APPENDIX J:
BUSINESS CASE ANALYSIS

MOBILE APPLICATION FOR GEOLOCATION OF IMAGERY AND COLLABORATION

MAGIC

Prepared for:
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Prepared By:
MAGIC Team
Jeff Carpenter
Thomas Haas
Dawin Wright
Erika Rojas Mejia

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Course Professor: Dr. Kathryn Laskey
Project Sponsor: Kurt Rogers, Integrity Applications Inc.

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1.0 Introduction

This analysis examines the economic feasibility of developing and marketing the Mobile Application for Geolocation of Imagery and Collaboration (MAGIC) and identifies the implementation path that will provide the greatest projected return on investment (ROI). MAGIC is an application that will be used on current and future smartphones and will provide the capability to geolocate objects within multiple images taken by smartphones. This analysis will look at the costs, benefits, risks, and issues associated with the various roadmaps available for developing and marketing the application to the public.

Each roadmap alternative is evaluated with the goal of high profitability, low cost, and least degree of complexity in mind. During the early design stages, brainstorming sessions were conducted to identify the primary users of the application. These users would ultimately drive the implementation efforts as wells as the marketing campaign. Over several brainstorming activities, 2 primary user groups were selected as ideal candidates. The first user group is that of the casual user. This includes the tourist and the occasional social networker. The second user group is that of the emergency responder, which includes all state, national, and international agencies that perform first response and rescue missions. In addition to the target audience, the initial operating system was included in the analysis to further solidify the most profitable implementation solution.

1.1 Scope

The scope of this analysis includes a high level study of the each viable implementation alternative with the goal to minimize cost and complexity while maximizing profitability. With the description of a rough order of magnitude and potential return on investment for each alternative, this effort will assist in reducing risk in future implementation efforts while providing the basis for a confident investment decision.

Initially, research analysis included the identified primary user groups in combination with the major wireless network providers in the United States. This included the Blackberry, Windows, and Palm OS along with Apple iOS and the Android OS. But after further analysis, two primary operating systems were selected for additional consideration. The results describe high level cost estimates as well as possible return on investment predictions for each alternative with risks and benefits providing the driving force.

The first part of this document describes the results from the market research. These results were used to identify some important assumptions and constraints having major influence on the analysis and its conclusions. The second part of the document describes each option as well as the benefits, risks, and issues associated with each one as the initial implementation approach. The third part of this document provides a rough order of magnitude (ROM) for total life cycle costs of the project. It also gives a theoretical prediction of return on investment (ROI) given some additional cost mitigation measures. The last part summarizes the key information in this document and highlights those elements that should be most relevant for the sponsor, IAI, to make a final investment decision. It also provides a recommended long term implementation approach along with the rationale for the recommendation.

1.2 Results Summary

The cost of each implementation alternative has been measured against the risks, benefits, issues and potential ROI. The results show that with more value placed on simplicity, targeting the casual user on the Android Operating System would provide the highest overall return on investment and consequently set up the strongest foundation for pursuing an application designed specifically for emergency responders.

2.0 Market Research

2.1 Smartphone Usage

The popularity of smartphones continues to rise with the introduction of each new iPhone, Blackberry, or Android device. In November 2010, among those who acquired a new cellphone in the previous six months, 41 percent opted for a smartphone over a standard feature phone, up from 35 percent from the previous quarter (Nielsen , 2010). According the same report, there were roughly 228 million US mobile phone users over the age of 13 of which 31% had smartphones (Nielsen , 2010). This equates to a total of over 70 million smartphone users in the United States alone. Taking the analysis a step further, approximately 77% of the global population were mobile phone users in 2010. That is roughly 5.3 billion people. In the countries with the most growth potential like China, India, and the US, the smartphone penetration is less than 15%, which again suggests opportunities for expansion and growth (dotMobi, 2011). Almost one in five global mobile subscribers have access to fast mobile Internet (3G or better) services and the number of 3G handsets is growing quickly. According to a report from mobiThinking, this base is expected to exceed 5 billion by 2012(dotMobi, 2011).

2.2 Mobile Operating System Battle

Figure 1 shows the total market share as well as the smartphone market share in October of 2010.

