Feasibility Evidence Description (FED)

Version 2.2

Cash Doctor 3.0

Team 12

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Version History

Date	Author	Version	Changes made	Rationale
09/28/14	LZ	1.0	• Create the draft of FED based on NDI template.	• For Valuation Commitment Package
10/12/14	LZ	1.1	• Update draft of FED	• For Foundation Commitment Package

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1. Introduction

1.1 Purpose of the FED Document

The Feasibility Evidence Description (FED) is maintained to provide the Success-Critical Stakeholders of CashDoctor 3.0 project with business case analysis, risk assessment and other feasibility evidence. It identifies business case, risks, costs, benefits and issues that may occur in the development life cycle. In particular, it reveals the business case of CashDoctor and the mitigation plans for risks. The FED also contains feasibility analysis of NDI/NCSs that may be applied on CashDoctor 3.0.

1.2 Status of the FED Document

- The risk of the incapability of OCR component has been eliminated.
- Risk identification and assessment has been finished in evaluation phase.

2. Process Feasibility

The following form indicates the process selection criteria with which we chose the NDI-intensive model as our process model.
In the "Importance", the level of importance of the criteria to the project is from 1 to 3, representing Low, Medium and High. In the "Project Status", the level of how the criteria fits the project is measured by 0 to 4, representing Very Low, Low, Medium, High and Very High.

Table 1: Rationales for Selecting NDI/NCS Model

Criteria	Importance	Project Status	Rationales
30 % of NDI/NCS features	2	4	The CashDoctor uses proprietary Ke Solution as its back-end CMS engine. The free-source javascript libraries jQuery.js and backbone.js provide front-end animation and the communication with back-end. The hybrid app also can utilize the fully characterized functionalities of bootstrap as its UI. Furthermore, Tesseract OCR provides the core capability of converting images to texts.
Single NDI/NCS	1	1	Single NDI/NCS cannot accommodate the requirements of CashDoctor like OCR and CMS.
Unique/ inflexible business process	1	1	The business process is neither unique, nor inflexible.
Need control over upgrade / maintenance	1	1	CashDoctor 3.0 is a web application with low requirement of upgrade and maintenance after release.
Rapid deployment	2	3	The client is eager to take the market before its rivals. So the speed of development would count into its success.
Critical on compatibility	1	2	The app needs only to be compatible with Ke the CMS of client's website.
Internet connection independence	1	1	The independence of Internet connection is not important. Connection through other services is acceptable.
Need high level of services / performance	2	2	The client wants the product to support 1000 simultaneous connection.

Need high security	3	2	High security is critical because the information of users are either highly private or confidential.
Asynchronous communication	2	2	Asynchronous communication is wanted to support more users.
Be accessed from anywhere	2	3	Accessibility is critical to mobile apps. If the users cannot connect to our service, they will give up the app.
Critical on mass schedule constraints	1	2	The schedule is strict.
Lack of personnel capability	1	3	Most developers have little experience in mobile development at beginning.
Require little upfront costs	1	3	No upfront costs.
Require low total cost of ownership	1	3	Very low cost of ownership. The server is prepared already.
Not-so-powerful local machines	1	2	We have good local machines.

