Agile software development methodology

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I. Background
What is agile development?

1. History

   Agile Manifesto. 2001.

2. Agile Values

   1). Individuals and interactions
   2). Working software
   3). Customer collaboration
   4). Responding to change

I. Background
What is agile development?

3. principles:

1). Active user involvement is imperative

2). The team must be empowered to make decisions

3). Requirements evolve but the timescale is *fixed*

4). Capture requirements at a high level; lightweight & visual

5). Develop small, incremental releases and iterate

Agile methods

1. eXtreme programing(XP)
2. Scrum
3. Feature Driven Development(FDD)
4. Crystal

I. eXtreme programming(XP)

- communication
- simplicity
- Feedback
- courage

When to use it?

- Small team size, 7 +/- 2
- Long-term development
- Feedback

II. Scrum

principles

- product backlog
- Effort estimation
- Sprint
- Daily meeting
- Sprint planning meeting
- Sprint backlog
- Sprint review meeting
- Sprint retrospective
- Sprint burn down chart

II. Scrum

Goal:

- For complex innovative scope of work
- Managing software projects
- Increase probability of successful development of the software

III. Feature-driven development

Basic processes

- Developing an overall model
- Building a features list
- Planning by feature
- Designing by feature
- Building by feature

III. Feature-driven development

Goal

- Focus: design and building phases.
- Deliver:
  - Frequent and tangible deliverables
  - Accurate tracking of reports

IV. Crystal

Crystal properties for a successful project

- Frequent delivery
- Close communication
- Reflective improvement
- Personal safety
- Easy access to expert users
- Technical environment with frequent integration

Agile methods characteristics

- Development style
- Project team size
- Team distribution
- Customer involvement
- Level of documentation
- Iteration time period

Agile methods characteristics

Characteristic	XP	Scrum	FDD	Crystal
Development style	Iterative increments	Iterative increments	Iterative increments	Iterative increments
Project team size	Fewer than twenty people (small team)	All size	Large team	All size
Team distribution	Co-located	Co-located and Distributed team	Co-located and Distributed team	Co-located
Customer involvement	Involved	Customer involvement through the role of product owner	Customer involved through reports	Customer involved though releases
Level of documentation	Basic and as little as possible	Basic and anything of value	Vital	Basic documentation
Iteration time period	One to six weeks	Two to four weeks	Two days to two weeks	Depending on Crystal method

Table 2. Characteristics of different agile methodologies

Case study

Case study:
A2Z computer Equipment company

1. overview:

1)large American semiconductor company.

2)Software development department located in California

Critical analysis:

Criteria	Description
Customer involvement	The customer or product owner works closely with the project manager to define requirements and desired features to be implemented. Typically, all agile methods boost customer involvement, but with some variation. In this case, Scrum is more appropriate since customer involvement is through the role of product owner.
Project team size	The project involves small-team size, about 13 engineers. While the XP method supports small-project team size, Scrum and Crystal accept small- and large-project team size.
Product: • High quality releases • Simple design	High quality releases: The case sheds light on the product's quality, and the whole product should involve lowest defect density. Basically, pair programming practice in XP method aims to achieve significant advantages in increasing code-quality level and minimizing the defect density. Simple design: Team members should pay attention to continuous simple design. Typically, simple design is a XP practice.
Guarantee of success	As mentioned in the given case, the company faces a number of challenges with its previous approach such as failure to meet product quality guidelines. Agile methods, however, are a better choice to ensure a high degree of project success.
Requirements specification	The project requirements specification would be continuously revised based on customers' desire. Undoubtedly, agile methods consider requirements changing during the project life cycle.
Implementation time	The project estimated duration is 15 months. In the broad picture, agile methods enhance project completion in a short-time period.
Iteration time period	Based on the given case, the iteration time period should not exceed six weeks. Therefore, all the methodologies are appropriate.
Level of documentation	Document project procedures were required. Scrum appears more suited to achieve this criterion.

Table 3. Criteria description

How to set up the problem:

