



Assembling Mobile Experiences with Drupal

Drupal provides unparalleled capabilities for assembling mobile experiences. With Drupal as a publishing platform, it's easy for magazines and news organizations to publish simultaneously on smart phones and personal computers. Drupal-powered dispatchers quickly manage drivers with Apple iPads to pick up riders, and continually track their fleet over a mobile network. Drupal-based Acquia Commons allows the Defense Security Cooperation Agency (DSCA) at the US Department of Defense to support an international community of defense and security professionals, both with desktop devices in their offices and mobile devices in the field.

These examples offer just a sampling of how organizations profit by mobilizing Drupal. Certainly there are different approaches to meeting the growing popularity of enterprise applications on smart phones and tablets. Depending on the requirements:

- Some build web-based applications accessed through mobile web browsers.
- Others build native mobile applications deployed on the devices themselves, periodically connecting to content sources over the network.

Underlying these experiences is an essential set of services that capture, organize, store, secure, and distribute content across networked environments. While supporting both mobile web browsers and native mobile applications, Drupal provides the content and application infrastructure that seamlessly delivers.

As a result, there is no need to create separate applications to support desktop browsers and mobile environments. Using Drupal, an organization can create and manage its content once, then distribute it to disparate devices. Moreover, by relying on a flexible content and application infrastructure, an organization using Drupal can quickly adapt to changing business requirements.

Let's examine how developers use Drupal to simultaneously address both delivery cases.

The Infrastructure for Mobility

As we described previously, Drupal's open framework allows rapidly developing and deploying content-centric applications, making it a perfect platform for assembling web applications¹. These applications include both desktop and mobile experiences.

Delivered as an open source platform, Drupal is developed in a modular fashion, through a community-wide development process. The central Drupal effort revolves around Drupal's core modules, while subsets of the community focus on additional contributed modules. This combination gives Web developers the flexibility to assemble only the Drupal modules that best meet their needs.

In the process, Drupal developers are continually innovating. When they encounter new situations, they can enhance an existing module, or create a new one, then contribute their innovations back to the Drupal community. These community-wide efforts allow Web developers to readily keep up with the rapid evolution of mobile devices, networks, and platform technologies.

Along with handling the content- and application-level services required to drive the user experience, Drupal lets Web developers:

- Abstract content delivery, and treat it separately from presentation. Content can remain wherever it's stored, so there's no need to manage it in multiple locations. Site builders can look at the business requirements, create a content type for each type of content that needs to be delivered, associate that type with unique descriptors (better known as metadata), and tell Drupal to create nodes pointing to each individual document belonging to each type
- Manage security and access rights associated with site actions. Developers can rely on application-level services to manage users, as well as define the roles and permissions for an enterprise application.
- Customize a site or application's look and feel. Drupal renders content through a series of themes, comprised of one or more cascading style sheet (CSS), and one or more PHP-based template. Themes can govern the entire site, a single node, or even a collection of nodes displayed within a device.

Taking advantage of these features allows a single Drupal-powered application to easily manage both a desktop experience, and various mobile experiences running on different devices (see Illustration 1).

¹ See Drupal and the Assembled Web



Source: VML

Illustration 1. Drupal renders content to themes via HTML and HTTP for a browser, or uses web services via XML or JSON for native mobile applications.

Delivering Mobile Experiences

As described in *Drupal and Mobile: A Resource Guide*, Drupal is a terrific platform for delivering content to devices of all sizes and capabilities. With Drupal, developers have multiple options on how best to deliver a mobile experience, either by extending the capabilities of a web site to a mobile browser, or by linking a native mobile application directly using web services.

Of course, there are design and functionality tradeoffs for each choice. Let's take a look at those now, in terms of the three layers involved in powering those experiences: the mobile presentation layer, the content infrastructure layer, and the application infrastructure layer.