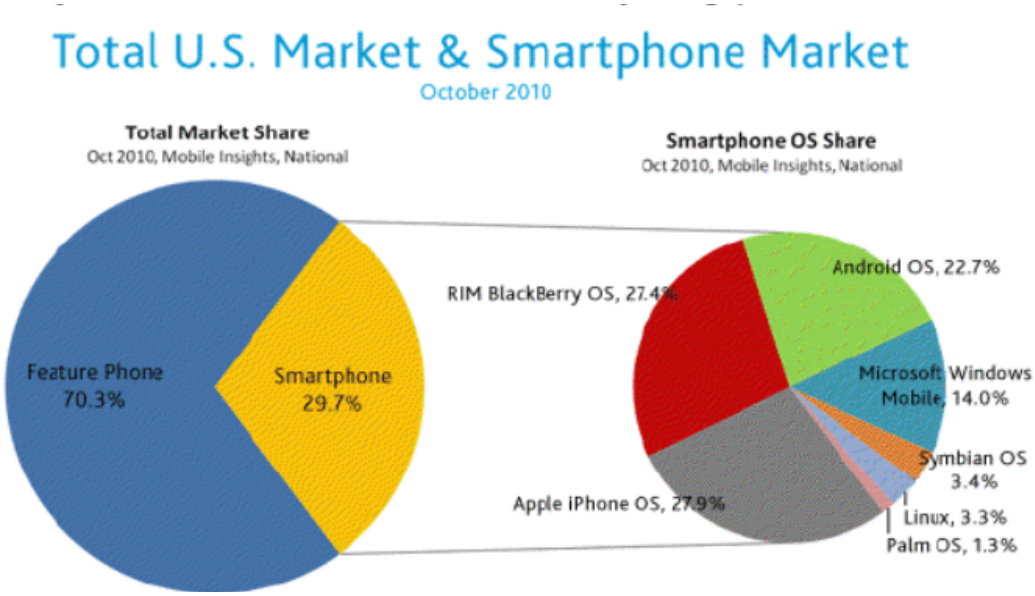

Figure 1: Total US Market and Smartphone Market - 2010

To illustrate the continuous growth, but more importantly, identify the leaders of the industry, compare the above figure with a March 2011 chart showing market share of recent purchases as well as total US market share (Nielsen, 2011).

