Development of the Decision Support System for Choosing Web Project Management Strategy under Conditions of Uncertainty

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Abstract—**The paper describes the development of the decision support system that helps to choose the strategy of management of web project under conditions of incomplete or inaccurate data.**

Keywords — decision support system; web project; project management; fuzzy logic; project strategy

I. INTRODUCTION

One of the key parts of the process of managing web project is the process of project planning. During this stage, the project manager's task is to make the key decisions concerning the further project management strategy. The less are the risks and the subjectivity factor at the very beginning, the more effective will be the process of project planning, developing and maintenance.

The decision-making system that is described in the article uses fuzzy logic [1] and analytic hierarchy process [2] in order to help project manager during the stage of planning work on project [3].

The data that the system uses for making decisions are called project characteristics. These characteristics describe the customer, the developer and the project's key peculiarities.

II. USE CASE DIAGRAM

Use Case diagram describes the relationships among acting sides (Client and Developer) and the system. [4] There are two sides in the project planning process: developer of the project and owner of the project (the client). The representative of project's developer is Project Manager.

Decision support system is an instrument that helps the Project Manager to organize information about the client and the project. Its main functions are to process data entered by the Project Manager, then to eliminate uncertainties in the data, and after this to choose the strategy of managing project.
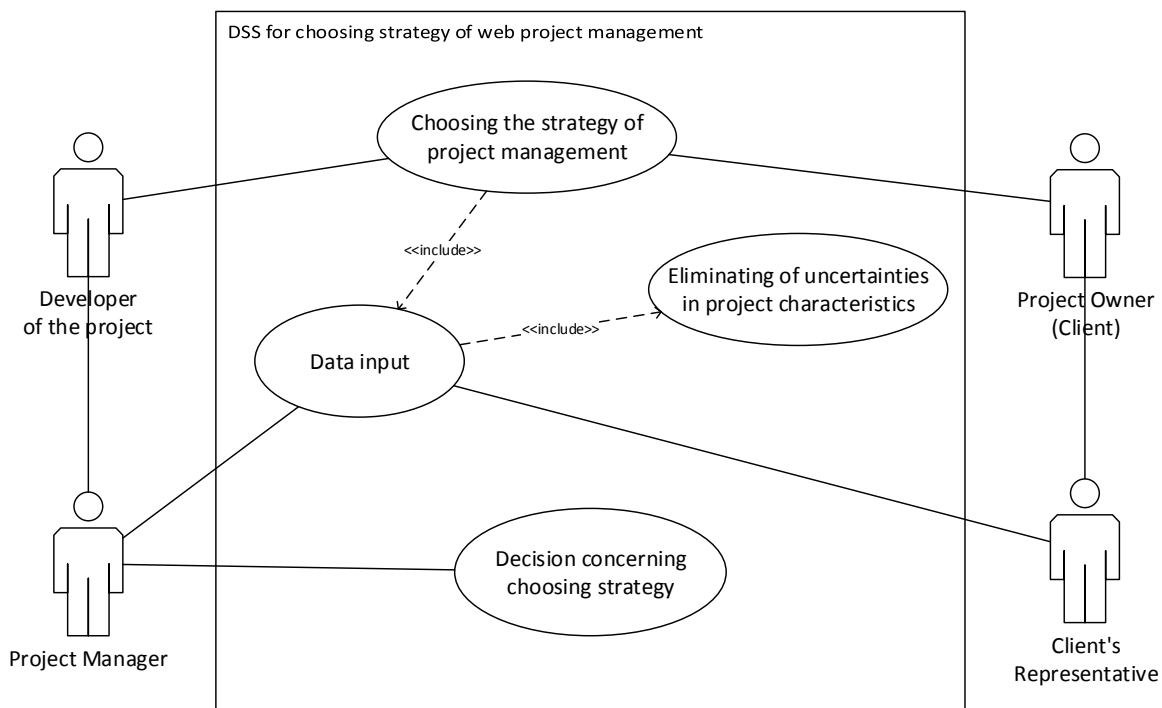

Fig. 1. *Use Case Diagram of Decision Support System for Choosing Web Project Management Strategy under Conditions of Uncertainty*

III. STATIC STRUCTURE DIAGRAM

Static structure diagram describes the classes of the system, their attributes and methods and the relationships among objects. [5] There are six main classes in the DSS for choosing project management strategy.

The class "Developer" has two attributes – developer's name and the array of developer's characteristics. There are two methods: one is updating information about project's characteristic that is selected. The second method for object of the class "Developer" is to reject project basing on incompleteness of the set of data about project or client and, therefore, impossibility of choosing project strategy. Alternatively, project rejection is a decision made because of processing of the project characteristics.

Objects of the class "Client" have such attributes as client's name and the set of client's characteristics. The method that such objects have is infomationUpdate() that is called when some data

about client or the project is missing. "Project" has such attributes as name, set of characteristics and project strategy that is undefined till the latest stage of the system's activity – choosing the project management strategy or impossibility to work with the project. The "Strategy" class consists of name and priority attributes and have one method choose (that takes arguments project Name, project Characteristics, strategy Priority) that implements the key functionality of the system.

"Project Characteristic" is a class of objects by type of characteristic of the project. Its objects have such attributes as name of the characteristics, value of the characteristic and the attribute that contains information if this characteristic is required for decision-making or not. "Uncertainty" class is related to the Project Characteristic class. Its objects have attributes that contains information about type of the uncertainty and methods that classify and eliminate this uncertainty.
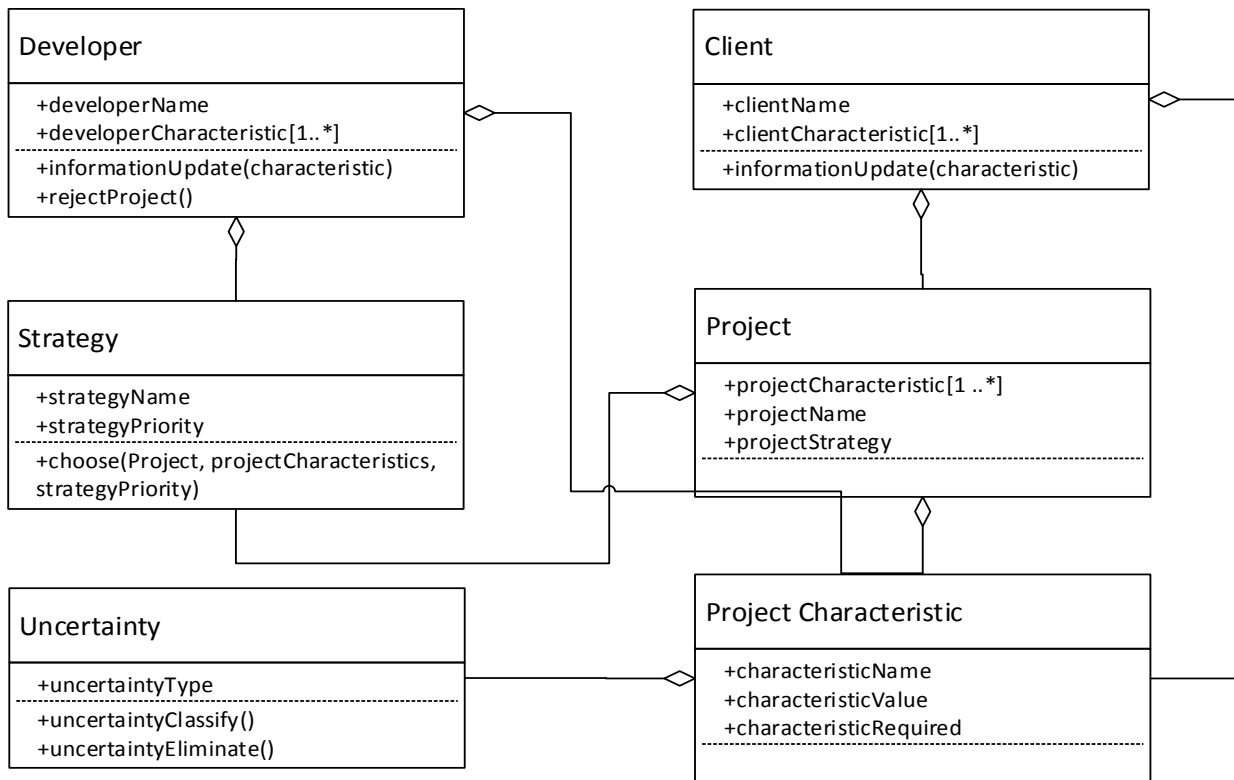

Fig. 2. *Static Structure Diagram of Decision Support System for Choosing Web Project Management Strategy under Conditions of Uncertainty*

IV. COMPONENT DIAGRAM

Component diagram describes the key functional program modules of the DSS and their relationships [5].

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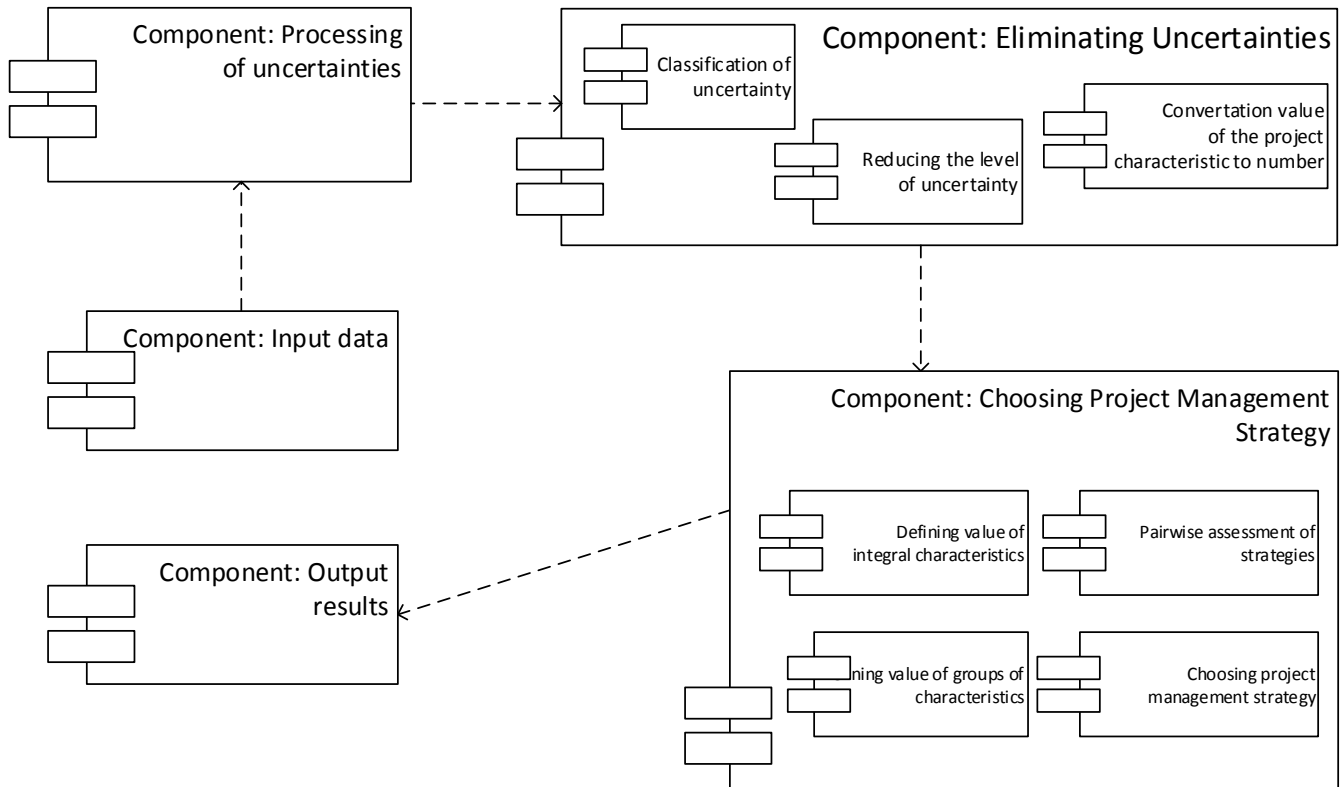

Fig. 3. *Component Diagram of Decision Support System for Choosing Web Project Management Strategy under Conditions of Uncertainty*

V. ACTIVITY DIAGRAM

The activity diagram describes the algorithm of performing interaction between Client, Developer and DSS. [6]

There are three key acting parties in the system: Client, Developer, System. The activity begins at the Client's side when he makes a decision about initiating the project. After this, Client collects and prepares all the needed information about the planned project and passes these data to Developer.

Developer's activity consists in processing the data from Client and then entering the post-processed data into the system.

When the data is passed to the system, the first check that the system performs is if all of required project characteristics are entered. If not, the requirement to complete the set of characteristic is returned to project manager. If all of the required fields have their values, the DSS can continue processing them.

The next step is eliminating uncertainties in project characteristics and then making decision concerning to choosing strategy of project management.

Then, the result is passed to the project manager who performs the further activity on project depending of results obtained by the system.

VI. PROGRAM DESCRIPTION

The DSS is intended to help Project Manager to make decisions concerning to the strategy of managing the project that is planned. The DSS is designed using SaaS principles. [7] The person who uses it will need a web browser Firefox, Chrome or Safari updated to the last version. The server side of the DSS is developer using PHP and MySQL database. User interface is developed using JavaScript, HTML5 and CSS3.

The system is dedicated to help perform tasks in project planning and management web-projects. The main task of the system is choosing the project management strategy basing on the information about the project, project's initiator and project developer.

Key algorithms of the DSS are the algorithm of eliminating uncertainties and the algorithm of choosing the strategy that is performed in several steps.
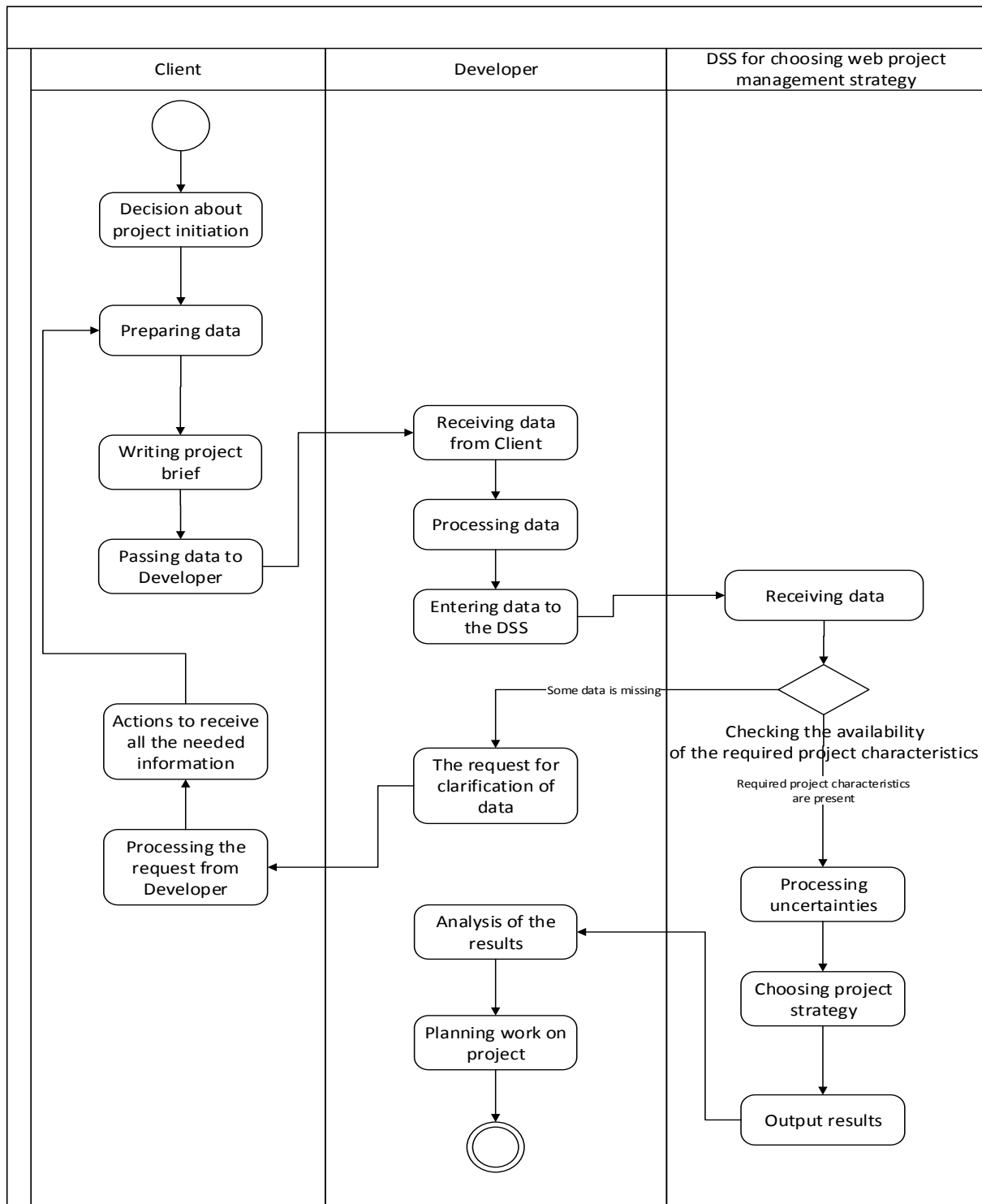
Fig. 4. *Activity Diagram of Decision Support System for Choosing Web Project Management Strategy under Conditions of Uncertainty*

VII. EVALUATION OF EFFECTIVENESS OF THE PROGRAM

The effect of the implementation of the DSS for choosing web project management strategy is reducing time and hours of work on project, especially on preliminary work, and, therefore, more effective use of project budget. The effect is achieved by the next steps:

- Reducing the amount of preliminary works:
  - Analyzing of business processes in client's organization.
  - Forming project requirements.
  - Correcting project requirements and project functionality.

- Improving the quality of decision made on project by reducing erroneous decisions and, therefore, expenses on their elimination.

- Increasing of productivity of the work on project.

- Reducing the total amount of the project work by reducing the number of erroneous decision and the amount of organizational work.

REFERENCES

[1] L. Zade "The concept of linguistic variable and its application to decision making ", Moscow, 1976

[2] T. Saaty "Decision making. Analytic Hierarchy Process", Moscow, 1993.

[3] K. A. Alekseyeva "Method Of Choosing Web Project Management Strategy With Using Of Modified Analytic Hierarchy Process" in Journal of Multidisciplinary Engineering Science and Technology (JMEST) Vol. 2 Issue 7, July - 2015, pp. 1946-1953.

[4] "UML Use Case Diagrams: Guidelines" Microsoft Developer Network, 2015. URL: https://msdn.microsoft.com/en-us/library/dd409432.aspx.

[5] A. Leonenkov "UML Self-tutorial" http://khpi-iip.mipk.kharkiv.edu/library/case/leon/gl5/gl5.html.

[6] D. Bell "UML basics Part II: The activity diagram" URL: https://www.ibm.com/developerworks/rational/library/content/RationalEdge/sep03/f_umlbasics_db.pdf, 2003.

[7] "Software as a Service (SaaS) definition" URL: http://searchcloudcomputing.techtarget.com/definition/Software-as-a-Service.