

Vertsumption: the “Green Consumption” iPhone application

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Table of Contents

1. Problem Space & Concept.....	3
2. Requirements	6
3. Conceptual Model.....	11
4. Paper Prototype.....	15
4.1 VALIDATION	15
5. High-Fidelity Prototype.....	22
5.1 VALIDATION	23
6. Refined High-Fidelity Prototype	29
7. General Conclusions.....	30
8. Bibliography	33
9. Appendix	34
9.1 ARTICLE: "PAPER IN SCREEN" DIGITAL PAPER PROTOTYPING	34
9.2 PROTOTYPE IMAGE LINKS.....	35

1. Problem Space & Concept

Apple's iPhone is one of the most revolutionary mobile devices in existence today. Interaction designer Bruce Tognazzini (of the Nielsen Norman Group -- www.nngroup.com) believes the iPhone, despite certain drawbacks, is still revolutionary as far as mobile phones go. He says "Traditional cell phones are dull, limited, and at end-of-life. The iPhone is glorious, and it is only the beginning." [1]. The iPhone is a device capable of connecting to the Internet via the EDGE and/or 3G networks. It has got a multi-touch screen and a one-button physical interface. It hasn't got a physical keyboard, but it offers a virtual keyboard that is rendered on the touch screen. It also is camera phone and portable media player (equivalent to the iPod Touch) in addition to text messaging and visual voicemail. Among its internet-based capabilities, it offers e-mail, web browsing, and Wi-Fi connectivity [2].

Currently, many applications exist for it for sale or free download at the "AppStore": the online marketplace accessed via iTunes or the iPhone itself [3]. Many of these applications are games, or different web-based services. The Telegraph calls the AppStore "a software revolution for mobile phones." It also mentions that the AppStore's potential "is limited only by the imagination of the developers busily creating new programs for the iPhone." [4].

The iPhone is a compelling mobile computing platform with a great potential: the potential to entertain, inform, be productive, and help save our environment. This is where *Vertsumption* could play an important role.

The concept behind Vertsumption is based on an environmentally friendly principle: that of changing the behaviour of consumers and how they go about consuming products on a daily basis. Vertsumption would be a free application in the AppStore that would function alongside a companion website, but it would function primarily via the iPhone application (the focus of this project).

Vertsumption is relevant to consumers in the present day for various reasons: Many people go about consuming certain goods and services without regard of their harmful impact to the environment. [5], [6], [7], [8] For example, some people may drink their coffee in paper cups when they could be drinking it out of a ceramic cup. Others may buy conventional light bulbs instead of energy-efficient light bulbs. Others may even drive regular petrol-based cars instead of clean Diesel-based cars. Regardless of what or how we consume, many times we don't pay attention to the way we consume and some of the details behind our favourite products and services. This may not currently look like a problem for the environment, but it could have potentially irreversible consequences. Although "green consumerism" may be considered an oxymoron [9], changing certain elements about how we consume certain products may lower harmful environmental impact in the future [10].

As an iPhone application (and web-based service) Vertsumption would attempt to change certain consumption behaviours and practices by rewarding its users for their efforts to consume in a more environmentally friendly way. This would be done by giving Vertsumption users a number of "Green Points",

depending on how they demonstrate that they are "consuming green". Users would be able to earn "green points" by consuming certain products at various businesses offering products officially approved by Vertsumption. "Green Points" would be "redeemable" for other free and "green" goods and services by such participating businesses, hence providing a constant source of motivation and in turn, making these consuming behaviours turn into a generally less harmful impact on the environment.

With 4 million iPhones sold by July 2008 (only a year after its release) [11] and 60 million applications downloaded to date [12], Vertsumption as an iPhone application would have the potential to be within reach of many users who currently have iPhones --number that keeps on rising every day around the world. Given that this would be a free application (as many are in the Apple AppStore) it would be easily accessible and useful in a number of realms. For example, it would encourage "green consumption" by making it clearly desirable from a user standpoint (by encouraging the user to earn "Green Points"). Currently, very few web-based services (or iPhone applications) help serve the purpose of lowering the negative impact consumers have on the environment. Given this, Vertsumption appears as a much-needed application to make part of every iPhone user's lives, for their own sake, as well as that of the environment we live in. Ultimately, Vertsumption would begin by showing small and progressive changes in the environment and its user's consuming behaviour, but with the potential to save the environment in the future.

