

ΤΕΧΝΟΛΟΓΙΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΥΠΡΟΥ
ΤΜΗΜΑ ΜΗΧΑΝΙΚΩΝ Η/Υ ΚΑΙ
ΠΛΗΡΟΦΟΡΙΚΗΣ



Υλοποίηση Εφαρμογής Λογισμικού
για το Υδροπαρκο Fasouri Watermania
Waterpark

Μετρικές Έργου Λογισμικού

- **Μέλη**

1. Αθηνόδωρος Μπουδουράκης
2. Χρίστος Ιωαννίδης
3. Μέμνων Κωνσταντίνου
4. Κώστας Παπανικολάου
5. Δημήτρης Χριστοδούλου

- **Επιβλέπων Καθηγητής : Δρ. Ανδρέας Σ. Ανδρέου**

Η Εργασία στον Τομέα Μηχανικής και Επαγγελματικής Πρακτικής υποβλήθηκε προς μερική εκπλήρωση των απαιτήσεων απόκτησης του πτυχίου Μηχανικών Η/Υ και Πληροφορικής του Τμήματος Μηχανικών Η/Υ και Πληροφορικής του Τεχνολογικού Πανεπιστημίου Κύπρου

Μάιος 2015

1 PROCESS METRICS

1.1 Development	1
1.2 Defects	2

1.1 Development

1.1.1 Development Effort (per phase in person-days)

Phases	Estimated Development Effort (Person-days)	Actual Development Effort (Person-days)
Requirements analysis	15	15
Requirements specification	9	10
System design	10	12
Implementation and integration	30	35
Testing	5	3

1.1.2 Development Duration (per phase in calendar-days)

Phases	Estimated Development Duration (Calendar-days)	Actual Development Duration (Calendar-days)
Requirements analysis	12	10
Requirements specification	9	8
System design	10	12
Implementation and integration	51	50
Testing	5	3

1.1.3 Slippage (Estimated minus Actual)

Phases	Development Effort (Person-days)	Development Duration (Calendar-days)
Requirements analysis	0	2
Requirements specification	1	1
System design	2	2
Implementation and integration	5	1
Testing	2	2

1.2 Defects

1.2.1 Number of Fault Corrections

The total number of corrected faults: **20**

1.2.2 Number of Requirements Changed

The number of requirements changed throughout the project: **20**

1.2.3 Number of Changes Due to Exogenous Factors (e.g., Legislation)

The number of changes required due to external factors: **10**

2 PERSON METRICS

2.1 Number of People Involved in the Project	3
2.2 Experience and Knowledge	3
2.3 Skills	4
2.4 Leadership	5
2.5 Team Cohesion	8

2.1 Number of People Involved in the Project (per phase)

Phase	Number of People
Requirements analysis	5
Requirements specification	5
System design	5
Implementation/integration	5
Testing	5

2.2 Experience and Knowledge (per member)

Experience and knowledge	Very Low	Low	Average	High	Very High
Αθηνώδορος			✓		
Χρίστος			✓		
Μέμνων			✓		
Κώστας			✓		
Δημήτρης			✓		

2.3 Skills (per phase per member)

Skills (Αθηνώδορος)	Very Low	Low	Average	High	Very High
Requirements analysis				✓	
Requirements specification			✓		
System design			✓		
Implementation/integration			✓		
Testing				✓	

Skills (Χρίστος)	Very Low	Low	Average	High	Very High
Requirements analysis			✓		
Requirements specification			✓		
System design				✓	
Implementation/integration				✓	
Testing				✓	

Skills (Μέμνων)	Very Low	Low	Average	High	Very High
Requirements analysis			✓		
Requirements specification				✓	
System design					✓
Implementation/integration				✓	
Testing			✓		

Skills (Κώστας)	Very Low	Low	Average	High	Very High
Requirements analysis				✓	
Requirements specification				✓	
System design			✓		
Implementation/integration			✓		
Testing				✓	

Skills (Δημήτρης)	Very Low	Low	Average	High	Very High
Requirements analysis			✓		
Requirements specification			✓		
System design			✓		
Implementation/integration					✓
Testing				✓	

2.4 Leadership

Leadership Requirements analysis	Very Low	Low	Average	High	Very High
Evaluation by member 1				✓	
Evaluation by member 2			✓		
Evaluation by member 3				✓	
Evaluation by member 4				✓	
Evaluation by member 5			✓		

Leadership Requirements specification	Very Low	Low	Average	High	Very High
Evaluation by member 1				✓	
Evaluation by member 2			✓		
Evaluation by member 3			✓		
Evaluation by member 4			✓		
Evaluation by member 5				✓	

Leadership System design	Very Low	Low	Average	High	Very High
Evaluation by member 1			✓		
Evaluation by member 2				✓	
Evaluation by member 3				✓	
Evaluation by member 4			✓		
Evaluation by member 5			✓		

Leadership Implementation/integration	Very Low	Low	Average	High	Very High
Evaluation by member 1			✓		
Evaluation by member 2			✓		
Evaluation by member 3			✓		
Evaluation by member 4				✓	
Evaluation by member 5				✓	

Leadership Testing	Very Low	Low	Average	High	Very High
Evaluation by member 1				✓	
Evaluation by member 2			✓		
Evaluation by member 3			✓		
Evaluation by member 4				✓	
Evaluation by member 5				✓	

2.5 Team Cohesion (per phase)

Team Cohesion	Very Low	Low	Average	High	Very High
Requirements analysis				✓	
Requirements specification				✓	
System design			✓		
Implementation/integration					✓
Testing				✓	

3 PRODUCT METRICS

3.1 System Attributes	8
3.2 System Size	10
3.3 Constraints	13

3.1 System Attributes

3.1.1 Development Platform (e.g., PC, Mid-Range, Mainframe, Multiplatform)

The primary development platform of the system (as determined by the operating system used) is: Notepad++, Sublime Text 2/3

3.1.2 Language Type(s) (e.g., 3GL, 4GL, Application Generator)

The language type used for the project is: 4GL

3.1.3 Primary Programming Language(s) (e.g., JAVA, C, VB)

The primary language used for the development:

Functionality : PHP, AJAX

Graphical User Interface : HTML,CSS, JAVASCRIPT/JQUERY

3.1.4 Business Area Type (e.g., Manufacturing, Personnel, Finance)

The type of business area addressed by the project is: Personnel

3.1.5 Application Type (e.g., Information System, Transaction/Production System, Process Control)

The type of application addressed by the project is: Information System

3.1.6 System Type (e.g., Real-time System, Embedded System, Distributed System, Simple Software, Web Application)

The type of software addressed by the project is: Web Application

3.1.7 Level of Case Tools Used

A/A	Case Tool	Very Low	Low	Nominal	High	Very High
1	Sublime Text 2/3		✓			
2	PHPMYAdmin			✓		
3	Web Browser	✓				

Very Low Edit, code, debug

Low Simple front-end, back-end CASE, little integration

Nominal Basic life-cycle tools, moderately integrated

High Strong, mature life-cycle tools, moderately integrated

Very High Strong, mature, proactive life-cycle tools, well-integrated with process, methods, reuse

3.1.8 Use of Case Tools (per phase)

Case Tool 1 Sublime Text 2/3	Very Low	Low	Nominal	High	Very High
Requirements analysis	✓				
Requirements specification	✓				
System design	✓				
Implementation/integration					✓
Testing					✓

Case Tool 2 PHPMYAdmin	Very Low	Low	Nominal	High	Very High
Requirements analysis	✓				
Requirements specification	✓				
System design				✓	
Implementation/integration					✓
Testing					✓

Case Tool 3 Web Browser	Very Low	Low	Nominal	High	Very High
Requirements analysis	✓				
Requirements specification	✓				
System design					✓
Implementation/integration					✓
Testing					✓

3.2 System Size

3.2.1 Lines of Code

Use the tool to produce the reports measuring:

- Number of source code lines : **112210**
- Number of blank lines : **19290**
- Number of comment lines : **10678**
- Number of mixed lines (code and comments):**715**
- Percentage of comments lines:**10,5%**
- Percentage of blanks lines: **5,8%**
- Percentage of source code lines :**83,7%**

3.2.2 Number and Complexity of Function Points

Component	Simple	Average	Complex	Total
Inputs	1	8	25	34
Outputs	1	4	50	55
Inquiries	2	10	30	52
Total	4	22	105	131

3.2.3 Influence of General System Characteristics (see Appendix A)

General System Characteristic	None	Very Little	Little	Mode-rate	High	Very High
Data communication		✓				
Distributed data processing	✓					
Performance objectives		✓				
Heavily used configuration		✓				
Transaction rate		✓				
Online data entry	✓					
End-user efficiency					✓	
Online update	✓					
Complex processing				✓		
Reusability					✓	
Installation ease						✓
Operational ease					✓	
Multiple site use				✓		
Facilitate change					✓	

3.2.4 Number and Complexity of Modules or Classes

Complexity	Very Low	Low	Average	High	Very High	Total
Number of modules/classes -						70
3GL modules to support 4GL						70

3.2.5 Number and Complexity of Entities in the ERD

Complexity	Very Low	Low	Average	High	Very High	Total
Number of entities	4	3	2	1	0	10

3.2.6 Number and Complexity of Tables in the Database

Complexity	Very Low	Low	Average	High	Very High	Total
Number of tables	5	5	8	3	3	24

3.2.7 Number and Complexity of Functions or Methods

Complexity	Very Low	Low	Average	High	Very High	Total
Number of functions/methods	18	22	10	10	10	70

3.2.8 Number and Complexity of Algorithms

Complexity	Very Low	Low	Average	High	Very High	Total
Number of algorithms		1	2	2		5

3.2.9 Number and Complexity of Input Screens

Complexity	Very Low	Low	Average	High	Very High	Total
Number of input screens	13	8	9	8	10	48

3.2.10 Number and Complexity of Queries

Complexity	Very Low	Low	Average	High	Very High	Total
Number of queries	30	50	75	30	15	200

3.2.11 Number and Complexity of Reports

Complexity	Very Low	Low	Average	High	Very High	Total
Number of reports	1	2	3	1	2	9

3.2.12 Number of Document Pages (per phase)

Phase	Number of Pages
Requirements analysis	45
Requirements specification	37
System design	65
Implementation/integration	6
Testing	15
Total	168

3.3 Constraints

3.3.1 Software Quality (see Appendix B)

Has the end-user requested for a specific quality measure to be implemented?

No he has not.

3.3.2 Interconnections with Existing Systems

Does the system interact with any other existing systems?

It is a standalone System

APPENDIX A

General system characteristics as defined by IFPUG

General System Characteristics	Brief Description
Data communications	How many communication facilities are there to aid in the transfer or exchange of information with the application or system?
Distributed data/processing	How are distributed data and processing functions handled?
Performance objectives	Is response time or throughput performance critical?
Heavily used configuration	How heavily used is the current hardware platform where the application will be executed?
Transaction rate	Is the transaction rate high?
Online data entry	What percentage of the information is entered online?
End-user efficiency	Is the application designed for end-user efficiency?
Online update	How many data files are updated online?
Complex processing	Is the internal processing complex?
Reusability	Is the application designed and developed to be reusable?
Conversion/installation ease	Are automated conversion and installation included in the system?
Operational ease	How automated are operations such as backup, startup, and recovery?
Multiple site use	Is the application specifically designed, developed, and supported to be installed at multiple sites with multiple organisations?
Facilitate change	Is the application specifically designed, developed, and supported to facilitate change and ease of use by the user?

APPENDIX B

General software characteristics and their factor decomposition as defined by ISO 9126

General Characteristic	Factors	Definition
Functionality	Suitability	Attributes of software that bear on the presence and appropriateness of a set of functions for specified tasks. (ISO 9126: 1991, A.2.1.1)
	Accuracy	Attributes of software that bear on the provision of right or agreed results or effects. (ISO 9126: 1991, A.2.1.2)
	Interoperability	Attributes of software that bear on its ability to interact with specified systems. (ISO 9126: 1991, A.2.1.3)
	Compliance	Attributes of software that make the software adhere to application related standards or conventions or regulations in laws and similar prescriptions. (ISO 9126: 1991, A.2.1.4)
	Security	Attributes of software that bear on its ability to prevent unauthorized access, whether accidental or deliberate, to programs and data. (ISO 9126: 1991, A.2.1.5)
System reliability	Maturity	Attributes of software that bear on the frequency of failure by faults in the software. (ISO 9126: 1991, A.2.2.1)
	Fault tolerance	Attributes of software that bear on its ability to maintain a specified level of performance in cases of software faults or of infringement of its specified interface. (ISO 9126: 1991, A.2.2.2)
	Crash frequency	The number of the system crashes per unit of time.
	Recoverability	Attributes of software that bear on the capability to re-establish its level of performance and recover the data directly affected in case of a failure and on the time and effort needed for it. (ISO 9126: 1991, A.2.2.3)

Usability	Understandability	Attributes of software that bear on the users' effort for recognizing the logical concept and its applicability. (ISO 9126: 1991, A.2.3.1)
	Learnability	Attributes of software that bear on the users' effort for learning its application (for example, operation control, input, output). (ISO 9126: 1991, A.2.3.2)
	Operability	Attributes of software that bear on the users' effort for operation and operation control. (ISO 9126: 1991, A.2.3.3)
Efficiency	Time behaviour	Attributes of software that bear on response and processing times and on throughput rates in performing its function. (ISO 9126: 1991, A.2.4.1)
	Resource behaviour	Attributes of software that bear on the amount of resources used and the duration of such use in performing its function. (ISO 9126: 1991, A.2.4.2)
Maintainability	Analysability	Attributes of software that bear on the effort needed for diagnosis of deficiencies or causes of failures, or for identification of parts to be modified. (ISO 9126: 1991, A.2.5.1)
	Changeability	Attributes of software that bear on the effort needed for modification, fault removal or for environmental change. (ISO 9126: 1991, A.2.5.2)
	Stability	Attributes of software that bear on the risk of unexpected effect of modifications. (ISO 9126: 1991, A.2.5.3)
	Testability	Attributes of software that bear on the effort needed for validating the modified software. (ISO 9126: 1991, A.2.5.4)
Portability	Adaptability	Attributes of software that bear on the opportunity for its adaptation to different specified environments without applying other actions or means than those provided for this purpose for the software considered. (ISO 9126: 1991, A.2.6.1)
	Installability	Attributes of software that bear on the effort needed to install the software in a specified environment. (ISO 9126: 1991, A.2.6.2)