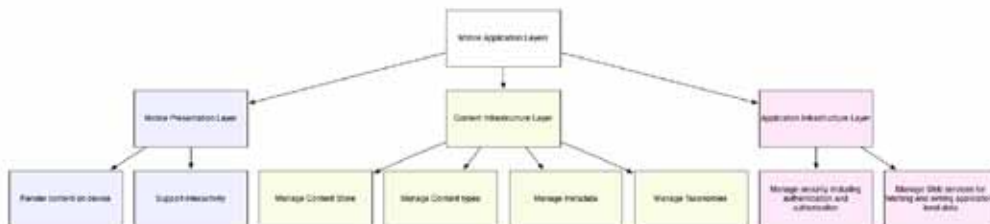


Illustration 2. The three layers of delivering mobile content, and what happens within each.

Delivering on the Mobile Web Browser

Rendering content to a mobile web browser involves designing and deploying the relevant themes across multiple devices, all with various form factors, screen sizes, and device operating systems. (Currently the most popular are iOS from Apple and Android from Google, but Blackberry from Research in Motion and Windows Mobile from Microsoft are also potential contenders.) Developers can choose among several approaches when building such sites.

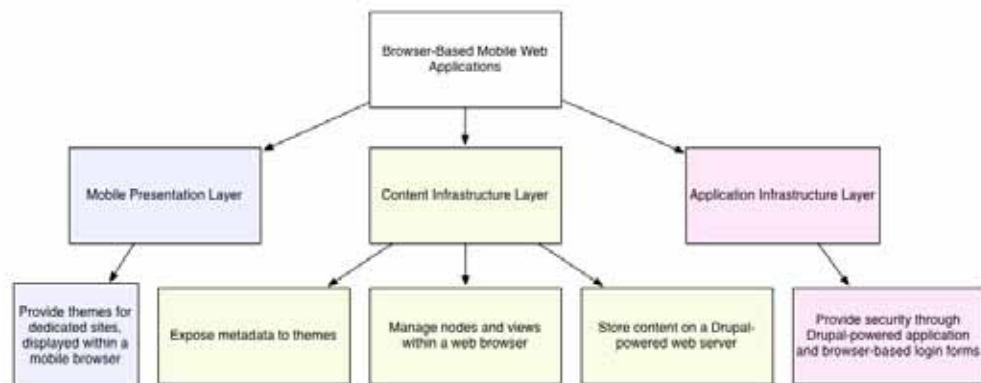


Illustration 3. The three layers of delivering content to mobile web browsers, and what happens within each.

Dedicated, Special Purpose Sites

Drupal can support dedicated sites that include themes for rendering content, on specific devices, and in different contexts.³ Thus, an organization publishing concurrently to desktop devices, smart phones, and tablets can maintain three Drupal-powered sites, each with a particular theme tailored to the capabilities of the device.

For example, the desktop theme can present all of the options on a single page with multiple links from headlines and pictures; the smart phone theme, designed for a smaller screen, can present the most popular options first, with headlines arranged in a simple list.

Third Party Conversion Tools

Drupal can be used in conjunction with third party tools that produce a mobile web application by extracting important sections from the desktop experience. Using such tools as Mobify and Velocitude, developers first identify the specific content elements within a full desktop site that need to be part of a mobile web application. They then select the content types appearing on desktop web pages and map them to a template designed for a mobile device.

Third party tools expedite development. Developers don't have to be schooled in the details of mobile web browser design, and can use the tool to support multiple families of devices. Such tools often allow non-technical editors to design or update the mobile web browser experience as part of their publishing process.

However, there are tradeoffs. Developers and editors are limited by the capabilities of the tool and sometimes cannot fully implement the mobile experience they desire.

² See <insert link>

³ See The Drupal Powered Enterprise <insert link> for a discussion of Drupal's multi-tenant capabilities using the Domain access method.

