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Open Geospatial Systems: A Business Perspective

The global geographic information system (GIS) market is expected to reach $14.6 billion by 2020, (source: P&S Market Research)—and that is with the common acknowledgement that much of enterprise location data is not being fully utilized. While estimates about this under-utilization range from 50-80%, there is no debate about the under-utilization and its business ramifications. And when the tens of billions of Internet of Things (IoT) devices start generating their flood of data, the proportion and importance of spatial data will skyrocket.

GIS makes sense of location-aware data, turning it into usable insights in industries as diverse as energy, agriculture, transportation, manufacturing, finance, and all levels of government. The problem with existing GIS solutions, however, is that they are proprietary and were built on technology that is now outdated. These legacy GIS solutions are hard to scale, costly to use, and unable to keep pace with today's cloud-based, mobile, and containerized technologies.

The Alternative: Open-Source GIS Solutions

The alternative to proprietary GIS solutions it to take an open-source approach. Open-source software has gained popularity in recent years, as exemplified by operating systems such as Linux, container software such as Docker, and automation tools such as Ansible.

In general, the driving forces behind the move to open source include:

- Significant cost savings compared to the costly licensing models of proprietary systems
- Avoidance of single-vendor lock-in
- Scalability without penalty
- More ability to scrutinize the code base
- Greater interoperability with existing software and architectures

In the geospatial world, the open-source trend has taken root over the past decade, deployed as software sometimes called Free and Open Source Software for Geospatial, or FOSS4G. The U.S. Department of the Interior launched the Map Overlay and Statistical System (MOSS) in 1978, and the U.S. Army Corps of Engineers released the Geographic Resources Analysis Support System (GRASS) in 1982. These offerings were some of the earliest open source GIS solutions supporting both raster and vector data.

Lower total cost of ownership (TCO)

Companies new to 'open source' often associate the term with 'free', due to the lack of licensing costs. But that doesn't take into consideration the costs associated with transitioning to open-source environments, including supporting and maintaining the software. Still, these costs are typically a fraction of the licensing costs demanded by proprietary software. Moreover, because open-source models don't penalize you for scaling your architecture up or out, you don't need to fear growth in an open-source framework.

Beyond software license costs, a typical proprietary software environment might also contain additional, sometimes hidden, costs. While initially these costs may be nominal, they can add up quickly—increasing the total cost of ownership (TCO) in an entirely proprietary solution.

It's important to note that unsupported open-source software also carries hidden costs, such as the expenses involved in supporting new releases, performing bug fixes, establishing interoperability with other enterprise systems, and implementing custom functionality. Figure 2 shows the potential costs beyond licensing for proprietary and unsupported open-source approaches.

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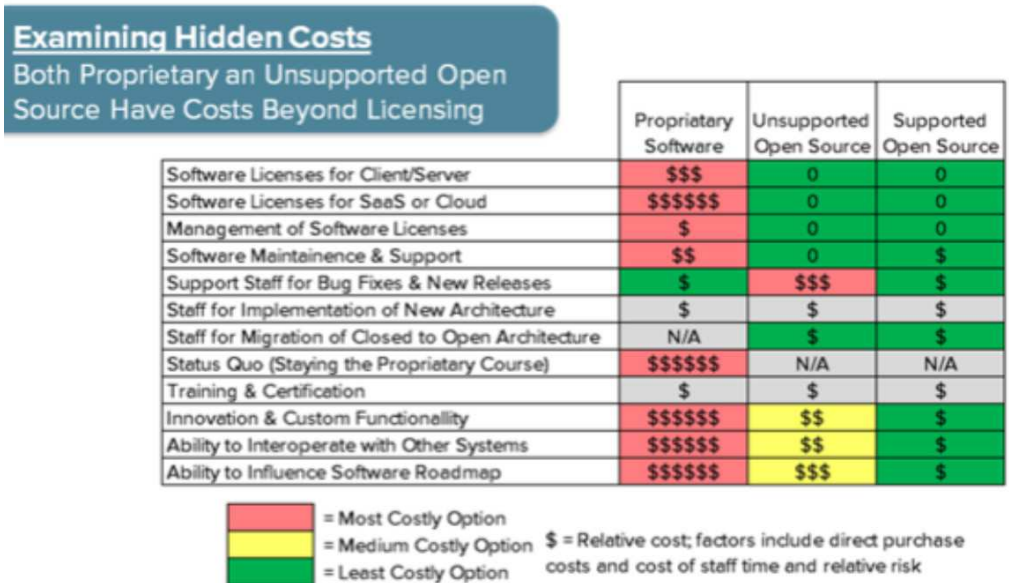

