

Improving Way Finding in Healthcare Organizations Using Wireless Technology

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Abstract--- The proposed system analysis and design involve implementing an in-hospital wayfinding app at ABC Hospital. The project comes in the wake of a growing demand for the incorporation of technologies into healthcare firms' operations. In a context such as the U.S., recent statistics suggest that about 66 percent of the largest healthcare organizations rely on mobile apps to support their health care service providers or programs. Given the skyrocketing of the use of Smartphones and mobile phones, additional findings illustrate that almost 54 percent of patients are keen to use apps, yet only two percent have strived to use the apps offered by hospitals in which they seek medical services. At ABC Hospital, recent trends point to substantial growth in the number of new physicians, visitors, and patients, yet the degree to which these groups could be assisted to navigate the system and physical locations within the facility remains unaddressed. In this case, information about the client and client needs was collected from written documents. Particularly, the data was collected based on regular company reports, as well as the health ministry's annual reports concerning the productivity of major community hospitals, their future projections regarding improvements in health care service provision, and some of the challenges faced by patients and families seeking services from these institutions. Therefore, the proposed project is deemed appropriate because the hospital has, in the recent past, proved complex and sprawled, demanding a more updated and responsive app. Some of the notable benefits that the wayfinding app is likely to lend to ABC Hospital include new opportunities for improved health care service provision, improve planning and control of end-user service provision, the aspect of the speed at which patients and their families might reach the required departments and physicians' offices quickly, increased flexibility, error reduction, and the reduction of the cost of medication (because there is likely to be a reduction in delayed or missed appointments). Important to note is that a few barriers might face the proposed project. For example, some of ABC Hospital's staff members might resist the change due to ideological differences. Also, there might be disagreements among members of the project design and implementation team. It is also worth indicating that the need for hardware, software, and training provision implies that there might be financial constraints. However, a successful identification and synchronization of the required features of the (and the description of the destination generated (as well as that of the turn-by-turn directions)) implies that the implementation of a wayfinding app at ABC Hospital might improve the experience of patients and their families significantly, hence positive reputation and overall satisfaction with the health care services offered.

Keywords--- Healthcare Organizations, Wireless Technology, Refill Processing, APIs.

I. INTRODUCTION

IN hospital settings, there has been a growing need to embrace technology. One of the factors motivating this demand entails the complex nature of the majority of physical environments of the affected healthcare facilities. According to Calori and Vanden-Eynden (2015), one of the technological trends that have continually dominated healthcare services entails the hospital app developed in the

form of a wayfinding app. Indeed, the wayfinding app paves the way for patients to navigate around healthcare facilities. According to Demiris and Kneale (2015), the app plays a crucial role of supporting the patients and their families to locate physicians, staff members, departments, and also access location-based maps and push messaging. In a related observation, Kaya, Ileri and Yuceler (2015) stated that the use of apps in the healthcare facilities or organizations ensures that there is greater engagement between patients and

the healthcare providers. The NSW Health (2014) reported indicated further that the increasing use of apps in these facilities accrues from motivating factors such as the state of convenience with which they come, as well as outcome improvement due to improved relationships between patients and the providers; hence improvements in the overall health of the patients (and their families' experience).

In a context such as the U.S., recent statistics suggest that about 66 percent of the largest healthcare organizations rely on mobile apps to support their health care service providers or programs (Reay, Collier, Bill, Kennedy-Good and Old, 2015). Given the skyrocketing of the use of Smartphones and mobile phones, additional findings illustrate that almost 54 percent of patients are keen to use apps; yet Reay, Collier and Douglas et al. (2017) asserted that out of these, only two percent have strived to use the apps offered by hospitals in which they seek medical services. Regarding the small percentage (two percent) of patients who have expressed interest in using the hospitals' apps, Reay, Collier, Kennedy-Good, Old, Douglas and Bill (2016) stated that the response or aspect that could aid in explaining this trend lies in the features offered by the respective apps. For example, the study indicated that most of the patients desire three major features. One of the features includes prescriptions, which involves the app's capacity to support refill processing on the given medical prescriptions. Another desired feature involves appointments, whereby many patients consider the ability of the app to reschedule, cancel, and book appointments. Lastly, the feature that many patients are likely to consider involves electronic health records (EHRs), which involves the app's ability to promote access to medical or electronic health records. Despite these desires and demands by the majority of patients, especially with the basic but crucial nature of the features desired of ideal hospital apps, Roberts, Chaboyer, Gonzalez and Marshall (2017) stated that they the features) have continually proved elusive to most of the apps that the interested hospitals develop; gaining the interest of patients who are as few as two percent.

