

Designing Software Ecosystems: How to Develop Sustainable Collaborations?

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Introduction

Software Ecosystem

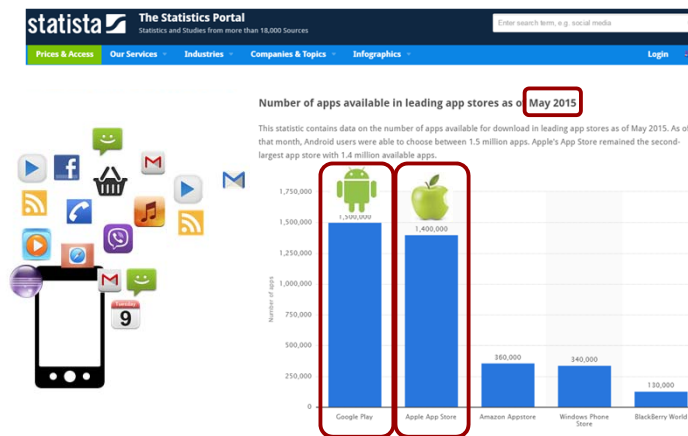
A recent practice in which software development companies collaborate with external developers in order to develop and extend a software platform for a shared market

- Jansen, Finkelstein, & Brinkkemper (2009)

Jansen, S., Finkelstein, A., & Brinkkemper, S. (2009).
"A sense of community: A research agenda for software ecosystems"
In 31st International Conference on Software Engineering-Companion Volume, 2009.
ICSE-Companion 2009. (pp. 187-190). IEEE.

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Example: The Mobile Software Ecosystem



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Challenges for Platform Developers

How to build, grow and sustain a software ecosystem?

How to attract external application developers to a software platform?

How to establish sustainable collaborative relationships with application developers over a software platform?

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Position in this study

To sustain and grow collaborative relationships with application developers over a software platform,

The objectives and decision criteria of the application developers need to be elicited and analyzed

Contribution of this study

A systematic approach for modeling and analyzing the objectives and decision criteria of application developers

i* goal-oriented social modeling technique is used to represent the objectives and decision criteria

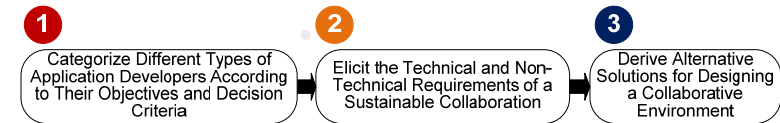
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Proposed Approach - General Steps

Question:

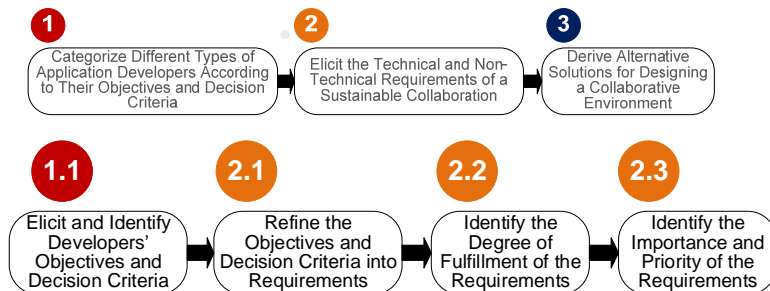
How to attract external application developers to a software platform?

How to establish sustainable collaborative relationships with application developers over a software platform?



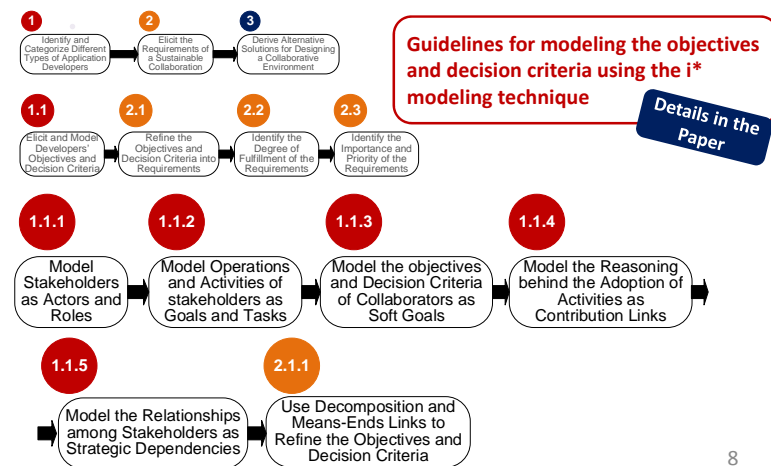
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Proposed Approach – Modeling and Analysis Steps