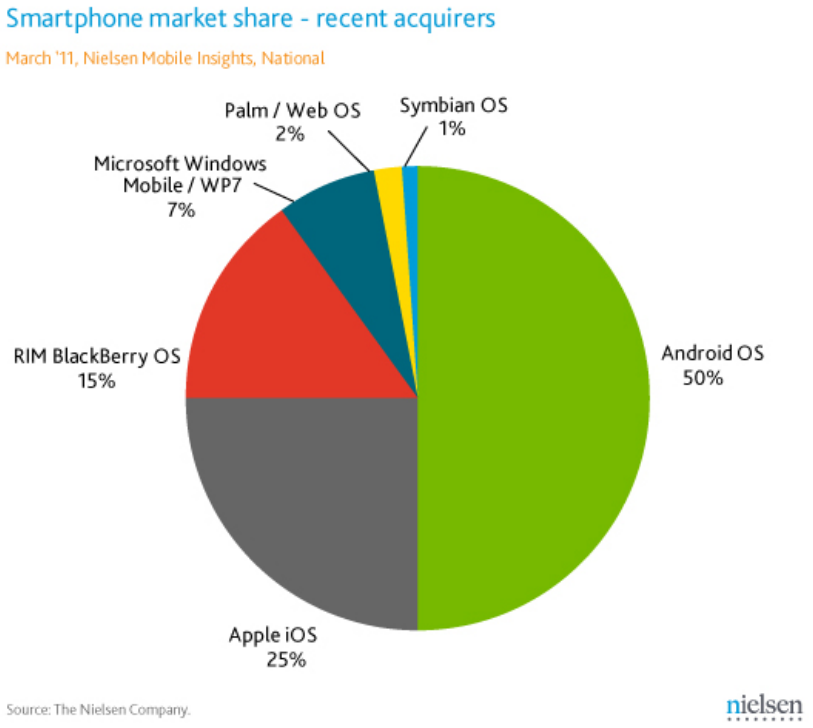

Figure 2: Smartphone Market Share - Recent Acquirers

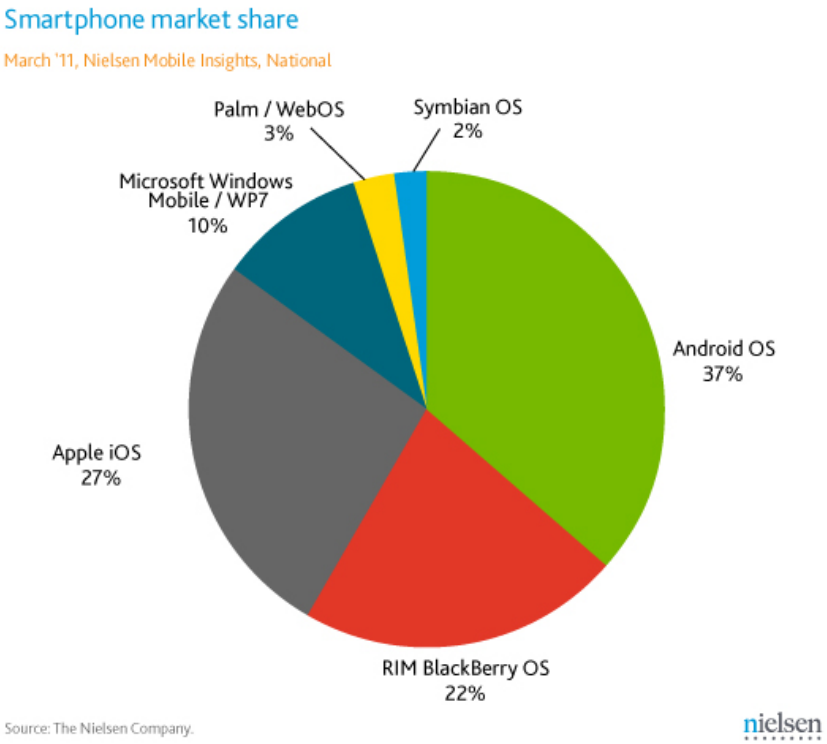

Figure 3: Total Market Share - 2011

This as well as data found in similar reports indicate that when it comes to market share by operating system, Android appears to be pulling ahead of both RIM Blackberry and Apple. The smartphone market will undoubtedly continue to grow as these devices become as fast and as powerful as computers capable of replacing your home phone, digital camera, video camera, and mp3 player with a single device.

2.3 Consumer Behavior

The most used applications across all smartphones were Facebook, Google Maps and The Weather Channel (TWC). The most popular categories are games, taking images, news, maps, social networking and music. As for the most popular activity on a smartphone, instant/SMS messaging is the clear winner. Still social networking and location based applications held a significant percentage of current smartphone market (Nielsen , 2010).

A report from Gartner predicts that the base of location based service users will grow globally from 96 million in 2009 to more than 526 million in 2012 (dotMobi, 2011). This suggests that applications which provide a useful location based service, a fun activity for the user, or both, have a great opportunity to be profitable.

Within the smartphone war, it appears that the Android OS platform is more popular amongst younger men and women. According to Nielsen in the 4th quarter of 2010, half of Android users were between the ages of 18 and 34 (see figure 4) (Nielsen , 2010). This is interpreted as further evidence showing the Android OS as more closely aligned with the targeted user of MAGIC.

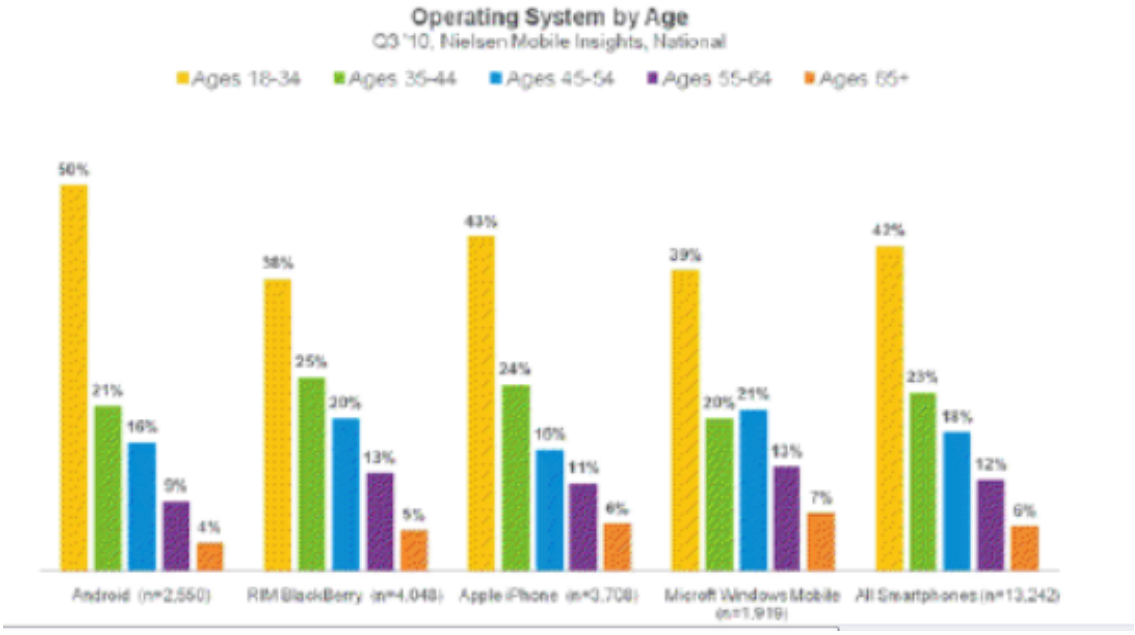

Figure 4: Operating System by Age

2.4 Mobile Application Trend

"With the consumer appetite for mobile apps rocketing, the opportunities for developers are huge," says the CEO and founder of GetJar, Ilja Laurs. In three years over 300,000 mobile applications have been developed according to a study by IDC. In 2010, these applications were downloaded 10.9 billion times. IDC predicts that global downloads will reach 76.9 billion in 2014 and will be worth US $35 billion (Haselton, 2010).

As stated earlier, location based, social networking and search applications were dominant in 2010 and continue to dominate so far this year. Figure 5 below shows that the Google Maps and Facebook were among the most popular apps for the all smartphone users (Nielsen , 2010).