2. Requirements

Functional Requirements

Vertsumption should be able to do the following:

- Provide "Green" tips. (Suggestions to behave in a more environmentally conscious way)
- Inform the iPhone user of "Vertsumption" locations nearby using Google Maps. These locations would generally be businesses that participate on the initiative that Vertsumption bases its philosophy on: that of making consumption more environmentally friendly. An example of a participating business would be a coffee shop that only serves coffee in a ceramic mug if consumed inside, or offers recycled-paper cups only. Another example would be an electric shop that sells energy efficient light bulbs as opposed to the conventional ones.
- Allow for earning of "Green Points" via photos taken with the iPhone camera. "Green Points" is a system of points that represents how "Green is that user being. It would be the main motivating factor of users to engage in consuming in the manner that Vertsumption encourages its users to consume. Green Points would be earned primarily by consuming certain products and services that comply to Vertsumption's guidelines, but it's subject to expand to other products and services. Green points would render different "rewards" depending on the number of Green Points earned via different visual and numeric representation directly viewable

on the iPhone.

- The number of Green Points earned would also allow for an approximate comparison between the user and different Vertsumption users in the main user's country, city or nearby location.
- Visualization in time from the moment the user starts using Vertsumption to present date in order to measure how "green" the user has become. This would be presented visually via a chart viewable directly on the iPhone. It would be based on the number of "Green Points" earned in time starting on the moment the user becomes a Vertsumption user to present day.
- Submission of tips via the iPhone. It could be seen as one of the most "practical" of Vertsumption's offered options. This feature intends on further informing the user on more ways to act in a more environmentally friendly way about consumption. "Green Tips" intends on being the fastest way of achieving meaningful interaction with Vertsumption. Within the "Green Tips" section, the user would be able to "shake" the iPhone to get a randomly selected "Green Tip" displayed on the iPhone screen. This is possible thanks to the iPhone's accelerometer [13]. There would be a new tip to read after every shake of the iPhone. These tips could come from Vertsumption itself or could be user-generated. Any Vertsumption user would be able to submit his/her own "green tip" to Vertsumption, and upon verification of the tip (on Vertsumption's part) it would make part of the Vertsumption "Green Tips" repository.

Data Requirements

Data for Vertsumption should be up to date, accurate, likely to change many times a day. It should be able to sync and remain on the user's account for months, even years. It will consist mainly of text input on the go and photos uploaded over the air thanks to the iPhone's 3G network.

Environmental Requirements

The context of use for this application is rather ubiquitous. It's intended to be mostly used through the iPhone. The physical environment of use will be anywhere the user is with an iPhone: on the street, at home, traveling...etc.

In relation to the organizational environment, the user of this application is not required to be an expert on anything that goes outside the boundaries of what a user already knows in relation to interacting with the iPhone. The menu options, functionality and overall interaction paradigm will not differ from several of already existing iPhone applications. It will not require any additional training.

As far as the technical environment for this application, it will require for the users to have an iPhone. For the developers, it would require obtaining Apple's iPhone SDK (Software Development Kit) in order to create and publish the application to the AppStore. Clearly, appropriate visualization of the information to be presented to the user in such a limited screen real state (2.2 x 4.6 x 0.5 inches) will be of outmost importance.

User Requirements

The Vertsumption user would use the application via an iPhone, although there would be a companion website that complements the Vertsumption experience. The focus of this study is the iPhone application itself, so there won't be any specification on the web site that would go along with the application.

The Vertsumption user would go from "novice" to "expert" quickly, as the interaction would not differ from that of any other iPhone application. A set of instructions could be provided in the application or on Vertsumption's web site. Despite this, the user may be either "casual" or "frequent", depending on how much the user wishes to allow Vertsumption into his/her daily consumption habits.

The "user profile" for Vertsumption would not very overtly specific. It would simply require a user of any gender, that owns an iPhone, and that wishes to allow the application influence his or her behaviour towards more environmentally conscious consuming.

Usability Requirements

Vertsumption should aim for efficiency, as it would allow users to engage in all of the proposed interactions rather quickly and seamlessly. This application aims to be rather useful in terms of overall environmentally conscious behaviour enhancement and since it follows the main iPhone interaction scheme, it should be relatively easy to learn, particularly for well-

established iPhone users.

This iPhone application should be able to handle data in and out to the extent that is not big enough for AT&T's 3G network to be unable to handle it. In those terms, Vertsumption needs to be efficient and able to deal with error situations (such as when there is no 3G or WI-FI connection available on the iPhone)

Outputs (such as tips, and photos of participating Vertsumption products) must be easy and quick to submit.