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Proposed Approach- Modeling Guidelines

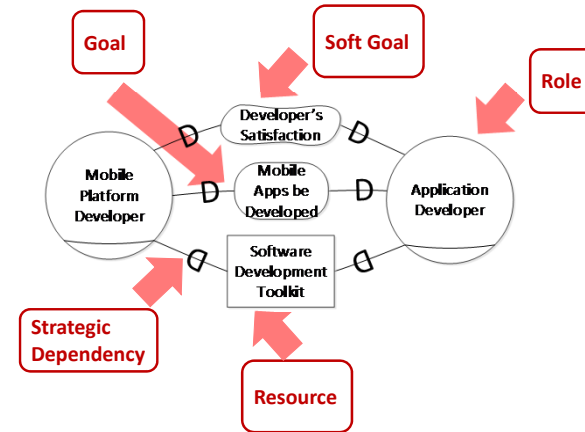


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Illustrative Study:

Modeling and Analyzing the Smartphone Software Ecosystems

Modeling Collaboration in the Smartphone Software Ecosystem

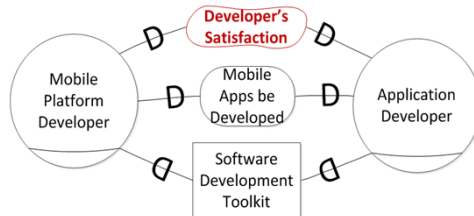


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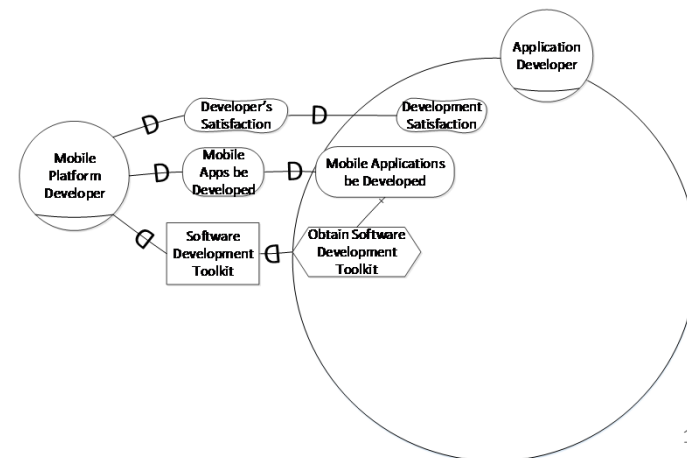
To develop and sustain a software ecosystem

Developer's satisfaction is a critical dependency for a mobile platform developer



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Mobile platform developer needs to elicit and analyze
What factors lead to developers' satisfaction?



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Eliciting Developers' Objective and Decision Criteria

To identify developers' objectives, we use the study of Koch & Kerschbaum (2014)

The study surveys the motivations and decision criteria of the application developers who develop applications for Apple iOS and Google Android

Koch, S., & Kerschbaum, M. (2014). Joining a smartphone ecosystem: Application developers' motivations and decision criteria. *Information and Software Technology*, 56(11), 1423-1435.

