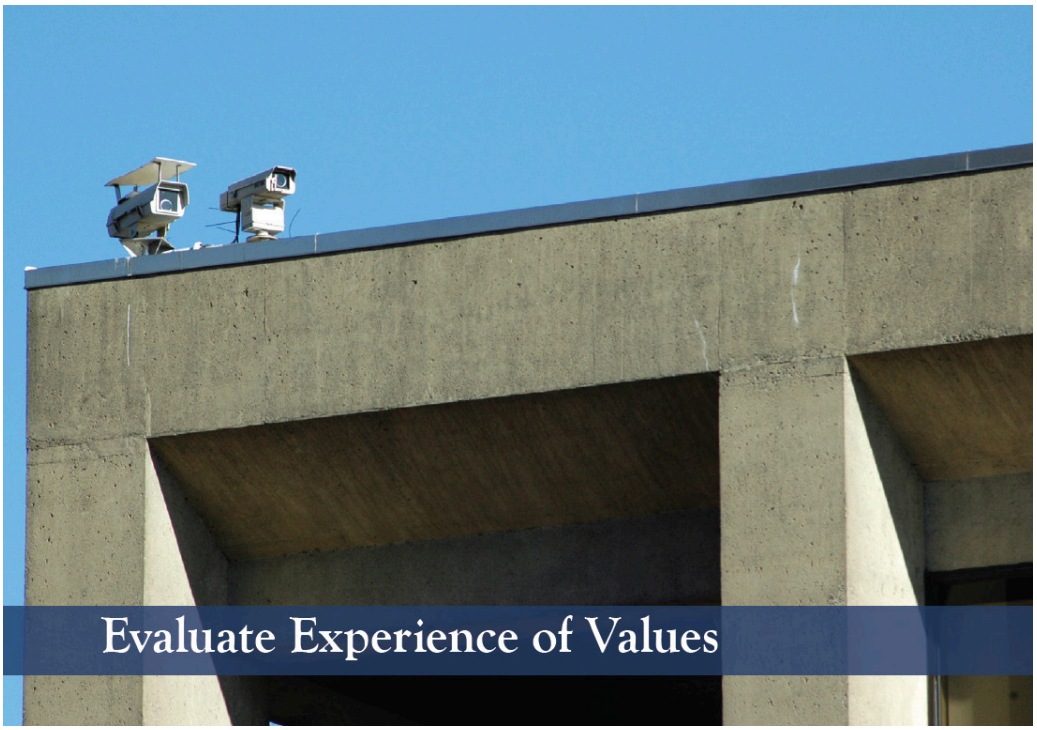
Environmental Sustainability

Stakeholders · Time · **Values** · Pervasiveness · Multi-lifespan

Environmental Sustainability

Systems can be designed to support desirable environmental outcomes (e.g., paperless document systems which lead to less use of paper and ink). Such systems may also have unintended negative environmental effects (e.g., paperless document systems rely both on disposable consumer devices and on data centers which consume large amounts of energy and water).

Specify the resources required to create and sustain your system. Work backward to identify the sources of these resources, then work forward to envision the byproducts of building, running, and disposing of your system. How might your design be adapted to support a more positive near-term environmental outcome?



Evaluate Experience of Values

Ask

Ask potential stakeholders whether use of the system has any positive or negative effects on a value that they feel is important. You might ask whether a specific feature of the system is OK, or not OK. And why, or why not.

A stakeholder may feel that a technology affects values differently than the designers intended. How do stakeholders experience the influence of a system on their values? This applies to both direct and indirect stakeholders.

Evaluate Experience of Values

Stakeholders · Time · **Values** · Pervasiveness · Multi-lifespan

Value Tensions

Value tensions occur when supporting one value in a technology challenges, disrupts, or unsettles another value (e.g., sharing more information in a social networking system may support sociability, but reduce privacy). Tensions can occur within a single individual (conformity vs. autonomy), between an individual and a group (individual privacy vs. national security), or across different groups (a culture that values independence vs. a culture that values interdependence).

Brainstorm three value tensions that your system might engage. For each value tension, identify one or more design features that favors one of the values over the other.

Brainstorm

Stakeholders · Time · **Values** · Pervasiveness · Multi-lifespan

Perceptions of a Value

Investigate

Investigate a value. When working with stakeholders, have them write a brief (1-2 sentence) definition of that value as it relates to the system. Identify any substantive differences in stakeholder perceptions.