Finally, the overall experience of Vertsumption should be enjoyable and more importantly, motivating. Shaking the phone to get a random "green" tip, interacting with a location-aware graph or looking at other's people "green" score should make of Vertsumption a really fun application to use, and one that motivates the user to be kinder to the environment.

3. Conceptual Model

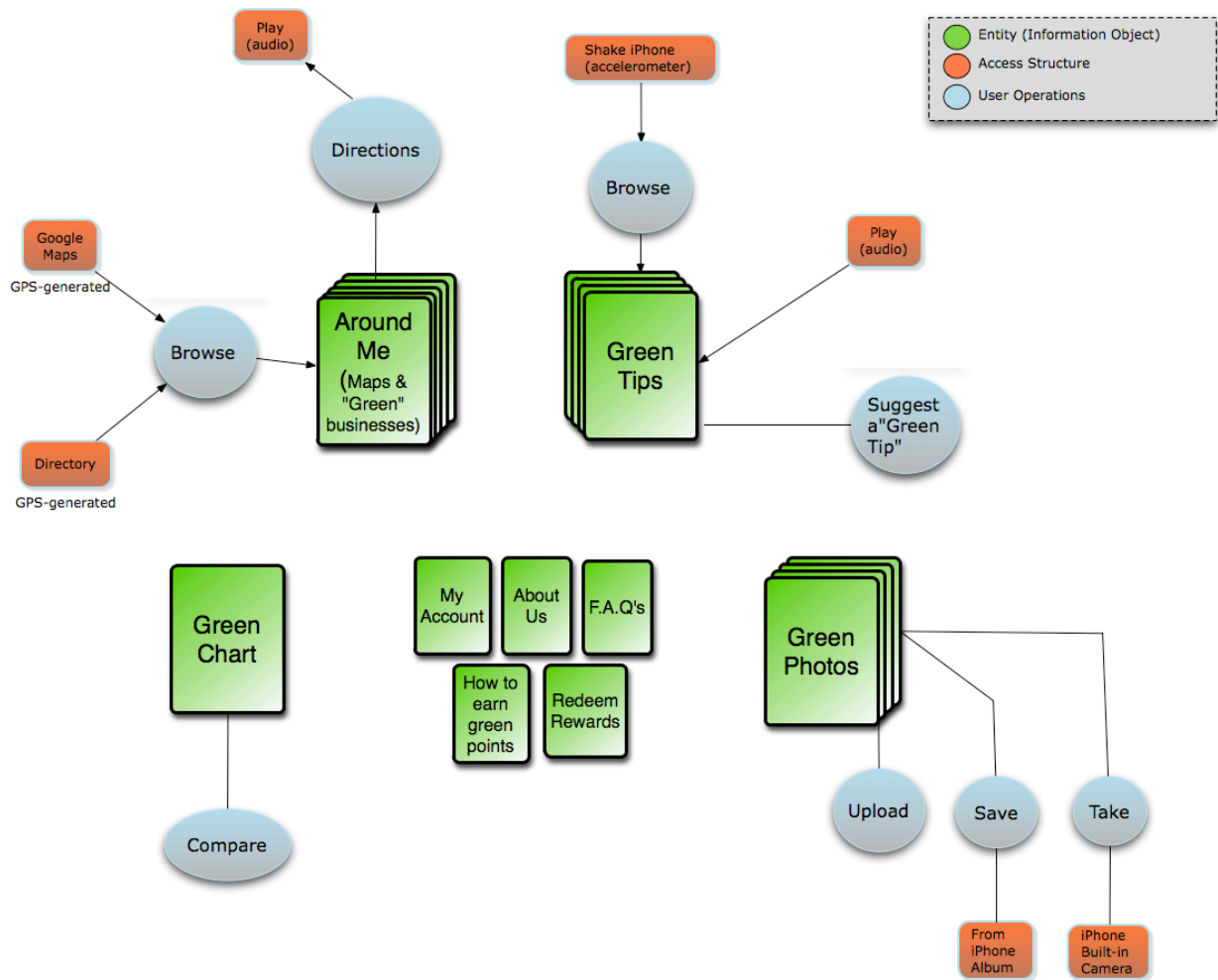
The expected life span of Vertsumption currently relies on the iPhone and its features. Nevertheless, it will continue to be relevant as long as other mobile devices support the abilities to take photos with built-in cameras and allow for Internet access directly from the device.