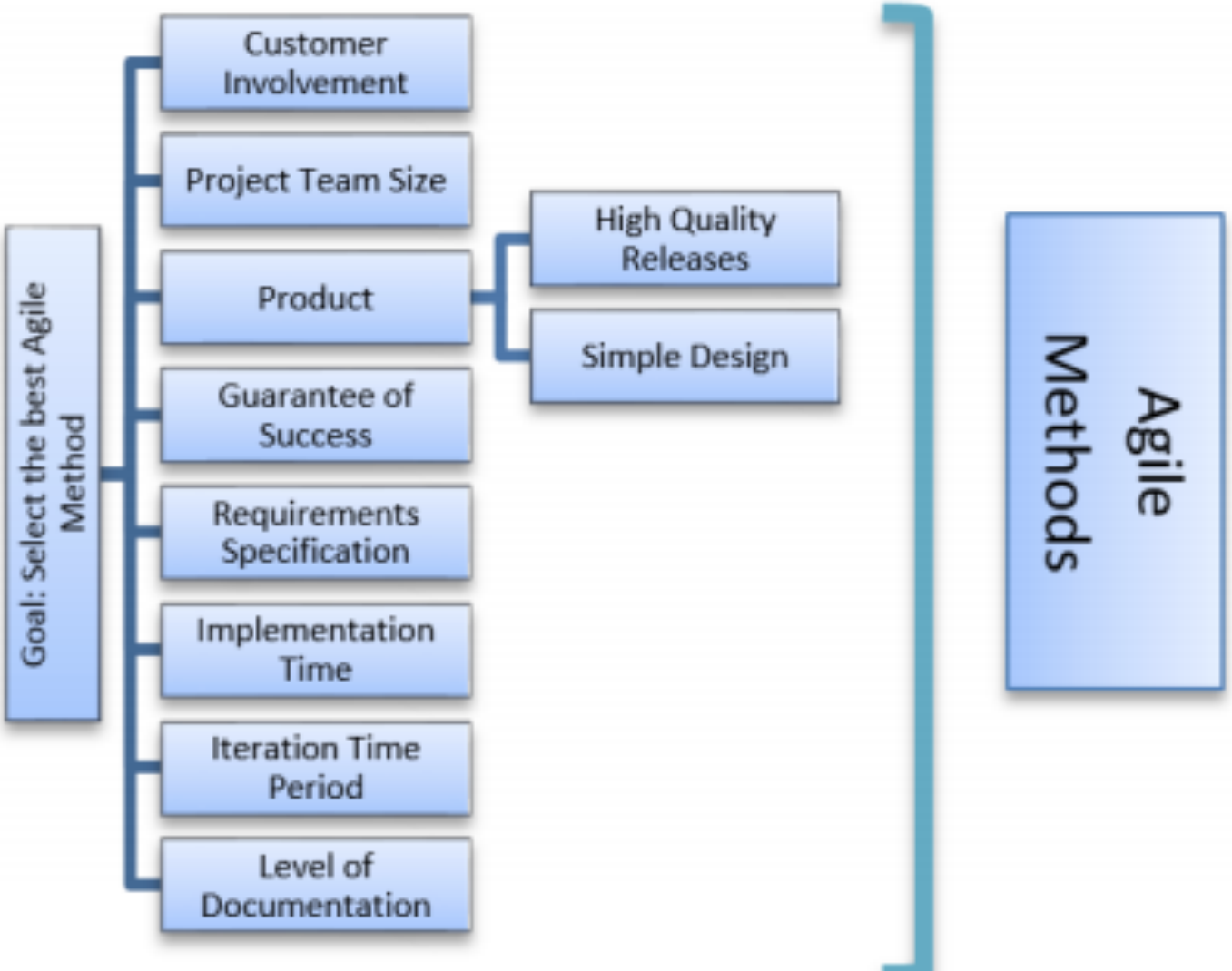
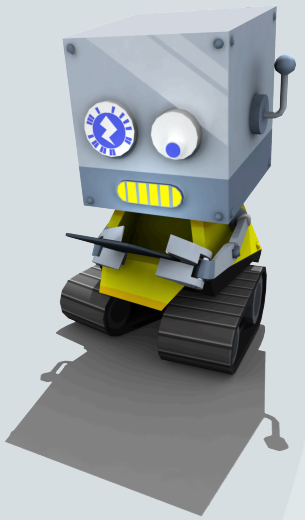


Figure 2. De-composition of the problem into hierarchy



Relative weight of each attribute

Value	Relative importance
1	Equal importance
3	Moderate importance
5	Strong importance
7	Very importance
9	eXtreme importance
2,4,6,8	Intermediate values between the two adjacent judgments
Reciprocal	"If activity i has one of the above numbers assigned to it when compared with activity j, then j has the reciprocal value when compared with i."