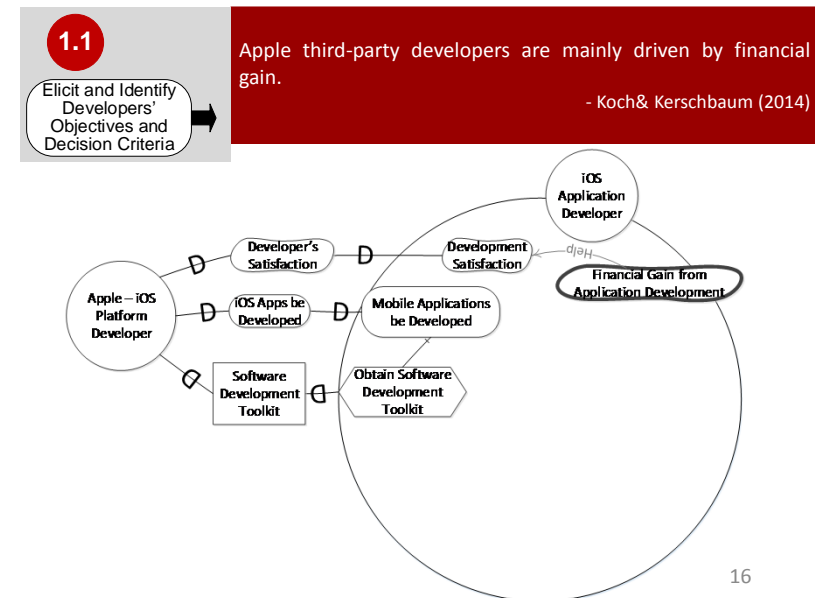
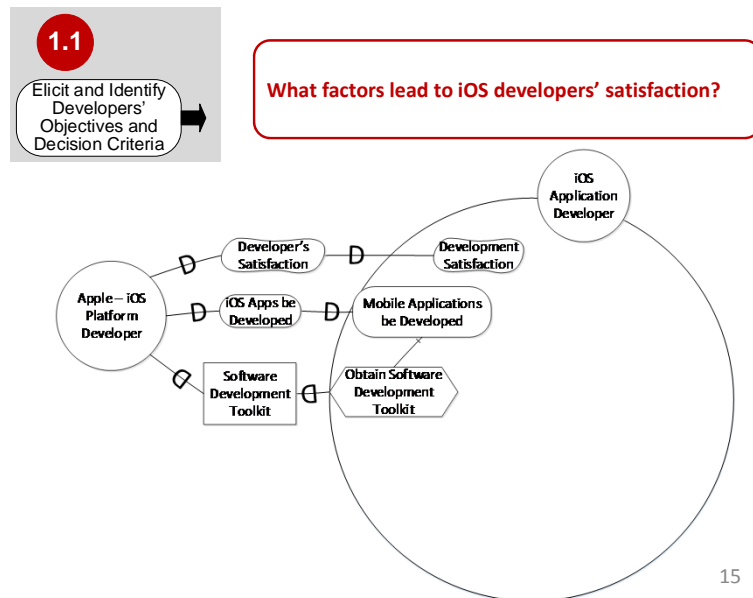
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Walkthrough 1- Apple iOS Software Ecosystem

Modeling and Analyzing Apple iOS Application Developers' Objectives and Decision Criteria



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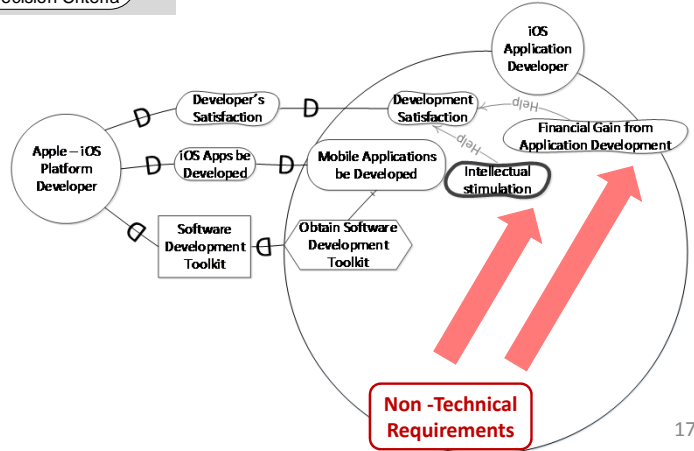


1.1

Elicit and Identify
Developers'
Objectives and
Decision Criteria

Intellectual stimulation is also an important factor for the developers who join Apple iOS ecosystem.