The application needs to:

- Store/save username & password information
- Be able to use the iPhone's 3G network + Google Maps to locate the user and other "Green Spots" around.
- Visualize the user's "vertsumption" (green consumption) visually through a chart and numerically by comparing "Green Points"
- Provide "Green Tips" at the shake of the iPhone
- Have the ability to use the iPhone's camera to take photos and upload them to the user's Vertsumption account to earn "Green Points"
- Much like other iPhone applications, it should make use of the accelerometer (when shaking the phone) as well as other iPhone-like input gestures. This would make the adoption of Vertsumption's iPhone application easy to achieve.
- The application needs to be able to distinguish between different images (photos) it takes when trying to earn "Green Points"
- The application needs to provide the ability to use photos taken when the phone is not connected to the Internet. E.g. --> use photos that reside in

the iPhone's camera roll for future upload, at the same time preventing for redundant uploads.

- There should be a way for the user to submit "green tips" from the iPhone itself, (within the "Green Tips" option in Vertsumption's UI)
- The application should allow for a quick comparison/status of Green Points between other Vertsumption users in near-by locations, as well as in the same city and/or country.



Entities description:

Green Chart: This section of the application will allow users to see a “Green Behaviour Chart”, composed of a visual representation of the number of points that the user has earned in time. This section will also allow the user to compare his own points earning with other people based upon near-by proximity (provided by the iPhone’s GPS capabilities), the city and/or the country where the user currently is using the application in.

Around Me: This section will allow the user to locate participating nearby businesses and shoppes offering Vertsumption’s “Green Points” products. Either by browsing through 4 different sets of near-by business categories or locating everything that is around in across a defined radius from the user, Vertsumption will use the iPhone’s GPS capabilities and Google Maps to offer the user the closest environmentally friendly establishments.

Green Tips: This section will allow the user to browse and suggest tips to have a more positive impact on the environment in text or video form. Browsing will be provided by shaking the iPhone –thanks to the iPhone’s built-in accelerometer.

Green Photos: This part of the application allows the user to either take a photo of a product from a participating business and upload it to Vertsumption's server through the iPhone immediately; save it and upload it later or retrieve a

previously taken photo from the iPhone's photo library and upload it later to earn Green Points.

[The following entities will reside under the "Settings" option, in the *Home* menu option of Vertsumption's user interface]

My Account: It will contain all the relevant information regarding the user's account, such as password, e-mail address...etc.

About Us: It will contain general information about the application (and company behind the application).

F.A.Q's: It will have a series of frequently asked questions about the application and its capabilities.

How To Earn Green Points: It will contain all the relevant information to allow a user to earn the most "Green Points"

Redeem Rewards: It will contain links to a Vertsumption web site (outside the application) that will allow the user to place a "green gift" redemption request.

4. Paper Prototype

After defining the conceptual model of the application, the next step in the process was to design the low-fidelity paper prototypes. These were designed for testing with users who were already familiar with familiar with the iPhone's interface, as previously mentioned. The main menu items were placed at the bottom like most current iPhone applications currently do. The navigation tools between the different layers of a menu item where placed at the top, also following the iPhone's navigation predetermined interactions.

The prototypes where hand-drawn in a letter-sized sheet of white paper, allowing for four 320 x 480 pixels screen sized prototypes to be drawn per paper. The screens were designed after a series of scenarios had been created; one for each menu item in the application's main menu. After each screen corresponding to every step of every scenario had been drawn, the prototypes were ready for testing. To see every image used during this testing session, please visit the link provided in the appendix section of this report.

4.1 Validation

Although low-fidelity paper prototypes are ready to be tested on paper itself, testing at this level is restricted to a number of things. Rudd, Stern and Isensee mention Low-fidelity prototypes as requiring "a facilitator, who knows the application thoroughly, to demonstrate or test the application" [14]. These authors also clarify that the user "is dependent on the facilitator to respond to the

user's commands to turn card or advance screens to simulate the flow of the application." The process followed for Vertsumption's Low-Fidelity prototypes were not fundamentally different from the one described by Rudd, Stern and Isensee, but the approach was different.

Instead of making the facilitator switch between different paper screens with the testing users, photographs of such paper screens were used to conduct the same type of testing. These images were uploaded to an iPhone to create a more accurate sense of context of the low-fidelity prototypes.

The process didn't change much from the original practice besides putting the "paper on screen". A grouping of the different screens into all the predefined use-case scenarios was created and the user had to voice out the action to take before taking them. The low-fidelity screens were still lacking many of the graphical components a high-fidelity prototype would have, which give room for the testing user to suggest potential improvements to the prototype.