Responsive Design

Drupal can support “responsive design,” where a single presentation layer and theme automatically renders content on multiple devices. Responsive design uses innovative technologies, including HTML5 and jQuery Mobile, to manage the presentation and interactivity across different devices.

Thus, the formatting for text and images automatically adapts to different device screen sizes; keystrokes and mouse click controls are remapped to the swipes and taps of a touch screen. While the development effort is more complex, the promise of responsive design is easier deployment and greater scalability.

No matter which approach you choose, the end result is a web-based experience that runs within a mobile browser. Drupal provides the content infrastructure and the application-level services including security, database access, and storage, plus it maintains variations of a consistent experience across both desktop and mobile devices. How cool is that?

Delivering through Native Mobile Applications

Rendering content to a native mobile application is all about having Drupal manage the content- and application-level services to power the experience, and letting the application leverage the capabilities of the device itself (be it a smart phone or tablet). The mobile application handles the user experience and manages the context, in some cases sensing location, an image, a scan code, and other input events. Then Drupal responds to these events, providing the content from a shared source.

When creating native mobile applications, developers use a mobile application development platform for each target device. Some platforms popular with Drupal developers, such as PhoneGap (originally produced by Nitobi Software and acquired by Adobe Systems in October, 2011) and Titanium, are capable of supporting multiple mobile operating systems. Protocols and response formats important to these developers include XML-RPC, REST, and JSON. Through these, the native mobile application communicates with its Drupal-powered server.

The end result is a self-contained native application that exploits the capabilities of a mobile device, even when not connected to the network

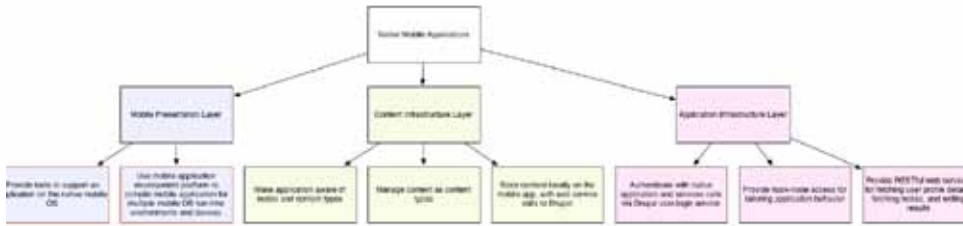


Illustration 4: The three layers of delivering content to mobile web browsers, and what happens within each.

Example Implementations

With the amount of choice and flexibility available, combined approaches are possible. Let's take a look at four distinct mobile experiences. In each case, the developers made different choices in terms of Drupal modules and more.

Web Publishing at The Alaska Dispatch

Established in 2008, The Alaska Dispatch (www.alaskadispatch.com) is an online news site dedicated to chasing down major news affecting the Last Frontier. The site's owners and publishers believe they're paving the way nationally for what will be the future of online journalism — locally produced stories backed by the resources of a professionally managed, profit-making website.

The Alaska Dispatch runs on Open Publish, a Drupal distribution from Phase2 Technology designed for enterprise-grade web publishing.⁴ Assembled with the help of developers at Medicurrent, a premier web development consultancy specializing in Drupal, The Alaska Dispatch publishes various types of content, including news stories, features, and blogs. As part of their publishing process, writers and editors categorize content using a taxonomy designed to target the major concerns of Alaskan readers. All of the content and taxonomy categories are managed and stored within the underlying Drupal repository.

With Open Publish, it's easy to support multiple themes for different experiences. To take advantage of this feature, Medicurrent developers separated the format-related markup (defined by content types) from the semantic-related markup (defined by taxonomy terms) using the Views module. When considering the mobile experience, they chose the jQuery Mobile Framework to implement a mobile web app for smart phones.

⁴ See Enterprise-Grade Web Publishing with Drupal <link>

As shown in Illustration 5, The Alaska Dispatch readers access the same content from the same server on their desktops and smart phones, optimized to the capabilities of their device. Content types and taxonomy terms drive the content they're shown, and the mobile web app organizes content by the same terms used for the desktop experience, categorizing the continued flow of new information in a format suitable for a smart phone rather than a full-screen browser.



