



HAL
open science

Serious Game for Company Governance: Supporting Integration, Prevention of Professional Disintegration and Job Retention of People with Disabilities

Yosra Mourali, Benoit Barathon, Maxime Bourgois Colin, Sondes Chaabane, Raja Fassi, Alice Ferrai, Yohan Guerrier, Dorothee Guilain, Christophe Kolski, Yoann Lebrun, et al.

► To cite this version:

Yosra Mourali, Benoit Barathon, Maxime Bourgois Colin, Sondes Chaabane, Raja Fassi, et al.. Serious Game for Company Governance: Supporting Integration, Prevention of Professional Disintegration and Job Retention of People with Disabilities. 15th ACM SIGCHI Symposium on Engineering Interactive Computing Systems, EICS 2023, International Workshops, Jun 2023, Swansea, UK, United Kingdom. pp.41-49, <10.1007/978-3-031-59235-5_5>. <hal-05363745>

HAL Id: hal-05363745

<https://uphf.hal.science/hal-05363745v1>

Submitted on 10 Jan 2026

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



HAL Authorization

Serious game for company governance: supporting integration, prevention of professional disintegration and job retention of people with disabilities

Yosra Mourali¹[0000-0002-1337-8892], Benoit Barathon², Maxime Bourgois Colin³[0000-0002-3117-464X], Sondes Chaabane¹[0000-0002-6306-6192], Raja Fassi³, Alice Ferrai⁴, Yohan Guerrier¹[0000-0003-1040-0799], Dorothee Guilain⁴, Christophe Kolski¹[0000-0002-7881-6435], Yoann Lebrun⁵[0000-0002-2376-8915], Sophie Lepreux¹[0000-0002-0582-7993], Philippe Pudlo¹[0000-0002-0339-7336], Jason Sauvé⁶

¹ Univ. Polytechnique Hauts-de-France, CNRS, UMR 8201 – LAMIH, 59313 Valenciennes, France

² Emploi et Handicap Grand Lille, 23 chemin du Moulin Delmar, 59708 Marcq en Baroeul cedex, France

³ HandixpeRh, 40, rue Eugène Jacquet, 59708 Marcq en Baroeul, France

⁴ Handyn'Action, 12 Boulevard Froissart, 59300 Valenciennes, France

⁵ Serre numérique, 2 rue Péclet, Parc des Rives Créatives, BP 80577, 59 308 Valenciennes Cedex, France

⁶ ARACT Hauts-de-France, 197, Rue Nationale, 59000 Lille, France

Yosra.Mourali@uphf.fr

Abstract. Despite efforts made, it is still difficult to clearly grasp the situation of disability within companies. Therefore, to overcome this problem, this paper proposes and describes an innovative tool that may facilitate corporate governance. The tool is a serious game developed on an interactive RFID tabletop associated with tangible objects. The serious game is called SG-HANDI. It is designed to be used in disability awareness sessions in companies. It implies directors, managers and employees and proposes a set of challenges to be solved as a team. The objective is to encourage stakeholders to think and act collectively for a more accessible company.

Keywords: Disability, Company Governance, Accessibility, Serious Game, Interactive Tabletop, Tangible Interaction.

1 Introduction

In an increasingly diverse world, inclusive governance is essential to enable all people to fully participate in society. As people with disabilities represent a significant portion of the global population, it is important for companies to reflect this diversity. In this

regard, two inclusion policies are adopted by countries to require companies to implement accessibility measures and provide equitable employment opportunities for people with disabilities. The first one is based on laws and legislation, as is the case in France and Italy. This inclusion policy imposes a quota of disabled employees on companies. This obligation is often accompanied by subsidies or interesting tax deductions. However, the second policy is based on the promotion of disabled people by relying on the responsibility of business leaders, as is the case in UK and USA.

