

Mobile Internet of Things

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Abstract: *Technology evolves the way businesses function, but if technology stops evolving even the best processes end up seeing inefficiencies creep in. This case outlines the next stage of evolution in Information Technology for the Logistics industry. The scope of this case is set for within the country of India.*

I. Introduction:

The logistics industry has had a number of technologies in place in the past half century. The last decade saw the creation of the *Internet of Things* wherein the desktop architectures were replaced from the silo that they were in, by their Cloud counterparts that would disseminate information collected from several sources. This gave rise to the scope of widespread use of *Hand Held Terminals* making them direct contributors in the business cycle – automation begins.

Not until the dawn of the current decade however did the true potential of this technology emerge. With the mass adoption of smartphones, each having a wide range of capabilities, several concepts that were previously never thought of are now realities. Efficiency in logistics has taken a whole new meaning.

This case details concepts being worked at WebXpress including *mobile focused data portrayal* and *device collaboration* alongside practical implementations such as PODXpress, BikerBuddy, and mAttendance. In a nutshell – how mobile software redefines hard processes along with its implementation costs and timespan.

The Core of Business

Technology today is heading in the direction of the *Internet of Things*. IoT is a fairly old concept but has seen widespread acceptance only recently. The reason behind this delayed spread is the ambiguity about its implication and application.

Internet of Things means interconnection of different technologies. It does not mean however to simply share data among each other. It requires making one core for all the technologies. Devices being Internet dependent these days, it made sense to keep that core on the Cloud. Instant access and non-fragmented are the hallmarks of this technology.

Acceptance of IoT relied on several factors happening together namely, widespread acceptance of the Internet to begin with; adoption of Internet-enabled technologies; and a modern architecture to integrate them. In India, it took a good deal of time for the Internet to gain popularity and smartphones (the technology having the architecture to exploit the former) only came into notice in the decade of 2010.

The next challenge was to understand the technology. Anything is useful only if its users understand how to use it. Cloud was being treated as a remote storage spaces and until the general perception about it change to expand it to a process enabler.

Integration: Establishing Technology

It is the age of managers. Their role is to be a catalyst and not the ground action. Their deliverables are measured in terms of how much they managed to *get done*. So the tools that they use must be more about thought than action i.e. more about information than processes.

Dependence on information is now omnipresent and its sole purpose is to achieve set goals. In the near future, people will spend most of their time thinking than making; that role will be left for automation to execute.

Information always forms a trail of links, each having far reaching implications from its point of origin. This allows system enablers to divide the process cycle of any business into logical steps each of which have distinct purpose and outcomes. In logistics for instance, booking and closure are handled at and by multiple locations and operators. This case is very simplistic though, true integration means linking information collected from various sources and streamlining them into one destination. This implies that the location, time, and situation will vary for every source and the destination will almost always be shown a roadmap with a timeline. The requirements to make such integration a reality are infrastructure and intelligence.

Infrastructure is the first step of integration. The technology that enabled them to complete their tasks was computers. However, isolated islands as they were at the beginning, they only managed to improve each specific user's productivity. When put together, the output of two entities is much more than the sum of their individual outputs. This is how first Internet then Cloud became the most important tools of today.

Getting intelligence into processes is another story altogether. Humans are prone to err but businesses are liable to losses. This was the birth of validation, the most basic form of intelligence. But today's intelligence is at a whole new level: recommendations – telling users what to do next. Since cycles usually follow predictable paths, it is possible to analyse and predict future course of actions. An even advanced level is to plan scenarios before any action is taken or money spent.

Both infrastructure and intelligence are a reality and today make companies more competitive and profitable. The underlying concept is integration. Once both are implemented, the next step is to choose a medium for each user to exploit the technology in place.

Ideally, each stage uses different devices these days because the hierarchy of responsibility increases the further one goes down the link information. The more complex it gets, the higher the position the employee and the simpler the actions become. So, more complex devices such as computers are used by entry level employees and simpler devices such as mobiles and tablets are preferred by top managers. But mobile is a platform built for consumption. It is meant not to create but to disseminate. This makes it the platform of logical choice for top managers and is only being used for quickly accessing information.

This is where the concept of mobile-first takes a different approach altogether. As progress happens, more and more processes become automated. Information is generated and collated by computers. This frees its users to focus on human intelligence and intuition. It is possible to make transporters do the data entry thus eliminating an entire step because orders come directly from the warehouse. This is only possible if mobiles are used.

