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End-user Developers: A Critical Corporate Asset

According to two recent analyst reports, by 2014 a quarter of all new business applications will be created by end users. These “citizen developers” deserve to be recognized and catered to for two reasons. First, they can help reduce a global “IT debt” of backlogged projects and deferred maintenance. Second, they are crucial in helping organizations use technology to create and sustain competitive advantage.

End-user development is not new, but technical, social, and business trends require that organizations learn how to manage it as a corporate asset, not an afterthought. But what does this mean, and how can it be accomplished in the face of security, budget, governance, and standards issues?

In this article, we’ll look at:

- What “end-user developers” do — and why?
- What current trends are driving end-user development?
 - What kinds of end-user development tools are available, and how are they being used?
 - What kind of help do end-users need?
 - What are the implications for information professionals?
 - What end-user developers do — and why?

End-user developers (also called “citizen developers” or “power users”), create new business applications outside the scope of enterprise IT, either from scratch or by mixing and matching data and features from other applications. They do it for three reasons:

1. *Specialization.* Business units need features too specialized to fit into the enterprise IT agenda.
2. *Speed.* Features are needed in days or weeks instead of months or years.
3. *Customization.* Applications need fre-

quent changes due to user feedback and changing business conditions.

Most end-user development projects fall into what the Gartner Group calls the “systems of innovation” application category. These are leading edge, experimental, and custom applications that sometimes evolve into more formalized “systems of differentiation.” Applications in this category support the aspects of the business that are unique and drive its competitive advantage. In knowledge-intensive organizations, corresponding work processes include fund raising, business development, sales, research and development, and customer service. Software examples include Apple iTunes software, Google’s ranking algorithm, and Netflix’s recommendation system. The third category is “systems of record,” the core applications that keep the business running: enterprise resource planning, supply chain management, and customer resource management.

The value of the categories is to show that each has different lifecycle and management requirements. Applications in the innovation category may have a life span of a year, while those in the differentiation category may last several years and those in the record category are relatively static over time. Historically, IT departments have developed successful programs to manage systems of record and differentiation once the requirements have been established. Systems of innovation and their transition to the differentiation category require different skills and culture.

Trends driving end-user development

End-user development is not new. I was introduced to it in the mid-1970’s through a product called the MARK-IV report generator. I began developing applications using Filemaker database software in the mid-1980’s. Until recently, end-user development was typically limited to a single user or workgroup. Now, end users can build department, enterprise, and even public

applications.

The recent increase in the number and scope of end-user development projects is being driven by the following trends:

- *Consumer devices and services.*

Tech-savvy employees know that they can create a custom electronic workplace by mixing and matching services from an “app store.” These low cost, easy to use, and device-agnostic features raise expectations for workplace productivity tools.

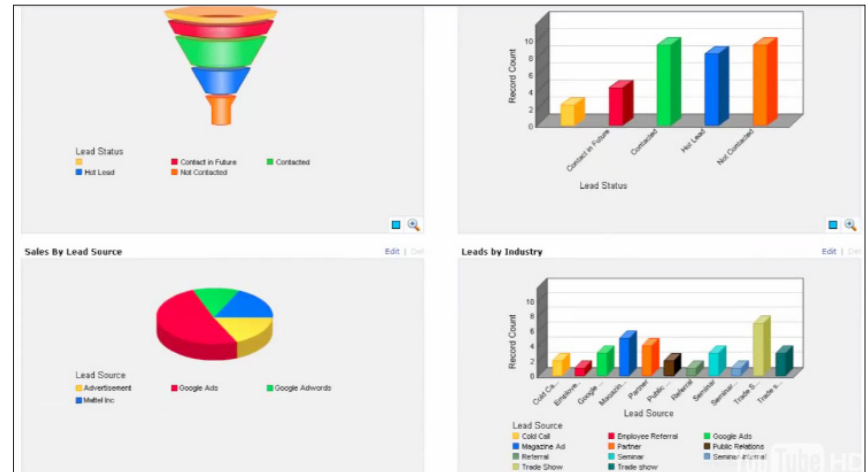
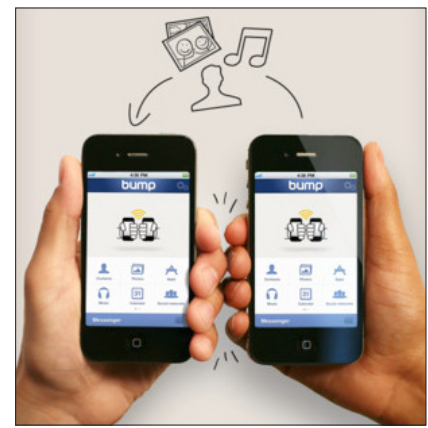
- *New technologies and standards.* Instead of waiting for the IT department to purchase, install, and integrate new software, users can access the same features using a Web browser and paying a subscription fee. The software “lives” in the Internet “cloud.” Backup, tech support, and network infrastructure are all handled by the service provider. It’s less costly and more convenient — unless there’s a network disruption.