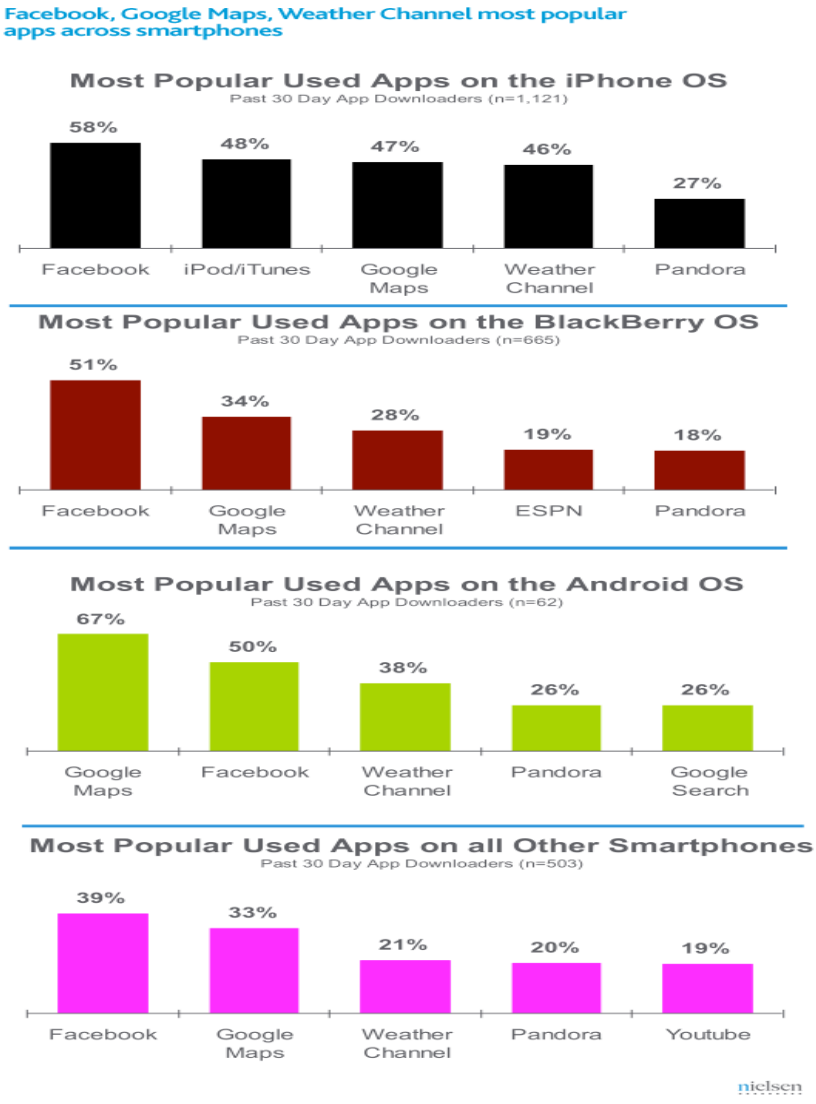

Figure 5: Most Popular Applications

While this has been the case for the last couple of years, what seems to be changing is the primary way to generate revenue from these applications. Research indicates that initially, the focus of making revenue from apps was based entirely on paid downloads or subscription-based models, but

this is going to change. Today, advertising-based revenue accounts for about 12% of app revenue, but by 2012 this figure is expected to rise to 28% (Bunz, 2010).

When considering ways to increase profit or decrease cost, the visitor numbers to popular mobile internet sites make a strong case for advertising and sponsorship options. Strategy Analytics (March 2010) estimates global expenditure on mobile advertising (defined as placing an advertisement within a variety of mobile media formats including mobile Internet, games and applications, mobile video, mobile TV, streaming music, text and media alerts) at $3.6 billion in 2009, growing to US$38 billion in 2015 (dotMobi, 2011).

2.5 Market Research Summary

The assumptions made, which were used in reaching the proposed implementation approach, are supported by the research performed for this document. To reiterate the key takeaways:

- The number of smartphones users is large and is projected to continue to grow.
- Android is emerging as the leader in the smartphone industry
- Most smartphone users use location based and social networking applications, which ties directly to the capability of MAGIC
- A profitable application is more likely with the incorporation of some form of a mobile advertisement marketing strategy

3.0 Description of Alternatives

This section briefly describes the alternatives analyzed as part of the Business Case Analysis and the risks and benefits corresponding to each one. Each alternative description also includes a potential marketing scenario, which could provide guidance in later stages of the development process. Per direction from the sponsor, for simplicity, only those implementation approaches that include an in-house Back End Processor (BEP) are considered here. The final recommendation will focus on what to do first, as well as a possible way forward in the implementation process.

Note: It is assumed that the sponsor would aim to eventually develop an application that is compatible with all major operating systems and satisfies the needs of both primary user groups.

The four options described in this document are listed below.