- Koch& Kerschbaum (2014)



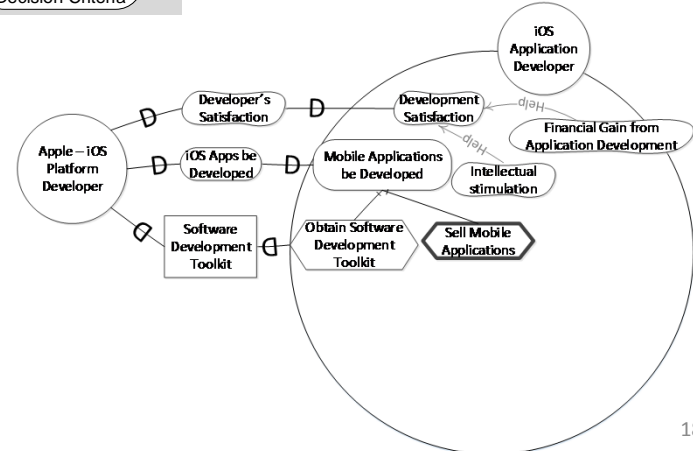
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1.1

Elicit and Identify
Developers'
Objectives and
Decision Criteria

These developers often prefer to charge fee for their application being used by Apple iPhone/iPad end users.

- Koch& Kerschbaum (2014)



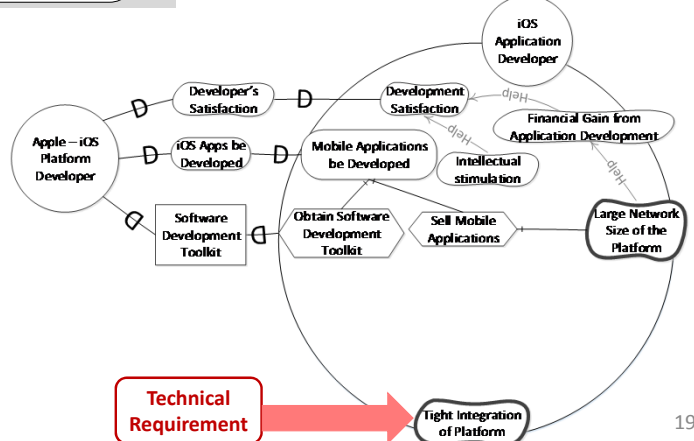
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1.1

Elicit and Identify
Developers'
Objectives and
Decision Criteria

The main characteristics of the iOS platform that motivate this group to join Apple iOS ecosystem are as follows: (a) Large network size of the platform (composed of the number of users, the market size, and the number of applications), and (b) the tight integration of the platform.

- Koch& Kerschbaum (2014)



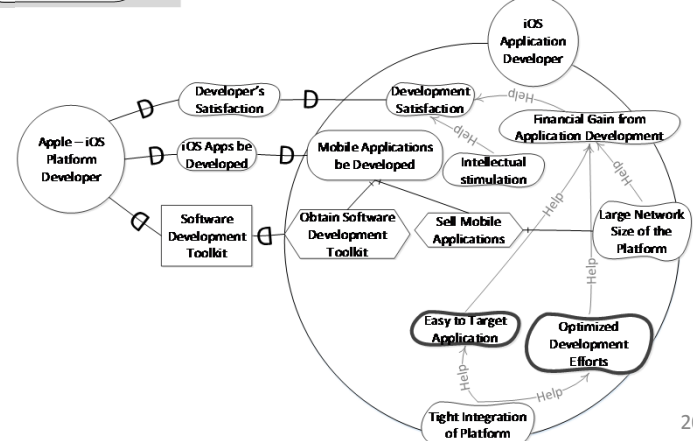
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1.1

Elicit and Identify
Developers'
Objectives and
Decision Criteria

A tightly integrated platform makes the complementary application development process easier for developers with strong motivations in financial gains by optimizing development efforts and facilitating the targeting of the applications.

