[PD-02-012] Commercialization of GIS Applications

Abstract

The commercialization of GIS applications refers to the process of bringing a software solution to market. The process involves three broad categories of tasks: identifying a problem or aspect of a problem that a GIS application can solve or address; designing and creating a GIS application to address the problem; and developing and executing a marketing plan to reach those with the problem, the potential users. Ideally these categories would be addressed in this order, but in practice, aspects of each are likely to be addressed and iterated throughout the commercialization process.

Bringing a GIS application to market requires expertise in 1) the target industry or market (e.g., forestry); 2) software development (how to design and build a product); 3) law (licenses, contracts, taxes); and 4) business (how to fund development, guide the process, evaluate success, marketing). A single individual or organization, referred to as the provider in this discussion, may lead or execute all three categories of tasks, or engage third parties when specific expertise is required.

Keywords: application, B2B, B2C, commercialization, license, marketing

Author & citation

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Explanation

1. Definitions
2. GIS Applications Solve Problems
3. Developing a GIS Application
4. Creating and Executing a Marketing Plan

1. **Definitions**

marketing: the creation of relationships with the goal of sparking demand for a product or service

2. **GIS Applications Solve Problems**

Commercial GIS software is designed to solve problems. In business language, the product is said to reduce or alleviate the user's pain points (Waldo, 2016). The pain point may be a new goal the user wants to achieve, but cannot with existing systems. For example, a conservation group wants to relocate burrowing owls but has no way to determine the

closest similar habitat to the owls' current threatened location. Alternatively, the pain point may be something that can be done now, but that is overly difficult, time consuming or expensive. An auto parts store staffer may be able to create a report listing customers within a 30 minute drive who spent more than $100 in the past three months to help determine the store's reach, but it takes one person two full days to do so.

2.1 Identifying Pain Points

There are two fundamental ways to identify pain points. The provider can draw on its own expertise or it can do research. In-house expertise involves reviewing pain points from work with previous clients and from staff's experience in the industry. Research may be in the target industry, or the provider can look to related or less related industries to find pain points that may also appear in the target industry. The provider will want to confirm the problem exists in the real world before moving too far into commercialization. Further, if one or more GIS applications already exists that address the pain point, the provider will want to identify how its application will be better or different. Will the new GIS application being considered be cheaper, faster, more complete, easier to implement and use, or run on different hardware?

2.2 Horizontal and Vertical Applications

GIS applications can be divided into two categories: horizontal and vertical.

Horizontal GIS applications can be used across many different industries for many different purposes. A horizontal GIS application, that enables quick layouts of maps, for example, might be useful to users in agriculture, town planning and pipeline management. CARTO's tools and platforms can be used as is, or customized for use in banking, retail, healthcare and pharmaceuticals. Esri's ArcGIS has a similarly wide range of applications.

Vertical GIS applications are built to address the needs of specific industries. A vertical GIS application might be crafted to meet the specific needs of facility managers in the healthcare industry. Caliper's Maptitude for Redistricting is designed specifically to address political redistricting. Trimble's Farmer software is designed specifically for use in agriculture.

2.3 Business to Business and Business to Consumer Applications

Business to business (B2B) GIS applications are specifically designed for businesses and organizations such as city governments or national mapping agencies, non-profit conservation programs, retail chains and healthcare networks. These applications tend to be designed for enterprises and are considered professional level software. B2B GIS applications may be delivered customized or integrated with enterprise systems such as Enterprise Resource Planning (ERP) solutions like SAP or Customer Relationship Management (CRM) solutions like Salesforce. For example, a water utility may manage its business (cash, materials, work orders, payroll, etc.) using an ERP software solution and integrate it with a GIS application to better leverage location information. Combining accurate, up-to-date information on the supply and location of assets (trucks, pipes, etc.) with those of field workers and trouble calls can increase efficiency and reliability, lower costs and increase revenue. A craft beer brewer may manage its interactions with existing and potential customers using CRM software and integrate it with a GIS application to create routes for efficient sales calls and timely delivery of products to customers.

