**Mobile Applications for a Sustainable Future: How Are Mobile Developers Contributing to Solving the Problems?**

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The recent growth of both technology and the internet has transformed how all industries across the world function. Mobile phones, which were once an accessory confined to the wealthy, are now a commodity and necessity for nearly every individual. Mobile solutions range from native and web apps for smart and feature phones, to mobile web sites, SMS services and voice solutions. Developers are at the center of the mobile revolution and their work is facilitated by marketplaces available to distribute mobile apps and reach masses of people globally. With more than 500,000 apps on the App Store and 450,000 on Google Play, “there are apps for almost everything”, particularly for sustainability. Sustainability is defined as “improving the quality of human life while living within the carrying capacity of supporting eco-systems” and is based on “the reconciliation of environmental, social equity and economic demands” (cf. the United Nations Environment Programme). Mobile phones and mobile solutions play the role of raising awareness, educating, and engaging users in creating a more sustainable future, and thus making a difference in addressing the issues.

In this study we focused on the following research questions: How are mobile app developers addressing the issues related to sustainability? What topics of sustainability are they tackling? What types of apps are they developing? How are they instilling messages on sustainability to users? What audience do they target? What motivates them in releasing these apps? What impact do these apps have on users? This abstract covers our approach to answer the three first questions. It presents some succinct results in the case of development for Apple devices. It also discusses our future work.

We carried out a qualitative approach to answer the research questions. We researched the subject of sustainability and developed a repository of papers, links to web sites and contests, and videos related to the topic to be used in mobile courses at Pace University. We privileged resources that would be fun for mobile developers to read or watch. We identified a set of keywords related to sustainability based on this research. We studied the organization of the Apple, Google, RIM and Nokia app marketplaces in terms of categories and search capabilities. We determined the numbers and types of apps targeting sustainability in the marketplaces based on our set of keywords. We collected the abstracts of all the apps we obtained through the keyword searches to produce Word Clouds using IBM Many Eyes software (*http://www-958.ibm.com*) and determined the patterns in the topics addressed by developers.

The repository we developed has been used in the Pace University global software development project in 2011 and 2012 where students in the US, Senegal and India collaborated to develop mobile solutions for sustainability. Sustainability is not a category in the organization of the marketplaces. We identified a set of 15-20 keywords related to sustainability that we used to make searches. These keywords included environmental sustainability, renewable energy, carbon footprint, and biomass. Green was not used as a keyword. The searches based on the different keywords categorized the apps in groups including education, health, games, books and lifestyle. This permitted us to understand the developers’ perception of sustainability and what category they believe their app fits under. Developers are developing apps rather than games to address sustainability. Figure 1 shows the top 10 keyword searches in the App Store for free and paid apps. Most of the apps focus on solar energy and global warming. Figure 2 depicts the word cloud obtained from the top 15 keyword searches. It shows that “energy”, “green”, “climate” and “footprint” are major descriptors of the available App Store apps.

These outcomes are promising in understanding the developer’s thought process, yet there are limitations to our approach. For example, it is difficult to determine the exact number of apps because they may appear under different keywords. We plan to compare the types of apps available in the different marketplaces and in different languages. We will extend our research by looking at mobile solutions proposed by companies (e.g., Recyclebank) and at contests (e.g., NYC BigApps, and App4Africa and World Bank contests on climate change). App marketplaces are evolving quickly. Therefore, it may be interesting to conduct this research at different time intervals to identify the trends and changes in the available focus and types of apps.

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| |  |  |  |  | | --- | --- | --- | --- | | Keyword | #Apps | Free | Paid | | Solar Energy | 94 | 56 | 38 | | Global Warming | 85 | 38 | 47 | | Climate Change | 58 | 36 | 22 | | Renewable Energy | 50 | 35 | 15 | | Eco Friendly | 46 | 23 | 23 | | Carbon Footprint | 40 | 33 | 7 | | Energy Efficiency | 40 | 33 | 7 | | Environmental Sustainability | 40 | 31 | 9 | | Nuclear Energy | 26 | 11 | 15 | | Clean Energy | 19 | 14 | 5 |   Figure 1. Top 10 Keyword Searches in the Apple App Store | Full Screen Visualization  Figure 2. Word Cloud Built from the Abstracts of the Top 15 Keyword Searches in the Apple App Store |

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