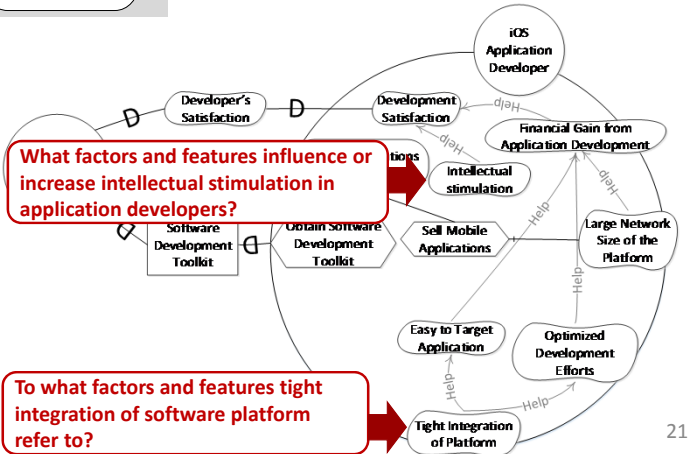
- Koch& Kerschbaum (2014)



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2.1

Refine the Objectives and Decision Criteria



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2.1

Refine the Objectives and Decision Criteria

Refining the requirements (the application developers' decision criteria) requires further data gathering and refinement of the available information

To develop models, we remain faithful to the available information provided in Koch& Kerschbaum (2014)

We do not add additional information

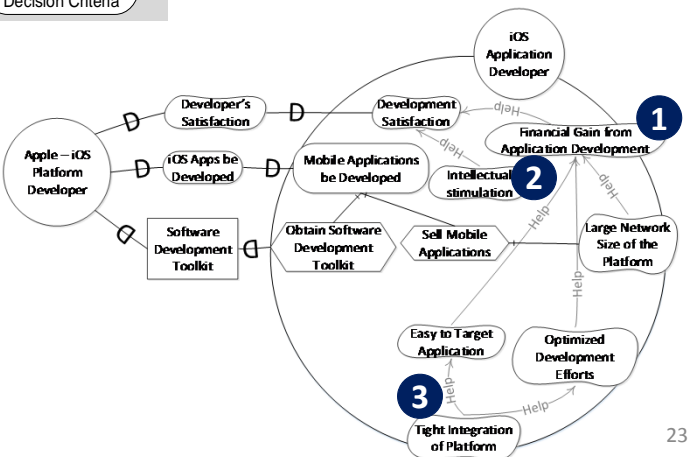
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2.2

Identify the Importance and Priority of the Decision Criteria

Hypothetical Prioritization

Real-world data is required to prioritize the requirements



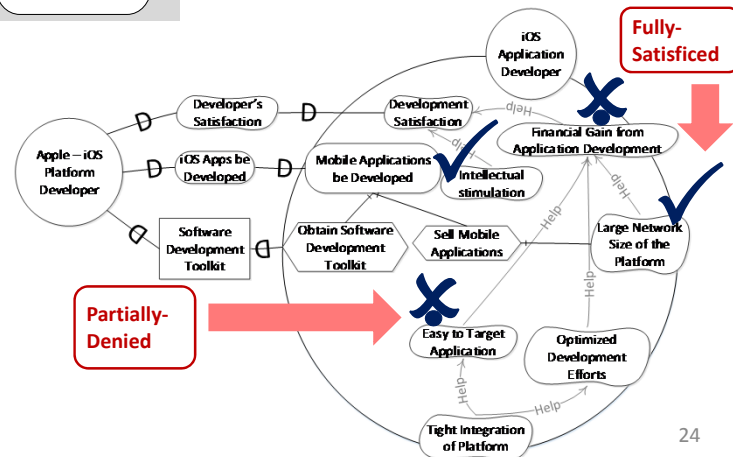
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2.3

Identify the Degree of Fulfillment of the decision Criteria

Hypothetical Evaluation

Real-world data is required to evaluate the fulfillment of the requirements



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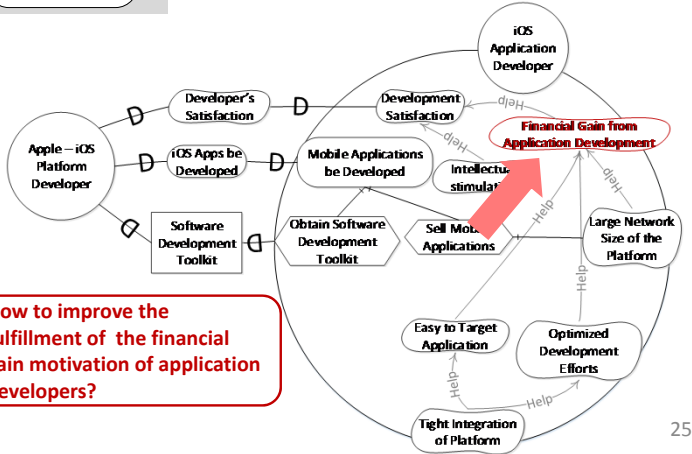
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Conclude the Requirements

Hypothetical Conclusion

Financial gain is the first priority requirement of iOS application developers

How to improve the fulfillment of the financial gain motivation of application developers?