At ABC Hospital, recent trends point to substantial growth in the number of new physicians, visitors, and patients, yet the degree to which these groups could be assisted to navigate the system and physical locations within the facility remains unaddressed. According to Short, Reay and Douglas (2019), the complex nature of such a facility, which could be exacerbated by patient and visitor anxiety, could imply that the absence of an efficient wayfinding app translates into adversities such as missed appointments and delayed service provision. As avowed by Short, Reay and Gilderdale (2017), the trickle-down effect of such adversity entails a loss of revenue and productivity at the departmental and organizational levels. Other effects that could arise from delayed and missed appointments due to difficult in navigating such a facility include patient dissatisfaction, disease severity, avoidable hospitalizations, and other serious health consequences. In the wake of growing demand to embrace apps and also improve the experience of patients and their families in healthcare organizations, the proposed

system analysis, and design entails an in-hospital wayfinding app (which targets Apple and Android device users) aimed at steering progress in the timely and efficient service provision at ABC Hospital.

II. METHODOLOGY

Information about the client and client needs was collected from written documents. Particularly, the data was collected based on regular company reports, as well as the health ministry's annual reports concerning the productivity of major community hospitals, their future projections regarding improvements in health care service provision, and some of the challenges faced by patients and families seeking services from these institutions. Apart from government and institutional reports, data about the client organization (ABC Hospital) and its needs was also collected from some of the recent scholarly investigations that have focused on the subject concerning trends in the use of hospital apps and how the resultant technological trends have proved beneficial (or otherwise).

III. RESULTS AND DISCUSSION

The initial step involved the determination of the expected features of the app – relative to the problem of poor system and facility navigation at ABC Hospital. Thus, the phase involved the consideration of features such as names and codes of locations and physicians' offices, the parking lot, and relevant departments, kiosks, business centers, and halls – or waiting rooms, hallways, and other indoor and outdoor structures at ABC Hospital. Whereas the target users included patients, physicians, and other staff members, the devices or mobile platforms that were supported were those that rely on Apple and Android operating systems. This consideration culminated into the design of the app – based on multi-touch gestures and UI design. Later the approach to be used to develop the app was established. In this case, a hybrid approach was employed, whereby on-the-fly web coding was combined with prebuilt native containers. According to Short, Reay and Douglas (2019), this approach requires the developer to augment native languages with web codes to ensure that unique features are created; eventually providing room for access to native APIs. A prototype was then developed before incorporating relevant analytics that would enable the programmers, testers, and debuggers to determine the number of site users, how they accessed the site, and how they could visit the site at a later date. In this process, the ideal mobile analytics tool that was used involves Google Analytics. Similarly, beta-testers were identified and any relevant feedback incorporated into the app design; eventually culminating into the deployment or release of the app. Before the beta launch, the target end-users were identified, bugs eliminated, and the target market's goals and requirements identified. With metrics capture, there was also an upgrade of the app in a way that would provide room for the incorporation of new features; hence, continuous system improvement in relation to end-user demands.

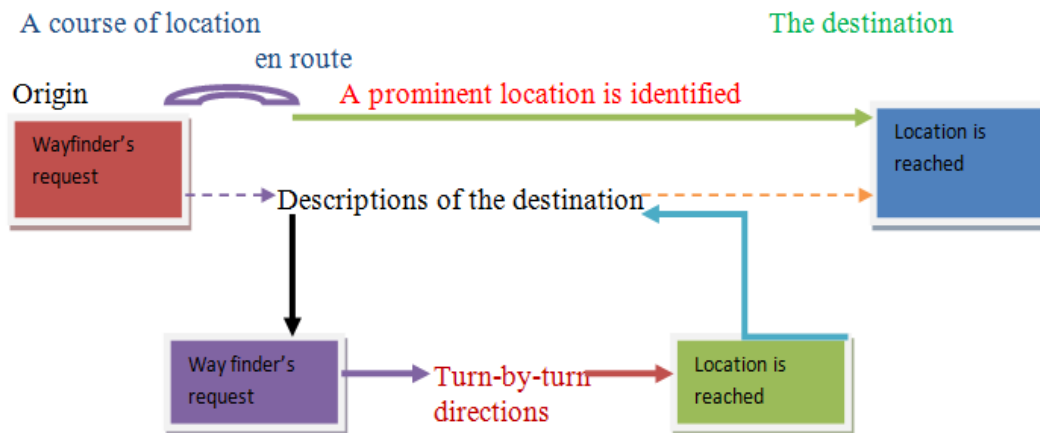
3.1 User Dialog

Given that ABC Hospital serves a broader community, the proposed wayfinding app targeted wayfinders or end-users with varying spatial knowledge. Therefore, the app tracked the required route and ensured that the dialog context is also established before adapting the detail and kind of spatial data that the wayfinder communicates in certain generated routes – relative to the needs of the wayfinder.