- Option 1 – Casual Users on the Apple iPhone platform
- Option 2 – Casual Users on the Android platform
- Option 3 – Emergency Responders on the Apple iPhone platform
- Option 4 – Emergency Responders on the Android Platform

The last 2 options have the same issues and opportunities and are therefore combined under one description.

Note: It is assumed that, for the emergency responder approach, the sponsor will not begin software development until a contract is awarded. This allows the research team to eliminate the risk of spending money to develop a product before first establishing a buyer.

3.1 Option 1 – Casual Users on the Apple iPhone platform

3.1.1 Description

The application/Front End Processor (FEP) would perform the image and POI calculations on the phone itself and share this information with other users using a server/BEP. In this option, MAGIC is first developed for the iPhone, and targeted for casual users. The application would employ a hybrid marketing approach where there would be a limited version sold at no charge as well as a fully capable version sold at a nominal download fee. In addition to this, there would be efforts put in place to generate revenue from mobile web application advertisements.

3.1.2 Benefits

The table below describes the expected benefits to the sponsor upon implementation of the solution with respect to targeting casual users first on the Apple iOS platform.

Table 1: Benefits – Casual Users on the Apple platform

Category	Benefit	Description
Market	• Greater web subscription market share	Apple has largest base of mobile web subscribers
Technology	• Better equipped to deliver required results • Less fragmented ecosystem	iPhones have the gyroscope, which makes calibration more stable Only Apple devices can host the application, creating a simpler approach

With all the other devices made by Apple such as the iPad and iTouch, it claims a much larger share of mobile web subscriptions, which could potentially be a long term advantage. Apple devices currently include the gyroscope, which may provide a better user experience due to the projected reduction of calibration frequency. The justification behind this is that a gyroscope allows for more stable calibration functionality. Current Android smartphones lack this component so the frequency with which the user would have to recalibrate would be higher. The fact that only Apple devices will initially house the MAGIC application is interpreted as a benefit since the burden of designing different versions of the application would be avoided.

3.1.3 Risks

This section summarizes the risk assessment activities and results surrounding this option. For each risk identified, a likelihood and impact rating is given along with a planned mitigation strategy. For the assessment, risk was defined as any event which may adversely affect the ability of the MAGIC system to produce the required capabilities or reach the targeted audience.

Table 2: Risks – Casual Users on Apple Platform

Description	Likelihood	Impact	Mitigating Actions
Inability to reach desired target user	Low	Medium	Modify the application to be more attractive to the larger base of iPhone users
Technology solution is unable to deliver required results	Medium	High	Complete a pilot project to prove the technology solution will deliver the required results

The first risk involves the age range of the casual user (approx. 15-40). While the bulk of Apple's users are between 18 and 34 (43% - See figure 4), Android covers more of the target user base with approximately half of its users being between 18 and 34. This is interpreted as a low risk overall since its likelihood is low and the impact is medium. The second risk deals with the fact that the desired product and capabilities are untested and unverified.

3.1.4 Issues

This section summarizes the highest priority issues associated with the adoption of this option. Issues are defined as "any event which currently adversely affects the ability of the MAGIC system to produce the required capabilities or reach the targeted audience".

Table 3: Issues - Casual Users on Apple Platform

Description	Priority	Resolution Actions
Cost of developing and listing with the App Store (30%)	Medium	Increase the listing price to offset additional costs.
Regulatory approval must be sought to implement the final solution	Low	Initiate the Regulatory approval process early so that it does not delay the final roll-out process.

Two issues are listed above. Apple currently charges a significant fee for publishing and selling an application in the Apple App Store. This would decrease profit and is considered an issue here. Standards, and policies, and regulations, which do change, must be adhered to before selling the application to the public and is therefore listed as another issue.

3.2 Option 2 – Casual Users on the Android platform (Recommended)

3.2.1 Description

Similar to the description of option 1, the application/FEP would perform the point-of-interest calculation and many other essential functions. It would then be able to share this information with other users. The server/BEP would provide the data sharing function. The key difference would be that it would be on the Android platform initially as opposed to the Apple iOS. The application would employ a hybrid marketing approach where there would be a limited version sold at no charge as well as a fully capable version sold at a nominal download fee. In addition to this, there would be efforts put in place to generate revenue from mobile web application advertisements.

3.2.2 Benefits

The table below describes the expected benefits to the sponsor upon implementation of the solution with respect to targeting casual users first on the Android OS platform.

Table 4: Benefits – Casual Users on Android Platform

Category	Benefit	Description
Financial	• No license fee or listing fee	Android does not charge to publish an application
Market©	• Greater potential market share	Android sales have beat iPhones in the last 3 quarters and leads in total market share
Customer	• Greater base of targeted user	50% of Android users are between 18 and 34

To sell an application in the Google App World is free, whereas Apple charges a 30% fee for iPhone applications. This results in a higher return on investment for the Android application. As indicated earlier by research from the Nielsen company (Nielsen, 2011), the Android OS is emerging as the

leader of smartphone platforms. Lastly, the Android operating system has a larger portion of its user base in the age range of the targeted casual user, which is between 15 and 40.