Collaboration: Internet of Things

Keeping in mind the demand trend, the need for Internet of Things has never been more apparent than now. The more companies become advanced in what they offer, the more they tend to become dependent on data. Further, WebXpress customer data shows that the sharing is key to achieving efficiency in operations as well as gaining end customer trust.

One of the essential tools of IoT is interoperability. Simple tasks like sharing operational and financial data between distinct systems can save not only money but also time, both of which are very important from a profitability perspective. An example is the ability to share local data with worldwide ERP implementations that multi-national companies use. The biggest case is that of SAP that is the de facto choice for overall management but may be expensive or not customisable enough for local scenarios. In this situation, IoT comes to the rescue by allowing for providing solutions that can automatically transmit data back and forth.

IoT is rapidly morphing into technology than a concept it is. Systems are even collaborating with data from other sources to bring ideas never possible before. Today, live location and temperature can be monitored within an existing ERP by integrating with a GPS box with the ability to record temperature variations. In this manner, IoT offers a chance in which there no need to perform a reengineering that requires a substantial investment.

If reengineering is required it is to make the whole system mobile ready. With the kind of agility demanded in the market, the future is not in just collaboration but in the combination of Internet of Things and a Mobile First approach. Time has proven that only by facilitating daily tasks by ease of use technologies and providing a holistic picture via data accessibility can companies provide an edge to survive in the market. So, by bringing technology in the hands of many people (through a mobile-first approach) and connecting them to form a smart chain (through IoT) a significant change be brought in. This is the idea behind suggested in the research paper.

Implementation: Mobile-First

Mobile First is not a technique or a set of rules that can be applied on a given system. Neither is it an architecture that will modernise it. Mobile-first is a concept that when implemented changes the priority of what the system is used for and in some cases even the purpose of it.

Here is the difference between mobile-ready and mobile-first approach: a system that is mobile-ready will have its layout friendly for a mobile device; a mobile-first system understands who their users are and what

they need. While the mobile-ready architecture will provide convenience, it is limited only up to navigation. This is not the goal of a truly mobile system. Its goal is to only provide what users are looking for and only at the time they are expecting it to come. For instance, the emphasis of an ERP such as WebXpress for its mobile-first applications is to provide decision oriented data in a friendly and intuitive manner (visual reports) rather than data entry.

For factors that matter the most such as follow-up and analysis, there is no better tool than a mobile. The biggest contributor to this is the fact that everything is simple and to-the-point.

The final factor is the weight of the information being consumed. In an intelligent world less is better. A mobile device is designed to be simple and light and this is a functional fit to the requirements of managers. The data is usually processed and has a certain degree of intelligence behind it. This intelligence results in quicker decision making and better outputs - an intelligent manager.

To implement mobile-first there are a set of questions that need answering before starting off being mobile-first:

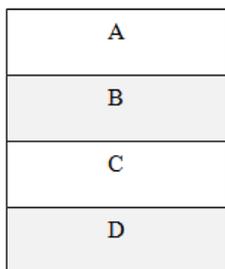
- Can you define who your users are and what their needs are?
- Are you able to define which device would they use the most?
- How will you manage the transition from one device to another?

Mobile-first is a must if the answers to these questions lie in the vicinity of:

- The users being managers looking out for control mechanisms
- They have to be on the move resolving issues most of their time and none of it to spare on process driven activities
- Their devices range from mobiles to tablets to computers depending on the occasion

Chances are the answers will almost always be a yes. The next step is to find out how to orient the system in question into mobile-first architecture.

Layout of Data

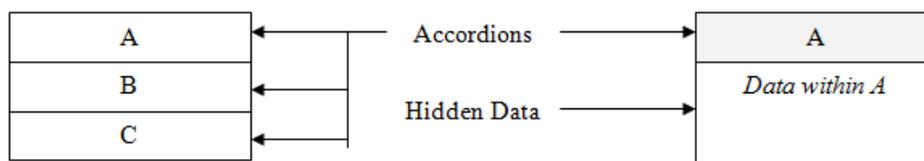


The diagram (top) showcases how a desktop with a wide-screen has the ability to portray on-screen elements with greater detail. In the case of mobile (left) there is only a little screen to accommodate all these elements. This means you have not only less space but also less chance to add in complexity.