These offerings can support large numbers of users and often have significant costs beyond those of the software (implementation, training, support). Business focused applications are likely to leverage large amounts of data, with much of it provided by the user organization.

The vast majority of GIS software to date has been developed for businesses.

Business to consumer (B2C) GIS applications are specifically designed for individual “home users” and smaller business and tend to be package products. They aim to fulfill basic mapping needs such as planning a route or creating a sales territory map. These products tend to be less technical, less expensive and have fewer features and customization options than their B2B counterparts. B2C software often includes basic datasets such as road networks and base maps.

The growth of cloud-based GIS is blurring the B2B and B2C categories. It’s common for providers to offer the same product to both businesses and consumers. There may be free or low-cost access for individuals (consumers) as well as enterprise access for organizations (businesses). Google Maps, which some identify as a mapping platform and others as a GIS, is one of the best known commercial products that spans these two categories.

2.4 GIS Software Delivery Options

Today’s software provider can deliver end-user software that’s installed on a computer (desktop software), software that’s used from a local server (sometimes called an on premise server), software that’s used from a cloud-based server (referred to as Software as A Service, abbreviated SAAS) or some combination of these. (Gardner, 2017)

The software provider can also deliver software tools and code (SDKs, APIs, software libraries) from which other developers can build custom GIS applications. Such tools may be marketed to organizations to use in-house to build solutions or to third-parties to use to build a solution for their client organizations.

Selecting the appropriate delivery method depends on the information gathered about the potential customers.

2.5 Identifying Potential Users

Identifying potential users involves exploring who has the problem or pain point. Are they individuals or organizations or both? Are they in a particular industry? Do individuals or organizations in other industries have similar problems or pain points? If so, that could expand the customer base. Do the organizations need to be a certain size to have the problem? Are the potential users in a particular geography? Do they speak a particular language? Do they tend use a particular type of hardware or software? How much money might be in the budget to address the pain points? How do the potential users prefer to pay for their software? Do they prefer to buy it outright, rent it on a project by project basis or commit to an annual subscription? The more information the provider has about its potential users’ pain points and existing workflows, the easier it is to define a product to address the pain points and create long-lasting relationships.

3. **Developing a GIS Application**

Developing a GIS application follows the same path as other software projects. These are outlined here and further detailed in specific topics in the Body of Knowledge.

3.1 Software Requirements Specification

With the problem to be solved in hand, the potential customers identified and delivery method selected, the provider is ready to negotiate the details of what the GIS application will do. This is a negotiation because a variety of stakeholders may have input: potential users, partners, investors and marketing staff among others. The negotiation process will be different depending on the nature of the product (a B2B custom solution, an off the shelf business solution, a consumer mobile phone app, etc.) and the developers involved (the provider, consultants, integrators or third-parties) but the target document is the same. The completed software requirements specification (SRS) will describe the application to be developed.

3.2 Design

Software design is the planning needed before programming begins. This effort addresses how the software will meet the requirements in the SRS.

3.3 Testing

The application programmers use the design documents to guide coding. The result is a GIS application software candidate. Testing explores the quality of that software candidate. It includes finding bugs and verifying that the software candidate is fit for use. After one more iterations of updates from the application programmers and further testing by the testing team, a software candidate will be approved. That final approval confirms that the product meets the goals detailed in the software requirements specification.

3.4 Implementation

Implementation refers to integrating the GIS application into the consumer or business workflow. A consumer is most likely to perform the implementation independently. A business user will likely engage the software provider or one or more third parties to plan the installation of software, its integration with existing software, and train the end-users.

3.5 Verification & Validation

Verification and validation are independent procedures that are used together for confirm that the GIS application meets the user needs. Validation may be required as part of a business customer’s acceptance of the product.

3.6 Deployment

Software deployment refers to all of the activities that make the GIS application available for use. Again, a consumer or small business may perform this step independently, while a business will require a rollout, training and other steps.