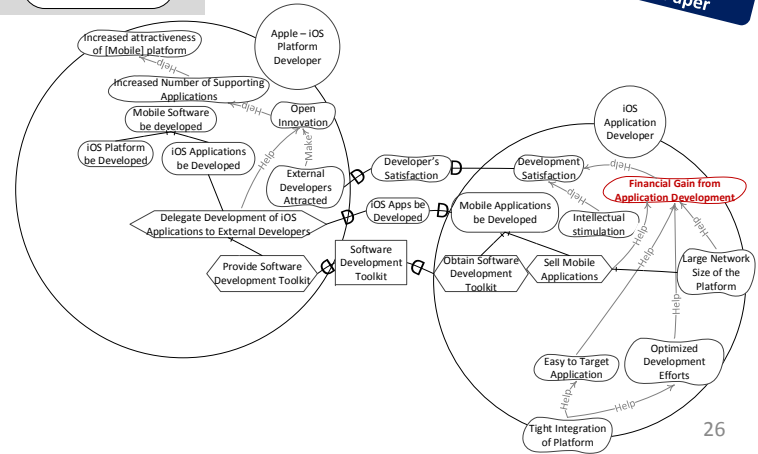
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Derive Alternative Design Solutions

The same modeling steps can be followed to explicate the objectives and decision criteria of the platform developer

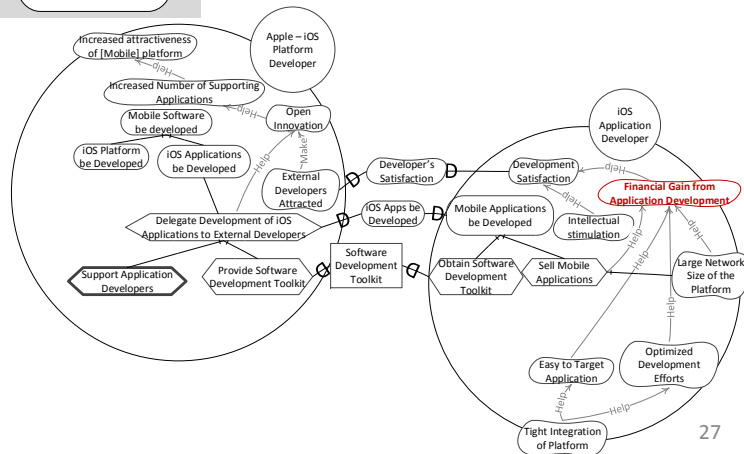
Details in the Paper



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Derive Alternative Design Solutions