Source: Mediacurrent

Illustration 5. By relying on different themes, readers access the same content on their desktops and smart phones, optimized to the capabilities of their devices, all from the same server.

As a result, readers can readily stay up-to-date with news and opinions, whether surfing from their desktop or connecting with their smart phones. This is the future of online journalism: being able to easily publish everywhere, with experiences designed to continually delight readers no matter how they're accessing the material.

Supporting an International Professional Community

As a liaison agency within the U.S. Department of Defense, the Defense Security Cooperation Agency (DSCA) fosters relationships with allies and friendly nations. In a desire to help security and defense professionals from around the world share information about security studies and security-related institutions, the DSCA launched GlobalNET. This web site provides a collaborative social networking environment in which international military students, alumni, faculty, partners, and other community members can find relevant and timely information, discuss topics of shared interest, support ad hoc relationships, and identify subject matter experts.

GlobalNET relies on Acquia Commons for its underlying social business software capabilities, and is hosted through Acquia's Managed Cloud service. VML, an interactive marketing agency with expertise in digital strategies, branding, and project management, spearheads the Drupal development efforts. They're using Drupal to maintain the site's access controls, roles, and permissions, as well as other elements of the application infrastructure layer, all within a protected and authenticated system. Commons provides the content infrastructure layer by:

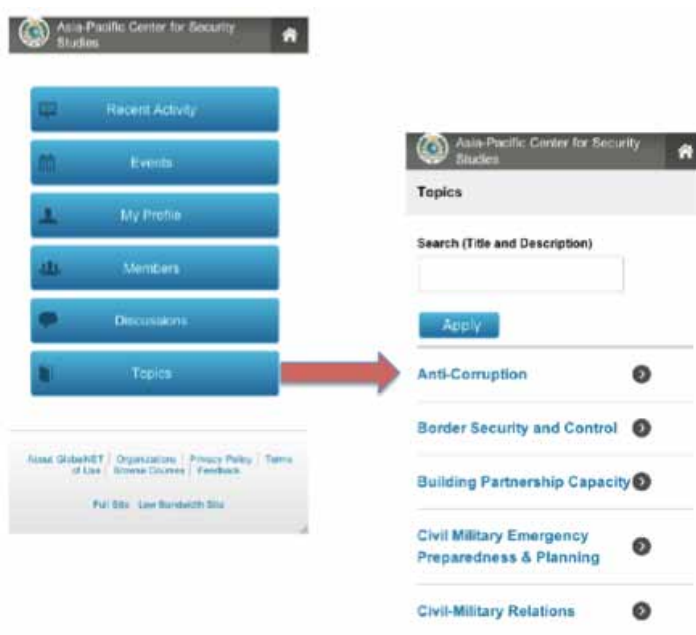
- Maintaining the operational context
- Defining the content categories
- Facilitating information sharing
- Building social networks

For example, each community members has an assigned role, and the assigned role gives them specific permissions to create and modify various content types. Since community members are frequently in the field and away from their desktops,. it was vital to detect and support a mobile experience. Fortunately, this is easy to do with Drupal, and GlobalNet offers a web mobile app, developed as a separate theme but fed by the same servers that power the desktop browser experience.

When on-the-go and relying on their smart phones, community members don't expect to contribute documents and reports to the community. Rather, they're attending meetings and engaged in operations such as doing program-related tasks. Reporting on those tasks and drafting documents is saved for when the tasks are complete.

For this reason, the mobile experience is designed for quick access to existing information. Thus, the mobile web app delivers only browsing and viewing capabilities. Creating events and adding reports to the online community requires the desktop experience.