Destination description generation: Whereas the “where” represented the dialog context, the “origin” represented the initial route context. With the destination location stated, the app computed a destination description. In this case, the system calculated the route between the wayfinder’s origin and the destination; with an optimal route expected to involve the shortest path – hence save time. In turn, sets of features found at or in the proximity of the destination were created before retrieving references for the

destination. With prominent spatial features and the destination’s location evolving as references, the resultant description would be at the wayfinder’s disposal.

Turn-by-turn directions’ generation: With the shortest path separating the destination from the origin determined, there was GUARD turn-by-turn directions. For end-users who might be completely unfamiliar with ABC Hospital’s physical structures, the app was required to prompt them to provide additional information while during “location en route.” With the next prominent location determined, the new location would become “current” and relevant turn-by-turn directions generated. With the pattern repeated, the wayfinder would be guided to the required destination. With dialog-driven route locations expected to dominate the operations of the wayfinding app, the flowchart below demonstrates how ABC Hospital’s end-users would interact with the designed system.



3.2 Communication Plan for Client Update on Project Progress

At ABC Hospital, several factors inform the need for a communication plan. For example, the plan sought to ensure that there is an alignment of the goals of the organization with the ongoing project. Also, the communication plan sought to boost team meeting productivity, offer an opportunity for sharing feedback, and increase the project status and scope visibility. Some of the communication methods that was embraced include the use of “to-do” lists, collaboration apps, status reports, discussion boards, meetings via video chat, phone, and in-person, and the use of email.

IV. CONCLUSION

In conclusion, the proposed system analysis and design involve implementing an in-hospital wayfinding app at ABC Hospital. The project comes in the wake of a growing demand for the incorporation of technologies into healthcare firms’ operations. Also, the project comes at a time when there is increasing structural and system complexity at ABC Hospital, pointing to the need for end-user autonomy and, in turn, pose benefits such as cost-

saving, reduced lengths of hospital stays, reduction in chances of mortality and comorbidities due to delayed or missed appointments, improved productivity among practitioners, and increased revenue – due to a smooth flow of operations at the institution. Given the economic, technical, political, legal and contractual, schedule, and operational feasibility of the project, the need for the ABC Hospital’s senior management and project sponsor to support the proposed project could not be overstated.

REFERENCES

- [1] Calori, C., & Vanden-Eynden, D. (2015). Signage and Wayfinding Design. New Jersey, USA: John Wiley and Sons.
- [2] Demiris, G., & Kneale, L. (2015). Informatics systems and tools to facilitate patient-centered care coordination. *Yearbook of Medical Informatics*, 10(1), 15-21.
- [3] Kaya, S.D., Ileri, Y.Y., & Yuceler, A. (2015). Importance of Hospital Way-Finding System on Patient Satisfaction. *Business Challenges in the Changing Economic Landscape - Vol. 2: Proceeding of the 14th Eurasia Business and Ergonomics Society Conference*, edited by M. H. Bilgin, H. Danis, E. Demir, and U. Can. Springer international publishing
- [4] NSW Health (2014). *Wayfinding for Healthcare Facilities*. Sydney, Australia: Ministry of Health

- [5] Reay, S.D., Collier, G., Bill, A., Kennedy-Good, J., & Old, A. (2015). Designing New Healthcare Experiences: Prototyping a Physical Space that Enables a Design Approach to Improving Patient Experiences in Hospital. *Proceedings of the 3rd European Conference on Design4Health*. Sheffield, UK.
- [6] Reay, S.D., Collier, G., Douglas, R., Hayes, N., Nakarada-Kordic, I., Nair, A., & Kennedy-Good, J. (2017). Prototyping Collaborative Relationships between Design and Healthcare Experts: Mapping the Patient Journey. *Design for Health*, 1(1), 65-79.
- [7] Reay, S.D., Collier, G., Kennedy-Good, J., Old, A., Douglas, R., & Bill, A. (2016). Designing the Future of Healthcare Together: Prototyping a Hospital Co-Design Space. *CoDesign: International Journal of Cocreation in Design and the Arts*, 13(4), 227-244.
- [8] Roberts, S., Chaboyer, W., Gonzalez, R. & Marshall, A. (2017). Using technology to engage hospitalised patients in their care: a realist view. *BMC Health Serv Res.*, 17, 388.
- [9] Short, E.J., Reay, S.D., & Douglas, R.A. (2019). Designing wayfinding systems in healthcare: from exploratory prototyping to scalable solutions. *Design for Health*, 3(1), 180-193.
- [10] Short, E., Reay, S., & Gilderdale, P. (2017). Wayfinding for Health Seeking: A Design-Led Exploration of How Wayfinding Employing Communication Design can improve the Hospital Outpatient Experience. In *Proceedings of the 12th European Academy of Design Conference*. Rome, Italy.