Sometimes stakeholders have different perceptions of the definition of a specific value (e.g., some may define privacy as having control over your information vs. those who define privacy as being left alone).

Perceptions of a Value

Stakeholders · Time · **Values** · Pervasiveness · Multi-lifespan

Widespread Use

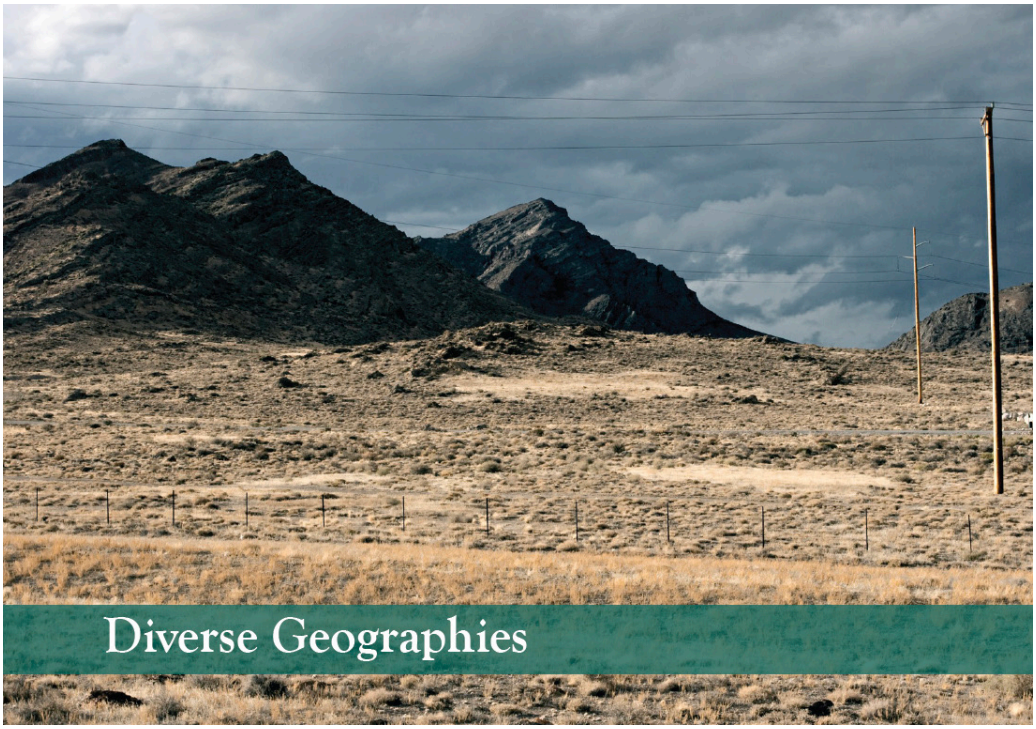
Envision

Stakeholders · Time · Values · **Pervasiveness** · Multi-lifespan

Widespread Use

A stakeholder's experience of a technology may be impacted by how, when, and where others are using it. How might interactions change as use of the system spreads to thousands or even millions of others?

Envision your system in use by a single stakeholder. Now imagine 100 such stakeholders interacting with the system. Then 1,000 stakeholders. Then 100,000. What new interactions might emerge from widespread use? Find three synergistic benefits of widespread use and three potential breakdowns.



Diverse Geographies

Enumerate

Enumerate 2-3 diverse geographies. For each geographic setting, consider ways in which the system could be adapted to better fit that environment.

A system designed for one geographic setting may perform quite differently in other geographies (e.g., a laptop computer designed for an urban setting may not function well in a desert setting).

Diverse Geographies

Stakeholders · Time · Values · **Pervasiveness** · Multi-lifespan

Crossing National Boundaries

Choose

Nations have different rules, customs, and infrastructure that affect use of a technology. What challenges will be encountered by your system if it is used in other countries or in shared commons (e.g., oceans, space)?

Choose two countries across the globe and one shared commons. For each, envision challenges for your system if it was deployed in that context. Label any recurring concerns that you surface.

Crossing National Boundaries

Stakeholders · Time · Values · **Pervasiveness** · Multi-lifespan

Accounting for Culture

Record

Breakdowns can develop when people from one culture make assumptions about the conventions, norms, or practices of other cultures. How might your system be misunderstood or understood differently by stakeholders who are unfamiliar with your culture?

Record 2-3 positive effects of your technology when used within your own cultural context. How might those effects be different in another culture? Develop and discuss potential benefits and breakdowns.