3. Risk Assessment

Table 2: Risk Assessment

Risks	Risk Exposure			Risk Mitigations
	Potential Magnitude	Probability Loss	Risk Exposure	
OCR failure on mobile platform: The OCR module we use is built on Windows/Unix and not yet tested on Android/iOS. The module may fail on mobile OS.	4	10	40	- Test the component and try to make a prototype.
Back-end incompatibility: Our system architecture and data flow may be incompatible with the existing back-end CMS Ke.	7	9	63	- Communicate with the client's co-worker to make sure the standards and interfaces of his CMS - Make the architecture flexible
Platform inconsistency: The hybrid app should be designed with HTML/CSS and distributed on both Android and iOS. However, the UI of two platforms have very different design criteria. So the "one design for two platforms" may cause problems once the product is released. For example, the iOS app store may reject the app for it does not obey Apple's design rules.	7	8	56	- Do incremental development after the first product with basic features is released and accepted.
Performance limitation: The capability of the client's server is unknown and the performance of the product relies on the response time of the server. Therefore, the deficiency of the server may compromise the mobile app product.	6	9	54	- Communicate with the client's co-worker to understand the capability of the server
Scalability uncertainty: The product is designed for 1000 simultaneous users. However, the requirement may easily be lifted to more users. The scalability of the product is still unknown.	6	8	48	- Try to learn scalability issues and build scalable architecture at the first stage
Personal time constraints: Developers may be as well committed to other courses and activities, which may reduce the time spent on this project.	7	8	56	- Talk with teammates to arrange meetings and work at time slots available for everyone.
Client time constrains: The client is an enthusiastic busy businessman who flied to India and Thailand investigating the market. He may not possible have time to set up meetings with us as the	6	6	36	- Try to get used to video meetings. - Arrange meetings as early as possible.

project is going on.				
Team cohesion failure: The team is composed of seven developers and one client from different backgrounds and cultures. It is possible that the difference may cause misunderstandings and unhappiness, which will damage the cohesion.	4	9	36	- Try to spend more time with teammates even after work and be good friends - Seek assistance from the CS577 faculty

4. NDI/NCS Feasibility Analysis

4.1 Assessment Approach

- In exploration phase, the client suggested product as a hybrid mobile application built with HTML5, jQuery Mobile, Bootstrap.
- At the first meeting with client's co-worker Lorin Morar, he introduced his Ke Solution CMS and suggested backbone.js for front-end javascript interaction library.
- The team discussed the implementation of backbone and bootstrap and decided to adopt those technologies in our project.
- Ekasit Jarussinvichai built the prototype of OCR, using the tools of Java OCR and Tesserate OCR. Comparing the functionalities of those two tools he decided to use Java OCR.

4.2 Assessment Results

4.2.1 NDI/NCS Candidate Components (Combinations)

Table 3: NDI/NCS Products Listing

NDI/NCS Products	Purposes
Google Map	Provides the locations and friendly interface for users to choose their search zones / interest zones.
bootstrap, jQuery, Backbone.js (BJB)	Connects the app to the existing APIs over a restful JSON interface. Builds the user interface more responsive, beautiful and stable. Minimize the cost of developing the user interface.
Java OCR	Provide local optical character recognition with minimum overhead.
Tesserate OCR	Provide local optical character recognition with minimum overhead.

4.2.2 Evaluation Criteria

IN the following table, the five most significant attributes of NDI are listed.

Table 4: Evaluation Criteria – NDI /NCS Attributes

No.	T	Weight
1	Functionality	20
2	Maturity of product	25
3	Flexibility	15
4	Ease of use	25
5	Inter-component Compatibility	15
	Total	100

In the following table, four minimum marketable features are displayed with their weight in terms of contribution to the win-condition.

Table 5: Evaluation Criteria - NDI/NCS features

No.	NDI/NCS Features/ sub features	Weight
1	Networking	15
2	Price Comparison	30
3	Price Posting	35
4	Rating And Review	20
	Total	100

4.2.3 Evaluation Results Screen Matrix

Table 6: Evaluation Results Screen Matrix

No	W	Google Map				AVG	Total	BJB				AVG	Total
		R1	R2	R3	R4			R1	R2	R3	R4		
A1	20	18	20	20	18	19	76	18	19	20	17	18.5	74
A2	25	22	24	23	22	22.75	91	19	22	22	20	20.75	83
A3	15	11	13	11	10	11.25	45	12	13	14	12	12.75	51
A4	25	20	23	22	23	22	88	18	20	24	19	20.25	81
A5	15	14	15	15	15	14.75	59	14	13	15	14	14	56
Total	100	85	95	91	88	89.75	359	81	87	95	82	86.25	345
No	W	Java OCR				AVG	Total	Tesserate OCR				AVG	Total
		R1	R2	R3	R4			R1	R2	R3	R4		
A1	20	14	18	16	16	16	64	16	19	18	17	17.5	70
A2	25	11	16	15	12	13.5	54	18	20	21	18	19.25	77
A3	15	8	12	12	9	10.25	41	10	13	14	11	12	48
A4	25	17	18	17	22	18.5	74	18	17	20	18	18.25	73
A5	15	11	13	12	11	11.75	47	1	3	4	1	2.25	9
Total	100	61	77	72	70	70	280	63	72	77	65	69.25	277