3.2.3 Risks

The risks associated with this option are outlined here along with a likelihood rating, impact rating, and planned mitigating actions.

Table 5: Risks - Casual Users on Android Platform

Description	Likelihood	Impact	Mitigating Actions
Technology solution is unable to deliver required results	Medium	High	Complete a pilot project to prove the technology solution will deliver the required results
Initial design effort may be too complex	High	Low	Emphasize code reusability

As stated earlier, the desired product and capabilities are somewhat unprecedented, which is interpreted as a high risk. A low risk for targeting Android users is that there may be added complexity since the OS is offered on several different platforms. This risk can be mitigated by placing a great deal of effort on reusing as much code as possible so that the variance across the multiple platforms is kept to a minimum.

3.2.4 Issues

The highest priority issues associated with the adoption of this option are summarized here along with a ranking and a possible resolution. An issue is considered as "any event which currently adversely affects the ability of the MAGIC system to produce the required capabilities".

Table 6: Issue - Casual Users on Android

Description	Priority	Resolution Actions
Device limitations	Low	Implement additional code to circumvent calibration
Regulatory approval must be sought to implement the final solution	Low	Initiate the Regulatory approval process early so that it does not delay the final roll-out process.

One known issue with the Android OS would be the lower degree of confidence of accuracy due to the lack of the gyroscope component. With known ways to circumvent this as well as with knowledge of more advanced phones coming to the market in the near future, this issue is solvable. As stated earlier, regulations are an issue that should be considered early and often in the development process.

3.3 Option 3 & 4 – Emergency Responders on the Apple iPhone or Android platform

3.3.1 Description

The application/FEP, no matter whether it is on the iPhone or the Android, would perform the point-of-interest calculation and other essential functions. It would then be able to share this information with other users. As in the other options, the server/BEP would provide the data sharing functionality. The BEP for this particular system is different from the BEP of one designed for casual users. The reason for this is because it would require more complex data processing. The idea behind this type of system is that there would be a human on the back end functioning as the monitor and control lead. He or she would have the capability of browsing and selecting specific images to be distributed to the field. This added functionality would also warrant the need for the system to be more secure and more than likely require some level of redundancy. Since there is a human in the loop, training would also become a factor.

The primary revenue stream for developing this type of application would come in the form of a contract. More important to note, there most likely will not be any web advertising used in this instance and there will not be a profit generated from each individual download.

3.3.2 Benefits

The table below describes the expected benefits to the sponsor upon implementation of the solution with respect to targeting emergency responders first on either platform.

Table 7: Benefits - Emergency Responders on either Platform

Category	Benefit	Description
Operational	• Improved industry reputation	Having a successful deployment for the government will build consumer confidence and provide inroads to mainstream users
Customer	• Increased customer retention • Greater customer loyalty	Having a successful deployment for one government agency may lead to future contracts with other CONUS and international agencies.

Both benefits here come with the assumption that the initial deployment is successful. If that is the case, then the developer's chances of buy-in from the public would increase. This positive reputation could also lead to contracts with other agencies.

3.3.3 Risks

Summarizes the most apparent risks associated with the adoption of this solution. Risks are defined as "any event which may adversely affect the ability of the solution to produce the required deliverables". Risks may be Strategic, Environmental, Financial, Operational, Technical, Industrial, Competitive or Customer related. Complete the following table:

Table 8: Risks – Emergency Responders on either Platform

Description	Likelihood	Impact	Mitigating Actions
Technology solution is unable to deliver required results	Medium	High	Complete a pilot project or conduct demonstrations early in the development process to prove the technology solution will deliver the required results
Potential cost overrun	Medium	High	Negotiate for a cost plus contract Engage stakeholders early and often throughout the design and development
Possible loss of contract	Low	High	Engage the customer as much as possible to develop relationship and explicitly meet customer needs

Since this is an unprecedented effort, the potential for cost overrun is serious, which makes the contract vehicle very significant. Also, there is a small chance that the contract would be awarded to another company. It is assumed that the awarding agency would be solicited for this capability by the inventors of it. Therefore, the contract should be won as long as the relationship with the customer is strong and their needs are validated to be met.

3.3.4 Issues

The highest priority issues associated with the adoption of this option are summarized here along with a ranking and a possible resolution. An issue is considered as "any event which currently adversely affects the ability of the MAGIC system to produce the required capabilities".

Table 9: Issues - Emergency Responders on either Platform

Description	Priority	Resolution Actions
Regulatory approval must be sought to implement the final solution	Low	Initiate the Regulatory approval process early so that it does not delay the final roll-out process.

4.0 Rough order of Magnitude (ROM) Analysis

The purpose of this cost estimation is, as accurately as possible, to define the software system costs and schedule projections from requirements analysis phase through product acceptance and maintenance phases. With the use of COCOMO II and function point analysis, a ROM was generated. The use of function point analysis was preferred over SLOC count primarily because little was known for SLOC estimation. Also, function point analysis provides a technology-independent assessment of the functions involved in developing the MAGIC system (Roetzheim).