- *Government initiatives.* The need to improve inter-agency cooperation, lower costs, and provide greater transparency have prompted governments at all levels to publish more data on the Internet. In response to government-sponsored contests and challenges, many independent developers have created useful applications, mashups, and data visualizations.

- *Evolving business models.* An aging and increasingly obese population plus an inefficient and inequitable health care delivery system is driving applications to reduce costs, encourage healthy behaviors, and increase the effectiveness of the whole system. An example is CardioTrainer, which allows users to track and record all their fitness activity. The app uses a global positioning system (GPS), pedometer, and a Polar heart rate monitor.

Similar forces are at work in commercial publishing. Faced with declining news revenue from print publications and their electronic derivatives, some publishers are publishing

Bump is a free application that lets two users transfer files by gently bumping their hands together. It works with the iPhone, Android phone, the iPod, and the iPad. As a bonus, the application lets users send free text messages, bypassing texting charges imposed by cell phone plans.



Zoho customer relationship manager. The service is free for up to 3 users but lacks all the bells and whistles available in the Enterprise edition, which costs \$25/user/month. Features include mail merge, sales lead management, customer case studies, product lists and orders, sales pipeline reports, data import and export, group chat, and integration with Microsoft Office, SharePoint, QuickBooks, and Google Apps

A screenshot of the FixMyStreet website for Oxfordshire County Council. The page has a header with navigation links: 'Report a problem', 'Your reports', 'All reports', 'Local alerts', and 'Help'. Below the header is a map of the council area with red and green markers indicating reported problems. A list of 'Recently fixed' issues is shown, including 'Footpath Subsidised', 'Overhanging trees on footpath in Stockham Park', 'Speed camera sign obstructing view of traffic - Dews Meadow Farm Shop', 'Speed sign knocked over: A338 north of Grove Bridge', 'Damaged distribution box (sent to both)', 'Failed repairs to pothole next to drain cover', 'Failed street light', 'Untaxed Dumped Vehicle', 'Street Lamp Broken', 'Failed Street lighting in the Peachcroft play area (at the back of Elizabeth avenue)', and 'Water leak in middle of road (sent to both)'. The page also includes a 'Wards of this council' section.

FixMyStreet, a UK site that allows citizens to report infrastructure problems and view their status (i.e. fixed or not). The site can be viewed with a Web browser and is also available for iPhone, Android, and Nokia cell phones. The cell phone version can detect the user’s location. Fixed problems are shown in green; pending issues are shown in red. You can mouse over a flag to view the problem. Similar sites exist in the U. S. and other countries.

data and end-user development widgets (application program interfaces). An example is Reuters (now Thomson Reuters), a news organization started in the mid 19th century. Developers use its OpenCalais service to create new applications built on Reuters' extensive back file of stories, its classification scheme, and text extraction software.

