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The Tablet's Potential For Engineering Buildings

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The first installment in this series introduces the collaborative tablet engineering experiment, and it is a roadmap for exploration of the tablet's potential contribution to enhancing and streamlining our collective endeavors.

When I was a kid, programming on my Texas Instruments TI-16 and later on a Commodore 64, I was in games to play. While I did not realize that such machines would later become indispensable to my work (and everyone's work), I did imagine that one could probably use the computing power for more productive tasks. I could not picture what those tasks might be at the time.

Now, as I sit holding a tablet (a 3rd-generation iPad to be specific), I find myself asking the same question, I am envisioning the potential tasks and how they might contribute to a larger whole. I have been experimenting with the tablet's utility as an engineering productivity tool for some time now, and I am hoping through this series to share the results of my experimentation and collaborate with you on potential ways it can enhance or streamline our collective engineering endeavors. At the same time, my eldest daughter, now in sixth grade, is embarking on a new discovery as she and her classmates use iPads as productivity tools in the classroom. And I suspect that because of her propensity for readily adapting to and utilizing new technology, I will learn some things from her that I can allay your fears about.

Before I get to the experimentation part, the first challenge I encountered was using the tablet consistently. I am admittedly still working on this. After years and years of going to the personal computer as my primary tool, with its all too familiar keyboard and mouse or touchpad, I find myself a little discomforted by the tablet. Getting used to typing on a tablet takes some time, and I have a tendency to fall back to the PC for anything requiring more than a few sentences. However, that brought me to my very first moment of tablet enlightenment. Maybe one does not have to type. It has a microphone and a camera, and you can use your finger or a stylus to draw. New form factor, new forms.

Furthermore, I tell myself that during the transition to the personal computer, it must have felt terribly awkward for professionals accustomed to working with paper and pencil to work on a computer, and that I must be patient with the use of the tablet if I ever hope to become proficient. Thus, the second point of enlightenment: Adaptation to a new tool requires a disciplined approach.

Assuming consistent use of the new tool, how do we stand to benefit from adopting this new platform? An obvious one is using it as a secondary email and text messaging interface, reading books or watching movies on trips, how can we really adapt it to specific engineering tasks? There are, of course, various engineering apps available for both iOS and Android. A search for "engineering" in the iTunes' App Store, or in Google's collection of Android Apps, yields lists of apps that provide engineering handbooks, calculators, measurement tools, converters, and of course, games. Many of these apps are great reference or educational tools. There are also very specific-purpose apps, such as those from Autodesk and Bentley for reviewing drawings, for example. I have believed that what I was seeking resided with the more general purpose apps and their adaptation to specific engineering tasks.

Thus, I started examining how I did my work and assembled a series of common tasks that are frequent elements of engineering activity, where an activity is an energy study or engineering design. Let's take an energy analysis study, of which I do a fair number on existing buildings. Such a study consists of several primary tasks, most focused on multimedia capture of information. The tasks range from note-taking, to imagery, to documentation, to name a few. Thinking about the activity and its component tasks in this way, a matrix began to form in my mind.

At the intersection of each activity and task, one or more apps may fit the bill for what we are trying to accomplish. This series of articles will set about to seek out those intersections and fill in the matrix, and provide commentary on the apps discovered along the way. I encourage you, the readers, to help me out, sharing your experience.

technology on the job, and together we can collectively develop a body of knowledge and experience, tablets to evolve from novelties to extremely effective tools in our capable hands.

ENERGY AND ENGINEERING STUDY

Let's return to the energy study activity and explore it further, illustrating how we will fill in the matrix by a first activity. The primary tasks in the on-site portion of an energy and engineering study of an existing building are around capturing the data and images that describe the building's characteristics in enough detail such that they can be made on potential improvements, both in terms of savings and corresponding investment. This can be a tedious task at times.

For example, building dimensions and construction materials may be needed for calculation of thermal loads, air handling unit supply air and outside air flow rates are needed to calculate potential improvements that include fan distribution, fan control, ventilation, and economizer operation. Here are some of the tasks and the apps I am experimenting with and using to complete those tasks on recent energy studies.

TASK 1: STORE AND ACCESS DOCUMENTS

Typically, before going on-site to investigate the building, the owner will share various documents and information on the building itself and its mechanical and electrical systems. I often like to make these documents accessible to myself and others such that I can view them if needed while on-site or elsewhere without carrying a large binder or rolls of drawings. A seemingly ubiquitous app for document storage and sharing is Dropbox. It allows one to easily store files in the cloud (with 2.25 GB of free storage), to move files from PC to tablet to phone, and to share documents with others. You can call up documents on a tablet for viewing while on the project site.

TASK 2: MAKE NOTES ON EXISTING DOCUMENTS

Taking the first task one step further, most often these days, the documents shared by owners come as PDFs. I have found that making notes on these existing documents is a good way to capture additional information within the existing documentation. While there are a number of apps available for annotating PDFs, one app that I use well is iAnnotate. This app enables you to work with multiple PDF files and annotate them on the fly. You can also incorporate multi-media notations such as photos. And, it offers built-in integration with Dropbox, such that files can be opened from and saved to your Dropbox. Using these tools and this technique, one can make additional notes about air handling units right on the mechanical schedules, or notate operational details on the existing sequences.

TASK 3: TAKE NOTES WITH MULTIMEDIA

But, what if you need to take notes in a more conventional manner? Let's say you are interviewing the facility manager. There are a variety of apps for note taking. One that I've come to prefer is Notability. It offers many tools for note taking, is easy to use, and again, includes built-in Dropbox integration. Notes can be organized in a file structure as well as PDFs. Numerous tools within Notability enable text entries, handwriting or drawing, and inclusion of photos. I have used this app to capture interview notes, lighting details, and make plans for deploying data loggers.

Placing these apps on the matrix under the appropriate activity allows us to begin to build out one column of the matrix. These versatile apps may very well appear in multiple columns along with new apps as we continue to explore activities and the means available to approach them on a tablet.

Hopefully, this will get you thinking about how you might do these tasks on a tablet and what apps you will be using. Or, perhaps you already do some of your work this way and you can share what you have learned. I am looking forward to continuing exploration of the application of tablets and apps to engineering buildings. Seewald has more than 20 years of experience in commercial buildings systems engineering, having served in a variety of roles in the HVAC, building automation and controls, and energy efficiency and management arenas.

Seewald's overall work experience spans a spectrum: from planning, technical analysis and engineering for building owners, to industry and market research, to education and advocacy for energy efficiency and high performance buildings. In his role at Sebesta Blomberg, Seewald's focus is on energy efficiency and sustainability in building design. Areas of expertise include energy management, building automation and controls, HVAC, central plants, commercial buildings, and energy efficiency.

re/retrocommissioning. Seewald gratefully acknowledges the inspiration and guidance of Scott Pinyard, se at Sebesta Blomberg, who got him started down this path.

ADDITIONAL READING

To get your mind moving further on this topic, some links are provided below to articles that review engineers.

- <https://www.asme.org/engineering-topics/articles/technology-and-society/10-ipad-apps-for-engineers>
- http://www.designnews.com/document.asp?doc_id=236155&dfpPPParams=aid_236155&dfpLayout=article
- <http://engineeringstrategynews.com/5-must-haveengineering-ipad-apps/>

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