

User manuals development in light of digital transformation technology

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Summary:

Now we are living in the era of the Fourth Industrial Revolution, where digital transformation has become an essential requirement to keep pace with developments in the current and future era by integrating digital technology in all fields, which helps to bring about fundamental changes in how companies work and how to provide value to customers in addition to improving customer experience and improving the service provided to them. By understanding their changing requirements and providing ways to better meet their expectations. In the field of product design, we find that each product contains a user manual or an indicative document to know how to use and maintain it. This document is either in the form of a printed or electronic brochure and is written by a programmer, technician, product developer or company customer service employee, despite the efforts made in its design and writing and take it out. However, many of these manuals, especially the manuals used with some complex products and systems, are still complex and many end users do not prefer to read or use them for many reasons, including that they are too long and contain many pages, are boring, or focus on technical details that do not interest the end user instead. Focusing on the actual features of the product. In addition to containing incomprehensible technological terms, the font size is often very small and difficult to read, especially with the elderly, who find it difficult to read user manuals attached with technological products. In addition to the length of the text paragraphs, as shown in Figure (1).



Figure (1) shows some types of paper user manuals

In addition to many defects that make the end user does not prefer to read these manuals and may read them once and does not prefer to see them again, then the user manuals developed and became digital by turning them into an electronic page within the company's website to facilitate users to find answers to the most common questions regarding The offered service. Although these pages are organized and more attractive, users still need to contact the support team or search for educational videos to get the tasks done. With the emergence of the term digital transformation and its multiple technologies, such as smart phones, which have the ability to pave the way for other digital transformation technologies through virtual reality technologies, augmented reality (VR / AR), and the Internet of Things (IoT), which works to connect and exchange data with other devices and systems over the Internet through a network. of the physical objects integrated with the sensors as shown in Figure (2).



Figure (2) shows the impact of the Internet of Things on the development of the user

And cloud computing technology, in which data is stored and distributed to ensure a permanent connection to it without interruption or data loss, in addition to many other technologies. Print guides to electronic guides in PDF format and from PDF to HTML format to achieve mobile compatibility by improving font and layout for smaller screens and integrating the table of contents into the menu while preserving the hierarchical structure as shown in Figure (3).



Figure (3) shows the conversion of data from the current PDF format to HTML format for compatibility with mobile devices

Then it developed into interactive 3D manuals, where interactive 3D user manuals are a form of digital transformation because they help visualize the product and understand and distinguish each part in it. They are 3D interactive manuals on CD format and provide step-by-step self-guidance/procedures on how to operate, assemble, disassemble, maintain and service, as well as on how to address basic problems in product maintenance. They are an audio-visual format that demonstrates through a graphical animation display the operation of the product. Detailed and audiovisual speaks and explains the operating instructions of the product in any language chosen. New technologies such as artificial intelligence (AI) and augmented reality (AR) have begun to be used in interactive user guides, where artificial intelligence helps speed up the process of finding information by anticipating the questions that people may ask and in the future, artificial intelligence may replace metadata and tags. Augmented reality allows for instructions to be layered so that users can interact with the product while learning how to use it, all through your smartphone with an augmented reality application. Computer-generated sensory such as sound or graphics, and an augmented reality environment contains digital information transferred to a real-world perspective. So the user can just click on the AR troubleshooting app on their smartphone or tab to experience the interactive troubleshooting manual. So it is not just technicians but users as well as they can easily troubleshoot devices by following the virtual guide of AR. This is already done through the widespread use of databases and XML markup language to organize the standard way of creating and managing brochures. QR codes are also integrated to facilitate quick access to relevant instructions as shown in Figure (4).



Figure (4) shows how augmented reality can add an overlay on real products, making it easier to understand the instructions

Figure (5) also shows a maintenance manual for a Leybold vacuum pump for an Atlas Group company using HoloLens or iPad as it has integrated augmented and mixed reality into its digitalization strategy, instructing employees through step-by-step instructions how to exchange the filter.



Figure (5) shows the integration of augmented and mixed reality Vacuum pump maintenance manual

Figure (6/a,b,c) illustrates A case study comparing a digital manual and a paper manual Where one simple task and one complex task were performed using GuideMe for one oven, one simple task and one complex task using the original printed manual for another oven as. The results of the study showed that the first group of 10 participants completed a simple and complex task using GuideMe in one oven and a similar task using the original paper user manual in another oven. In the closing questionnaire, 90% of them indicated that they preferred GuideMe over printed brochures as participants felt that the printed brochure caused increased mental and temporal effort as well as performance concerns compared to the interactive digital GuideMe an interactive digital manual as shown in Figure (7),(8).



a **b** **c**
A - Oven with Vuforia frame marker pen and QR code attachment
B - GuideMe highlights the corresponding operating elements
C - Screenshot from GuideMe with featured launch items
Figure (6/a,b,c) shows the GuideMe prototype in action

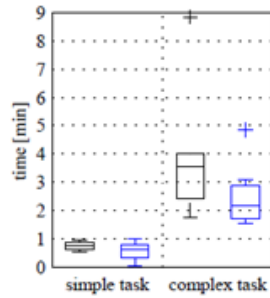


Figure (7) shows the result of using an interactive GuideMe digital manual and the printed paper manual