No	W	Google Map				AVG	Total	BJB				AVG	Total	Tesseract OCR				AVG	Total
		R1	R2	R3	R4			R1	R2	R3	R4			R1	R2	R3	R4		
F1	15	13	14	14	12	13.25	53	13	15	15	14	14.25	57	0	0	0	0	0	0
F2	30	28	29	28	28	28.25	113	28	29	25	28	27.5	110	20	16	25	10	17.75	71
F3	35	30	35	35	33	33.25	133	30	34	35	31	32.5	130	33	35	35	34	34.25	137
F4	20	10	12	12	12	11.5	46	16	18	19	19	18	72	15	8	19	10	13	52
Total	100	81	90	89	85	86.25	345	87	96	94	92	92.25	369	68	59	79	54	65	260

4.3 Feasibility Evidence

4.3.1 Level of Service Feasibility

Table 7: Level of Service Satisfiability Evidence

Level of Service Win Condition	Rationale
LOS-1: The app's snapshot feature should be effective to recognize most well printed medical documents.	This requirement is due to the product's functionality. The Java OCR or Tesserate OCR component is responsible for the recognition. Since the open-source technology is not mature, the objects of recognitions are limited to well printed documents.
LOS-2: System response should have minor delay.	The responsive delay is a killer of user experience. CashDoctor's response should be optimized to reduce the delay as much as possible. The jQuery and Backbone tools can contribute to this.

Table 8: Level of Service Implementation Strategy

Level of Service Win Condition	Product Satisfaction
LOS-1: The app's snapshot feature should be effective to recognize most well printed medical documents.	Product Strategies: Error-reducing, Monitoring & Control
	Process Strategies: Test Plans & Tools
	Analysis: Revising the recognition errors and monitoring allows the app to avoid sending nonsense to back-end.
LOS-2: System response should have minor delay.	Product Strategies: Optimization
	Process Strategies: User Involvement
	Analysis: Adjust the front-end data flow to satisfy the Ke CMS's capability. For example, reduce the length of content sending to the server to optimize the response speed.

4.3.2 Capability Feasibility

Table 9: Capability Feasibility Evidence

Capability Requirement	Product Satisfaction
CR-1: Acquire Geographic Location	Software/Technology used: Google Map
	Feasibility Evidence: Google Map has functional APIs for both Adroid and iOS
	Referred use case diagram:
CR-2: Display Price	Software/Technology used: HTML5, bootstrap, jQuery, intellXDK
	Feasibility Evidence: The technologies are mature for hybrid applications to manage contents.
	Referred use case diagram:
CR-3: OCR	Software/Technology used: Java OCR
	Feasibility Evidence: A working prototype.
	Referred use case diagram:
CR-4: Post Price	Software/Technology used: backbone.js, AJAX, JSON
	Feasibility Evidence: The technologies are already used in web and mobile applications with similar functionalities.
	Referred use case diagram:
CR-5: Input Price Manually	Software/Technology used: HTML5, backbone.js
	Feasibility Evidence: The technologies are already used in web and mobile applications with similar functionalities.
	Referred use case diagram:

4.3.3 Evolutionary Feasibility

No evolutionary requirements were specified in win-win session.

5. Business Case Analysis

ASSUMPTIONS

- Users will share info and provide reviews.
- Corporations will push their employees to use it via incentives.
- People will move away from insurance providers if it saves them money.
- Providers will benefit from using cash.
- Providers will use the system.

