

Alive and well

Kellogg design process management

Frances Duncan frances@durablegoodsdesign.com December 5, 2014

Introduction

Williams College is creating a new environmental center that aims to achieve Living Building certification. The college needs to gather data on the building's energy use and communicate that data in a dynamic and compelling way to the building's occupants and other interested people and institutions.

Over the course of two months, I worked with project stakeholders and potential users, including faculty, staff, students, and members of the community, to understand the project context and articulate and prioritize project goals. I facilitated two hourlong meetings with the stakeholder team and conducted around twenty exploratory interviews with potential users across a targeted cross-section of the Williams community. Interviewees were mostly students and faculty involved directly with the Center for Environmental Studies, the Zilkha Center, Williams Environmental Council, or with a strong interest in sustainability issues on campus. I also spoke to students, faculty, and staff from Computer Science, admissions, development, and elsewhere on campus, and to a few other members of the Williamstown community.

For the purpose of this report, I refer to the building itself as Kellogg, and the outcome of this project as "the tool." But the tool isn't just one thing — at its best, it will be a number of interrelated technologies and approaches.

Quotes I've drawn from interviews are unattributed to protect the anonymity of the interviewees.

Goals

Project goals are the *why* of the project. What's the purpose of creating this tool? What are some best-case scenarios for a positive outcome?

Three strong themes emerged during our first meeting: education, data, and public relations. From the three themes we teased out more specific project goals.

To Educate

The tool must provide <u>a significant educational benefit for students</u> and the college in general. This is an absolute requirement and the definition of success for the project across all stakeholders, including the donors themselves, for whom a key motivation is a "continual quest for knowledge." "If we weren't measuring all this stuff it would just be another nice building to hang out in."

- Teach people to be sustainable. Through the tool, communicate to building users to monitor and change behavior. Use the data to learn how behavior changes and in response to what. Both project stakeholders and students would like eventually to see the tool encourage change elsewhere on campus, and promote activism around sustainability in general.
- Achieve net zero energy and water in Kellogg. Put simply, the building should work. But it shouldn't be at the expense of the building's designed uses — as a space for teaching, studying, and recreating.
- Tell the story of the building and grounds over time, especially what you can't see the non-obvious, obscure, or otherwise hidden elements of the renovation and ongoing maintenance of the building.

To contribute to data & research

"Just the facts, ma'am."

The tool must offer a simple, direct way to engage with the data collected from Kellogg, not only in its visualized form, but also as a downloadable, standardized dataset.

- Provide data for students, faculty, and a broader community of scholars and researchers to use in their work.
- Share data with campus maintenance to learn from and use comparatively with other campus buildings or new ones.

To support public relations

"Let's make hay of it."

The tool will function as part of the public face of Kellogg, which will be a kind of showpiece for the college. These specific goals are more closely aligned with the building, but they will inform the tool's promotional use.

- Tie Williams to national concerns about sustainability.
- Attract prospective students, faculty, staff, donors.
- Represent sustainability as a metaphor for the liberal arts a mix of students with a mix of expertise, and an awareness of many components, fields, and aspects coming together in one working example of what it is to be sustainable.
- Create a model that other institutes of higher learning can use.

Users

Users are the *who* of the project — people who will interact directly with the tool. The tool's users are a slightly different group than a public relations audience — the people to whom messaging about Kellogg or the tool might be broadcast. The users are most broadly categorized into two groups: people on campus, and people off campus.

Primary Users

The primary users are building occupants and people on campus. CES and Zilkha have a long tradition of being a place where people hang out.

- Faculty and staff with offices in the building. There will be 13-14 adults who "live there."
- Students, ages 18-23, from a range of backgrounds
 - EnviSci majors/concentrators
 - Working for CES or Zilkha
 - Involved in WEC or other environmental groups
 - Hanging out or otherwise using the building, which has a kitchen, classroom, and other formal and informal space.

The amount of attention that these groups pay to the tool will vary over time. Educational use will be ongoing, but it's difficult to get students' time, attention, and energy. Students who interface with the tool for a course will do what is asked of them — but otherwise, and for anyone else, "you either grab them or you've lost them."

Environmental Studies concentrators and activists in WEC said they were likely to use the new building informally if it was comfortable, and were likely to engage on a limited basis with a tool that was present in the building, especially with extra time before and after class.