A high level cost assessment was created for the following initial implementation options:

1. Emergency responder on the Apple iOS using in house back end processing (BEP)
2. Emergency responder on the Android OS using in house BEP
3. Casual user on the Apple iOS using in house BEP
4. Casual user on the Android OS using in house BEP (Recommended)
5. Casual user on the Apple iOS using 3rd party data sharing application
6. Casual user on the Android OS using 3rd party data sharing application

For simplicity, only the cost assessment for the recommended option is included in this document. For an in depth explanation of all options which include those that consider 3rd party sites, please reference the Detailed Rough Order of Magnitude (ROM) and Return On Investment (ROI) Analysis.

4.1 Software Development Costs

This section summarizes the analysis conducted to determine the number of function points and SLOC for this particular option. Using these numbers in the COCOMO II tool, the following cost model for the software development effort was created:

Table 10: SW Estimate

Software Development Estimate (Casual Users - Android OS - w/BEP)				
Function Point Estimate**	**Quantity**	**Conversion Factor**	**Function Points**	**Comments**
External Inputs	23	4	92	User provides 4 inputs for up to 4 photos. Also include settings inputs (7)
External Interface Files	3	7	21	Image, Metadata, and POIs are the 3 data object types
External Outputs	5	5	25	List of available images, map of images, search results, image with metatdata, and image with POIs
External Queries	9	4	36	Google,Facebook, Twitter, Picassa, and the device itself (camera, gps, accel, gyro)
Logical Internal Tables	6	10	60	Table of images, POIs, pixels, setting options, smart phone db, and astronomical table
Total Function Points			**234**	Sum above point values
Java 2 language equivalency value			46	Assumed value from reference
KSLOC Estimate			10.8	Total Function Points x language equivalency value
Estimated Effort (person-months)			29.01	(Productivity) x (KSLOC^Penalty) (in months) see reference
Total Labor Hours			4,642.23	Effort x 160hours/month
Cost/Labor Hour ($80/hour)			$80	Assumed value from budget expert
Total Function Point Estimate			**$371,378.36**	Labor Hours x labor rate

This function point total is based on a document by William Roetzheim, "Estimating Software Costs," Cost Xpert Group, Inc. using the Web development linear productivity factor of 2.51 and penalty factor of 1.030 (Roetzheim). To obtain the total number of function points, an estimate of the number of external inputs, external interface files, external outputs, external queries, and logical internal tables was created. The raw values are converted into actual function points using the conversion factors as seen in table 11. From there, a software language equivalency factor was used to convert the number of function points into SLOC. As stated earlier, the number of SLOC is used along with a "productivity" and "penalty" factor to obtain an estimate of man-months. This is the projected level of effort, which is converted to dollars by considering the number of hours in month to be 160 and the labor rate of developers to be $80 per hour.

COCOMO was used with modifications to the effort adjustment factor, which resulted in very similar schedule and cost estimates as above. Screen shots of this can be found in the ROM and ROI analysis.

4.2 Total Project Costs

This section summarizes the total cost analysis conducted for the recommended implementation approach. A hypothetical work breakdown structure (WBS) was created to allow a bottom up cost estimation approach. Using this technique, individual project areas were estimated and summed up to get a total for the entire project. The expected project cost is shown in table 11.

Table 11: Total Project Estimate

System ROM (Casual Users - Android OS - w/BEP)					
	# Units/Hrs.	Cost/Unit/Hr.	Subtotal	Total	% of Total
Items					
1. Labor				**$200,000**	26%
Project Manager	800	$100	$80,000		
SE Team Members	1600	$75	$120,000		
2. Hardware				**$26,000**	3%
Handheld device	2	500	1000		
Servers	5	$5,000	$25,000		
3. Software				**$371,378**	49%
Software development*			$371,378.36		
4. Testing (10% of total hardware and software costs)				**$39,738**	5%
5. Reserves (20% of total estimate)			$127,423.24	**$127,423**	17%
Total project cost estimate				**$764,539**	
*See software development estimate					

It's important to note that the labor units are based on the schedule estimate that came from both the function point analysis and COCOMO II tool. Each method estimated a most likely schedule of 10 months to design, develop, test and deploy the system. While the SE Team members will work full time on the project, the project manager is assumed to have additional duties and would only designate half of his/her time to the project. The labor rate (cost/unit) is an assumed rate based on input from budget experts

4.3 Return on Investment (ROI) Analysis

As, stated earlier, research has revealed a recent shift in the focus of mobile application marketing and revenue generation. While the bulk of revenue generated in today's market comes from paid downloads, this number is expected decrease as advertising based revenue heats up. Therefore it is important to consider both methods in the marketing strategy. While it is not the intention of this document to uncover the best marketing strategy, it is useful to show a generic calculation of potential revenue outlook as this will provide the sponsor an idea of what is needed as a bare minimum in order to recover the cost.