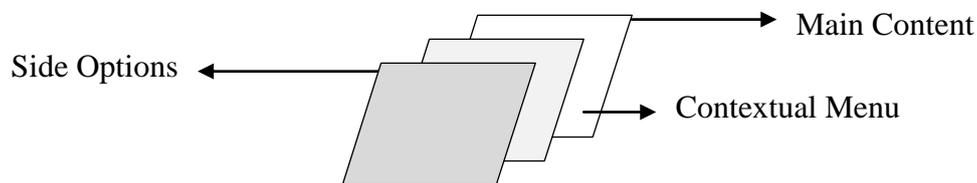
There is a need for techniques to manage user interface complexity.

Some suggestions on tools to achieve layout simplicity and maintain data abundance are:

- Accordions: When there is a lot of information on one page and it can be clubbed into groups, it is preferable to use accordions that are collapsible stacks that store different information in each stack. Opening one closes the others. This allows the user to focus on one thing at a time.



- Layers: If there us more information to be displayed but no space to accommodate, they should be added to different layers that would be revealed only when the user needs them.



- **Pages:** Desktops usually contain a lot of information because they have a lot of space to spare for it. If that space is not available but the complexity cannot be reduced, the use of pages provides some respite by creating multiple pages that are swiped to reveal the other while hiding the first. This is particularly useful for entering several rows of information.

Priority of Data

The main difference between a broad system orientation and a mobile-first orientation is that the former attempts to fit all-under-one-roof whereas the latter should take a more delegation based approach. By creating separate applications for each set of tasks, one can potentially make each activity logically and functionally autonomous. At the same time the total weight of each application will reduce. This also allows for the management to distribute tasks among employees of different verticals.

The second concept within priority is the kind of data to showcase. As per users, the more it is processed the better. Raw data or lists of data have less utility when it comes to taking macro decisions and it leads to excess time extracting something meaningful. So the best information for mobiles is that is collated through a set of sources giving a macro picture. In fact it is highly preferable that the information is portrayed in a graphical format. Users will have a better understanding of the outcome since it highlights what is important.

Design of Data

The biggest hurdle of mobile-first is found out to not be getting data onto mobiles the way users want rather the looks and attractiveness they would expect from it. Today, design seems to matter as much as content it is wrapped around. The engineers behind the systems need to keep in mind the overall feel of the product.

In the Real World

The testament of any concept is its practical usage. Both the IoT and Mobile-First are concepts that are in use around the world. In India, though, it is yet to pick up momentum. This is particularly true about the logistics industry. WebXpress is an example of a product that has taken the path towards making these concepts a reality. For this it needed to be reengineered in a few key areas. At this stage too, the product has simply taken baby steps towards the new target.

To elaborate how the above concepts can be put to use, here are a set of examples in which IoT has shaped processes and mobile-first has enhanced the speed of operations. The products used for elaboration are the copyright properties of ECPL and are only mentioned for the purpose of practically showcasing the models explained in this paper. Each example is either fully developed or in pilot testing. Further certain ideas are proposed, which are in the works at the company.

Each application hence mentioned spun-off an existing system or module within WebXpress. They were created from the ground-up so as to make them truly mobile oriented. This step is not unique, and is needed when a system is not oriented towards these concepts to begin with.

mAttendance: An Example of Integration

WebXpress exploited the concept of shared data by creating the mobile app mAttendance built to manage employee attendance. Data from this app can be synced directly to salary calculations. It uses GPS technology to create a Geo-fence relative to the location of the employee's specific workplace. Once logged in, it consumes only a few bits of data to transmit the time of punch. The goal was to make it both secure and economical to operate.



BikerBuddy: Division of the Work Cycle



BikerBuddy is another example of an app designed to simplify the process of delivery. Using a status dashboard it helps users plan out their delivery day. It then provides the customer addresses with the ability to trace them live on a map relative from the users' current locations or even to call them for assistance. This is only possible because of the tight level of integration done throughout the information chain.