Other students I spoke with said <u>they wouldn't hang out in Kellogg</u> <u>unless it seemed welcoming</u>. Some with friends in CES or WEC, or peripheral interests in sustainability on campus, seemed interested in accessing the tool, but only if it were used particularly compelling, or also available outside of the building.

Secondary Users

Secondary users are less likely to spend time on campus or to engage directly with the output of the tool.

"The building will be a failure if in order for it to be selfsufficient we can't allow students to hang out there."

- Scholars and researchers who are interested in the data only.
- Donors to the project, from the class of 1966, who are interested in stewardship and "leaving a legacy" at Williams.
- Prospective students, especially with an interest in sustainability and environmental issues. Kellogg will be seen during campus tours, and the admissions office is interested in sharing data about sustainability on campus and linking to a web-based tool for interested prospective students.
- Prospective faculty and staff, especially in CES and Buildings & Grounds.

Tertiary Users

Tertiary users are least likely to come to campus but may occasionally engage directly with the tool in another medium.

- Alumni
- Parents of students
- Potential donors
- People interested in the Living Building Challenge (e.g., other buildings or groups considering entering the challenge)
- People generally interested in sustainability

User Motivations

In light of our effort to create behavioral change, I asked interviewees to tell me about the major motivations and hindrances in their lives. <u>They</u> were surprisingly frank, sharing inspiration and roadblocks from their lives in general and specifically related to their environmentalism. Our users' motivations are a guide for developing the tool's feedback and rewards systems, while hindrances help us understand what stands in the way creating change on campus, or even interacting with the tool in the first place. Here's what I heard. "I want to make abstract catastrophic futurism into something people will care about in their day-to-day lives. College isn't the real world but it's a good place to start."

Motivations

Interviewees were clearly and strongly motivated by community, whether this was their immediate community of family or friends, or the community of humanity and the natural world. <u>Our users feel they are "part of</u> <u>something" and find disconnection from these communities alienating</u>.

- Family, kids
- Friends
- Nature; the environment; making an impact environmentally
- "Leaving the world a little better"
- Challenges
- Intellectual engagement
- Fostering, understanding, and building community
- Conversation
- Social justice
- Self-drive; perfectionism
- Personal growth
- Self-righteousness
- Helping people understand
- Leaving a legacy

Hindrances

Overwhelmingly, across all user types, the most often cited hindrance was lack of time, with lack of sleep a close second for students.

- Lack of time; busyness
- Not enough sleep
- Small-mindedness; parochialism; short-sightedness
- Private and state interests; inertia; bureaucracy
- Lack of community
- "It doesn't affect me" attitude
- Complexity of environmental issues
- Habitual patters of behavior
- Bad infrastructure

"It's hard to change other people, but I can change myself and have an affect on people by living in a way that feels more conscious."

"Leaving Williams better than it was my freshman year."

"The workload is daunting."

"[Williams is] very much school-sportssleep."

Actions

Actions are the part of the what of the project — things the users will do with the tool.

- Get a snapshot. Monitor and track performance-based progress.
- Feedback. Receive feedback and suggestions. Change behavior.
- Explore. See how the building works. Understand project history and context.
- Download. Obtain a dataset for a class, thesis advisor, research, or classroom use.
- Ask. Contact the Zilkha center for help or more information.

Attributes

"As much art as science."

Attributes are adjectives and short phrases that we want the tool to convey, descriptions of the tool's general look and feel, or even feelings we wish the tool to evoke.

Technical, Experiential

- accessible
- adaptive
- user-friendly
- intuitive
- fast
- efficient
- optimized
- standardized (for data)
- contextualized
- synched
- reliable
- current

Tonal, Visual

- visually compelling
- creative
- catchy "gets into people's brains"
- approachable
- playful
- delightful
- fascinating
- evolving, changing
- exciting
- meaningful

Approaches

Over the course of our meetings and my interviews with users I discovered a broad and idiosyncratic range of desired features for the tool, from reporting real-time individual occupant energy and water use to measuring garden output and its impact on the wider community. The diversity of users, too — especially geographically — suggests the need for an adaptable, multi-platform tool. It would be quite an undertaking to create one piece of software with such a wide range of features and for such a disparate user base. We can set some boundaries with technology and approach.

The tool's build should be broken up into two or more phases. First, address a basic set of features for primary and secondary users, then continue to evolve the product as time and budget allows. An adaptive, web-based application built with standard HTML5, CSS, and JavaScript, along with vector image rendering libraries like Raphaël¹ and D3², can be served over a variety of devices, including, eventually, small tablets mounted in key areas in Kellogg. To begin, the group could monitor key metrics related to the Living Building Challenge, using data from other buildings on campus as a point of comparison, then branch out into more specific and nuanced data, like individuals' energy use.

The Zilkha Center is fortunate to have at its disposal Computer Science thesis students who are eager to use Kellogg data for experimental visualizations. Encourage these students' contributions as part of an ongoing effort to create responsive, effective visualizations that create change on campus — students will be able to react nimbly to changes and adjust visualizations on-the-fly in response to feedback. Their solutions are apt to be innovative and highly usable, as they are 1. http://raphaeljs.com 2. http://d3js.org part of the user base for which the tool is designed. This could be the second phase of the project.

<u>Charts and graphs can be alienating because of the interpretation</u> <u>involved, and should be paired with practical feedback</u>. Is there enough water to get us through the summer growing season? Can I boil a pot of pasta right now? Context is important, too, especially for students, for whom the "dollars saved" comparison is less relevant — they aren't footing the bill. It's essential not only to compare buildings across campus, but also to compare use with more understandable metrics, like emissions generated by a car ride or a transcontinental flight, the number of hours an iPhone could be charged, or how long you could light the Empire State Building.

Although there's a lot of interest in receiving the information that the tool might produce, there's disinclination to engage much with it — few interviewees I spoke with ever visited the current Zilkha energy tool and rarely even used the Williams website, nor could they imagine inputting personal information to a site or app. (Though they'd be happy to see how they stacked up if the app did all the work for them.) Most imagined only glancing at some kind of display briefly before moving on with their day. The most active environmentalist students and some faculty were more keen to interact with the tool, especially students involved in WEC, who understand that the administration expects students to take the lead on sustainability issues before the college will step forward with its own public plan.

For some interviewees there was <u>a strong resistance to an in-building display of any kind</u> — both because the display would use energy and because users would eventually become habituated to any display and ignore it, no matter how engaging. A few respondents were concerned that monitors would keep students, faculty, and staff from using the building as it was intended. <u>Worried about Big Brother watching over</u> them, they'd charge their laptops in the library instead of in Kellogg.

Meanwhile, the computer science students I interviewed stressed that <u>real-time</u>, <u>immediate feedback is essential for creating change</u>. Whatever the visualization, it must respond in the moment in order to be most effective. There was also a positive response in students to peer competition, either on campus — reducing energy use in students' entryways, or by department — or among other NESCAC schools. Systems for rewards, points, and easy sharing within peer networks contribute to this sense of playfulness.

The Oberlin College "orbs" are a good example, as they make visible through light and color the invisible use of energy without the necessary translation that is required by a chart or graph. Though abstract, they are simple and understandable at a glance, and respond to real-time data. The computer science interviewees mentioned similarly abstract "I'm not going to go out of my way to look at a graph."

"Another stupid screen that's using energy."

"We want people to use the building and be comfortable there."

"It's fun to interact with data where you can see a change when you make it." but screen-based visualizations such as spinning colorful pinwheels or growing and shrinking hexagons, which were easily understood in a research context with little instruction. Abstract displays like these can be used in conjunction with a more traditional, web-based visualization tool that is accessible across a wide variety of devices and platforms.

On top of all this, there is a strong desire for supporting materials, exhibitions, events, and activities around Kellogg, especially if they foster real-life, community interaction — "getting people together." The word community popped up over and over in my interviews, and stood in strong relief to my original focus on technology. It was a surprising and humanizing contrast.

What if we took the idea of a "living building" literally by anthropomorphizing it — giving the building its own Twitter feed or having the tool's feedback use everyday language? I'm hot! Phew, what a day! Tank's full — feeling good! If a building could blog, how would it blog? How would it tweet or share on Facebook? What kind of a personality would it have? Data visualization is exciting, and can be revelatory beyond words, but the common communication around the tool should be in normal language — funny, surprising, even crabby language. If bots on Twitter can convince people they're alive, why can't a Living Building? Is it possible to create emotional engagement with a building in this way? Maybe the building's name is Kay, and she's got a whole URL dedicated to her status — iskayokay.com. Visitors to the site would find warm, simple textual feedback and recommendations, perhaps in the style of a single-serving website, and a suite of graphical visualizations to explore, both drawn from data, along with detailed background information.

To address the real-life needs of our users, we should offer simple wayfinding aids for orientation — Where are the solar panels? What kind of berries are these? Wall text and signs are other simple, non-technical solutions for places within the building where materials could be further explained and demystified. The composting toilets in particular provoked a lot of inquiry, and a little revulsion. A small, friendly sign — and its equivalent, accessible online — could make the difference between Kellogg being weird and off-putting or weird and exciting. One interviewee mentioned to me that she'd heard about someone collecting old nails from the construction site. Could these be a part of some kind of supporting exhibition? Other interviewees suggested creating exhibitions and speaker events in Kellogg — like WCMA's Thursday night parties — to help to draw in people who might otherwise never set foot in the building.

All of this supporting material and background information should be written in a friendly, warm, engaging manner — try to avoid the kind of technical jargon often found in architectural documentation, and on the Living Building Challenge website itself. Direct, humane communication could be an entry into a more data-focused component of the tool. It could inspire empathy and create behavioral change. "It's hard to get people behind a cause without some really effective story being told through images and words online."

Features & Requirements

These features and requirements are blue-sky suggestions for ways users can interact with the tool and the kinds of information they would like to see. I've organized the features into four sets of priorities, starting with the most important.

1. Feedback & Data Visualization

Provide interactive visual and textual feedback about building energy and water use, and other data points, if possible, based on data collected and user behavior; report changes; encourage and reward good behavior. Feedback and data visualization are interdependent.

<u>Visualizing the system as a living and breathing thing gives people</u> <u>a sense of ownership and investment</u> and will help them feel connected to the space.

2. Building

Display contextual and detailed information about the building itself and the Living Building Challenge, especially aspects that may be otherwise "invisible." These features could be mostly static — wall text, signs, simple web pages with supplemental images, galleries, or videos, browsable via device or on a touch screen in the building. A blog and social media will be useful to encourage faculty, staff, and students to participate, and will allow you to create content and engagement over time. A secondary benefit to this approach is its utility as a PR tool. This same information, or permutations of it, could be shared across multiple platforms — through a web-based version of the tool, via Facebook, Twitter, or Instagram — the latter of which would be particularly interesting for archival images of the building renovation and materials.

3. Data

Provide a simple way for users to retrieve the raw data in a standardized format, like CSV.

4. Getting the Word Out

Support the building and tool on campus and off, encourage building interaction, raise awareness, and promote the project and building. Enable students, staff, faculty, donors, and the community to share a sustainability success and celebrate.

"The visualization isn't the story, it's something you use to find the story." From here, I've further refined the features into must-haves, shouldhaves, could-haves, and wishlist. The suggestions detailed below are drawn from our meetings and my conversations with students, faculty, staff, and the community, and my own recommendations. Each feature is labeled with and ordered by its feature priority group from above. Order within is random.

Here we go!

Must-Haves

Feature ideas or requirements that *must* be satisfied in order for the tool to be considered a success.

- Display compelling visualizations of current, real-time energy and water use. (Feedback)
- Track progress toward LBC. (Feedback)
- Provide an easy-to-understand visual cue in the building when energy/water use are over expected thresholds. (Feedback)
- Give the user simple positive/negative feedback on current energy/ water use (e.g. smiley faces, happy cows/sad cows, checkmarks). (Feedback)
- Tell people what a Living Building is. (Building)
- Explain why our goal was a Living Building. (Building)
- Show user how the building was made and of what it was made, explaining materials and process as clearly and simply as possible. (Building)
- Explain how solar power works to generate energy. Explain how the composting toilets work. Show where the water is captured and where it goes. (Building)
- Compare the old building with the new. Document the decisions that were made, and explain why they were made. (Building)
- Provide standardized, downloadable datasets to the public in exchange for personal information, such as an email address, so we know who is using the data and how, either through the tool itself or in a public repository like Github. (Data)
- Keep a repository/archive of past data in standardized formats and allow them to be accessed to view or print reports. (Data)
- Provide a way for users to contact tool administrators with feedback or questions on building operations. The hope here is that people on campus and off might suggest changes to help us improve. (PR)

Should-Haves

High-priority feature ideas or requirements that *should* be included in a phase one build if possible. Critical features, but ones that can be satisfied in other ways if necessary.

- Predict whether we will achieve LBC based on current use. (Feedback)
- Explain solar and water systems with an interactive diagram. (Building)
- Show much energy solar panels collect now and in the past. (Feedback)
- Send out an alert (via email, Twitter, Facebook) when energy use is above a particular threshold for a period of time, or water level in the tank is low. (Feedback)
- Track behavior changes over time of building users as a group. (Feedback)
- Allow building occupants to see how much energy they are using in real-time in their offices. (Feedback)
- Take a baseline of a week before, compare week-to-week each day, or day-to-day. (Feedback)
- Allow people to pick a resource to view energy or water. Don't present all the data at once. (Feedback)
- Compare Kellogg to other buildings on campus in terms of energy and water use per occupancy or use-case or square footage. (Building)
- Explain which sensors were installed, what they do, and why they were selected. (Building)
- Display images of "invisible" building features that impact water/ energy use (e.g. insulation in the walls). Students and staff also expressed an interest in a physical "cutout" display or glass panel in the wall, to "see inside," or to be able to touch or otherwise handle materials. (Building)
- Create a query engine to allow users to view specific types of data at specific granularities. (Data)
- Provide outward-facing, social communication about energy and water use in Kellogg. Tweets about building energy use, backstory, construction materials, gardens, "red list;" Instagrams (photo-based social network) showing building backstory, gardens, events; Facebook posts. (PR)

Could-Haves

Features and requirements that are desirable but not necessary. We could include them in phase one if time and resources permit, or delay their implementation for a later phase.

- A screen in the building that lets user see trends in energy or water use and generation. (Feedback)
- An alarm goes off in the building when certain water or energy use levels are happening for long periods of time (e.g., someone leaves a faucet running). (Feedback)
- Allow people to monitor their own power usage in the building and show what it would mean if all occupants acted similarly. (Feedback)
- Relate power generation and use to weather patterns. (Feedback)
- Feed data to a display in another building, like Paresky. (Feedback)
- Connect users with the grounds, for example by creating a custom Google map to report ripening fruits and vegetables ready for harvest and embedding it within the tool. (Building)
- Show where the physical waste goes, how much is being produced, and what happens to it. (Building)
- Tell stories of faculty, staff, student, and donor motivation, investment, and commitment. Perhaps feature profiles of a handful of people involved in the project. What were the major obstacles that had to be overcome? Surprises? Things the group never anticipated? (Building)
- Give the building a cute nickname. (Building)
- Occasional email newsletter alerts. (PR)
- Occasional Daily Messages alerts. (PR)

Wishlist

These features and requirements probably won't be implemented in phase one because of their technical complexity. They could be considered for future development, or jettisoned entirely depending on resources, time, and user feedback.

- Provide a widget to monitor users' computer energy use and remind them to turn off computer. (Feedback)
- Keep track of unoccupied space that's using energy that doesn't need to be. (Feedback)

- Compare individual spaces within the building vs. aggregate space of the whole building — show how individual spaces are used. (Feedback)
- Connect energy savings from the building to money savings in the long run; how long does it take to recoup investment on a project like this with the average energy price in Williamstown? (Feedback)
- Create facilities to compare loads of "vampire" electronics. (Feedback)
- Track anyone's personal energy usage throughout campus. (Feedback)
- Give real-life incentives, for example, if energy use is down X%, campus gets X% off at Tunnel City or some other local or national partner. (Feedback)
- Compare Kellogg to what a "regular" building would do in terms of energy saved if Paresky or Sawyer were using the same measures as Kellogg, what kinds of savings would occur? (Feedback)
- Send push notifications about energy use to mobile devices. (Feedback)
- Tally how many pounds of produce are grown and harvested in gardens and where they end up. (Building)

Quotes

"Hold Kellogg as a standard of what's possible at Williams."

I heard so much more in my interviews than just user needs for an energy tool — more than I can fit in this report. Here are a selection of quotes from interviewees will help shed light on the tone around campus.

- "Kellogg could reinvigorate environmental studies on campus."
- "It's hard to create a truly self-sufficient building on a college campus."
- "There is power in the symbol of a closed system perennialism, homeostasis, self-regulation."
- "This building should not be a symbol, a greenwashing opportunity."
- "Just looking at the numbers isn't terribly useful."
- "Williams likes to think some of its other buildings are green, but I maybe don't agree with that. . ."
- "10 watts? I have no idea what that means."
- "When you're aware of exactly what you're actions are doing in one building, it's directly transferable to another building."
- Technology stuff is cool, "but it's a new building, it's not going to decrease the college's emissions."
- "I think we live pretty cushy lives that don't need to be so cushy."
- There has to be a willingness to change to counteract the attitude of "If I can afford it, I can do whatever want."
- "I want to learn from myself rather than be told what to do."