The mobile experience is also optimized to focus on navigation and work context. With themes and the capabilities of the mobile presentation layer, Drupal makes it easy to hide (and reveal) different page elements and content types, based on roles, permissions, and work context. As shown in Illustration 6, key collaborative activities are presented in an easily viewed list with both drill-down and search options readily available. Using the mobile web app, community members tap through relevant categories and options to find the information and resources they need.



Source: VML

Illustration 6. A mobile web app includes drill down capabilities into Commons to support collaborative information sharing.

Dispatching Taxis at Green Cab

Green Cab (<http://www.greencabofmadison.com>), the newest taxicab company in Madison, Wisconsin, needed a dispatch system for their eco-friendly fleet of hybrid electric vehicles. Rather than relying on an expensive, proprietary application or an inefficient radio-based system, Green Cab decided on a different approach: to build a dispatch solution using open source, and have it communicate with Apple iPads, which it installed in its taxicabs. In the process, they upgraded from the old version of mobile communication (radio) to the new.

Starting development with less than two months before rolling out its taxicab service, Green Cab sought to rapidly implement the essential functions using an extensible platform, and make additional enhancements after the launch. With little room for learning as they went, they partnered with Promet Source, a web development firm with extensive Drupal expertise, and complementary experience in mobile application development.

The following features were determined to be critical for their new dispatch system's launch: two-way ride requests, zone-based fare calculations, and continual vehicle location updates. With these core features in mind, the dispatch system was based on a set of structured messages that allow dispatchers at a central location to:

- Save a ride request
- Schedule a ride request for a future time and date
- Calculate the zone-based ride costs
- Dispatch a taxi for pick up
- Allow drivers to receive and accept or decline requests
- Update drivers with new information as they fulfill requests, or cancel a request altogether
- Display the location of vehicles on a map

Developers proceeded to assemble the solution for Green Cab by adding key community modules to Drupal's core, as shown in Illustration 7. Particularly important modules include:

- The Open Layers module for integrating location information with Google Maps
- The Services module
- The Content Construction Kit
- The Views module

These community modules extend the capabilities of the content infrastructure and the application infrastructure layer of Drupal, by adding essential features and services for dispatching taxicabs.

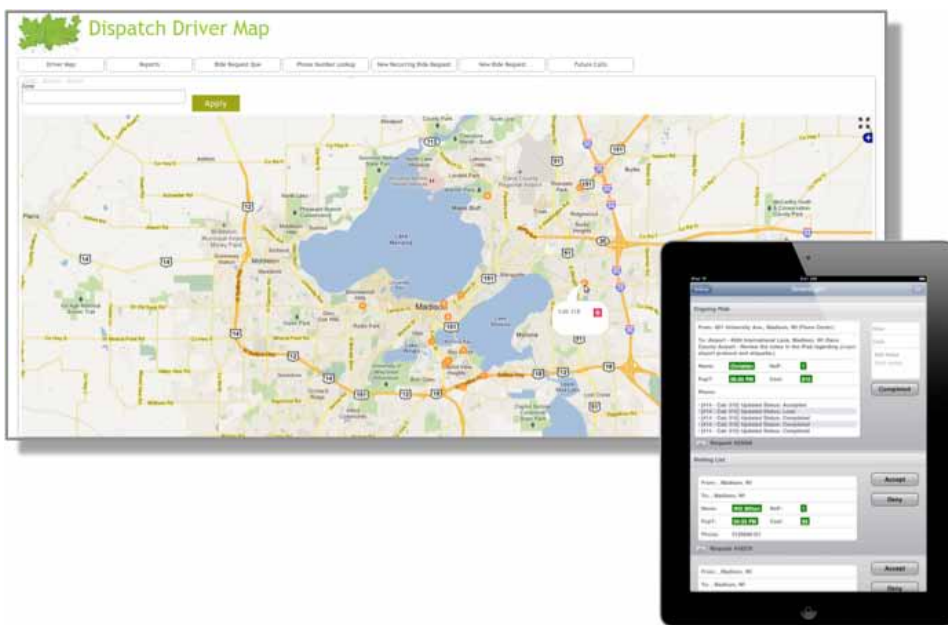


Source: Promet Source

Illustration 7. Drupal supports both a desktop experience for dispatchers, and a native mobile app for drivers using iPads.