One of the main advantages discovered during this type of "Paper on screen" testing is that, contrary to conventional low-fidelity prototype testing, the user was able to hold the iPhone in his hand, which provides a heightened sense of context for the application, as it would "feel" like it already resides in the platform where it would ultimately be functioning. Also, since the different set of photographs were ordered in independent photo-albums (each once corresponding to a different use-case scenario) the path designed for the user to take was controlled; yet it appeared less intrusive to the user and more

“interactive”. It also prevented for any possible confusion between the different paper screens, since every album only contained the images of the relevant steps for each particular task.

The task to follow during testing with the low-fidelity prototypes were the following:

Task 1: Start at Vertsumption’s initial screen. Sign in to Vertsumption, look at the “Home” screen and end at the “Settings” screen.

Task 2: Start at the “Home Screen”. Go to the “My Vertsumption” section. See your progress of “Green Points” on the chart. Compare your points earned with an aggregate of the city where you are at the moment. End at this screen.

Task 3: Start at the “Home Screen”. Go to the “Around Me” Section. Locate any “green business” around you with the application’s geo-locator. Choose a participating coffee house (locate it on the map) find more information on that establishments. Find directions to this coffee house from where you are. How else can you consume these directions without reading? (Press the “audio” button for audio directions)

Task 4: Start at the “Home Screen”. Go to the “Tips” section. Browse for a new tip (shake the iPhone). Look for another tip (shake the iPhone again). Tap on the “Video” tab and watch a video tip. End at the video tip screen.

Task 5: Start at the “Home Screen”. Imagine you have arrived at the coffee shop and you are ready to take a photo of the coffee mug in front of you. Go to the “Photo” section. Choose to take a photo. Upload it to Vertsumption. End at

“upload confirmation” page.

For the low-fidelity prototype, 5 people were asked to test these tasks. All 5 users were current iPhone owners or have a high level of familiarity with the iPhone interface. It was important for the users to be highly familiarized with the general interaction scheme of the iPhone, for this application bases many of it's own behaviours on existing iPhone applications and any other interaction natively embedded in it.

Here is a list of different reactions by the users who tested the low-fidelity prototype:

Menu Section	Feedback
<i>Home</i>	<ul style="list-style-type: none"> • At first, the "photo" button wasn't clear whether it allows you to take photos or takes you to the photo library • "Green Points" information should be placed in this screen • Would like to see latest things being done with the application on this screen • User expected more icons onscreen • Label named "photo" is not clear at first • No differentiation on whether the home screen has got all the options the application offers (inside the application screen), or if the menu is composed of the buttons at the bottom. • It doesn't show anywhere here how to redeem points
<i>My Vertsumption</i>	<ul style="list-style-type: none"> • Chart seems more important than "my account" in this section • Options looked crammed. Recommended to separate distance between buttons • There is no way to see if user is close to getting a prize (via "green points") • Would like to see the option of being able to compare user's "greenness" with more than one city • User suggested that you should be able to expand or

	contract the Green Chart the same way iPhone users can pinch and expand photos
<i>Around Me</i>	<ul style="list-style-type: none"> • Expects to see a list of available businesses after hitting any of the 4 options above • Some one else would like to see how many points have been earned at one "green business" in particular • Someone would like so see a way to rate the best "green businesses" • Some users expect when pressing the "play directions" button, to be taken back to the map and shown a trail of the road to get to the desired "green business" Others understood the button to play directions one by one in audio • For users not familiar with the iPhone interface (specially Google Maps on the iPhone), the "Vertsumption Around Me" cross-hair icon may not be immediately intuitive
<i>Tips</i>	No criticisms were made on this section for digital paper prototype
<i>Photos</i>	<ul style="list-style-type: none"> • A user suggested that maybe you don't have to take photos to earn points, but maybe you could enter a number or a code • Suggestion to include a red line as a guide for the product's "bar code" • The "Shutter" button wasn't very clear

After completing this testing session, some conclusions (specific to this interface) were gathered:

- All the participants praised the fluidity of the "Paper on Screen" approach.
- Since the labels on the menu items at the bottom were handwritten, it was difficult to read them some times. The same was experienced at various points throughout the testing

- Some of the participants focused their feedback on suggestion about the hypothetical “business model” behind Vertsumption, and were left aside from the feedback recorded on this paper.
- The most drastic of changes were suggested on the “Home” screen. The screen that received the least criticisms was the “Tips” Screen
- Since the “My Account” section was thought of “misplaced” under the “My Vertsumption” section.
- Some users expressed they would like to see more information regarding “how far away” s/he would be from getting a “green prize” (e.g. Green Behaviour Chart, Home screen)

At the paper prototype stage, there were 3 main categories within the nature of the user feedback:

1. Information Architecture and Affordance: Most of the user feedback referred to comments about the placement of the menu items, the options within the main menu buttons and the distribution of labels. For example one user was confused on whether the “Home Screen” contained the main menu items on the screen itself or if the buttons at the bottom of the screen were the structure of the application. The users also made various comments about what could they really afford to do at certain points during the test, perhaps because it wasn’t clearly stated in the paper prototype itself. This includes comments on the labeling of certain menu items and other screen elements.