End-user development tools

End-user development tools fall into three overlapping categories:

- *Data visualization.* These tools format data in graphical displays that let users better understand the information and spot trends. Visualization tools go beyond the standard charts and graphs used in spreadsheets, displaying data as dials and gauges, geographic maps, and other ways. Tibco's Spotfire is a popular example.

- *Workflow, collaboration, and productivity.* These tools allow the user to automate segments of a business process, such as qualifying a sales lead, process an insurance claim, or compiling information about a customer. The cloud-based services I've looked at let users combine features from different services and data sources and tailor both the process and the display to their needs without any programming.

- *Reporting, tracking.* Reporting and tracking applications typically include some visualization, but this category also includes performance dashboards that combine a variety of current data that lets a manager get a quick overview of key performance indicators. Other types of reports include industry-specific applications (e.g. institutional research, insurance), survey analysis, and "big data" (e.g. retail data from barcodes, government statistics).

What kind of help do end-user developers need?

End-users need answers to the following questions:

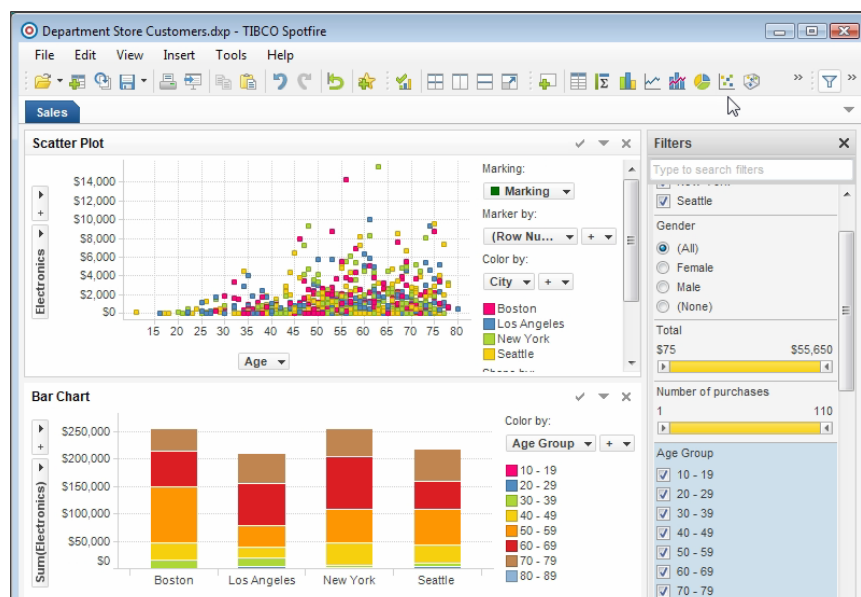
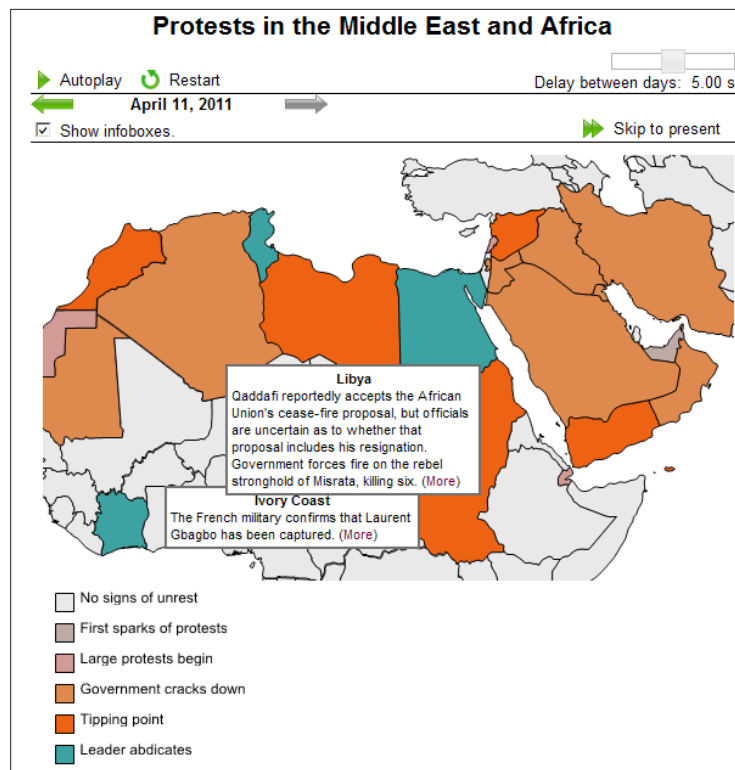
- *Defining the need.* How can end-user development tools help make the employee or team more productive?