Accounting for Culture

Stakeholders · Time · Values · Pervasiveness · Multi-lifespan

Political Realities

Characterize

Stakeholders · Time · Values · **Pervasiveness** · Multi-lifespan

Political Realities

Different political systems (e.g., democratic, socialist, totalitarian) can influence perceptions and practices that emerge in relation to your system (e.g., unmoderated vs. moderated discussion forums).

Characterize two different political environments in which your system is likely to be deployed. Consider how those political realities may influence how stakeholders in those environments may interact with the features of your system.

Collect Now

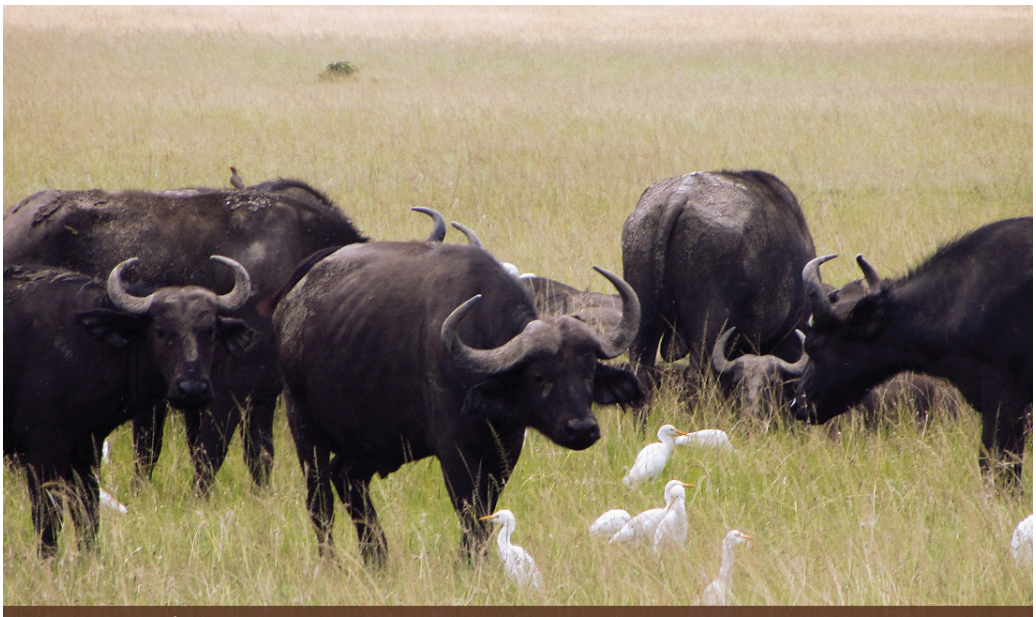
Choose

Choose one way your system collects and preserves knowledge. Imagine three very different ways future generations might use this information.

What exists now may be of use at some future time. Collecting and preserving knowledge in the near-term enables a greater range of possible solutions in the future (e.g., an online database documenting endangered species and biodiversity).

Collect Now

Stakeholders · Time · Values · Pervasiveness · Multi-lifespan



Cultivating Trust

Stakeholders · Time · Values · Pervasiveness · **Multi-lifespan**

Cultivating Trust

When we trust, we make ourselves vulnerable to others, yet still feel safe. Trust takes time to build and requires attention to sustain. It can take generations to recover from major breeches of trust (e.g., a country healing from civil war or internal conflict). Systems play a role in establishing, building, maintaining, strengthening, and compromising trust.

Surface different points in your system where stakeholders might be vulnerable. Draw a diagram showing how your system may compromise or strengthen relationships of trust over time (e.g., between individuals, between individuals and systems, between individuals and institutions, between species).