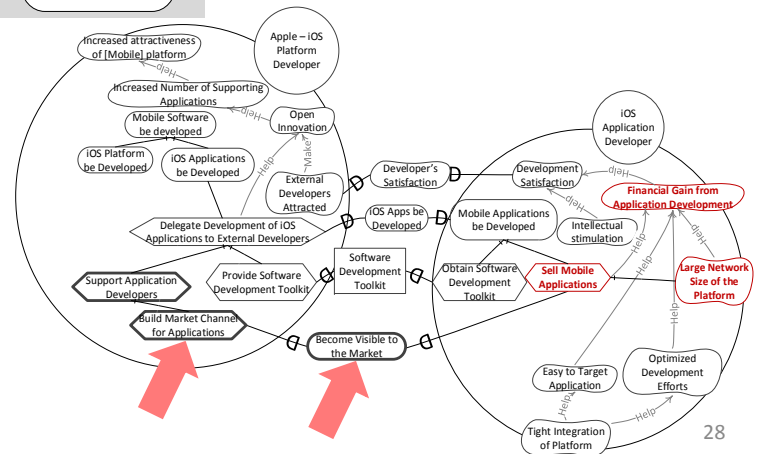


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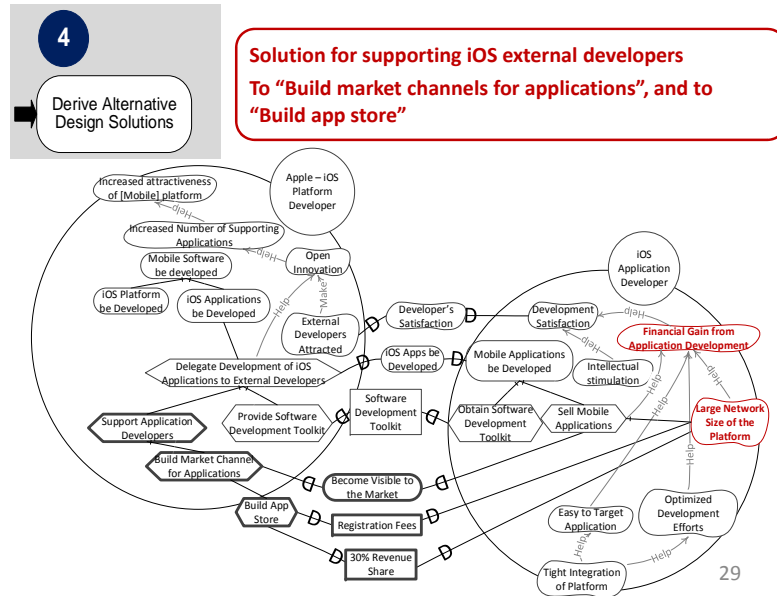
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Derive Alternative Design Solutions

For selling the mobile applications, developers become dependent on iOS platform developer, for the goal of "Applications become visible to the market place"



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Summary of Walkthrough 1

We illustrated

Appropriate design solution can be concluded by elaborate analysis and investigation of the objectives and decision criteria of third-party developers who collaborate with iOS

Discussion

Depending on the objectives and decision criteria of application developers, solutions for supporting external developers differ.

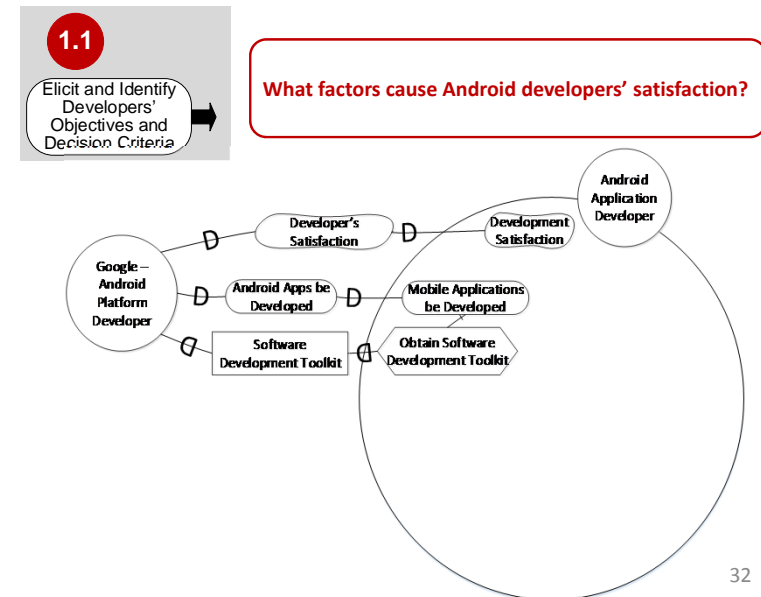
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Walkthrough 2- Google Android Software Ecosystem

Identifying and Analyzing Google Android Application Developers' Objectives and Decision Criteria



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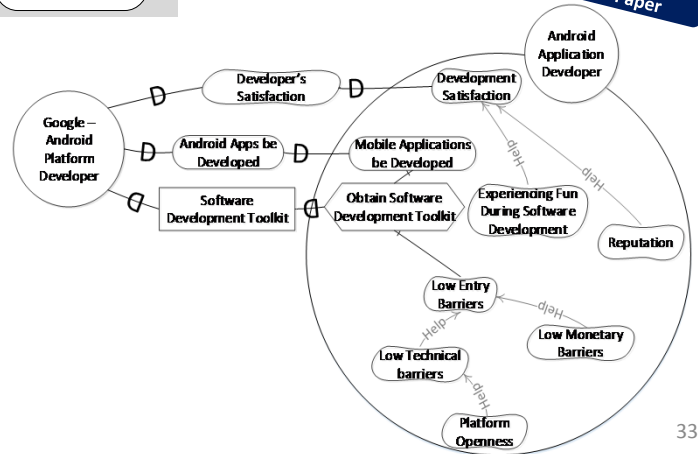