Figure 2: Consider the hidden costs in both proprietary and unsupported open-source software implementations.

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Better pricing and better-skilled staff

Single-vendor strategies have the technical advantages of simplicity and homogeneity, but they are not without substantial drawbacks. For one thing, your development roadmaps are contingent on the vendor roadmap. You have limited ability to influence change in the software, forcing you to wait for changes added at the vendor's leisure, 'in the next release.'

Using multiple vendors, which is possible when you devote at least some of your architecture to open source, enables greater flexibility. That's because each vendor has to maintain technological parity to avoid losing business on feature/performance grounds.

In addition, relying on a single vendor limits negotiating power. If no alternative technology is available, a single vendor fears no blowback from maintaining high prices. With multiple open-source vendors, each vendor has incentives to provide competitive pricing. And in a hybrid environment, those incentives can also extend to vendors offering proprietary solutions.

Integrators of single-vendor architectures usually wind up with a constrained skillset, making the move to alternative technologies difficult. Single-vendor strategies become self-fulfilling over time. They start as a choice, but quickly turn into a straitjacket. Architectures with multiple vendors, including open-source vendors, require that your staff masters a mix of skills, which gives your organization the agility to mix and match technologies and to evolve to updated technologies.

Compatibility with modern IT

Open-source technology continues to proliferate in modern IT enterprises, enabling virtualized infrastructure, containerization, and software automation. Open-source geospatial software is specifically designed to operate in these modern architectures.

Many open-source geospatial software packages enable cross-platform support. Boundless Desktop, for example, is built upon the Qt framework. This allows the same core codebase to be compiled for different operating systems. As a result, Boundless Desktop can be installed on Windows and OS X, can be complied for Linux, and can even be extended to mobile operating systems.

Fortune magazine predicted that open source will become the standard for infrastructure software in 2016, with virtual container software such as Docker and OpenShift continuing to replace 'bare metal' server hardware. With this in mind, open-source geospatial software, such as Boundless Suite, is distributed via modern software distribution methods such as:

- Packaged as a stand-alone virtual machine in Open Virtualization Format (OVF)
- Packaged as preconfigured containers in Docker and Pivotal Cloud Foundry format (OpenShift format coming soon)
- Distributed via RPM Package Manager (RPM)

These distribution methods enable open-source geospatial software to be installed and integrated into modern IT architectures with less work. Furthermore, these distribution packages can be digitally signed and scanned quickly by Information Assurance (IA) personnel within an organization, shortening the time from integration to operation.

Finally, DevOps practices continue to become more common in IT enterprises. DevOps automates the process of software delivery and infrastructure changes, establishing a culture and environment where building, testing, and releasing software can happen rapidly, frequently, and more reliably.

To support these DevOps environments, open-source geospatial software is designed to work with automation tools such as Ansible, Chef, and Puppet. These tools enable an organization to quickly scale an architecture to support increased load or high availability.