Stakeholders (Who?)	Initiatives (What?)	Value Proposition (Why?)	Beneficiaries (For Whom?)

• Developers
• Cash doctor
	• Develop the system (for price & review/rating).
	• Market the app/system
	  • Corporate marketing strategy.
	  • Individual marketing strategy.
	  • Provider marketing strategy.
		• Increase price transparency of health care costs.
		• Increased time and dollar savings for patients and healthcare consumers in general.
		• Empowering the consumer to make a more educated choice about healthcare expenditures
		• Enable consumers/patients to evaluate or provide feedback on healthcare services for community benefit.
		• Revolutionize the industry and profit.
			• Healthcare consumers - individual and corporate.
			• Health care providers.
			• Cash doctor (includes student team)

Cost	Benefits

• Development time (in person-hours)
• Hardware
• Software
• Network
• Maintenance
• Miscellaneous
	• Consumers and corporations save money
	• Consumers have access to healthcare, information, and networks (intangible)
	• Doctors make more money
	• Usage
	  o Registered users
	  o Downloads
	  o Rate of access
	  o Rate of sharing
	• Time saved in finding coverage

5.1 Market Trend and Product Line Analysis

Table 10: Market Trend and Product Line Analysis

	Google Map	Bootstrap, jQuery, Backbone	Java OCR
Market Trend	It has dominant power both on iOS and Android. It is very popular. Every cell-phone users are used to it. It will remain mainstream for long time.	They are very popular with strong influence on front-end technologies. The front end developers are used to them. And they will remain mainstream for long time.	It is not popular. And it remains idle for a few years. It cannot be replaced because it is almost the only OCR solution that is open sourced.
Product Line	Google	Twitter, Open-source Community	Google

5.2 Cost Analysis

The cost is measured in terms of personal effort devoted to the project. For stakeholders except developers, their personal efforts are estimated in the following table.

5.2.1 Personnel Costs

Table 11: Personnel Costs

Activities	Time Spent (Hours)
Development Period (24 weeks)	
Exploration, Valuation and Foundation Phase (12 weeks)	
Client meetings [2 hrs/week * 12 weeks * 1 person]	24
Client Win-win sessions [2 hrs/session * 2 sessions * 1 person]	4
Prototyping Presentation [1 hr * 1 person]	1
Architecture Review Boards [2hrs * 1 person]	2
Subtotal	31
Development and Operation Phase (12 weeks)	
Client meetings [4 hrs/week * 12 weeks * 1 person]	48
Client training seed users [2 hrs/week * 12 weeks * 1 person]	24
Architecture Review Boards [2 hrs * 1 person]	2
Performing core capabilities drive-through [2 hrs * 1 person]	2
Subtotal	76

Maintenance Period (Annual)	
Promoting the app [2 hrs/week * 52 weeks]	104
Subtotal	104
TOTAL	211

5.2.2 Hardware and Software Costs

Table 12: Hardware and Software Costs

Type	Cost($/year)
Development Cost	
Java OCR	0
COCOMO II	0
IntellXDK	0
Android SDK	0
Xcode	0
Winbook	0
Test Cell Phones	1200
iOS developer license	99
Operational Cost	
App Store on iOS Storage	0
Google Play on Android	0
Web hosting	1000
Transition Cost	
Total	2299

5.3 Benefit Analysis

It is estimated that $600 billion dollars are spent on health care in USA every year.
Userbase Assumption: The product CashDoctor 3.0 would have a userbase at first 3 years after the release as presented in the following table.

Year	Optimistic	Conservative
2015	50,000	25,000
2016	100,000	50,000
2017	200,000	100,000

Benefit Assumption: 5% of the money one person spent on health care can be saved by the price transparency provided by CashDoctor 3.0.
Benefit (the money saved) can then be calculated in this way:

Benefit = $600 billion * (userbase / population of US) * 5%

Revenue Assumption: 15% of the money saved of our users can be converted into CashDoctor's revenue.