2. Business model behind the application: Whether because the paper prototype looked “malleable” or more “under construction” than a high-fidelity prototype, various users expressed their ideas on how they would change fundamental aspects of the application if they could. They also suggested various changes to aspects that were not in scope of the iPhone application itself. For example, one user said “It would be great if a Green Product could have a numeric codes, instead of just a barcode, so the user could also enter those numbers in a Vertsumption website on a computer at home”.
3. New content/functionality requirements: This could have happened due to the same reason as the previously described type of feedback. Most users didn’t hesitate when expressing how they would like to see certain types of feature included or excluded from the application. For example, some users expressed how they would like to see some sort of indication of how many more points they needed to get to earn Green Rewards. One user said “I’d like to see how close I am to getting something in this chart, or in the home screen, or somewhere else.” Most of the feedback during this testing session was of this type.

Finally, there were comments from the users in regards to the prototype technique itself of placing an image in the iPhone photo library that closely resembles that of the interface to be. More on this type of feedback can be seen in the final conclusions section of this report.

5. High-Fidelity Prototype

After reviewing the user feedback from the paper prototype testing session, there were various changes made on the interface during the design of the high-fidelity prototypes:

- The labels for “Tips” “Photos” and “My Vertsumption” where changed to “Green Tea-ps”, “Green Photos” and “Green Chart” respectively.
- “My Vertsumption” was changed to “Green Chart” because the subsection “My account” was thought of being misplaced in this section. Instead, the prominent element in this section was the “Green Behaviour Chart” so the entire section became the chart itself, uniquely.
- Visual Indication to how many points were needed to get the next possible Green Reward in the “Green Chart” and the “Home” menu items.
- Some entities that existed inside the “Home” screen were added and/or modified in contextual model and where located under the “Settings” option, under the new “Home” window.

The high-fidelity prototypes were created based on the paper prototypes used in the first round of testing. The software program OmniGraffle was used to create the application’s look and feel, using the Yahoo! iPhone User Interface stencils created specifically for this software application. The images were consequently edited with Adobe Fireworks to create individual screens out of every image created in OmniGraffle. To see every image used during this testing session,

please visit the link provided in the appendix section of this report.

5.1 Validation

The high-fidelity prototype validation process was not different than the paper prototype validation process. The use case scenarios and the tasks users were asked to complete were identically similar to the task in the paper prototype testing session. The implementation was also the exact same: the different scenarios were turned into single photo albums in a fully functional Apple iPhone. The users were required to navigate through the different screens by flicking the photos with their finger.

For the high-fidelity prototype, 5 people were asked to test these tasks. All 5 users were current iPhone owners or have a high level of familiarity with the iPhone interface. It was important for the users to be highly familiarized with the general interaction scheme of the iPhone, for this application bases many of it's own behaviours on existing iPhone applications and any other interaction natively embedded in it.

Here is a list of different reactions by the users who tested the high-fidelity prototype:

Menu Section	Feedback
<i>Home Screen</i>	<ul style="list-style-type: none"> • Would like to see more information that usually would go in the "green chart" section, but here. • Would like to see more of the "competition element" here (the comparisons)

