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VESSEL LIFE JACKET COMPATIBILITY MOBILE APPS FOR SAFETY ASSESSMENT

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Abstract: Life jacket is one of the safety appliances that can be found on the ship that provide buoyancy and prevention against drowning. Before the ship can sail, every element of safety of the vessel should be confirmed. Despite the establishment of standards for life jacket, both local and international, there have been cases of drowning associated with the usage of life jackets by the passengers of passenger boat/vessels for open-deck situation. Moreover, deficiency of information on safety instruction is reason the passengers are lack of personal safety information during on board. Thus, the evaluation on safety standard of life jackets and passenger vessel are vital for assessing the provision of the life jacket on board passenger vessel with respect to compatibility between life jacket and passenger vessel. In this paper, A Vessel Life Jacket Compatibility Mobile Apps (VELIT) was developed using software development methodology called Rational Unified Process (RUP) to automate the safety assessment process based on model called LCI (Life Jacket Compatibility Index). VELIT apps synchronized the safety assessment aspect and which allow user to compute the element in the model and produce the result of the safety assessment in real time. The VELIT apps are expected to be used in maritime area especially for ship safety assessment process.

Keywords: Life jacket provisioning, mobile application, vessel/ship, safety assessment

Introduction

Nowadays, technology transforms into one of the vital aspects in our daily basis. As we know technology makes our task organized and improved much better. In maritime sector, technology could shake the entire industry. It comes from all angles, from transportation of passenger and cargo to communication. Numerous Changes in maritime industry include developing and application of IT (information technology) and digitalization from traditional system. Ship-owners must already be aware of safety of the vessel in term of procedure and standard are the serious issues that must not be dispute in all reason. Although smarter fleet management ensure higher productivity and more systematics, it will not complete if the management are not improving the fleet safety requirements. All authorities should be concern about increase the safety in maritime transportation and should assist by computerized technology for gain marvellous result. Not only for the cargo or the components that the vessel managed, but for the crew and passenger carried. The safety should be complemented in all aspects. It might be costly, but passengers and crew life are more precious than anything else.

Compatibility of life jacket and passenger vessel in one of the highlight issues in passenger ship safety. Necessity of research on the development of the safety assessment model of coastal passenger vessel in the perspective of compatibility of life jackets with coastal passenger vessels have brought many advantages to the marine practitioners. But, lots of improvement should be reviewed in order to increase the efficiency and to obtain clearer result. In may be consist of computerized tools to calculate the Life Jacket Compatibility

Static Index from the algorithm in the previous research. Systematic tools that act as a digital safety assessment software could save thousands of lives in near future.

VELIT apps has been developed using OutSystems Platform. Applications developed with OutSystems include three types of components: generation, start-up time and back-end customization. This component is automatically created each time an application is submitted for compilation and publication. The components produced include interface components, REST API and web SOAP services and Back-end logic. The user interface component required to support the Mobile and Web Screens or Designs you design. This is high quality JavaScript based on HTML5 and CSS3 standards. The REST API and SOAP web services are created directly and serve as back-end endpoints. The contract (. json Swagger or .wsdl files) is also generated. In addition, a set of REST APIs is automatically created by the platform as a support service for mobile applications. Back-end / server logic that supports business rules, background work logic, and APIs is generated as an optimized server code. Proxy to other reference applications is included in the back-end logic as assemblies. This extraction means that the application reuse of the service is not affected when the execution of the service changes.

In addition, from the runtime point of view, there is a set of components included in each application that support basic functionality, including basic rendering capabilities and access to various services within the OutSystems platform. First and foremost, the Generic Platform Library: Customers and Server Classes and methods used in all generated applications, such as OutSystems built-in functionality in Service Studio, a database connection management, management tool Excel workbook, site real estate management, Ajax server side utility, or related utility timer. In addition, Mobile and Web Library: Web / Javascript control with modular (modularized) functionality for each UI-based widget used to structure the system's user interface (for example, components that perform all data-related functions (Input), already protected for script injection).

Next, the third component deals with back-end customization. Installed in Service Studio, this specialized component extends OutSystems and allows application developers to incorporate the appropriate code into their applications. Subsequently, these Components are used in the context of any application that references them, and the code is executed on the front of the server where the application is used. Lastly, it contains assemblies that are either directly compiled or included through Integration Studio, along with additional resources.

Maritime Security

Safety is a very important aspect of transportation especially in the maritime industry (Hystad, *et al.* 2015) (Lu & Tseng, 2012). This is because, one of the successes in maritime success lies in the safety of the ship itself. In the field of maritime security consists of rules and regulations. As it is well known that every company that manages passenger ships has different rules and regulations of safety. Therefore, this study is very important to study the weaknesses in each of the existing rules and regulations. In addition, security issues can be associated with the management of security equipment (Weigall, 2008). Safety issues on passenger vessels are important as each type of passenger ship has different sizes and types (Lois, *et al.,* 2004). Therefore, this study was conducted to identify the safety aspects of safety equipment especially in safety jackets. most important on board. This issue of safety is of utmost importance to all concerned, the responsible authorities, the owners of the shipping companies as well as the passengers and crew. The issue of safety is still unresolved since the death rate due to ship accidents is still high and new studies and methods are being made based on the various data and records obtained.

The method used to improve the existing system of rules and regulations is to create an algorithm or "LCI Static Model" based on variables in previous research that have identified the development of a static safety jacket model adaptation index. Next is the development of algorithms in static security jacket customization index. Then, data collection, data validation and data validation. In this issue, "accessibility, types of space, security instructions and compatibility. Based on the variables used, then there is the static LCI model and the LCI algorithm. This method aims to uncover new perspectives in the assessment of passenger safety. As such, it can be an indicator of the level of safety of the passenger ship whether it is still weak or vice versa. This makes it easier for authorities to evaluate and take action to improve the safety of passenger vessels.

Materials and Methods

Methodology: Requirement Gathering (LCI Models)

LCI Models has been adapted from (Ahmad Fuad, *et al.,* 2015). There are eight process to produce a complete system based on the LCI static model that have been a prime reference in this research namely; Feasibility Study, gather user requirement, analyse software requirement, translate requirement (algorithm) into system code, analyse bug and error, test product to target user and lastly, deploy product. All the steps been adapted using RUP methodology which is the software development methodology.

For the first step, is evaluation of initial assessment. Essential step to ensure the algorithm build from LCI static Models are acceptable. Next, as a developer, it is important to gather requirement or user expectation from the system. Enough, precise and concrete information about upcoming system allow developer to develop project according to plan. On the other hand, developer must gather the software requirement. It also contains about data control, page section, and process to be execute and any raw data and information that must kept in database. Furthermore, to ensure the main phases which is execution of value of LCI Static Models, the system must translate all the variables and process all the mathematical expression into computerized tools in mobile application. As the algorithm were calculated, then the result can be obtained, and further research and improvement can be made. To make sure the system run smoothly, bug and error must be fixed. Analyzation of system to remove and bug and error that might affect the LCI Static Index value. It is very necessary to ensure the precise value acquires. Besides, test product to the target user also an essential procedure. It allows developer to recognize any flaw in the system. User can recognize the deficiency and which module should be improved. Finally, the product which is the apps verified to be deployed and applied by the target user. Despite that, the system can be enhancing from time to time.

Results and Discussion

From the mobile application developed, the value of the Life Jacket Compatibility Index Static produced. The result obtained were from the variables in LCI Static Model and calculated from LCI algorithm.

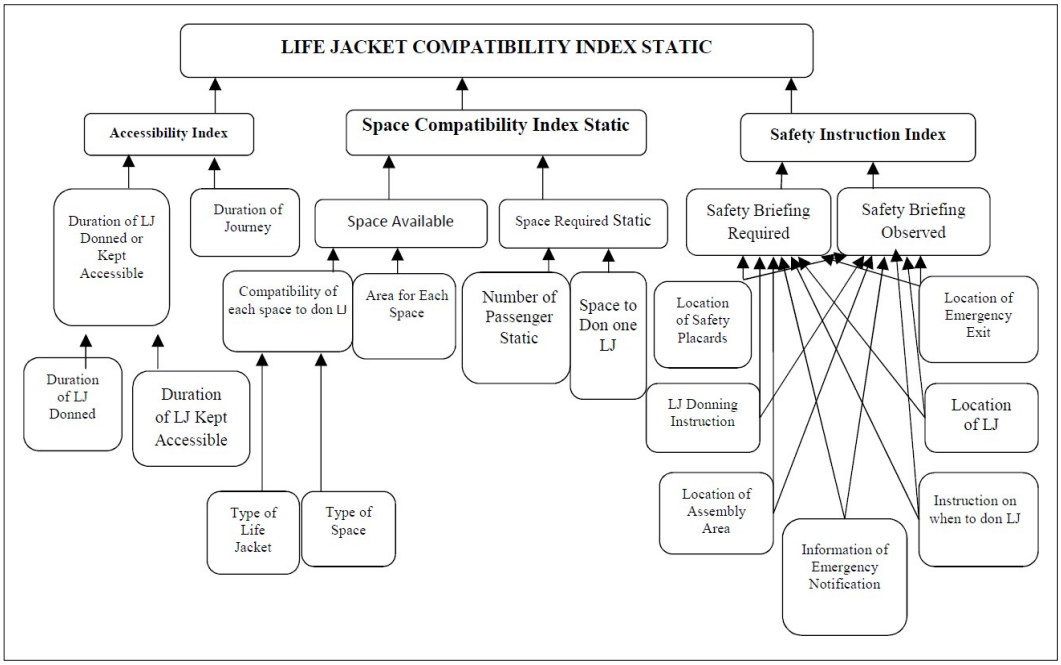

Figure 1: Life Jacket Compatibility Index Static Model

(Adapted from: Ahmad Fuad *et al.,* 2015)

The value was obtained from these algorithms: -

LCIS = IAC + ISI + ISCS

Where: LCIS = Life jacket Compatibility Index Static; IAC =Accessibility Index; ISI = Safety Instruction Index; ISCS = Space Compatibility Index Static

Table 1: Shows the value of LCI index produced from the safety assessment procedure

ShipName	**Passenger**	**I_{AC}**	**I_{SI}**	**I_{SCS}**	**L_{CIS}**
Ship A	55	2.35	7.0	0.2	9.55
Ship B	25	1.43	13.0	0.10	14.53
Ship C	46	2.35	21.0	0.2	23.55

Prototype System

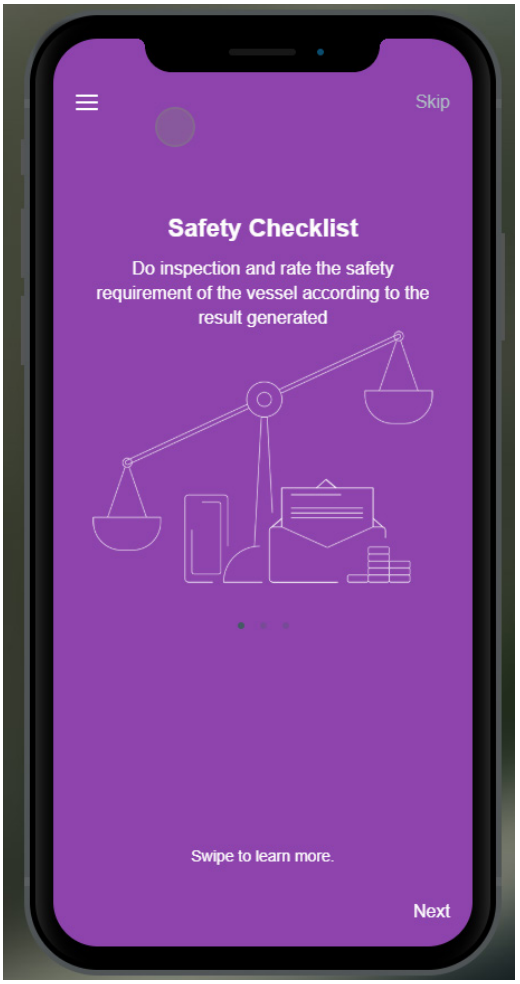

Figure 2: Life Jacket Compatibility Index Static Model introduction interface

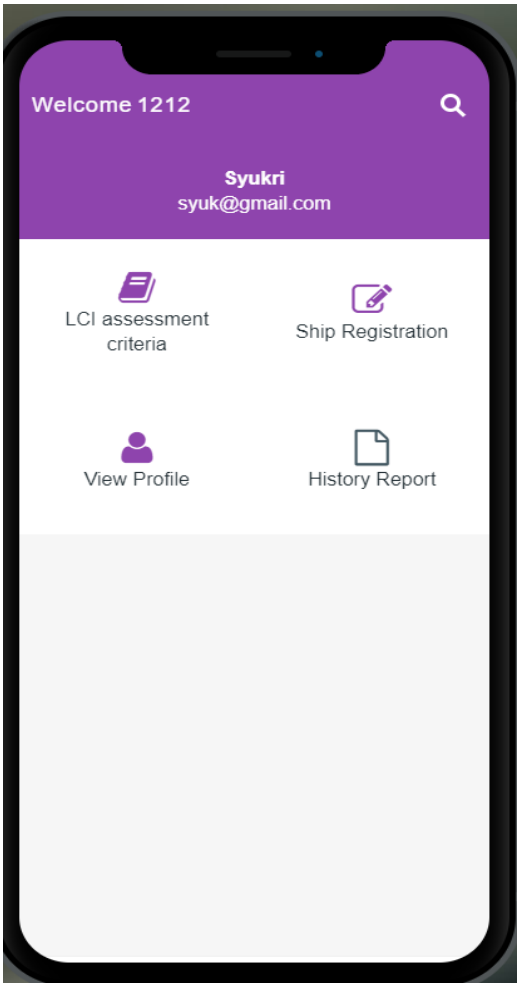

Figure 3: VELIT main menu interface

Figure 1 shows the first interface for the apps to make it clear the purpose of the development of the apps. The interface can be seen before logging in or register process to access functionality of the apps

Next, Figure 2 shows the interface of the main menu. After login/register process, the interface will appear on the user phone's screen. This interface shows some of the function of the apps dedicate to the target user.

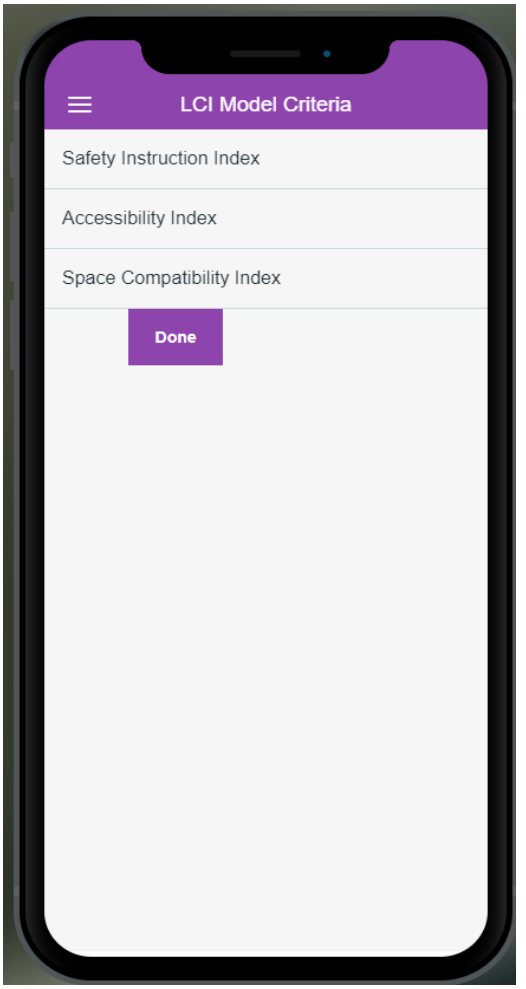

Figure 4: VELIT interface, LCI Criteria Menu

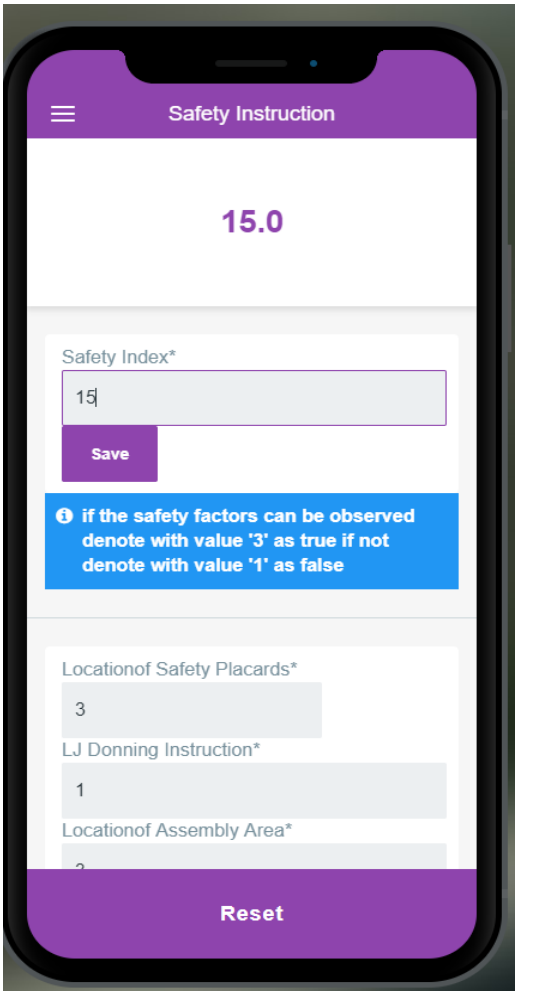

Figure 5: LCI criteria Form interface

In addition, Figure 3 shows the interface of the main function of the apps which is LCI criteria menu. Since purpose of the apps to rate the compatibility of life jacket with passenger vessel, the 3 criteria which space compatibility, safety instruction and accessibility are criteria to assessed to achieve the apps objective.

Next, Figure 4 shows the LCI assessment process. After user choose one of the criteria to start the assessment, user was brought to this interface. User was asked to fill in the criteria element to process the calculation thus, produce result.

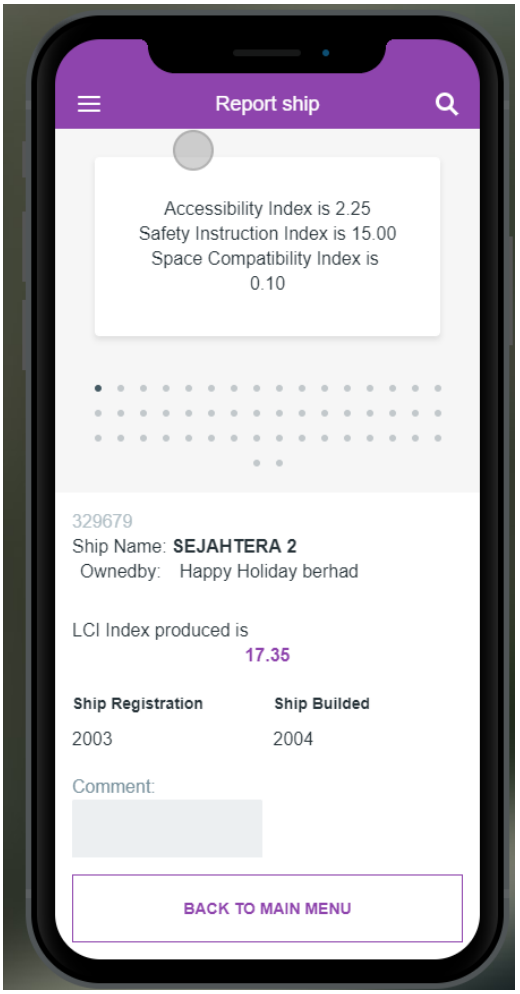

Figure 6: VELIT's generated report Interface

Furthermore, user can see Figure 5 shows the generated report produce after all the LCI criteria are complete assessing. In this interface user can know the information about the vessel such as the owner, year it builds and register legally and the LCI static Index of the particular vessel.

User can comment any advice, warning or notice to the ship owner and authorities headquarter.

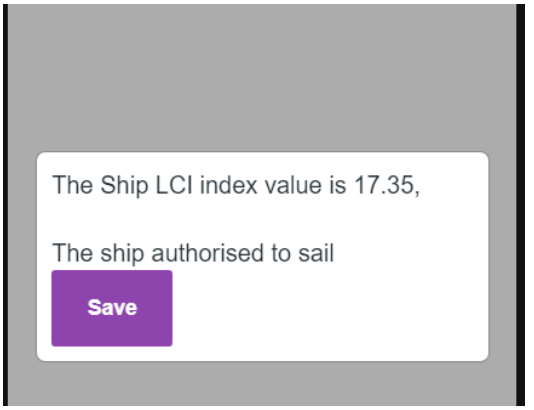

Figure 7: Decision system interface in VELIT

Lastly, Figure 6 shows the notification interface in the apps. After the report generated and all the information showed. The user would check and gives any comment if required and submit the result. This interface will pop up and shows the LCI static Index of the rated vessel. This interface also shows the result of the ship whether it authorized to sail or not. The result will report back to headquarters and assessment procedure just now was recorded and kept in the apps' database.

Conclusion

Compatibility is a variable that shared by models of life jacket and coastal passenger vessel and use to calculate the LCI static Index. The value is obtained from the previous research that combine models of life jacket and models of passenger vessel for the development of a LCI static Model. From the model developed, value of LCI index static produced from the calculated mobile tools. Rather than calculate the index, the system also allows user to determine maximum number of passengers for particular vessel inspired from the model that provides alternatives to figure the maximum number of passengers for coastal passenger vessels. VELIT apps will ease the compatibility index calculation in time efficient manner.

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