Table 4. Comparison values

comparison

Customer Involvement	XP	Scrum	FDD	Crystal
XP	1	1/2	1	1
Scrum	2	1	2	2
FDD	1	1/2	1	1
Crystal	1	1/2	1	1

Table 5: Pair-wise comparison of alternative with respect to the attribute "customer involvement"

comparison

Select best Agile Method	Customer involve-ment	Project team size	Final Product	Guarantee of success	Require-ments specifica-tion	Implemen-tation time	Iteration time period	Level of document-tation
Customer involve-ment	1	2	1	1	1	2	2	3
Project team size	1/2	1	1/2	1/3	1/2	1/2	1/2	2
Final Product	1	2	1	1	1	2	2	4
Guarantee of success	1	3	1	1	1	2	2	4
Require-ments specifica-tion	1	2	1	1	1	2	2	4
Implemen-tation time	1/2	2	1/2	1/2	1/2	1	1	4
Iteration time period	1/2	2	1/2	1/2	1/2	1	1	4
Level of document-tation	1/3	1/2	1/4	1/4	1/4	1/4	1/4	1

Table 6: pair-wise comparison of attributes with respect to choosing the best Agile Method objective

Results:

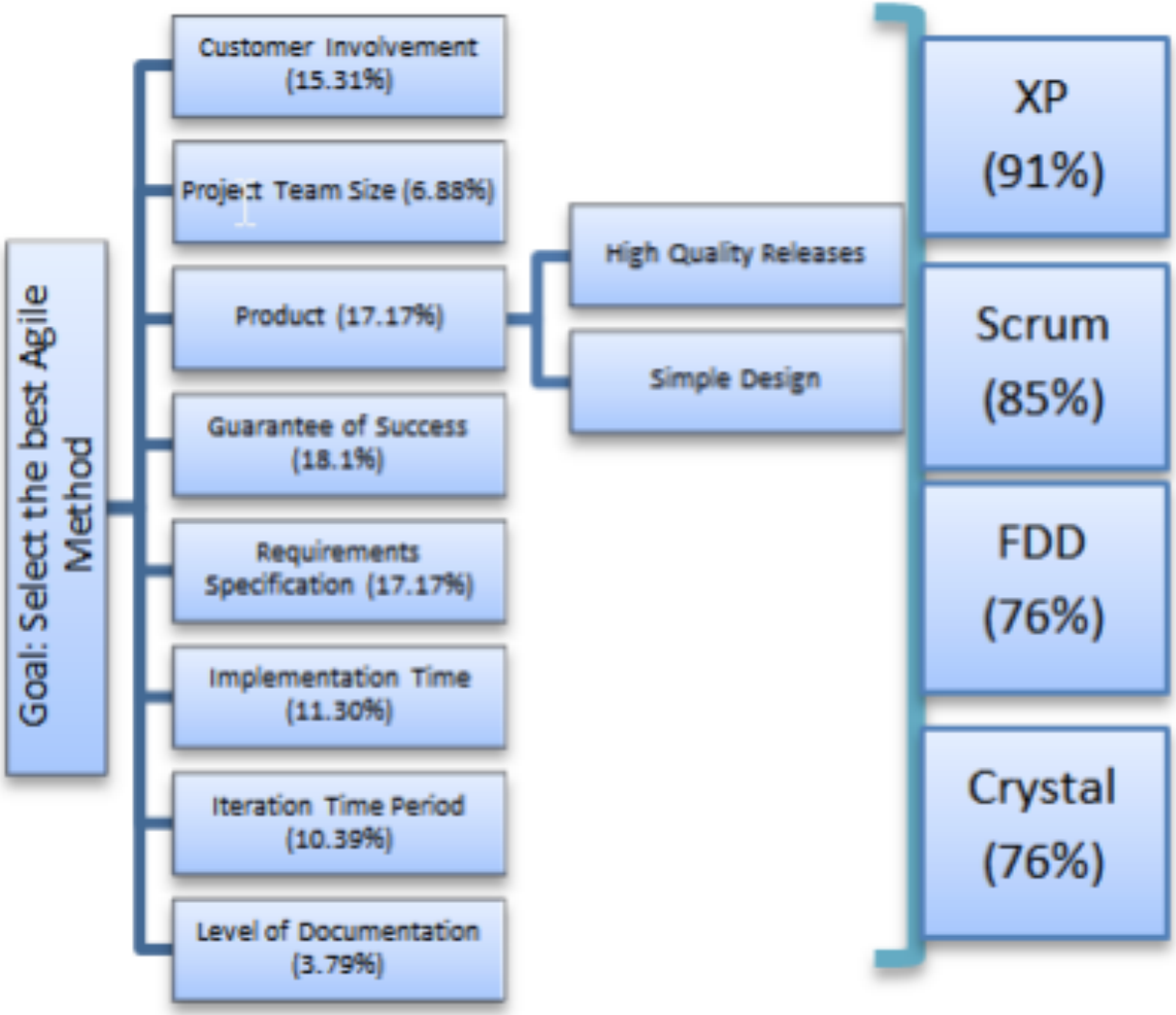


Figure 3. The solution