Since dispatchers automatically communicate with drivers over a mobile network, the developers relied on a mobile application development platform, PhoneGap, to produce the iPad app.

The Drupal-powered dispatch system necessarily features two experiences — a desktop experience for dispatchers and a mobile experience for drivers. Under the hood, the dispatch system relies on RESTful services to exchange structured messages between a shared repository and the iPad app. Drupal defines and manages the content types for these structured messages. Both the experiences for dispatchers and drivers are tuned to their particular work tasks. (See Illustration 8.)



Source: Promet Source

Illustration 8. With a desktop web experience, dispatchers have easy access to a map charting the locations of all cabs. Drivers use an iPad app to respond to dispatchers' requests and pick up riders.

With Drupal, it is easy for Green Cab to enhance and extend these experiences — such as adding features for automatic driver routing and financial reporting — as well as developing a new one for customers. In the future, riders in Madison will be able to request pickups using their iPhone and Android devices, and to calculate their wait times and fares to reach their destinations. Developers simply need to define the additional content types and service requests managed by Drupal, and when necessary use PhoneGap to deliver the relevant functions for a native mobile apps running on smart phones.

As an open source platform, Drupal functions as Green Cab's content hub. Through choosing this solution, Green Cab builds its brand on Drupal by cost-effectively dispatching cabs and delivering the eco-friendly services that riders in Madison expect.

Broadcasting Mobile Radio Experiences

Radio broadcasters succeed by reaching committed audiences, no matter where they're located. In particular, the Internet lends itself to streaming, which extends a station's reach to a much broader audience. As of July, 2011, more than 45,000 stations use SHOUTcast to stream their digitized broadcasts, and with the explosion of mobile devices, listeners are not only connecting through their desktops. Broadcasters need to augment their digital programming by mobilizing their radio experiences.

Managing the digital connections, however, is the "fun" part. Enter Digital Frontiers Media (DFM) (<http://digitalfrontiersmedia.com/>), a multimedia production company that specializes in projects where technology, content, and interactivity intersect. DFM offers a services-oriented Drupal-powered solution for broadcasters to produce, provision and manage mobile radio experiences.

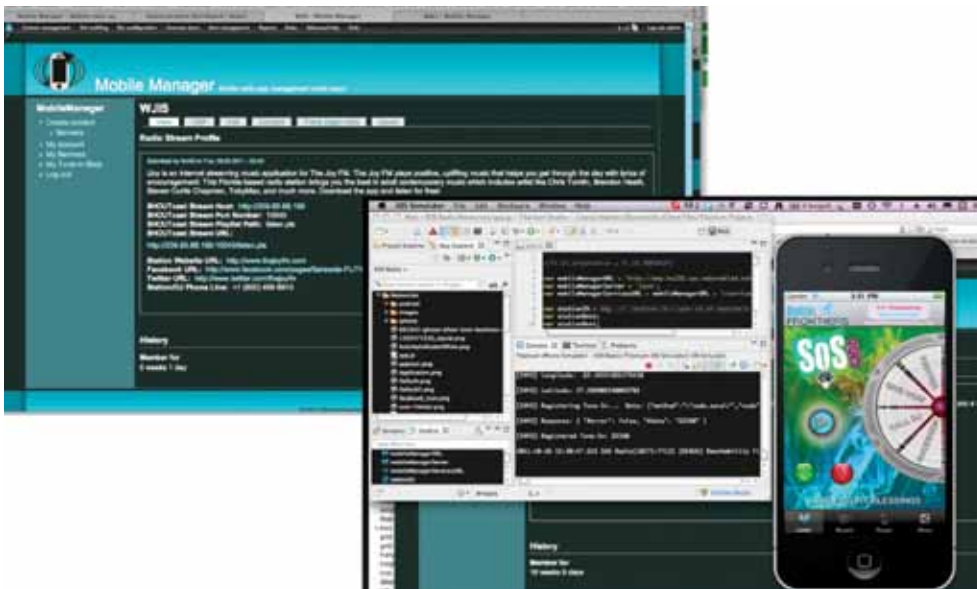
This turnkey solution includes:

