ELECTRONIC PERSONALIZED HEALTH RECORDS FRAMEWORK: VALIDATION AND VERIFICATION FROM EXPERTS IN MALAYSIA

Noorayisahbe Mohd Yaacob[1], Mohd Khanapi Abd Ghani[2,] Abd Samad Hasan Basari[3], Mohamed Doheir[4], Abdelrafe Elzamly[5]

[1]Department of Software Engineering,, Faculty of Malaysia-Japan International Institute of Technology (MJIIT),
University of Technology Malaysia (UTM), Jalan Sultan Yahya Petra, 54100 Kuala Lumpur,
Federal Territory of Kuala Lumpur, Malaysia.

[2,3,4] Department of Software Engineering , Faculty of Information & Communication Technology,
Universiti Teknikal Malaysia Melaka, Hang Tuah Jaya,
76100 Durian, Tunggal, Melaka, Malaysia.
[4]Faculty Of Multimedia, Enforcement & Computing,, University Geomatika Malaysia (UGM)
[5]Faculty of computer and information technology, Al-Aqsa University, Palestine

Corresponding Author's Email: [1]noorayisahbe@utm.my

ABSTRACT: *A validation from the software framework is considered important in order to ensure the framework process and it capable to work. It is also important in delivering the right framework. The validation and verification of the framework consist of several methods and criteria.* ***Objective:*** *This study presents the validation and verification of the e-PHR framework in the Malaysia case study which has been conducted at two Information Technology (IT) company which are one a local company and the second company an international company, in Malaysia.* ***Method:*** *The proposed framework has been validated and verified by software experts from three different areas which are the software engineer, software architect, and software designer through several methods like surveys, interviews (formal /informal) including questionnaires from several perspectives such as for architecture-aspect related to (i) components of proposed framework, (ii) functionalities of proposed framework, (iii) solution of framework process; another aspect viability of the framework; implementation process and; user acceptance. The feedback from them has been analysed and revised which has been presented in another related journal.* ***Results:*** *Based on the validation and verification, the feedback shown positive from three different areas of expertise for the framework process. Also, been stated that very clear and effective in the overall overview of the proposed framework. Easier understanding of the integration of existing flows with the proposed framework. The proposed framework functionalities' conciseness and clarity, they mentioned that the use cases described in the framework were easy to understand and implement in the actual setting of healthcare.* ***Discussion:*** *Proposed framework solution framework process and explanation were very clear and concise. For the design aspect, the design of the proposed framework was succinct and very easy to understand as well. The proposed framework architecture framework was a good way in its current form for incorporating such an innovation. Besides that, the expert also gives several suggestions for the proposed framework for further enhancement and improvement such as including a few cases like cholesterol monitoring level in functionalities also having the option of listing the top clinic in the particular city chosen by users as well as to provide the option to view by month and by choosing the range of the month. For the viability aspect, the expert has stated that the proposed framework is flexible and enabled patients' health records can be accessed at anywhere any time via pervasive devices. Implementation process aspect, the expert mentioned that they are really excited to implement this framework for the current and future systems used. It should continue to be practiced at UTeM health centres and throughout private or government health centres in Malaysia.* ***Conclusions:*** *Validation and verification are crucial parts that should be conducted, it describes how the system is tested internally. The expert stated 100% no any barriers to the possibility of implementation or acceptance of the proposed framework be overcome with comments and recommendations. In order to measure the acceptance level of users the prototype system for e-PHR has been developed and distributed among patients. This study has contributed to the body of knowledge in the field of health informatics. A further suggestion for this research has been discussed and presented.*

Keywords: Software Validation & Verification, Software Architecture, e-Health, ePHR

INTRODUCTION

Validation of framework refers to the process of validating the proposed framework to measure specifications and fulfills research objectives in order to maintain the software quality[1, 2]. It may also be referred as software quality control [3, 4]. This study explained the details about validation through interviews and questionnaires [5] used to validate and verify the proposed framework in order to obtain feedback from software experts and user satisfaction [6, 7]. In order to ensure it can be implemented in the Malaysian Medical Healthcare system [8–10] for the continuous use and seamless upkeep of LHR [4, 11, 12]. The validation and verification in this study has been conducted in two stable IT companies located in Malacca to verify the architecture[13] of the proposed framework. The validation for interview questions and aspects has been adapted from [14]. The purpose of this process is to make sure that the framework process is right and its capacity to implement at UTeM Health Center and other hospitals and clinics in Malaysia in order to achieve the objective of this research and also to provide excellent solutions through this enhancement of current framework in Healthcare environment [15, 16].

METHOD

This process was carried out in order to generate evidence for the following three issues:

i)   *To test the functionality and non-functionality of the system*

ii) *To validate the need for the prototype system for proposed framework focus on patients retrieves medical health records.*

iii) *To validate the prototype system for framework through interview and questionnaire.*

iv) *The prototype system for Proposed frameworks acceptable as it is;*

v)   *The prototype system for Proposed frameworks acceptable but requires certain modifications.*

According to [14], The use of various case studies will lead to widely accepted evidence for a prototype system for the proposed framework. The questions related to the validation of the prototype system for the proposed framework have been addressed in the following sections: 1) the system testing; and 2) the applicability of the prototype system for the proposed framework. System testing for the prototype system for the proposed framework has been tested by analyzing test cases and test results. This framework has been validated by analyzing feedback and responses from the following:

1. Architectural of proposed framework
   i.   Components of Proposed Framework
   a) The explanation for proposed framework components concise and clear?
   b) The roles of proposed framework components described adequately?
   c) Do you have any suggestions that you would like to make to revise the proposed framework components?
   ii. Functionalities of Proposed Framework
   a) The proposed framework functionalities (use cases) concise and easy to understand and implement?
   b) Do you agree with the processes described in the proposed framework use cases?
   c) Based upon your experience, are there any critical use cases that you would like to incorporate in the proposed framework functionality?
   iii. Solution of Framework Process
   a) The proposed framework solution framework process easy to understand and implement?

b) Do you agree with the solution framework flow described in each of the scenarios?

   iv. Proposed framework design
   a) Do you think that the design of the proposed framework is concise and clear?
   b) Is the Proposed framework design scalable, flexible and easy to integrate with the existing system?

2. Viability of the framework
   a) Do you think there are any specific benefits that may not have been stated that might arise from the implementation of the proposed framework?
   b) What are probably the main problems that can impede the implementation of the proposed framework?
   c) If accompanied by a detailed supporting documentation, would you be willing to implement the proposed framework (system)?
   d) Do you think you will use the proposed framework in future?

3. Implementation Process
   Was the introduction to the proposed framework adequate?
   b) Do you have any suggestions for how the Proposed framework might be introduced in a more coherent and simple manner (please provide particulars)?
   c) Given the proposed framework user guide, would you be willing to implement the proposed framework (system)?
   d) Have any dispute by your users with regards to the possible implementation/acceptance of the proposed framework?
   e) If so, how could the barriers to the possible implementation/acceptance of the proposed frameworks overcome?

Validation of framework through Interview

The proposed framework has been validating through interview session in two companies' IT in Malacca to validate the framework process, architecture and design.

Table 1: Interviewer Background

Expert	Company	Position	Work Experience
1	A	Software Engineer	6 +
2	A	Software Engineer	4+
3	A	Software Engineer	3+
4	A	Software Engineer	2+
5	A	Software Engineer	4+
6	A	Software Engineer	2+
7	A	Software Developer	3+
8	A	Software Developer	4+
9	A	Software Developer	3+

| 10 | B | Software Developer | 5+ |

Interview Question

Table 2: The explanation of proposed framework

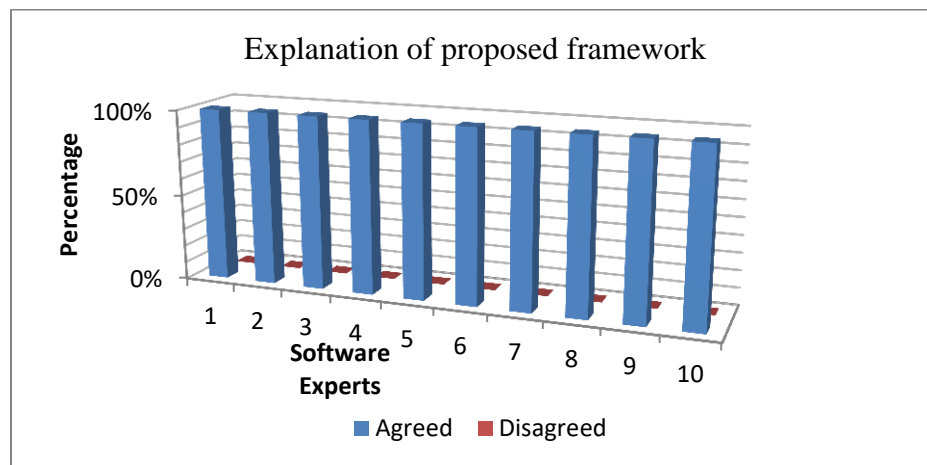| Software Experts	Disagreed	Agreed	Recommended / Comment
1		✓	Easy and succinct
2		✓	Easy and clear
3		✓	Yes, It is
4		✓	Yes, it's easy and succinct
5		✓	Yes, it is very easy to understand and succinct
6		✓	Yes, it's easy and succinct
7		✓	Yes, it is very easy to understand and succinct
8		✓	Easy and clear
9		✓	Yes, It is
10		✓	Easy and succinct

Figure 1: The explanation of proposed framework

Figure 1 shows feedback from the all experts, they totally 100% agreed with this explanation of the proposed framework with comments and recommendations it is succinct and easy to understand.

Table 3: The components of proposed framework

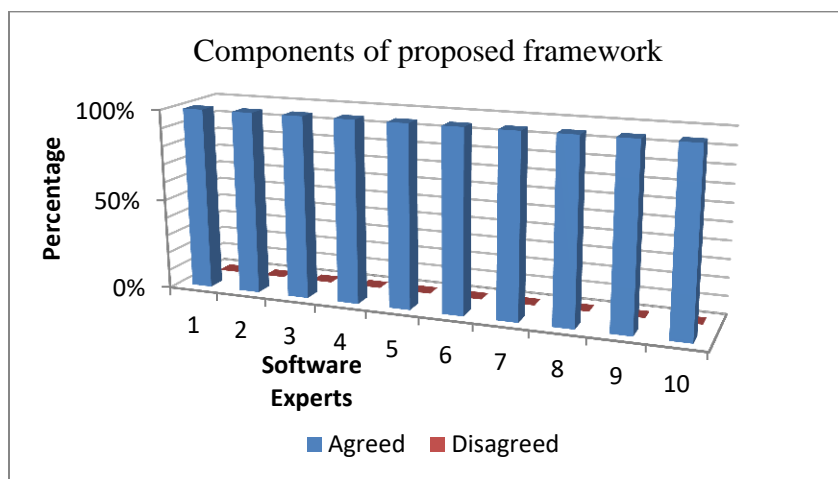| Software Experts	Disagreed	Agreed	Recommended / Comment
1		✓	Yes, it is can understand and contain of the component been described with complete requirement.
2		✓	Yes, It is
3		✓	Yes, it has been described with sufficiently
4		✓	Yes, it been described very clear
5		✓	Yes, it is can understand.
6		✓	Yes, It is
7		✓	Yes, it has been described with sufficiently
8		✓	Yes, it been described very clear
9		✓	Yes, it is can understand.
10		✓	Yes, it been described very clear

Figure 2: The components of proposed framework

Figure 2, Feedback from all experts totally 100% agreed with this component for the Proposed framework described sufficiently with comments and recommendations it is can understand and the content of the component has been described with the complete requirement

.Table 4: The functionalities of proposed framework

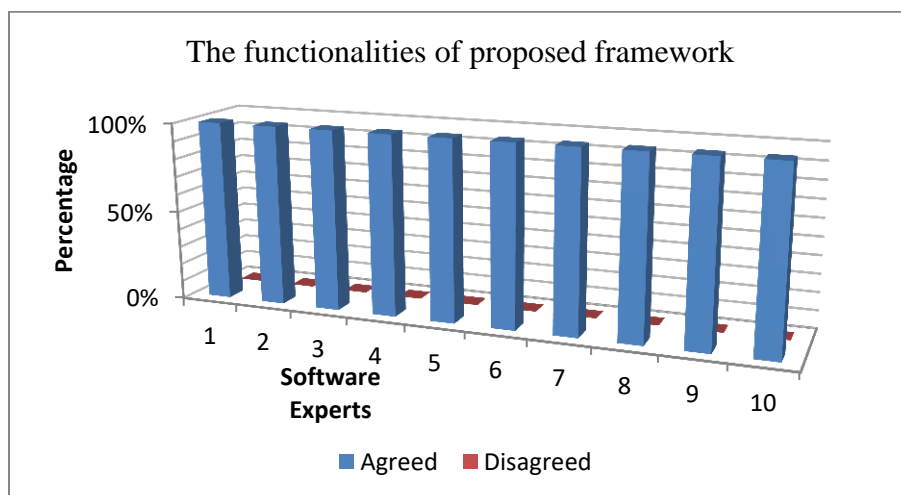| Software Experts	Disagreed	Agreed	Recommended / Comment
1	✓	✓	Yes, it very succinct and straightforward to understand and also can implement as well especially in Malaysia.
2	✓	✓	Yes, easy to understand and can be implement.
3	✓	✓	Yes, it is very succinct and straightforward to implement.
4	✓	✓	Yes, it is succinct and should implement.
5	✓	✓	Yes, it is can understand and implement
6	✓	✓	Yes, It is
7	✓	✓	Yes, it is succinct and should implement.
8	✓	✓	Yes, it is can understand and implement
9	✓	✓	Yes, it is can understand.
10	✓	✓	Yes, it is succinct and should implement.

Figure 3: The functionalities of proposed framework

Figure 3 shows feedback from all experts totally 100% agreed with the functionalities explained in the use cases succinct and straightforward to understand and implement with comments and recommendations it succinct, straightforward to understand and also can implement as well, especially in Malaysia.

Table 5: Process of proposed framework

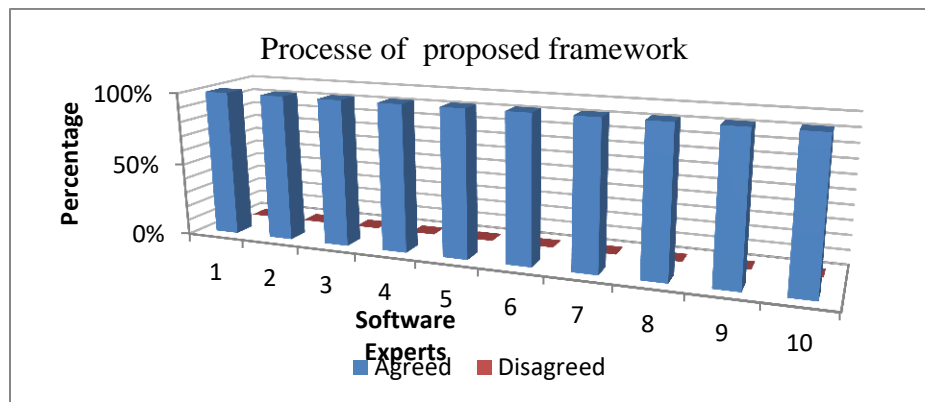| Software Experts	Disagreed	Agreed	Recommended / Comment
1		✓	Yes, agreed with use – case described
2		✓	Yes, the process of use – case been described enough with the scenario given.
3		✓	Yes, it is very clear to understand the use – cases.
4		✓	Agreed with process flow described.
5		✓	Agreed with process flow described.
6		✓	Agreed with process flow described.
7		✓	Agreed with process flow described.
8		✓	Agreed with process flow described.
9		✓	Agreed with process flow described.
10		✓	Agreed with process flow described.

Figure 4: Process of proposed framework

Figure 4 shows feedback from all experts, they totally 100% agreed with the processes described in the Proposed framework use cases with comments and recommendations on the process of use – the case has been described enough with the scenario given and also the process flow.

Table 6: Functionality of proposed framework

| Software Experts	Disagreed	Agreed	Recommended / Comment
1		✓	No. The proposed use – cases has been enough described process and it is already concise also clear as well.
2		✓	No further recommendation for additional use – cases.
3		✓	No at the moment.
4		✓	No at the moment.
5		✓	No at the moment. The process flows it's clear and so far, it's seem no need any further additional use – cases.
6		✓	No at the moment.
7		✓	No at the moment.
8		✓	No at the moment.
9		✓	No at the moment. The process already clear and succinct.
10		✓	No at the moment.
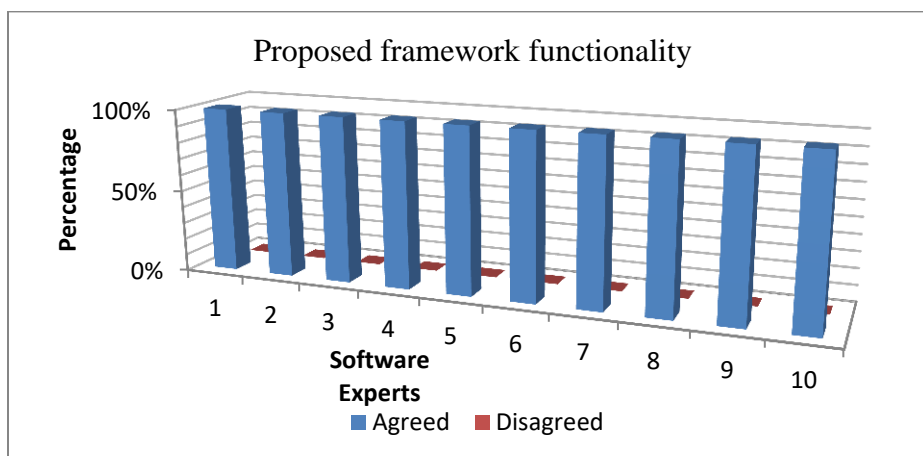
Figure 5: Functionality of proposed framework

Figure 5 shows feedback from all experts totally 100% agreed with use cases that already have in the proposed framework functionality with comments and recommendations the process flow . it's clear and so far, it seems no need for any further critical or additional use – cases and also, they don't have any critical use case need to add in for this moment

Table 7: Implementation solution of proposed framework

| Software Experts	Disagreed	Agreed	Recommended / Comment
1		✓	Yes, it is easy to understand and implement in Malaysia.
2		✓	Yes, can understand and should be implement.
3		✓	Yes, can understand and implement.
4		✓	Yes, the process of this solution for this framework is effortless to understand and implement.
5		✓	Yes, can understand and implement.
6		✓	Yes, can understand and implement.
7		✓	Yes, can understand and implement.
8		✓	Yes, can understand and should be implement.
9		✓	Yes, can understand and should be implement.
10		✓	Yes, can understand and should be implement.
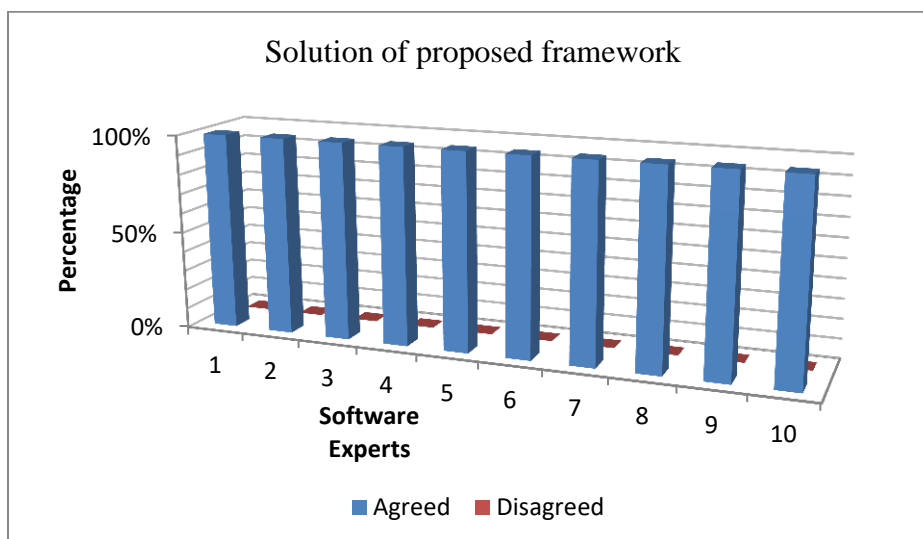
Figure 6: Implementation solution of proposed framework

Figure 6 shows feedback from all experts totally 100% agreed with use cases that already have in Proposed framework functionality with comments and recommendations the process flow it's clear and so far it seems no need for any further critical or additional use – cases also they don't have any critical use case need to add in for this moment.

Table 8: Solution framework in accessing method

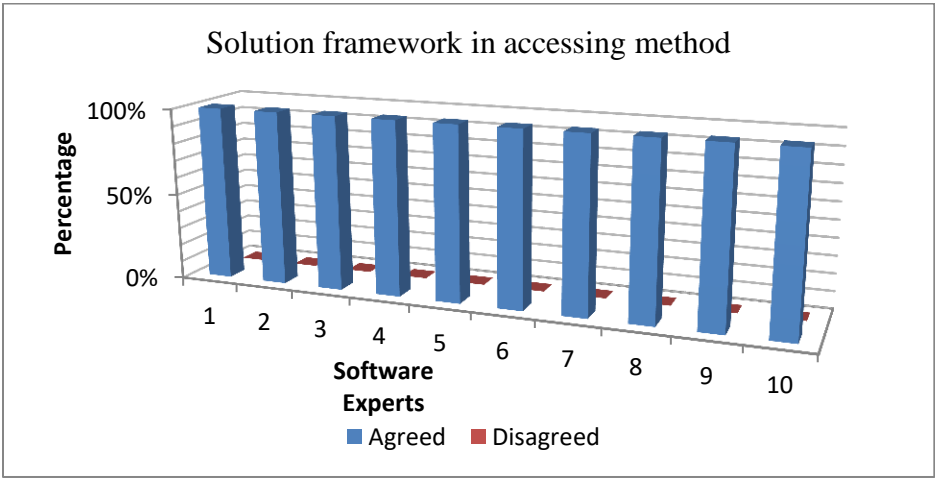| Software Experts	Disagreed	Agreed	Recommended / Comment
1		✓	Yes, the proposed solution framework could bring benefit to that healthcare center that still have inadequate to retrieve, store patient health records, it could provide continuous access and maintain to patient's health records.
2		✓	Yes, agreed with the solution framework flow for devices integrated method that has been described.
3		✓	Yes, agreed with the solution framework flow for devices integrated method that has been described.
4		✓	Yes, agreed with the solution framework flow for devices integrated method that has been described.
5		✓	Yes, agreed with the solution framework flow for devices integration.
6		✓	Yes, agreed with the solution framework flow for devices integration.
7		✓	Yes, agreed with the solution framework flow for devices integration.
8		✓	Yes, agreed with the solution framework flow for devices integration. It also good and excellent way.
9		✓	Yes, agreed with the solution framework flow for devices integration.
10		✓	Yes, agreed with the solution framework flow for devices integration.

Figure 7: Solution framework in accessing method

Figure 7 shown feedback from the all respondent they totally 100% agreed for the solution framework in accessing records method with comment and recommendation the proposed solution framework could bring benefit to that healthcare center that still have inadequate to retrieve, store patient
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health records, it could provide continuous access and maintain to patient's health records and also, they agreed with the solution framework flow for devices integrated method that has been described
.

Table 9: Method implement of proposed framework

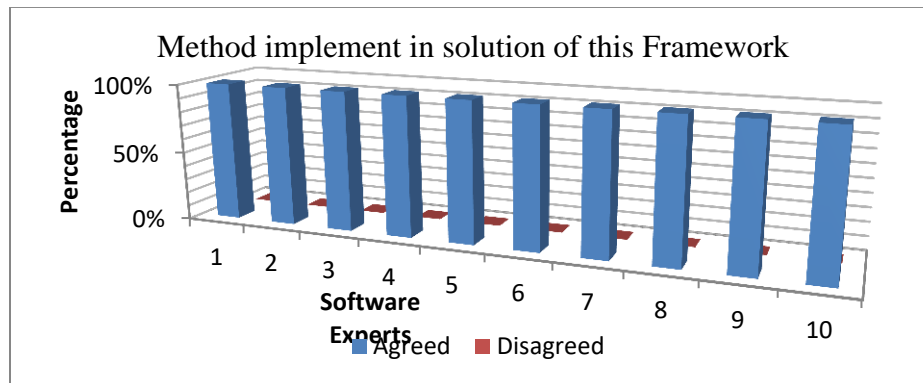| Software Experts	Disagreed	Agreed	Recommended / Comment
1		✓	Yes, agreed. It provides clear process on how to overcome to the problem and it's been described clearly with the example and scenario given.
2		✓	Yes, agreed. It provides clear process on how to overcome to the problem and it's been described clearly with the example and scenario given.
3		✓	Yes, agreed with the solution framework flow for method that has been implementing in this framework.
4		✓	Yes, agreed with the solution framework flow for method that has been implementing in this framework.
5		✓	Yes, agreed with the solution framework flow for method that has been implementing in this framework.
6		✓	Yes, agreed with the solution framework flow for method that has been implementing in this framework.
7		✓	Yes, agreed with the solution framework flow for method that has been implementing in this framework.
8		✓	Yes, agreed with the solution framework flow for method implementation. It also good and excellent way.
9		✓	Yes, agreed with the solution.
10		✓	Yes, agreed with the solution.

Figure 8: Method implement of proposed Framework

Figure 8 shows feedback from all experts totally 100% agreed with the method implemented in a solution of this framework with comments and recommendations It provides a clear process on how to overcome the problem and it's been described clearly with the example and scenario given, the solution framework flow for the method that has been implementing in this framework and It also good and excellent way.

Table 10: Architecture flow in proposed framework

Software Experts	Disagreed	Agreed	Recommended / Comment
1		✓	Yes, agreed. It provides clear process of architecture of Proposed framework flow and it should be implementing.
2		✓	Yes, agreed. The architecture of the framework flow was clear and concise.
3		✓	Yes, agreed with the architecture data flow for propose framework.
4		✓	Yes, agreed with the architecture data flow for propose framework.
5		✓	Yes, agreed with the architecture data flow for propose framework.
6		✓	Yes, agreed with the architecture data flow for propose framework.
7		✓	Yes, agreed with the architecture data flow for propose framework.
8		✓	Yes, agreed with the architecture data flow for propose framework.
9		✓	Yes, agreed with the architecture data flow for propose framework.

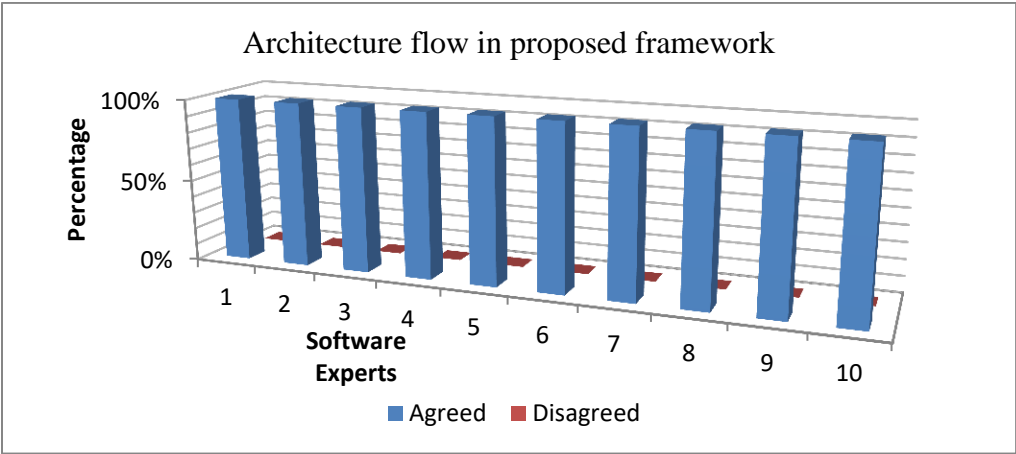| 10 | ✓ | Yes, agreed with the architecture data flow for propose framework. |

Figure 9: Architecture flow in proposed framework

Figure 9 shows feedback from all experts, they totally 100% agreed with the architecture flow to data that has been implemented in the proposed framework with comments and recommendations it provides a clear process of the

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architecture of the proposed framework flow and it should be implemented, the architecture of the framework flow was clear and concise and also architecture data flow for propose framework

Table 11: Flow described in each of the scenario

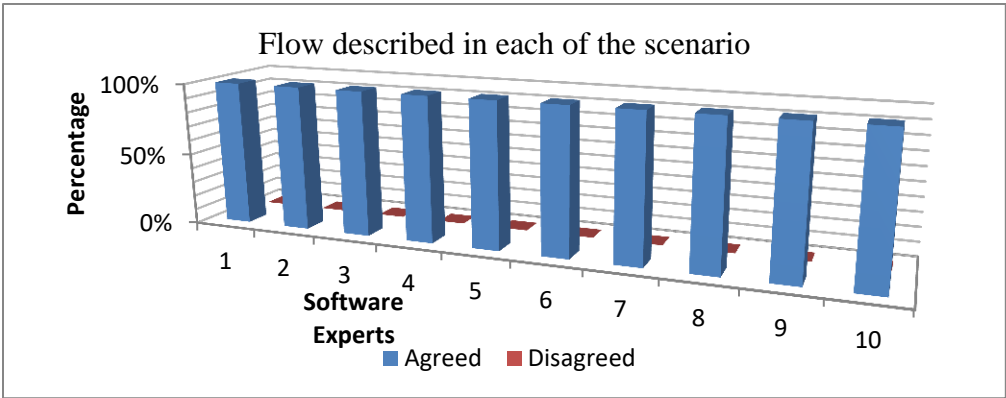| Software Experts	Disagreed	Agreed	Recommended / Comment
1		✓	Yes, agreed. It provides a very good implementation and good example for each scenario that has been explained.
2		✓	Yes, agreed.
3		✓	Yes, agreed. It a good solution
4		✓	Yes, agreed.
5		✓	Yes, agreed.
6		✓	Yes, agreed.
7		✓	Yes, agreed.
8		✓	Yes, agreed with the solution for each scenario.
9		✓	Yes, agreed with the solution for each scenario.
10		✓	Yes, agreed with the solution for each scenario.

Figure 10: Flow described in each of the scenario

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Figure 10 shows feedback from all experts totally 100% agreed with the solution of flow described in each of the scenarios with comments and recommendations it provides a very good implementation and a good example for each scenario that has been explained.

Table 12: Revise the proposed framework components architecture

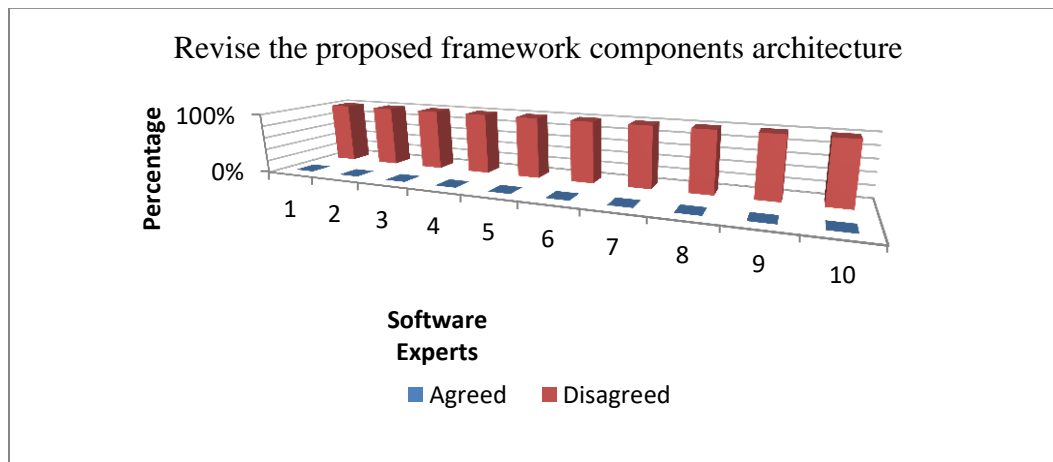| Software Experts	Yes	No	Recommended / Comment
1		✓	No any suggestion at the moment
2		✓	No any suggestion at the moment. It seems a complete component.
3		✓	No, I don't have any suggestion at the moment
4		✓	No any suggestion at the moment
5		✓	No any suggestion at the moment
6		✓	No any suggestion at the moment
7		✓	No any suggestion at the moment
8		✓	No any suggestion at the moment.
9		✓	No any suggestion at the moment
10		✓	No any suggestion at the moment.

Figure 11: Revise the proposed framework components architecture

Figure 11 shows all experts don't have any suggestions for the moment and the component of the framework architecture seems complete.

Table 13: Design aspect of proposed frameworks

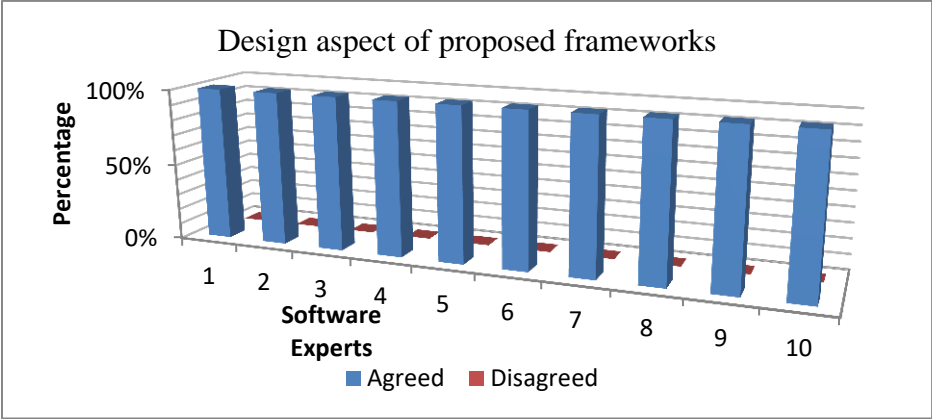| Software Experts	Yes	No	Recommended / Comment
1		✓	Yes, fairly clear and succinct.
2		✓	Yes, very clear and succinct.
3		✓	Yes, It clear and can understand and easy to see.
4		✓	Yes, It clear and can understand and easy to see.
5		✓	Yes, It clear and can understand and easy to see.
6		✓	Yes, very clear and succinct.
7		✓	Yes, very clear and succinct.
8		✓	Yes, very clear and succinct.
9		✓	Yes, very clear and succinct.

| 10 | ✓ | | Yes, very clear and succinct. |

Figure 12: Design aspect of proposed frameworks

Figure 12 shows feedback from all experts totally 100% agreed with the design of the proposed framework with comments and recommendations it is clear and can understand and easy to see. Additionally, also fairly clear and succinct

. **Table 14: Scalable and flexible of design solution**

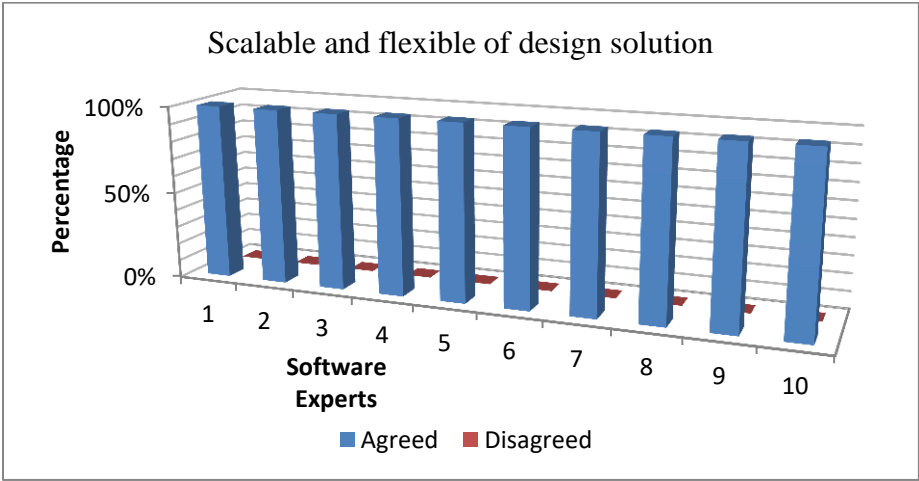| Software Experts	Yes	No	Recommended / Comment
1	✓		Yes, the data comply to the standard and the design is scalable, flexible also easy since it can be support from multi devices to access and it used the method is applicable to integrated with existing system.
2	✓		Yes, It seems easy to understand and standard also flexible as well.
3	✓		Yes, It seems easy to understand and standard also flexible as well.
4	✓		Yes, It seems easy to understand and standard also flexible as well.
5	✓		Yes, the design is scalable, flexible.
6	✓		Yes, the design is scalable, flexible and seem easy to see
7	✓		Yes, the design is scalable, flexible.
8	✓		Yes, the design is scalable, flexible.
9	✓		Yes, the design is scalable, flexible.
10	✓		Yes, the design is scalable, flexible.

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Figure 13: Scalable and flexible of design solution

Figure 13 shows feedback from all experts they totally 100% agreed for the proposed framework design is scalable and flexible with comments and recommendations the data comply with the standard and the design is scalable, flexible also easy since it can be supported from multi devices to access

.Table 15: Revise of design solution

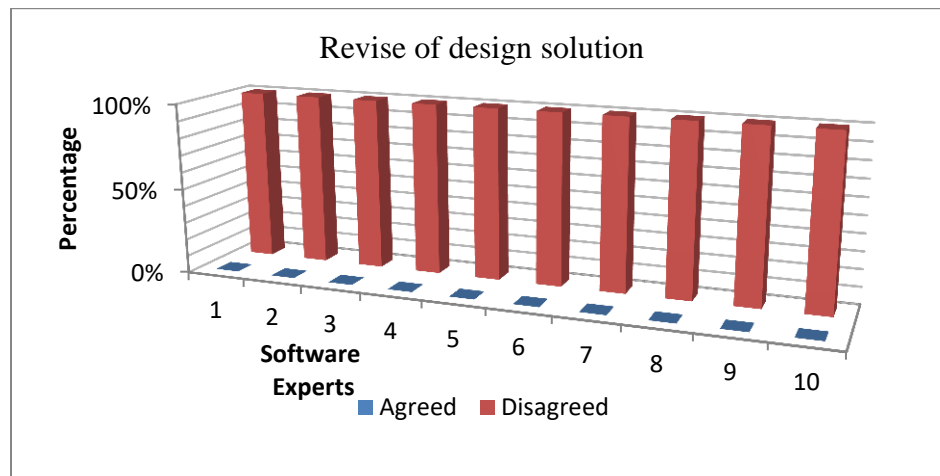| Software Experts	Yes	No	Recommended / Comment
1		✓	No any suggestion at the moment
2		✓	No any suggestion at the moment. It seems a complete component.
3		✓	No, I don't have any suggestion at the moment
4		✓	No any suggestion at the moment
5		✓	No any suggestion at the moment
6		✓	No any suggestion at the moment
7		✓	No any suggestion at the moment
8		✓	No any suggestion at the moment.
9		✓	No any suggestion at the moment
10		✓	No any suggestion at the moment.

Figure 14: Revise of design solution

Figure 14 shows all experts don't have any suggestions for the proposed framework design at the moment and the design of the framework seems clear.

Table 16: Specific benefits from implementation

Software Experts	YES	No	Recommended / Comment
1	✓		Proposed framework was designed in manner and provides advantages in maintaining the system for accommodating new and future requirement.
2	✓		Save the time to retrieve patient data.
3	✓		It gives many benefits to users while their can access their health records through many ways.
4	✓		Save the time to retrieve patient data.
5	✓		Proposed framework was designed in manner and provides advantages in maintaining the system for accommodating new and future requirement.
6	✓		It gives many benefits to users while their can access their health records in many platforms at any time anywhere.
7	✓		Provide multiple ways for patient to retrieve their medical records.
8	✓		Provide a good solution for accessing patient medical records.

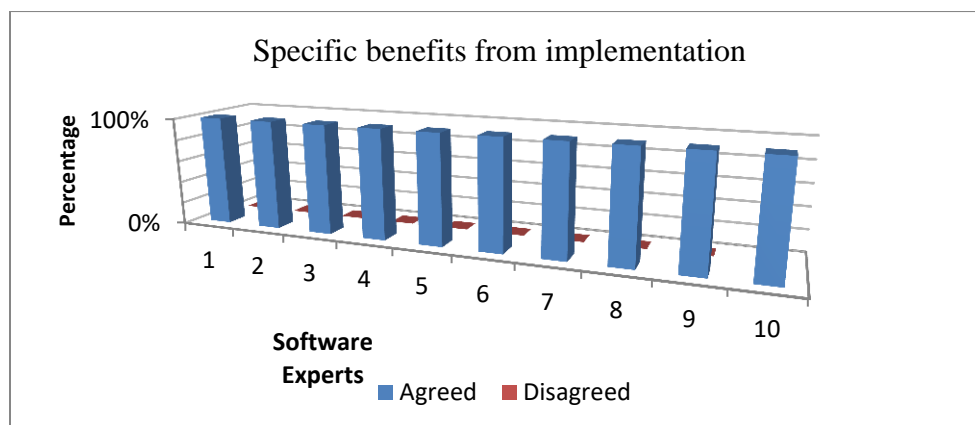| 9 | ✓ | It will save time and avoid to lose patient records |
| 10 | ✓ | Provide good solution in retrieving medical records also to keep as well. |

Figure 15: Specific benefits from implementation

Figure 15 shows feedback from all experts totally 100% think that there are specific benefits It may be that the implementation of the proposed framework with the comments and suggestions of the proposed framework has been designed in a way that gives the advantage of maintaining the system to meet new and future needs. Other than that, it saves time retrieving patient data. It also gives many benefits to users while there can access their health records in any way. The Proposed framework provides a good solution for accessing patient medical records.

Table 17: Impede of implementation

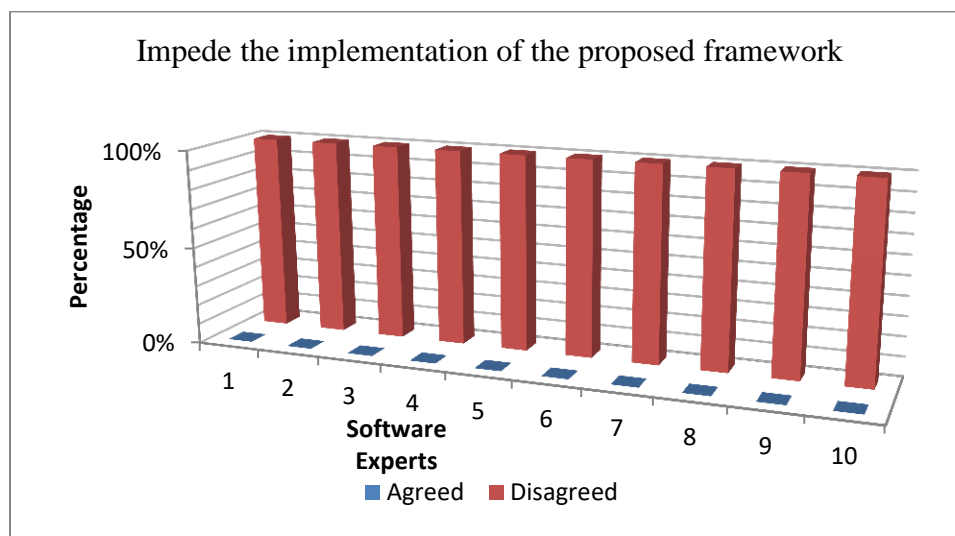| Software Experts	Yes	No	Recommended / Comment
1		✓	So far, cannot define the main problem that can impede the implementation at this moment.
2		✓	No, at this moment.
3		✓	No, at this moment.
4		✓	No, at this moment.
5		✓	No, at this moment.
6		✓	No, at this moment.
7		✓	Cannot define any main problem
8		✓	No, at this moment.
9		✓	No, at this moment.
10		✓	No, at this moment.

Figure 16: Impede the implementation of the proposed framework

Figure 16 shows all experts did not have a major problem that could impede the implementation of the proposed framework.

Table 18: Implement the proposed framework (System)

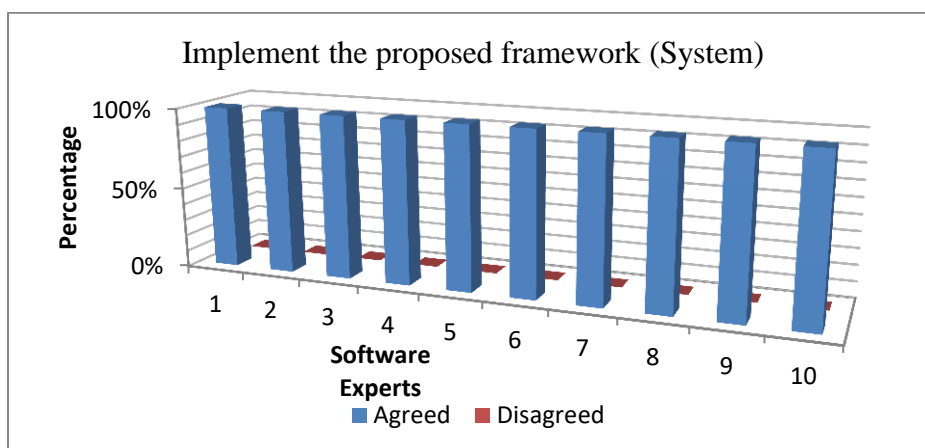| Software Experts	Yes	No	Recommended / Comment
1	✓		Yes, It should be implementing.
2	✓		Yes.
3	✓		Yes.
4	✓		Yes.
5	✓		Yes.
6	✓		Yes.
7	✓		Yes.
8	✓		Yes.
9	✓		Yes.
10	✓		Yes.

Figure 17: Implement the proposed framework (System)

Figure 17 shows feedback from all experts totally 100% said yes and were willing to implement the proposed framework.

Table 19: Future for the proposed framework

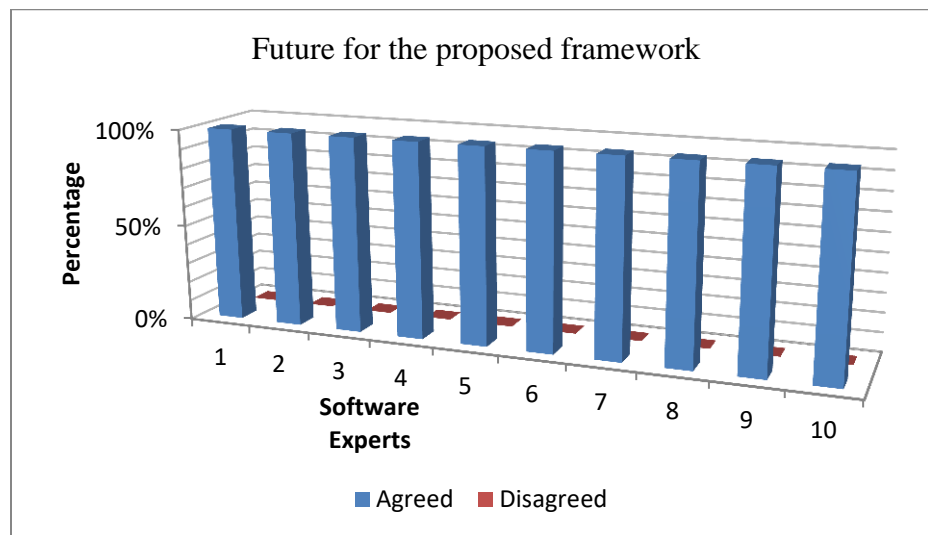| Software Experts	Yes	No	Recommended / Comment
1	✓		Yes, the framework has future
2	✓		Yes.
3	✓		Yes, the framework has future
4	✓		Yes, the framework has future
5	✓		Yes, the framework has future
6	✓		Yes.
7	✓		Yes.
8	✓		Yes.
9	✓		Yes.
10	✓		Yes.

Figure 18: Future for the proposed framework

Figure 18 shows experts who said yes to any future for the proposed framework with comments and recommendations for the proposed framework has future.

Table 20: Introduction to the proposed framework

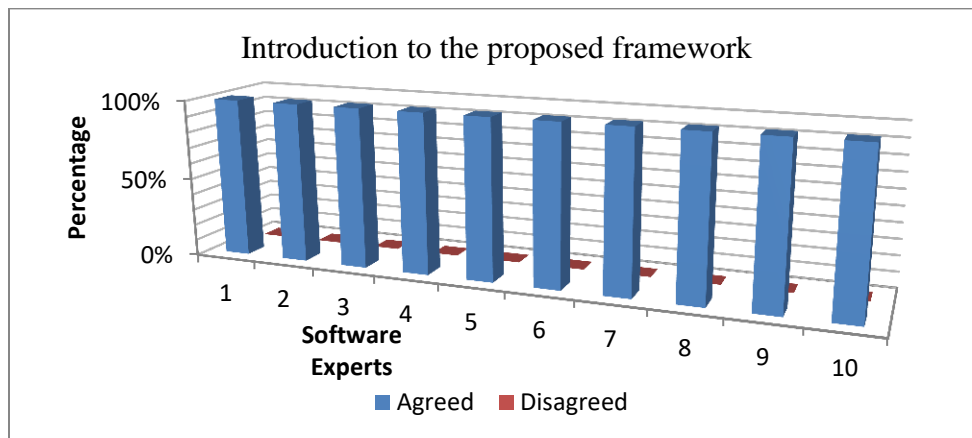| Software Experts	Yes	No	Recommended / Comment
1	✓		Yes, the introduction was clear and sufficient.
2	✓		Yes, It was presented adequately.
3	✓		Yes, the introduction was clear and sufficient.
4	✓		Yes, the introduction was clear and sufficient.
5	✓		Yes, the introduction was clear and sufficient.
6	✓		Yes.
7	✓		Yes.
8	✓		Yes.
9	✓		Yes.
10	✓		Yes.

Figure 19: Introduction to the proposed framework

Figure 19 shows all experts said yes to the introduction to the proposed framework sufficient with comments and recommendations the introduction was clear and sufficient

.Table 21: Suggestion on introduce of proposed framework

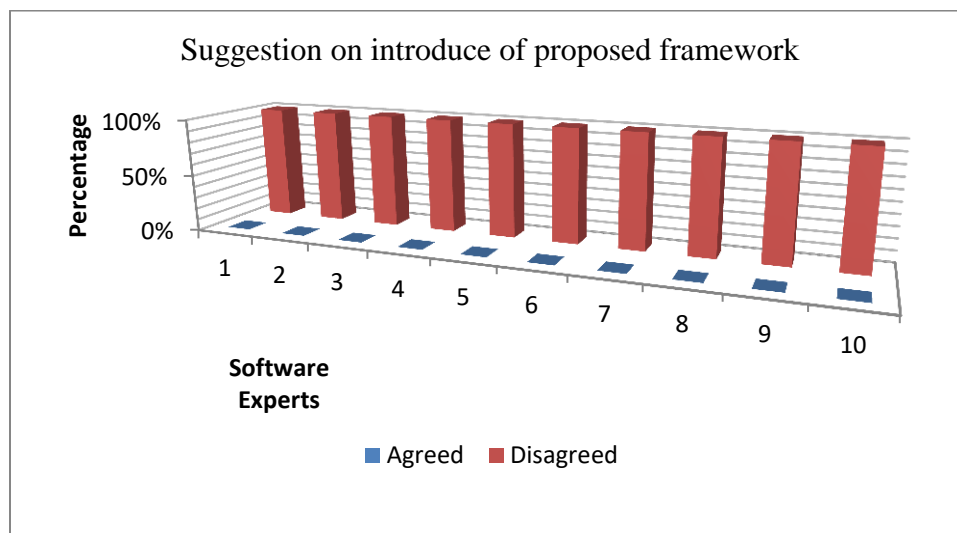| Interviewer	Yes	No	Recommended / Comment
1		✓	No any suggestion at the moment
2		✓	No any suggestion at the moment. It seems a complete component.
3		✓	No, I don't have any suggestion at the moment
4		✓	No any suggestion at the moment
5		✓	No any suggestion at the moment
6		✓	No any suggestion at the moment
7		✓	No any suggestion at the moment
8		✓	No any suggestion at the moment.
9		✓	No any suggestion at the moment
10		✓	No any suggestion at the moment.

Figure 20: Suggestion on introduce of proposed framework

Figure 20 shows feedback from all experts they don't have any suggestions on how to introduce the proposed framework in a more coherent and simple manner with comments and recommendations no any suggestion at the moment.

Table 22: Willing to implement

Software Experts	Yes	No	Recommended / Comment
1	✓		Yes, should be implementing.
2	✓		Yes.
3	✓		Yes.
4	✓		Yes.
5	✓		Yes.
6	✓		Yes.
7	✓		Yes.
8	✓		Yes.
9	✓		Yes.
10	✓		Yes.

Figure 21: Willing to implement

Figure 21 shows feedback from all experts they 100% agreed for willing to implement the proposed framework (system) with comments and recommendations it should be implemented.

Table 23: Implementation / acceptance of the proposed framework

Software Experts	Yes	No	Recommended / Comment
1		✓	No at the moment
2		✓	No.
3		✓	No.
4		✓	No.
5		✓	No.
6		✓	No.
7		✓	No.
8		✓	No.
9		✓	No.

10	✓	No.

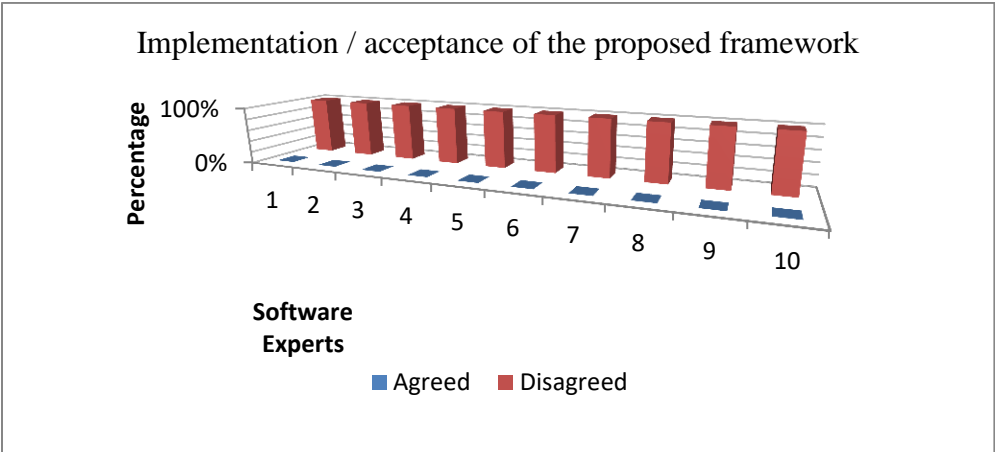**Figure 22: Implementation / acceptance of the proposed framework**

Figure 22 shows all experts don't have any dispute from your users about the possible implementation/acceptance of the proposed framework with comment and recommendation no at the moment.

Table 24: Overcome of proposed framework

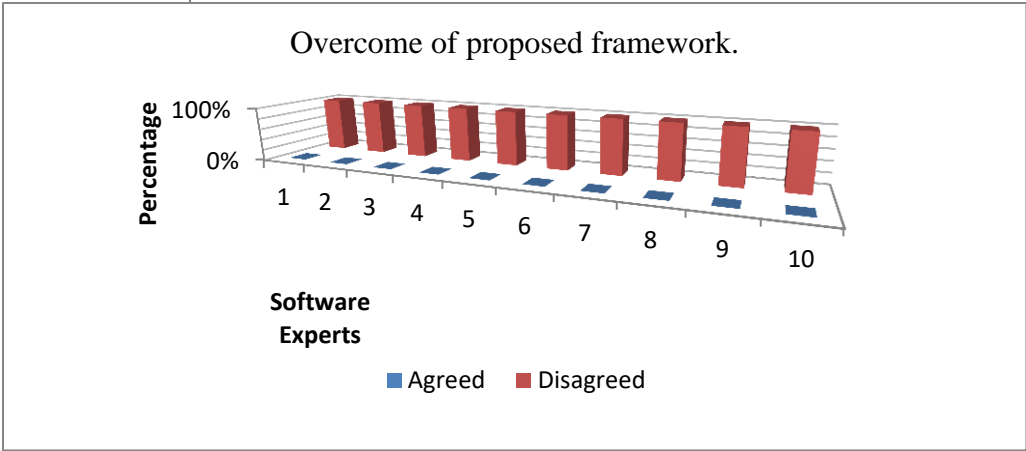| Software Experts	Yes	No	Recommended / Comment
1		✓	So far, didn't see any possible barrier that will influenced the implementation as all the planning of this framework is complete and plan properly.
2		✓	No.
3		✓	No.
4		✓	No.
5		✓	No.
6		✓	No.
7		✓	No.
8		✓	No.
9		✓	No.
10		✓	No.

Figure 23: Overcome of proposed framework.

Figure 23 shows feedback from all experts, they said 100% no barriers to the possible implementation/acceptance of the Proposed framework be overcome with comments and recommendations so far, didn't see any possible barrier that will influence the implementation as all the planning of this framework is complete and plan properly.

Table 25: Standard of data

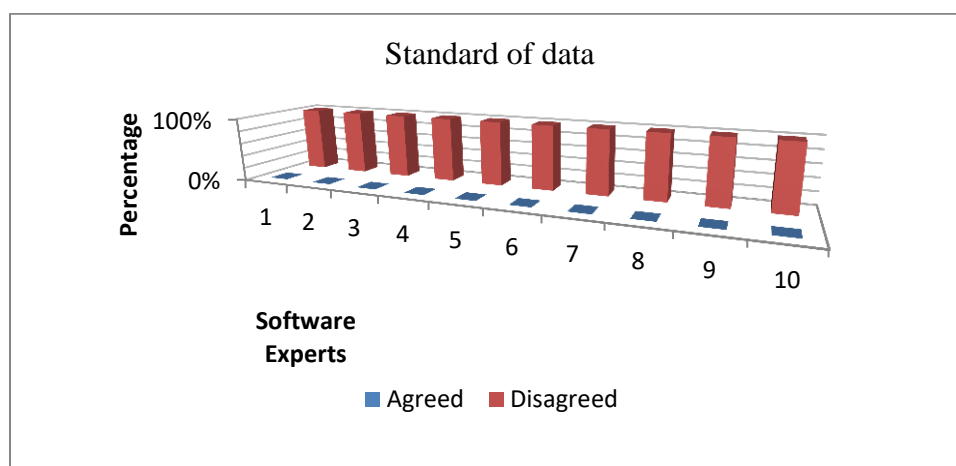| Software Experts	Yes	No	Recommended / Comment
1		✓	No, the data already look standard.
2		✓	No.
3		✓	No.
4		✓	No suggestion seems already standardize with world used.
5		✓	No.
6		✓	No.
7		✓	No.
8		✓	No.
9		✓	No.
10		✓	No.

Figure 24: Standard for data

Figure 24 shows feedback from all experts they said 100% that no standard for data was required before the implementation of the proposed framework with comments and recommendations and no suggestions, it seems already standardized with the world used and the data seem standard.

DISCUSSION
Based on the feedback from the expert, it can conclude that the component of the proposed framework components, it is very clear and effective in helping them get an overall overview of the proposed framework. This enables them to understand and integrate existing flows with the proposed framework. The proposed framework functionalities' conciseness and clarity, they mentioned that the use cases described in the framework were easy to understand and implement in the actual setting of healthcare. Other than that, it also can be concluded that the proposed framework solution framework process was easy to understand and implement that the explanation was very clear and concise. For the design aspect, the design of the proposed framework was succinct and very easy to understand as well. Other than that, it was clear and succinct. The proposed framework architecture framework was a good way in its current form for incorporating such an innovation. Other than that, have a suggestion for the proposed framework for further enhancement and improvement which is to include a few cases like Cholesterol Monitoring Level in functionalities and also to have the option of listing the top clinic in the particular city chosen by users as well as to

provide the option to view by month and by choosing the range of the month.

Feedback of Viability Aspect

For this aspect, they have suggested that the proposed framework is flexible and enabled patients' health records can be accessed at anywhere any time via pervasive devices including storing their personal health records in pervasive storage devices.

Feedback of Implementation Process Aspect

For this aspect, can be concluded that they are really excited to implement this framework for the current and future systems used. It should continue to be practiced at UTeM and throughout private or government health centers in Malaysia

User Acceptance

System testing is a complete and complete software product test[17, 18]. System testing also means testing by professional test agents on complete software products before they are introduced to the market[1, 4]. System testing is a series of different tests whose purpose is to run a full computer-based system[19]. In order to measure the acceptance level [20, 21] of users the prototype system for e-PHR has been developed and distributed among patients. This section begins with a brief description of the current system and proposed framework, and the discussion is followed by a summary of system testing which has been in another journal.

CONCLUSION

The study begins with an introduction to the proposed framework development process, the current business process flow, and how validation has been obtained. As the validation and verification of the crucial parts that should be conducted, it goes on to describe how the system is tested internally. This study presents the validation and verification part of the e-PHR framework in a Malaysia case study which has been conducted at two Information Technology (IT) company which are 1 a local company and the second company is an international company located in Malacca, Malaysia. In addition, this study also discusses how systems and frameworks have been validated by expert cases through case studies and their results. The experts stated 100% no barriers to the possibility of implementation/acceptance of the proposed framework be overcome with comments and recommendations.

Limtations and Constraints

This research limitation and constraint is file encryption from an online aspect. Internet access and speed also include limitations because need the internet to access and manage their health records.

CONTRIBUTIONS

In general, this study has contributed to the knowledge body in the field of health informatics through the dissemination of journals and conference papers. Journal articles and conference papers published include the following.

•   Proposed framework
•   Prototype System (e-PHR).
•   Improve electronic personalized health records as well as better self-patient management.
•   Most importantly, healthcare is to be implemented in an efficient manner for the healthcare environment in Malaysia.

Further Research

A further suggestion for this research is to investigate the acceptance level from the Malaysia perspective randomly. In order to obtain the level of acceptance in Malaysia. Also, the study needs improvement in the security aspects of this framework because protecting personalized health data is very important and confidential. Other than that, to ensure the patient's health records it's always protected and safe.

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