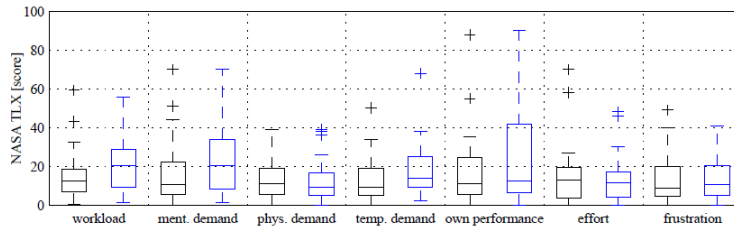


Figure (8) shows the results of the NASA TLX survey to compare the use of digital and printed evidence

The research problem is summarized in the lack of many designers’ knowledge of the types of user manuals and their development in light of digital transformation technology and the lack of considerations for designing user manuals, in addition to the lack of research and scientific theses presented in this field. The research aimed to familiarize designers with knowledge of the role of digital transformation in the development of the user's manuals and to come up with considerations for designing user manuals in light of digital transformation technology to conform to the end user's experience. To achieve this goal, the research used the deductive analytical method by identifying the concept and types of user manuals, interactive user manuals (IUM), digital transformation techniques.

Through analyzing the previous information, it was possible to reach the results of the research, which is educating designers about the types of user manuals and determining the role of digital transformation in the development of user manuals, as shown in Figure (9)

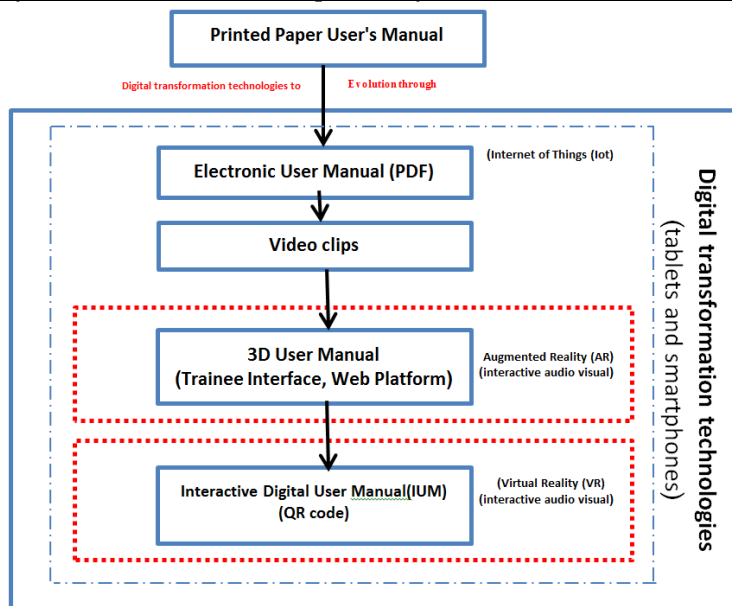


Figure (9) illustrates the role of digital transformation technology in the development of user manuals

where the user manual developed with the emergence of digital transformation technology that aims to improve the service provided to customers and achieve their desires and the Internet of things from paper brochures Printed into visual electronic guides in PDF file format through a page inside the company's website and then into educational videos based on the audio-visual method to achieve ease of understanding and completion of tasks. Then it developed after the emergence of mobile panels and smart phones, and it was possible to benefit from the applications available on tablets and smartphones such as augmented reality (AR) to interactive three-dimensional brochures based on the trainee interface and the web platform through the use of a CD that is used to obtain the required information as it depends on the interactive three-dimensional audio-visual method and then developed through virtual reality (VR) technology into interactive digital manual based on The use of a QR code, which helped the user to be able to interact with the product.

In addition to setting considerations for designing user manual in light of digital transformation technology, as follows:

1. Providing an appropriate background on modern technologies by identifying the capabilities of the technologies available on tablets, mobile phones, and smartphones, and their various applications such as augmented reality (AR), virtual reality (VR) and the Internet of Things.
2. Determine the type of manual required (use, operation, maintenance, training, etc.).
3. Determine the type and culture of the target audience.
4. Determine what the manual should include (by making a quick scenario of what it should include depending on the type of evidence).
5. Taking into account that the evidence is visual, audio, three-dimensional, according to the type of evidence.
6. Clarity of instructions.
7. Defining the required tasks in short, meaning reducing the steps of completing tasks to avoid boredom and achieve user pleasure.
8. Determine the steps to complete the tasks using the logical sequence.
9. Clarity of instructions and make them animated on the user interface.
10. Include pictures, illustrations, diagrams and videos that show how to complete the tasks.
11. Use high quality graphics and illustrations.
12. The possibility of free vision by displaying all aspects of the product more effectively and viewing it from all angles, in addition to the possibility of enlarging and reducing parts and components.
13. Use simple and understandable terms.
14. Ease of vision and implementation.
15. The possibility of hearing the detailed explanation while displaying the parts of the product in more than one language.
16. Reducing the time required to use, operate and repair the product or training.
17. Reducing words and written explanations and relying on interactive visual presentation in addition to audio clips.
18. Simple and attractive user interface design, easy to use.
19. Allocating a part in the interface to identify the opinions of customers and their problems with the application used (feedback).

20. The directory can be easily accessed through portable smart devices.
21. Easy for the user to learn to navigate the interface.

And the most important recommendations are:

1. Designers must be interested and follow up everything new regarding the design of user manuals and digital transformation technology.
2. Designers and researchers should do research and studies on user manuals and how to design them

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