The download price for mobile applications ranges from $0 to $999, but research shows the average price in 2009 was $1.90 and is expected to drop in the coming years (Bunz, 2010). Location based services (LBS) account for a large percentage of types of apps downloaded and seems to have the highest affordable price amongst all other categories.

Average Price Paid by US Consumers for Mobile Applications

Mobile Application	Average Price Paid
LBS	$9.23
Weather	$3.82
Sports	$4.58
Wallpapers/Pictures	$3.29
Music	$4.99
Maps/Directions	$3.95
Personal Organization Tools	$5.41
Source: Telephia Mobile Application Report, Q2 2007	

Assuming that the acceptable download price will continue to drop, then it can be stated with a high level of certainty that $1.50 is a reasonable price to charge for this application in 2012. With this assumption in mind, it would take approximately 510,000 downloads to recover the cost.

Going down the ad funded marketing path might mean offering two versions of the application: one that is free or "lite", to maximize the number of people who download it and thus draw in crowds to try out this service. This version could be used as an appetizer of sorts that would only offer a limited set of capabilities. The second prong of this strategy is to have a premium or priced version of the application, which would offer users the full suite of features and functionality.

A report from eMarketer states that ad-funded mobile applications typically serve 3-5 impressions each time a customer interacts with them, with even higher figures for some especially engaging applications (dotMobi, 2011). CPM is defined as revenue per 1000 impressions and the average CPM for ad based apps was around $8.75. With an application such as MAGIC, which has a legitimate chance to be a more frequently used application, one can see how lucrative it would be to go down this route. A report from AdWhirl says that "applications that crack the top 100 in the Free Apps list make $400-$5000 a day." This is a wide range, but even at the low end, it would amount to approximately $12,000 per month. With this in mind it would take approximately 65 months or 5.5 years to recover the $720K project cost. On the higher end at $5,000 per day or $150,000 per month, it would only take a little less than 5 months to break even.

5.0 Assessment of Alternatives

5.1 Summary

Table 12: Summary

Criteria	Casual w/iPhone	Casual w/Android	Emergency Responder w/Either Platform
Unique Benefits	3	3	3
Unique Risks	1	1	2
Unique Issues	1	1	0
Cost	~$840K	~$760K	~$1.2M

The above table shows the early ROM projections for each option associated with in-house BEP along with the number of unique benefits, risks, and issues. (See tables 1 through 9) Risks and issues that are common for all options are left out of this table to provide a high level and exclusive summarization of each option. It's important to note that the quantity of each field (risk, benefit, issue) does not necessarily mean the option is the best or worst. All of these factors were analyzed against the criteria of IAI when determining the final recommendation. For a more detailed explanation of the cost for each option including with and without BEP, please refer to the Detailed ROM and ROI Analysis.

5.2 Recommendation

With the goal of achieving the highest profit margin and ROI in mind, the recommended initial implementation approach is to target the casual user on the Android OS using an in-house BEP. This option provides the highest predicted ROI based on the market trend as well as the cost. If the app is pay-per-download then this means revenue is driven by how many new users can be reached. If the app is also ad-funded, then the important thing is how often the application is used once downloaded and for how long it is used. It can be stated that this application is one that will be used multiple times because it offers a unique experience each time it is launched. Therefore a hybrid blend of both marketing strategies is suggested.

It is understood and accepted that in comparison with any option that uses a 3rd party for its image and data sharing, the total SLOC will be higher since a 3rd party option would eliminate the need for any BEP. However, the interface complexity, uncertainty and potential performance degradation are reason enough to utilize an in-house BEP. Certainly more work can be done, but for the scope of this project, the BEP cost and functionality is analyzed strictly from a high level.

6. References

Bunz, M. (2010, March 17). *Mobile Apps Will Outsell CDs by 2012*. Retrieved from gaurdian.co.uk: http://www.guardian.co.uk/media/pda/2010/mar/17/mobile-apps

dotMobi. (2011, March). *Global Mobile Statistics 2011*. Retrieved from mobithinking.com: http://mobithinking.com/stats-corner/global-mobile-statistics-2011-all-quality-mobile-marketing-research-mobile-web-stats-su#popular-activities

Haselton, T. (2010, March 17). *Mobile App Industry Will Surge to $17.5 Billion in 2012*. Retrieved from mobileburn.com: http://www.mobileburn.com/news.jsp?Id=9014

Nielsen . (2010, November). *State of the Media - US Audiences and Devices*. Retrieved from nielsen.com: http://blog.nielsen.com/nielsenwire/online_mobile/factsheet-the-u-s-media-universe/

Nielsen. (2011, April 26). *Who is the Most Wanted*. Retrieved from nielsen.com: http://blog.nielsen.com/nielsenwire/online_mobile/u-s-smartphone-market-whos-the-most-wanted/

Roetzheim, W. (n.d.). *Estimating Software Costs*. Retrieved from costxpert.com: http://www.cs.iupui.edu/~mroberts/n361/SDArticle1.pdf