	<ul style="list-style-type: none"> • Would like to be asked here "if you wish to reveal your location" (most iPhone apps ask is you wish to share your current location) • User would not like to have to sign in every time the application is opened. • Another user would like to see more recently done things on this screen, such as thumbnails of recently taken and approved photos since last login • User would like to see a constantly present "photo" button at the top of this screen for easy photo access. • Most users were clear on the colour-coding of which menu item was active and which were inactive
<i>Green Chart</i>	<ul style="list-style-type: none"> • The "Red dot" is confusing. It seemed as if the user had "missed" the chance to earn a reward because it looks as if it was positioned "previously in-time"
<i>Around Me</i>	<ul style="list-style-type: none"> • A user expected voice turn-by-turn directions at the same time that the application goes back to the map to show the route. • User expected sliders (like those used in the "Green Chart" section) instead of buttons for the 4 categories of "green businesses" so the user doesn't have to go back and forth and actually be able to add/subtract "types" of businesses within the map itself. • The 4 icons used for the 4 different types of businesses were not easy to make out, once placed in the map • It was recommended to display how far away the selected "green business" is from the current location once selected, as soon as you press on one of these businesses' icons. • User really liked the "audio" icon. Expected directions turn-by-turn • User didn't see a need to offer the option to get directions "from a different location" other than the current location. User mentioned that for such a geo-location based application it didn't make sense. • Another user would like to see a representation of the different colour-codes of "green businesses" at the bottom of the screen, on top of Vertsumption's' menu items (as guidance)
<i>Green Tea-ps</i>	<ul style="list-style-type: none"> • User thought the name "Green tea-ps was a bit "cheesy" • User would like to see a random tip right at the beginning, not the instructional text. • User would like to see the instructional text greyed-out, and not

	<p>in the centre of the screen. User thought it shouldn't be the first thing to see here.</p> <ul style="list-style-type: none"> • Tabs were heavily criticized for not looking "like a real iPhone application". A user said the concept was there, but that the presentation didn't belong • Another user thought that the video tab looked "ghosted". Would like to see "buttons" more than these tabs.
<p><i>Green Photos</i></p>	<ul style="list-style-type: none"> • User really liked the "save to library" option in this section • User would like the application to build a separate album outside the application and inside the iPhone photo library with all the previously taken and approved photos (which would be located under the "photo history" section inside Vertsumption)

After completing this testing session, some conclusions (specific to this interface) were gathered:

- Various users were interested in seeing "recent user activity" in the home screen.
- Many users attempted to "click" on the different menu items on screen, as opposed to using their finger to flick through the images. This may have happened due to the similarities between this prototype and a fully functional iPhone application.
- Users liked seeing visual indication of how many points were needed to earn the next possible reward in the home screen. Some were confused by the way this was implemented in the "Green Chart" screen.
- Many users found the "pins" used in the map difficult to see. They also

expressed a need to have visible labels in the map to differentiate between the 4 categories.

- The presentation of the “Green Tea-ps” section was heavily criticized for not looking “right” or “iPhone-like”, specially regarding the treatment of the tabs.

At the high-fidelity prototype level, there were 4 main categories within the nature of the user feedback:

1. Graphics and Colours: The users were particularly keen on making comments regarding the colours used throughout the application. Most of the comments were made in regards to the “Around Me” and “Green Tea-ps” section. For example, a user mentioned he didn’t understand why the Green Tea-ps section was mostly grey. Another user expressed she could not make out the colours of the pin-drops in the Google map.
2. Consistency with iPhone patterns: Where in the paper prototypes this aspect didn’t appear as a potential problem, most users were keen on mentioning their dislike with certain aspects of the interfaces. Since this prototype resembled a real iPhone more closely than the paper prototype, certain design patterns now appeared out of place and inconsistent. For example, some users disliked the “tab” treatment in the Green Tea-ps section for being anything but “iPhony”. Another user praised the use of the “switches” in the Green Chart and suggested they should be used in the Google map as well.

3. Labeling: This type of feedback seems to have overlapped from the paper prototype testing session. There were recurring and new comments about certain menu items and overall interface elements. For example, one user thought the name “Green Tea-ps” was “cheesy and inappropriate”. Another user expressed concern about the name “Green Photos”, saying that he would not know what to do with that section without clicking on it “Can I browse green photos, or can I take them?”
4. Flow/experience stoppers: Another aspect that did not seem to matter during paper prototype testing were certain aspects that appeared to have “interrupted” the experience of navigating through the screens. For example, even though the Tips section had only instructions on how to browse the different green tips as a first screen, it was during high-fidelity prototype testing that this was seen as a nuisance. Some users mentioned that they would like to open the Tips section and simply see one random tip presented. Another user expressed that he would not like to have to sign in every time he opened the application. The same user asked if the application would ask users to reveal their location, because he would not like to reveal it every time (this was not accounted for in either type of prototypes)

Finally, it is important to mention that there was still some overlap of feedback regarding the hypothetical business model behind the application, but it was considerably less in number than during the paper prototype testing sessions.

The recurrent feedback on Vertsumption's "business model" may have occurred because the users knew these screens were still part of a university project and something not in real production. The reduced number in feedback of this type might have been affected by the high-fidelity looks of the prototype itself. This could have made some of the users believe the "business model" behind Vertsumption was more advanced or "set in stone" for a prototype of this type to have emerged.