Right: CardioTrainer, a mobile phone app that allows users to track and record all their fitness activity.



Below: Slate is a publication that uses the Reuters OpenCalais service to create interesting maps, such as this one showing protests in the Middle East and Africa. The map depicts the tides of protests and government retaliations day by day, beginning in Tunisia and ending with the unresolved conflict in Libya. You can click through the days one by one with the green arrows or choose "Autoplay."

Bottom: Tibco's Spotfire is a powerful data visualization tool with an easy-to-use drag-and-drop user interface. It comes with a desktop tool that saves data to the Internet cloud. Visualizations can be either public or private. Data can be imported and exported in a variety of formats: images, data, PowerPoint, PDF, and HTML.



- *Finding the tools.* What available tools are a good fit for the user's needs and ability level? Remember that some end-users are more tech savvy than others. Some simply enter data and tweak parameters. Others can do some light-weight programming. Neither want to sit through classes or videos that are either beyond their skill level or waste time on topics they already know about.

- *Reducing the learning curve.* End-user development tools do require some training. Most vendors offer helpful videos, but they are generic. Users need help figuring out how to adapt the tools to their own environment, especially when they need to access internal corporate databases and external information services.

- *Integrating data.* End users often find data anomalies, such as different date formats and text encoding schemes, multiple labels for the same data, and sometimes data that is just plain wrong. How should they handle these issues? Do they need special software widgets or connectors to get access to live data? Do they need new permissions?

- *Complying with policy.* Users want to know about access and publishing restrictions. Can they use their applications on mobile devices and workstations? Can they share them with customers and business partners? Do they need to conform to certain meta-data standards? Are there any applicable information lifecycle policies?

- *Examples and best practices.* What are some innovative ways that end-user development tools are being employed by similar industries, departments, or job functions? What are the user interface guidelines for interactive data visualizations?

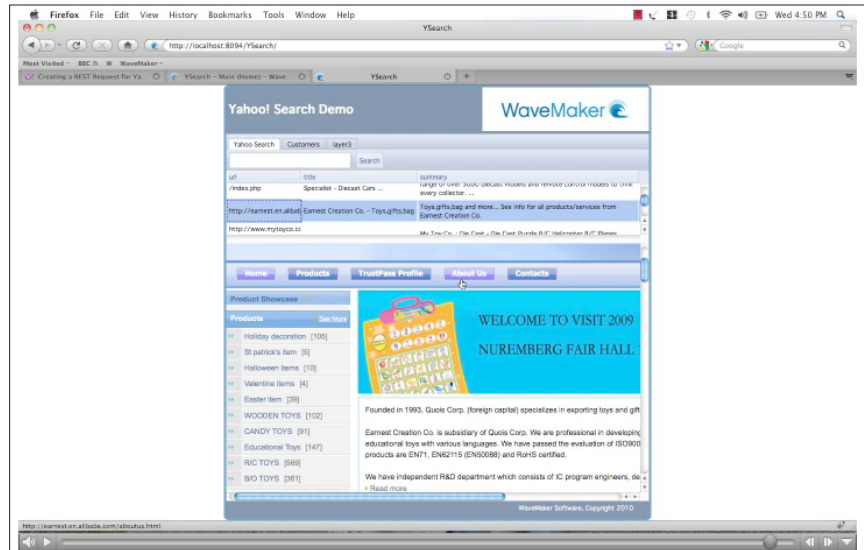
- *Expert assistance.* How do I find and work with a professional programmer who can supply the missing widget to complete my project? Often, this means looking outside the organization. How do you find a reliable contractor?