Surface

Generational Amnesia

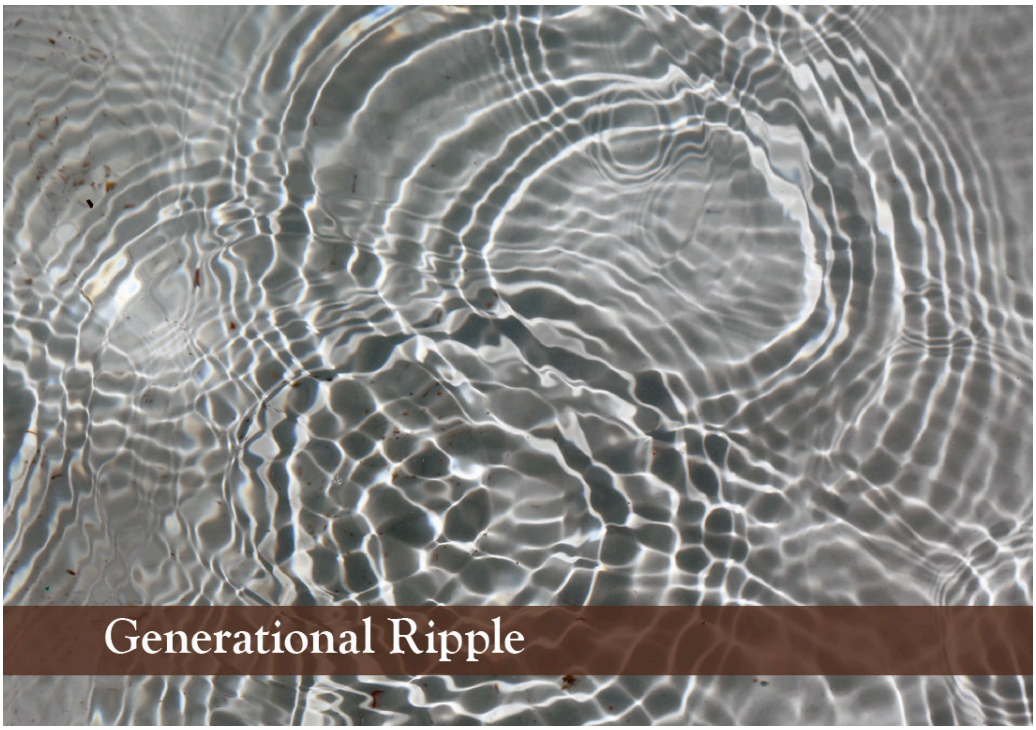
Sketch

The environmental and social conditions we remember from our childhoods can serve as the baselines we use to assess present and future conditions (e.g., what is a forest, when does a child become an adult). What we experience in childhood shapes our understanding of longer-term trends, particularly trends that precede and extend beyond our personal lifespan.

Sketch different baseline views relevant to your system's key functions. What were the norms 50, 20, or 5 years ago? What might be the norms for a person born in 5, 20, or 50 years? Reflect on how changing norms might affect your system and vice versa.

Stakeholders · Time · Values · Pervasiveness · Multi-lifespan

Generational Amnesia



Generational Ripple

Reflect

Our actions are shaped in part by ripples from past events and situations. In turn, our actions create new ripples that will shape future contexts. This cycle repeats with future generations—their identities are shaped by the actions we take.

Reflect on three ripples from the past that shape the context in which your system will be deployed.

Going forward, brainstorm positive and negative ripples your system might generate.

How might you encourage the positive ripples and mitigate the negative ones?

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Generational Ripple

Reimagining Infrastructure

Infrastructure constrains design. Thinking longer-term (e.g., 50 years in the future) lets us consider more broadly the physical and organizational contexts in which our systems are deployed. As infrastructure becomes part of the design space, it creates opportunities to reconsider the processes that affect many functions of our society (e.g., security and privacy, energy generation and storage, transportation, education).

Picture an alternative infrastructure more supportive of your goals. What does this infrastructure look like? How might your system be different if that infrastructure was in place? What might need to happen for infrastructure to transform in 20 or 50 years?

Reimagining Infrastructure

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Long Cycles in Nature

Contemplate

Relative to a human lifespan, some natural processes occur quickly (e.g., the lifespan of a firefly). Other natural processes take hundreds or thousands of years (e.g., the lifespan of a baobab tree). For the latter, interacting with the nonhuman world requires us to think of systems that will extend far beyond a single human lifespan.

Contemplate three ways your system connects directly or indirectly with long-term natural cycles. How might your system change (if at all) by foregrounding long-term natural cycles?

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Long Cycles in Nature

Material Longevity

Examine

Designs take physical form. The materials we use determine the longevity of an artifact. Some materials can sustain harsh wear and tear while remaining usable (e.g., cast iron), other materials degrade after repeated use (e.g., rubber). Digital artifacts may appear ephemeral, but rely on materials as well (e.g., hardware, energy, connectivity).

Examine the materiality of your system from a long-term perspective. List five materials your system relies on. Investigate the characteristics of each (e.g., durability, recyclability, and visibility; energy and connectivity needs; human-made or found in nature). How does each material change over time (e.g., evolve, erode, degrade)?