6. Refined High-Fidelity Prototype

After gathering the feedback from the high-fidelity prototype testing sessions, some final changes were made to some of the images. Some of the most significant changes are:

- The “home” screen was redesigned almost completely. A “recent activity” panel was added and the “Redeem Rewards” button was repositioned.
- The red dot indicating the next Green Reward in the “Green Chart” section was removed and changed for a green line spanning across the graph.
- The 4 different sections in the “Around Me” section was given brighter colours and different pin-drops containing letters for better readability.
- The 4 categories in the “Around Me” section can now be seen in the Google map itself for reference.
- The “Green Tea-ps” section’s label was changed to “Green Tips” and was provided with big green buttons for the video and regular tips sections instead of the grey-coloured tabs.
- The browsing instructions in the “Green Tips” section was moved to the bottom of the screen and looks less prominent.
- A “camera” button was added to the top of the “Home” section for easy access to one of Vertsumption main actions: taking photos for green points

To see every image generated after high-fidelity user feedback, please visit the link provided in the appendix section of this report.

7. General Conclusions

Having created the conceptual model and designed the main components of an iPhone application that would help users consume in a more environmentally friendly manner, followed by two rounds of testing among different types of prototypes, it is evident that the main concept behind Vertsumption has taken an interesting shape from beginning to end.

This project was conceived having in mind some of the most relevant and established practices in the design of any user interface, whether of a computer program, a web site or a mobile application. The progression and evolution of the application prototype took place seamlessly thanks to the steps that were followed and represented in this report.

One of the most interesting outtakes of this design project was the type of feedback that the paper prototype testing sessions generated. This refers more specifically to the technique used during this testing sessions: Including images of the paper prototypes in the device itself where the application would ultimately be. This was done with the idea of providing the user with a more relevant context of use at the “low-fidelity” prototype level.

Since low-fidelity prototypes (more specifically paper sketches) are generally validated by utilizing paper screens with the testing users, the intention behind this “Paper on Screen” idea was to get closer to the end result without the efforts that imply creating high-fidelity prototypes.

The paper prototypes used in this project seem to fit the idea of “sketches”

and the high-fidelity prototypes fit the concept of “prototypes”, according to Bill Buxton [15]. As Buxton explains, sketches appear to be evocative, to suggest, provoke and generate questions in a noncommittal manner. Prototypes, on the other hand appear to be more didactic, refined and specific.

The paper and high fidelity prototypes used during testing seem to be in accordance with Buxton’s description of sketches and prototypes respectively. Nevertheless, in some aspects the “paper prototype” tested for this project seems to have aspect that could be considered to be “in between” the two descriptions defined by Buxton.

During the testing sessions for Vertsumption’s paper prototypes, some users provided rather specific and refined feedback about the application itself that would have not appeared if it had been presented in paper form. For example, one of the users talked about how he would like to see some of the elements on screen not so close to the main bottom menu because he could tap on the wrong button. Another user felt compelled to “tap” on some of the items on screen, as opposed to flicking the image to go from one to the next, which leads to believe that the user thought of this prototype as somehow “closer” to a real, functional one, even though it was clearly drawn with a pencil. Another user expressed he would like to see the Green Chart expand and contract by pinching it and expanding it with two fingers the same way any user can do the same with any photo in an iPhone. In fact, the user proceeded to enact the desired behaviour during testing (since he knew he was working with a photo of the sketch) to

clarify what he would have like the Green Chart to allow the users to do: afford zooming in and out as with any photograph in the iPhone's photo albums.

Finally, it would have been interesting to test the paper sketches of this iPhone application without using the iPhone to see the differences with this technique and that of "paper on screen". This would further validate the innovative factor of the technique used to test the paper sketches of Vertsumption.

Although the hypothetical business model behind Vertsumption was not in strictly in scope for the design of the application's user interface, it is important to say that many of the functions behind this supposed "business model" were arbitrarily assumed and placed within the logic of the application without much thought of whether it is 100% possible to make it a reality. At the same time, it does not differ much from what it is technically possible today or could be in the near future. Further exploration on the idea and the application's user interface itself could result in the implementation of Vertsumption as a real, functional iPhone application that could span across various mobile platforms.

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9. Appendix

A. Online location of Prototypes

All the images used during paper and high-fidelity prototype testing sessions, along with the images of the final iteration of the high-fidelity prototypes can be found at the following web address:

<http://picasaweb.google.com/vertsumption>

B. Article: "Paper on Screen" Digital Paper Prototyping