3.7 Licensing

A software license is a legal document governing the use or redistribution of software. In general GIS software is offered under a proprietary license (opportunity to use software

without access to source code following terms and conditions such as the number of computers on which it may be run or the time period) or an open source license (opportunity to use the software with access to the source code and freedom to change and share that source code following terms and conditions related to preserving the provenance and openness of the software). The provider will need to decide not only which of these broad categories of license makes sense for the new application, but also whether to use an existing license or a custom one.

Both proprietary and open source licenses (Open Source Initiative, n.d.) are used to govern the use and distribution of commercial software. Further, while proprietary licenses may require payment of a fee or not, open source software, by definition, does not require a fee be paid. Business models built around commercial proprietary and open source software include assessing fees for hosting services, customization, training, packaging and related products and services.

If more than one organization is involved in producing the final product, the participants (the lead organization and any consultants, integrators and others) will need to determine intellectual property (IP) ownership, if any. These details would be included in the license.

4. **Creating and Executing a Marketing Plan**

A marketing plan outlines the marketing efforts for a GIS application. It describes activities designed to accomplish specific business objectives within a set time frame. For example, the goal may be to sell 1000 licenses within six months of release or to drive 2000 downloads of freely available software before the annual user conference or to capture 15% of the current market. A marketing plan helps a business to decide on the best use of its resources to achieve objectives. Creating and executing GIS application marketing follows the same path as creating one for other software offerings. Some of the common features and activities are noted below.

4.1 State of the Market

Before bringing the product to market, the provider needs to survey the landscape. Note that the situation may change significantly between when the product is conceived and when it is finally ready for release.

The provider needs to gather information including:

- What is the size of the overall market (number of potential users)?
- Who are the other providers of similar applications in the marketplace?
- What is their market share and price point?
- What are the strengths and weaknesses of their offerings?

This information, combined with details about the new product can help drive appropriate marketing. A SWOT analysis (Queensland Government, 2018) explores strengths, weaknesses, opportunities and threats and can help illuminate where the new offering fits in the existing marketplace.

4.2 Marketing Mix

The marketing mix is the combination of factors the provider can control that help guide customers to the product. The two common sets of principles that make up the mix are the four P's and the seven P's. (Professional Academy, n.d.)

Four Ps

- Product – the GIS application
- Price – how much the application costs
- Place – where it will be sold (wholesale, retail, Internet, etc.)
- Promotion – how potential users will hear about the product (communications, advertising, events)

Seven Ps – This version includes the Four P's above plus:

- People – both those who are in customer organizations and those in the provider organization
- Process – how the product will be delivered and the continuing relationship managed
- Physical Evidence – the environment where the product is sold/delivered, but also branding to remind the user of the provider/product

4.3 Pricing

Determining how to price GIS applications (if proprietary) or related services (if proprietary or open source) is not an exact science. The goal is to ensure that the product and/or service is priced low enough that those who need it can purchase it but not so low that the provider can't meet its goals. Determining an appropriate pricing plan (Sequoia, n.d.) includes information about both how much it costs the provider to build and support the product as well as the potential customers' perception of the product's value.

4.4 Delivery

In the past, before the 1990s, most desktop GIS applications, and many other software applications, were delivered on media (tape, disks, CDs, DVDs) in boxes. Today most GIS software destined to be installed on a desktop or mobile device is packaged to be downloaded either from a software provider's website or an app store. More and more GIS software is becoming available as a service, such that a browser or a small software installation is required before the user accesses the software via credentials.

4.5 Sales

Sales is the fulfillment of demand created by marketing efforts. In some cases, sales can be fully managed online. The customer can find all the software application details online (hardware and software requirements, features, reviews, price, FAQs, interactive chat to answer specific questions) and make the purchase there and then. Consumers and small businesses are often happy to make such purchases online for lower priced products. As a user organization's size, the complexity of the application, the price of the software and/or implementation rise, the more likely sales staff will need to spend considerable time (months to years) with potential customers to close a sale.

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