What are some tips to get the most out of the relationship? How to negotiate a contract and where to get funding?

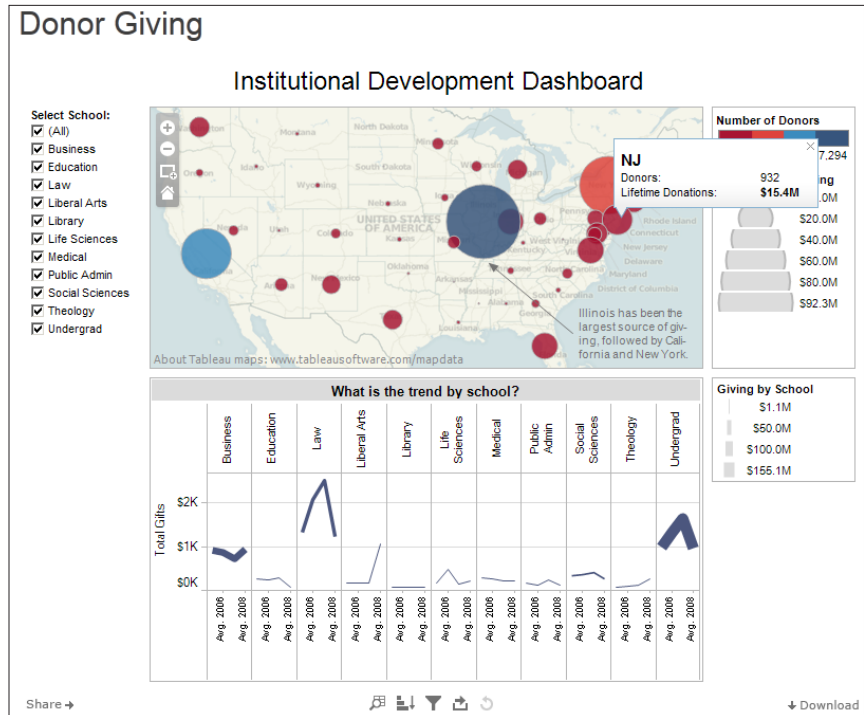
Implications for info pros

Finding and evaluating end-user development tools is not easy. One reason is that some vendors target their

wares to corporate IT, while others market to the end users themselves — college professors, scientists, legal and financial professionals, the sales force, and media people. For example, I was dismayed (but not surprised) to learn that none of the tools I reviewed for this article allow for the direct consumption



This example from VMware Wavemaker shows how a user can select a customer from an internal database, use the customer name to perform a Yahoo search, and display not only a list of Yahoo search results but a full page preview of a specific found item



A dashboard example from Tableau Software. This user-friendly program allows businesses to drag-and-drop large amounts of data onto a digital "canvas," creating graphs instantaneously

- Features include:
- easy drag-and-drop design;
 - drag-and-drop import from files, spreadsheets, databases or a data warehouse;
 - combining an Excel spreadsheet with live data from another source;
 - support for mobile devices.

of data from Filemaker, one of the most popular end-user development tools of all time but one that's largely ignored by corporate IT.

In fact, employees in mission-critical systems like finance, inventory control, and personnel management look to end-user development tools for the bells and whistles that vendors and IT are slow to deliver. At the same time, members of the corporate creative class are clamoring for more integration with external data and internal back-end systems. This presents IT-based info pros with a dilemma: follow the lead of their IT colleagues and focus on incremental improvements to enterprise systems or pay more attention to "systems of innovation." While the IT focus may be more closely aligned with current job roles, the innovation focus is critical to an organization's competitiveness and even survival. Ultimately, of course, it's a matter of balancing and integrating the two.

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