2.1

Refine the Objectives and Decision Criteria

The same modeling steps has been followed to explicate the objectives and decision criteria of Android Application Developers

Details in the Paper



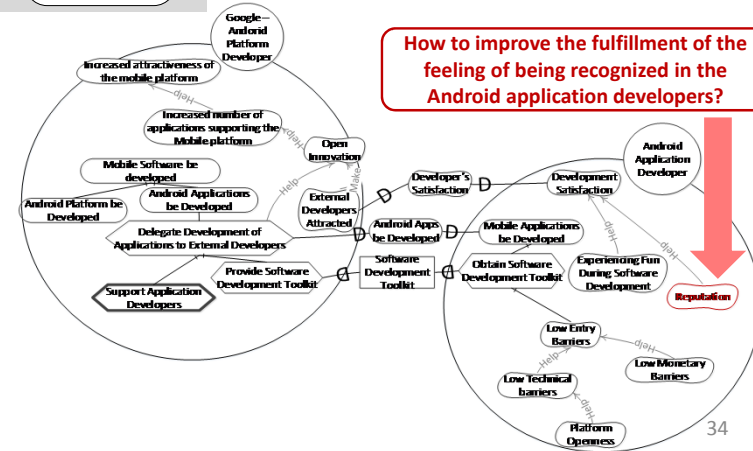
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Conclude the Requirements

The same hypothetical analysis steps have been followed to conclude the requirements.

How to improve the fulfillment of the feeling of being recognized in the Android application developers?

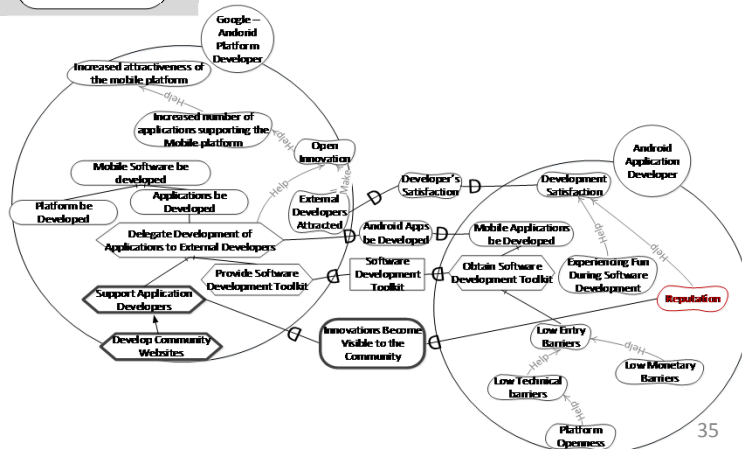


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Derive Alternative Design Solutions

Solution for supporting Google external developers
To "Develop Community Websites" in order to publicize the information about the innovations to the end users and the developers' community



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Summary of Walkthrough 2

We illustrated

Depending on the objectives and decision criteria of application developers, solutions for supporting external developers differ

Conclusion

It is required to elicit and analyze developers' objectives and decision criteria as source for identifying the appropriate requirements for growing and sustaining a software ecosystem

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Summary

One crucial activity in developing a software ecosystem is to attract external software developers to contribute to a software platform

We proposed a model-based approach to systematically develop and extend sustainable collaborative relationships with external software developers

The main idea behind our solution is to model and analyze collaborators' objectives and decisions

Using scenarios from Google Android and Apple iOS software ecosystems, we illustrated the viability of the proposed approach

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Limitations of the Study

Evaluating the proposed approach

Via experimentation in case studies of software ecosystems

Elaborating the proposed approach

With techniques for eliciting, evaluating, and prioritizing collaborators' objectives and decision criteria

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References

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