The Revenue can then be calculated in this way:

Revenue = $600 billion * (userbase / population of US) * 5% * 15%

Table 13: Benefits of CashDoctor 3.0

Year	Optimistic	Conservative	Optimistic	Conservative
2015	5,000,000	2,500,000	750,000	375,000
2016	10,000,000	5,000,000	1,500,000	750,000
2017	20,000,000	10,000,000	3,000,000	1,500,000

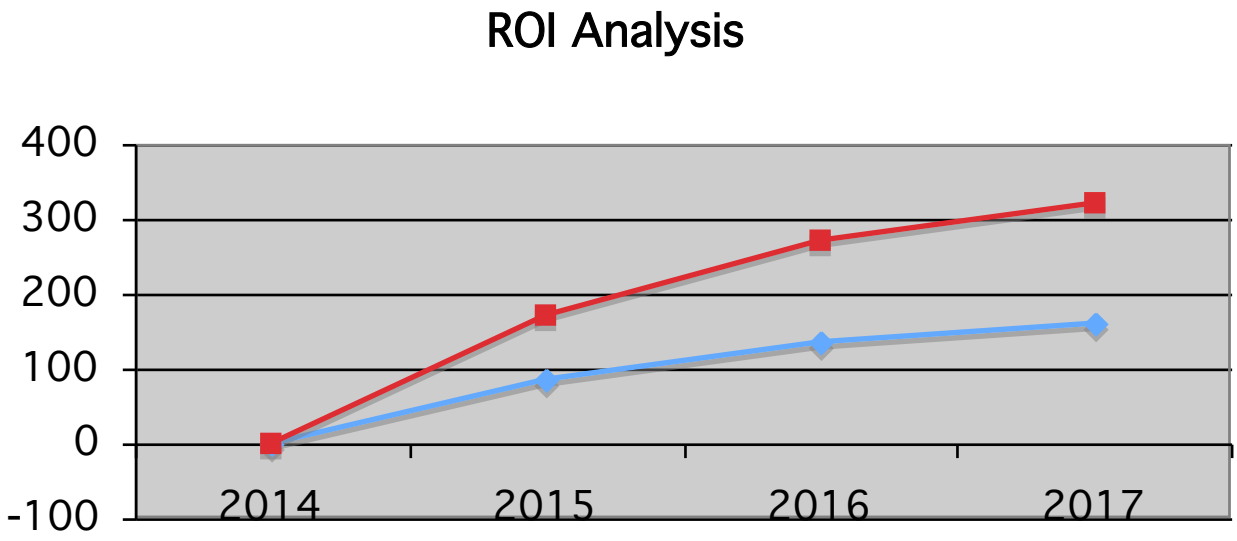
5.4 ROI Analysis

Assume 50% per year increase in operation cost for the first three years.

Table 14: ROI Analysis

Year	Cost	Cumulative Cost	Benefit (con)	Cumulative Benefit (con)	Benefit (opt)	Cumulative Benefit (opt)	ROI (con)	ROI(opt)
2014	2299	2299	0	0	0	0	-1	-1
2015	2000	4299	375000	375000	750000	750000	86	173
2016	4000	8299	750000	1125000	1500000	2250000	134	270
2017	8000	16299	1500000	2625000	3000000	5250000	160	321

Figure 1: ROI Analysis Graph


ROI Analysis
400
300
200
100
0
-100
2014
2015
2016
2017

6. Conclusion and Recommendations

<< In general, it is best to organize these into (conclusion-recommendation) pairs, for example:
C1. **Component 1** has by far the best performance, but runs only on Windows, failing the acceptable portability criterion. **Component 2** is fully portable, and has acceptable performance.
R1. Use **Component 2** for the oversize image viewer function.

C2. The DBMS assessment is still underway, and **Component 2**'s interoperability is still uncertain.
R2. Perform an interoperability assessment between **Component 2** and the two DBMS finalists.
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