- Capabilities for distributing station-specific native mobile applications on popular mobile devices.
- Facilities for station managers to manage their mobile experience within the context of their overall digital strategy.
- Features for supporting mobile advertising campaigns and tracking results, thus enabling stations to develop an additional revenue stream.

Drupal provides the content and application infrastructure layers, tuned to the needs of broadcasters. Drupal also integrates with Titanium as the mobile application development platform, producing station-specific mobile apps for iOS and Android devices.

Specifically, DFM relies on the Drupal core and several key community modules (including Content Profile, the Content Construction Kit, Views, Services, Location, and Advertisement) to assemble a flexible management platform for broadcasters. DFM maintains each radio station as a separate user profile. The station ID is the Drupal user ID.

DFM also defines a set of content types for radio stations, tuned to familiar broadcasting terms and activities. Each profile contains the URI for a radio station's SHOUTcast stream, together with its Twitter stream, Facebook page, DJ request line, and home web site, as shown in Illustration 9.



Source: Digital Frontiers Media

Illustration 9. *Drupal maintains the URIs for a station's SHOUTcast stream, Twitter stream, Facebook page, DJ request line, and home site. The smartphone app fetches this profile information from the Drupal server and streams the results to the device.*

DFM passes this profile information together with the station's logo and a mobile template to Titanium, and compiles the results into native mobile apps for iOS or Android devices. When a listener wants to listen to a mobile broadcast, the station's mobile app then fetches this profile information from the Drupal server, and streams the results to the device.

Finally, DFM help radio stations add a new revenue stream. Broadcasters can easily support mobile advertising in their apps. The mobile app itself contains the URI for fetching an ad from the Drupal-powered server. Program producers and marketing managers use Drupal to maintain either the mobile ad inventory, or a link to a digital advertising service from within their station profile. They can track listeners in terms of location and the length of time they're connected. All of which helps the station with their bottom line, and at a modest cost.

Profiting from the Drupal Difference

One consequence of the mobile revolution is that both business customers and consumers alike are enthralled with (and challenged by) new devices, all featuring new capabilities and based on innovative technologies. Features, functions, formats, and price are all factors that separate winners from losers, and understanding the fundamental differences between a smart phone, a tablet, and a cell phone are the key to survival.

So is a flexible solution. As you can see, Drupal excels at delivering both the content and application infrastructure for mobile experiences, whether you choose to go with mobile web apps, native mobile apps, or something in between. This powerful platform lets developers manage and augment everything from the desktop experience to mobile experience, letting them offer the users a solution that's best for the context they're working within.

With its content-centric infrastructure and its flexible, extensible platform services, Drupal delivers the ecosystem for mobile experiences that delight customers, and return tangible business results to the organizations that build them.

Drupal offers the ideal fuel for the mobile revolution.

About Acquia

Acquia empowers enterprises with the open-source social publishing system Drupal. Co-founded by Drupal's creator in 2007, Acquia helps customers manage their growth and scale their online properties with confidence. Acquia's products, cloud infrastructure, and support enable companies to realize the full power of Drupal while minimizing risk, as it's done for nearly 1,500 enterprise customers including Twitter, Al Jazeera, Turner, World Economic Forum, Stanford University, New York Senate and NPR. See who's using Drupal at showcase.acquia.com, and for more information please visit www.acquia.com or call 855.430.7700

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