Project persistence and resilience

Perhaps the greatest benefit of leveraging open source is the resilience and continuity it builds within your organization. Developing projects in the open provides visibility to each member of your organization. So if an employee leaves the organization, another should be able to pick up where the departed employee left off. This flexibility helps to ensure that your architecture is not reliant on any one company, technology, or developer to keep an operational project alive

Another benefit of developing with open source is the sheer number of people who can review, verify, and enhance the resulting solution. More eyes looking at source code means a better chance of finding and fixing potential bugs before they happen—plus easier integration with other departments or groups within your organization. And an increase in visibility into a project typically correlates to an increase in adoption by the eventual users.

How a Next-Generation GIS Can Deliver Business Benefits

More data is being generated than ever before, and much of it is location-based. You need to be able to process and make sense of this data, quickly and with minimal hassle, to fuel important business processes.

Here are a few examples of how geospatial data can be put to use in a wide variety of situations, and why an open-source approach adds extra benefits.

Precision agriculture

Food shortage is a serious global issue. Precision agriculture is an approach to farming designed to find smarter, better ways to produce better crop yield using fewer resources. Precision agriculture relies on GPS data to help farmers boost their efficiency and yields by making better-informed decisions on everything from seed choice and crop location, to when and how much to water and fertilize.

An open-source approach to GIS enables farmers integrate location-based data into their decision-making cycle without the risk of unpredictable software costs. Cost savings can be turned into better equipment, purchasing more pest resilient seed, or even irrigation costs. Better technology leads to smarter analysis, and ultimately innovative ways to feed the world.

Site selection

Selecting the best site for a brick-and-mortar facility is a complex process, whether the facility is a hospital or medical office, a retail clothing or home goods store, or a financial services or law office. Similarly, maybe the site being selected is for marketing purposes, such as what region or neighborhood to run ads or promotions.

In each case, site selection means overlaying a variety of different sets of information about the people and the location itself. What are the ages, incomes, occupations, hobbies, and media habits of the people in a given location? What pertinent regulations and laws apply? Does the selection of the site require a consideration of weather, traffic, or public transit patterns?

A GIS can be enormously helpful in gathering, processing, and making sense of the layers of data that contribute to a good decision on site selection. Choosing an open-source GIS makes it easier and more affordable to bring many different data sources into the picture, and to scale the IT infrastructure both up and out as required. By being able to explore all the options, and to overlay all the data that might be useful, an open-source GIS can help organizations make the best possible site-selection decision.

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Transportation logistics

Moving people and things from point A to point B presents enormous logistical challenges. Consider a municipal government that wants to establish optimal bus and light rail routes, a hospital that wants to provide its patients with the best and fastest route to their facilities at a particular moment, an oil company that wants to plan its pipeline locations, or a manufacturer that wants to ship its products as efficiently and cost-effectively as possible. In each case, analyzing complex location-based information is crucial.

With proprietary geospatial software, subscriptions determine not only how many data sources can be considered, but also how much it will cost to determine optimal routing. In contrast, open-source geospatial software allows enterprises, state and local governments, and transportation and healthcare organizations to leverage location-based data without incurring per-user, per-login, or per-CPU cycle costs. They are not penalized for increasing their number of users or doing as much analytics as they require to determine the ideal routing.

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Conclusion

Gaining the business benefits of GIS solutions is far easier to achieve if your organization is not locked into an entirely proprietary geospatial software approach. Using open-source geospatial software means you can afford to provide more of your location-aware users with GIS tools and to scale the use of those tools as you increase your user base or processing demands. It also makes your finances more predictable: you switch from the unknown costs of subscription-based proprietary models to the fixed costs of open source.

Open-source software works more efficiently in today's modern IT environments, where elastic cloud infrastructures, containers, and mobile technologies are the norm. Combined with robust commercial support, training and consulting services, you have all the resources you need to be successful right out of the gate.

To learn more about how to get the most from open source GIS, contact Boundless today. Let Boundless help you break free from the constraints of proprietary GIS while avoiding the hurdles that traditionally accompany a move to open source.

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Boundless Spatial Inc.
222 Broadway, 19th Floor | New York, NY 10038