Material Longevity

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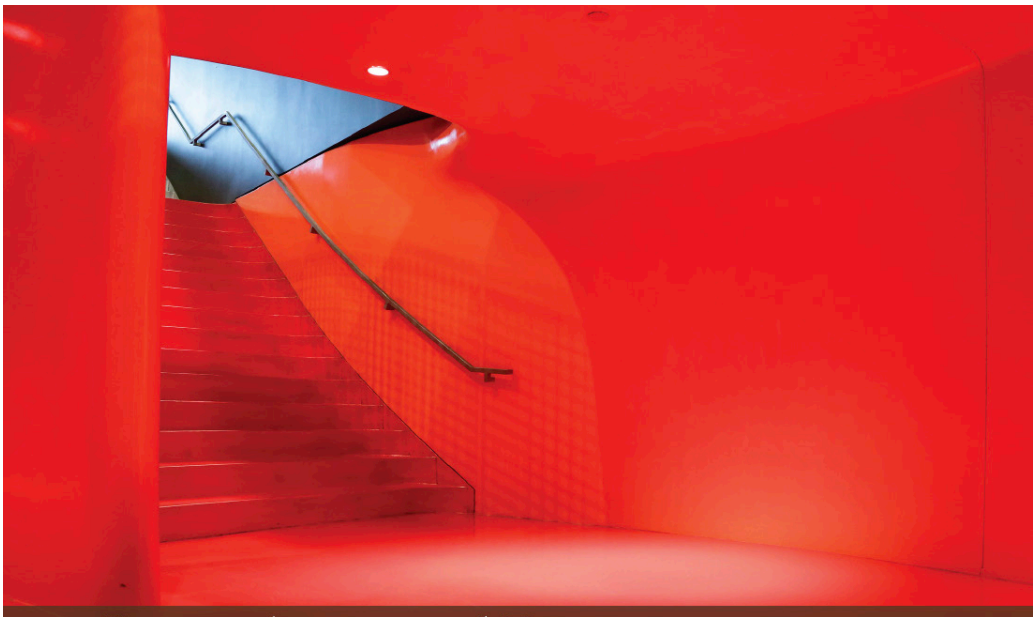
Pause

At times, inaction may be a wise course of action. Pause is intentional inaction. Pause has many rhythms: *periodic hiatus* (regular pause intervals); *pending future events* (pause until a particular condition); *tango* (pause entangled with changing socio-political conditions); *temporary closure* (pause without clarity around restarting); *lying fallow* (longer periods of pause).

Draw a timeline representing your design project. Identify the rhythms of pause and action your project employs. What other types of pause could benefit your project and in what ways?

Draw

Pause



Remembering and Forgetting

Make

Different designs allow for different experiences of remembering or forgetting. Systems record communications and activities, regulate who can access what records and when, and define what content is more or less salient. What is more salient (highlighted in the system) supports remembering—what is less salient (obscured in the system) supports forgetting.

Make a list of the information your system highlights, and a second list of the information your system obscures. Consider the rationale behind these decisions. Create a scenario exploring the benefits and risks of how your system affects remembering and forgetting now, in 10 years, and in 50 years.

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Remembering and Forgetting

Representation Over Time

Characterize

Characterize how key stakeholders are represented in your system (e.g., images, text, categories). How might these representations marginalize or celebrate your stakeholders? How will your system be designed to accommodate changes in representation?

New narratives emerge when groups previously excluded from public dialogue share their stories. Representations of groups change to match new social contexts (e.g., in the United States, images representing disability have shifted from passive to active stances).

Representation Over Time

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Stages of Life

How we experience systems is influenced by our life stage. As an individual moves from childhood, to adolescence, to adulthood they might have very different experiences using the same system (e.g., the library might be a playground to a child, a place to study for an adolescent, or a place to work for an adult).

Visualize how your system looks—physically, emotionally, socially—to a toddler, an 8-year old, a 30-year old, a 50-year old, and an 80-year old.

Visualize

Weaving Social Fabric

Develop

Social fabric is the complex mix of structures through which stakeholders—human and nonhuman—care for themselves and each other, pass along generational knowledge, and sustain life. Natural or human events can cause tears in the social fabric (e.g., communities can lose entire generations to an epidemic). It takes time to rebuild social structures damaged by these tears.

Develop a scenario in which one of your key stakeholder groups loses a generation (e.g., through migration, disruption, or conflict). Describe what social structures might be strained by such a loss. Brainstorm different ways your system might help support damaged social structures.

Weaving Social Fabric

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Title:

Create Your Own

Suit:

Title: