

# User-Experience for Personal Sustainability Software: Determining Design Philosophy and Principles

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**Abstract.** Business developers worldwide seek to develop sustainability software with a user experience that provides usability, usefulness, and appeal. This paper describes the research and analysis that led to a design philosophy and a set of principles that were then “tested out” in a series of short prototype applications intended to make more compelling and engaging business applications incorporating sustainability and taking advantage of people’s interests, expertise, and experience with sustainability.

**Keywords:** Business, design, development, enterprise software, management, user interface, sustainability, user experience.

## 1 Introduction

User-experience development (UXD) and sustainability are both of increasing concern to developers of business-oriented applications worldwide. This project describes the activities undertaken to determine a UX philosophy and set of design principles that could be explored through conceptual prototypes, then evaluated, before attempting to apply them to actual product development..

In August, 2010, SAP engaged the authors’ firm to envision possible products in the space of personal sustainability. AM+A was selected in part because of its prior demonstration of a consumer-oriented mobile conceptual prototype called the Green Machine, which combined information design/visualization and persuasion design to change people’s behavior regarding sustainability [Marcus, 2009, Jean and Marcus, 2010].

AM+A created four initial concepts and then merged them into a final concept that was presented to SAP on 4 October 2010.

## 2 User-Centered Design Process

In order to explore what motivates people to make changes around sustainability, and to evaluate current trends in the market space, AM+A conducted research in knowledge visualization and conducted competitive analysis, content analysis, and user research. AM+A then created design principles based on that research. With

those principles as basis, AM+A conceived four possible personal sustainability products, Green Buddy, Gas Gauge, Credible Edibles, and Green Jeeves. Working in partnership with SAP, AM+A then combined several features from Green Buddy and Green Jeeves to create a final sustainability product.

## 2.1 Market Research

AM+A surveyed current sustainability-related applications for mobile devices, focusing on the iPhone, and the Web. AM+A analyzed the results to observe trends, effective solutions, and current industry best practices, then to discover which images and design styles had become “stale” from over-use/over-exposure and were to be avoided.

Applications that provided clear, easy-to-follow advice, such as the GoodGuide and Seafood Watch, seemed especially popular.

**Websites.** Websites can provide more detailed and complex tools than mobile phones applications. Users seemed more likely to invest more time and thought, and might be willing to log in and save results over multiple sessions. Some of the Websites surveyed were so complex and hard to understand that users seemed likely to be unwilling to struggle through the process. Others were so over-simplified that their results seemed meaningless. Very few sites appeared to find the sweet spot that balanced relevance with ease of use. AM+A also looked at Websites that had the following specialized tools:

- Sustainability ratings for consumers
- Calculator tools for measuring personal energy usage
- Other calculators, such as water usage
- Dashboards and meters

AM+A found that the market was “flooded” with personal carbon-footprint calculators. Many of these calculators seemed difficult to use. Many Websites featured these tools as a way to convince users to purchase carbon offsets or carbon management solutions from the site,. Somewhat surprisingly, most of the carbon-footprint Websites featured a palette of blues, unlike the greens which predominated in the iPhone applications. This color palette may be selected to connote an image of blue skies uncontaminated by greenhouse gasses, or cool colors unaffected by global warming.

**Knowledge Visualization.** AM+A collected examples of information graphics and data visualization, then presented them to the client to stimulate thinking about similar techniques that could be carried out with SAP’s data.

## 2.2 User Research

Over the course of the project, AM\_A conducted user research with a total of 108 participants in order to gather information about concerns around personal sustainability and to glean information about what motivates people to make behavior changes.

**Content Analysis.** AM+A's Content Analysis had two major objectives:

- Determine what particular sustainability issues stand at the front of popular consciousness
- Examine language used to describe sustainability issues

**Key Sustainability Issues.** To explore prominent issues, AM+A generated tag clouds from leading news sites to determine frequently used and mostly highly weighted words. AM+A first generated a tag cloud of 200 words for each site, then reviewed the cloud for each site and selected words relevant to sustainability concerns. AM+A then returned to the news site and searched articles using each word, then noted what the topic was of relevant articles. Using this method, AM+A filtered the most frequently used words around sustainability, then identified what subset of sustainability concerns appeared most frequently in popular news media.

**Sustainability Language Use.** To learn more about language, AM+A generated tag clouds from leading environment organizations, based on membership. By examining and cross-referencing frequently used words and phrases, AM+A generated a short glossary of sustainability nomenclature.

**“Man on the Street” Interviews.** This method uses a “buttonholing” approach to gathering subjects. The researcher stands in a well-populated area and recruits potential interview subjects. The objective of this approach is to “take the pulse” of everyday people in order to discover their main concerns, gain insight into what language people naturally use, and to gauge their aversions. For this user research method, AM+A sought specifically to gather un-premeditated responses. AM+A recorded audio of interviews to include as part of its final presentation to the client. Over the course of three days, AM+A interviewed 18 subjects, both at work and shopping in two different supermarkets (one in Berkeley, California, and one in Walnut Creek, California ) and in a mall (in Walnut Creek). These sites represent different demographics: liberal and more conservative.

**Focus Groups.** AM+A also conducted two focus groups on-site at SAP with SAP employees as participants. The objective of the focus group was to promote open discussion among participants who had had time to consider the topic at length. Participants were encouraged to offer their opinions and to develop their ideas through conversation. The interaction and development of opinions throughout the session provided information about what changed and affected the perceptions of participants around sustainability, and about what ideas maintained strength and constancy when challenged and explored.

AM+A conducted two 90-minute focus groups over the course of two days in two sessions, with a total of 13 participants. These participants were asked to respond to the same five questions that were used in “man-on-the-street” interviews; however, for focus groups, participants were given the questions beforehand. At the end of the sessions, participants split into pairs and were given a video camera. They conducted brief interviews *with each other* about key points in the session. Short video segments of participants' responses were used in the final presentation to the client.

**Global Survey.** To expand user-research feedback across different cultures, AM+A created a Web-based survey provided to SAP employees worldwide using the same five questions that formed the foundation of its prior user research. A total of 76 participants, from 17 countries, responded. These responses were then compared with other user research to create trends in user response.

**Synthesis Session.** In order to surface user-research trends and organize these trends into categories and priorities, AM+A conducted a synthesis session with key SAP stakeholders. Using post-it notes (a standards UCD technique), the team named, organized, categorized, and prioritized user research findings.

### 2.3 Results: Key Trends

Based on the previously described user research methods, the most high-level trends observed in sustainability were the following:

- Lifestyle is a primary concern.
  - Any solution must fit into potential users' current lifestyles)
- People have a lot of confusion about what the right thing to do is, and they share a universal sense that it is important to do *something*, although they are unsure of what that something should be
- The topics most often in the media and cited by people as most important are these:
  - Energy (oil, fuel, cars)
  - Environment
  - Wasteful consumer culture
  - Food
- The actions people actually take most often around sustainability are these:
  - Recycle
  - Take public transit, bike, walk
  - Eat local organic food, less meat
  - Buy energy-saving things: cars, meters, solar panels, *etc.*
- Users distrust sustainability efforts in business, considering it a marketing ploy, or “green washing” to capitalize on a trend or fad to make profit
- People want guidance from trusted sources. Distrust of green marketing leads to distrust of companies. The meaning of labels and terms is often unclear, e.g., “organic”, “free range”, “natural”
- The things that motivate people to actually make changes in their lives around sustainability involve both “carrots and sticks.”
- Carrots include:
  - Infrastructure, e.g., recycling bins
  - Competition and “cool” points
  - Financial benefit
  - Benefit for children, the next generation
- The primary stick is this:
  - Forced change is acceptable within boundaries, *e.g.*, making people pay for plastic bags, or a company no longer providing plastic water bottles

- The most effective influences that lead people to take action are:
  - Community, trusted friend, teacher
  - Company: employees of SAP cited SAP mostly positively
  - News, online sources, popular media, *e.g.*, the “Al Gore movie”, *Omnivore’s Dilemma*, or striking images
  - Negative perception of “preachy” approaches, “eco-nags”, or “extremists”
- User research also uncovered key findings around language:
  - Most users define “sustainability” in ecological terms, *i.e.*, maintaining resources
  - The term “green” is sometimes viewed as a marketing tagline
  - The term “Eco-” is overused in common parlance, even though it occurs surprisingly infrequently in news sources
  - Overall, “sustainability” and “sustainable” still maintain the most positive associations

Based on these trends, AM+A developed user-centered design principles to guide their initial concept designs.

### 3 Design Concepts

Following the lessons learned from its research, the key trends, and its design-principles formulation, AM+A proposed four initial concepts for product directions that would combine sustainability with business applications.

For the final concept, AM+A combined Green Jeeves and Green Buddy into a single application.

AM+A created several sample screens and wire frames to illustrate this application and presented the final concept to the client.

### 4 Conclusions

In general, the client response was favorable in regard to the usability and usefulness of the trends identified, the design principles formulated, and the effectiveness of their embodiment in the final concept design.

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