Dashboard Delivered Pending

Cnote No.	Status
V19438675	Pending
V19443205	Pending

Cnote Details

Cnote No : I30000515881
 Consignee Name : RAMESH JOSHI
 Address : AKSHAY APARTMENT
 JAIRAJ NAGAR
 BORIVALI(WEST)
 MUMBAI 400092

Delivered : YES NO

Reason : Consignee not available

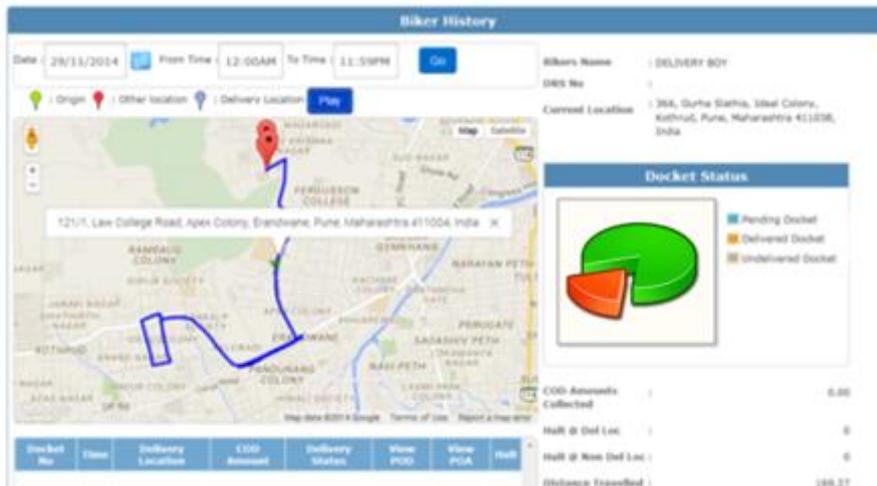
POA : Image
 Video
 Audio

Update

Control Tower: Decisions supported through IoT

WebXpress developed Control Tower as a mobile and web system to join all the diverse ideas and platforms it has created over the years. It plugs into any existing system to collect real-time location information and analysis the same for all its users' movement. This is specifically useful to industries that are highly time sensitive in nature, the biggest example being the pharmaceutical industry that need to provide the drugs well within their shelf life. Today however the biggest users are e-commerce companies to ensure they deliver customer products within a set time (Amazon now provides a three hour delivery guaranty within New York should people opt for this premium service).

Later this data is actively used to analyse the productivity of bikers and their locations. Over time its scope, like any other system, increased to add innovative reasons to make it more useful. Because it tracks every user live, ever working-hour moment of the day, it can now be used to determine the availability of a biker near the region of need rather than using the traditional FIFO mechanism of task assignment.

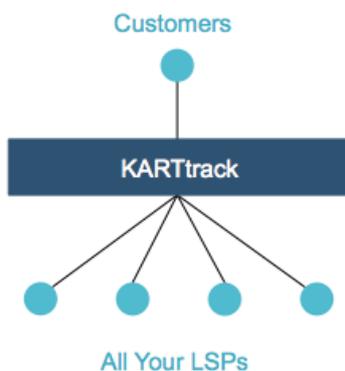


Widgets: Information Dissemination

Widgets are micro mobile apps that are meant for small and regular updates. IoT enables information to be instantly available the moment it is created or modified. The widgets by WebXpress exploited this opportunity. A status as simple as pending activities can have a huge impact on follow-ups done by managers. There are several key statistics that are important to managers, especially for those in senior positions. Data from around the world are collected and provided for the perusal of the top management. Future project are aimed at providing data of financial expenditures, sales figures, personal performance parameters, and so on.

KARTtrack: A Ground-up Platform

The WebXpress R&D team discovered an opportunity in the fact that realising the true potential of IoT will lead to areas that have never been exploited before. Today every industry player is communicating with each other freely, so if their data were to do the same it would be of great benefit to everyone. In logistics, there are many LSPs providing services to individual customers. In every case today, these customers have to manage each LSP’s data separately. This consumes a significant amount of time and manpower. Here is where IoT comes into the picture – if the LSPs allow for WebXpress to interact and manage their data then it can be actually brought to a central location – the Cloud and only relevant customers can access them.



An experimental Software as a Service (SaaS) currently, it enables management of multiple companies through one browser window. Later builds are planned to allow for decisions through mobile reporting.

Further, it is proposed that if the data is collected over a period of time can be used to recommend which LSP to select of a given job. This intelligence does not need advance algorithm but the interconnectivity that IoT brings along.

Footnote

A change in architecture is enough to bring several layers of intelligence and several other innovative ideas. All platforms need to orient themselves towards change or they will face a time when they will become the inefficiency in processes that need to be changed.