Thus, by engaging people with disabilities, today's companies aspire to respect legislation and diversity, which can improve their reputation with consumers and investors. In this context, this paper proposes an innovative IT tool (serious game) aiming to encourage companies integrate people with disabilities and help them to manage the adequate working environment. Precisely, the serious game is developed on an RFID interactive tabletop called *TangiSense* (built by the Rfidees company) associated with tangible objects. It is inspired by previous work (see for instance [1][2][3]). It is used to carry out awareness-raising actions for company stakeholders (executives, managers and employees able-bodied and with disabilities) [4] [5].

The serious game is a part of the SG-HANDI project “(Serious Game (SG) de sensibilisation à l’intégration à la prévention de la désinsertion professionnelle et au maintien dans l’emploi des personnes en situation de HANDIcap)” translated by (Serious Game (SG) to raise awareness of integration, prevention of professional disinsertion and retention in employment of people with HANDIcap). The project is led by ARACT Hauts-De-France in partnership with the LAMIH-UMR CNRS 8201 laboratory, the Serre Numérique (CCI Grand Hainaut), the Handyn’Action association, the Emploi et Handicap Grand Lille association and the HandiexpeRH consulting firm. This project is supported by Agefiph.

The rest of the paper is structured as follows: Section 2 presents key concepts about employment, disability and governance. Section 3 exposes the serious game conceptual modeling. Section 4 and section 5 are devoted to the implementation and the evaluation of the SG-HANDI serious game. Finally, this paper is ended by a conclusion and perspectives.

2 Background

Generally, questions about the integration and/or retention in employment of people with disabilities or health difficulties arise when the person is being integrated or when needs to be retained. Regarding this matter, governance strategies can vary enormously from one company to another and from one country to another. They often require global solutions, both technical (hardware, software, etc.) and organizational. Recommendations, case studies, and best practices are available, see for example [6][7][8][9].

For companies needing to innovate or transform in this field, a raising awareness phase among the company's stakeholders is essential in order to better reflect on global solutions. These solutions can lead to anticipatory (technical and/or organizational), individual and collective actions. This paper focuses on the phase of disability awareness in the work environment.

Sensitivity to disability in the workplace can be facilitated through various activities. Several websites offer recommendations on this topic [10][11][12]. For example, Thrivier suggests eight disability awareness activities, including (1) organizing an inclusion day, (2) offering employees the opportunity to share their experiences, (3) providing key resources, (4) creating an accessibility map, (5) running workshops and training days, (6) organizing charity fundraising events, (7) offering staff workplace needs assessments, and (8) providing mental health awareness training sessions. In this paper, we focus on activity number five: running workshops and training days.

It is possible to organize workshops inside or outside the company, for raising awareness of disability in the workplace. These workshops are often based on classical pedagogical methods (conferences, presentation of case studies, exercises, and so on). What about incorporating new interaction techniques to keep participants engaged and promote active learning?

As far as we are concerned, our approach is based on a serious game [13][14]. Serious games provide a novel approach that combines technology, storytelling, and gameplay mechanisms [15]. They also can provide interactive visuals and audio to create a dynamic learning environment accommodating different preferences. Thus, serious games can enhance the overall effectiveness of the workshop and facilitate deeper understanding and engagement with the subject matter. The serious game proposed in this paper is used in a collective context. This context involves (1) one or several animators, specialized in management of disability in companies, and (2) participants from the company. The approach proposed is described below.

3 Proposal

This section presents users and then the flow of SG-HANDI serious game.

3.1 The SG-HANDI serious game users

The SG-HANDI serious game is designed to be used in corporate disability awareness sessions. The target users have two profiles:

- (1) The facilitator specialized in employment and disability. The facilitator is the master and manages the serious game, gives instructions, orchestrates and moderates discussions to make players aware in the target domain.
- (2) The players are company stakeholders such as executives, managers and employees able-bodied and with disabilities. They play as a team to solve challenges proposed by the serious game. They are the people to raise awareness.

3.2 SG-HANDI serious game flow

In order to facilitate the description of the SG-HANDI serious game flow, the activity diagram is shown in Fig. 1.

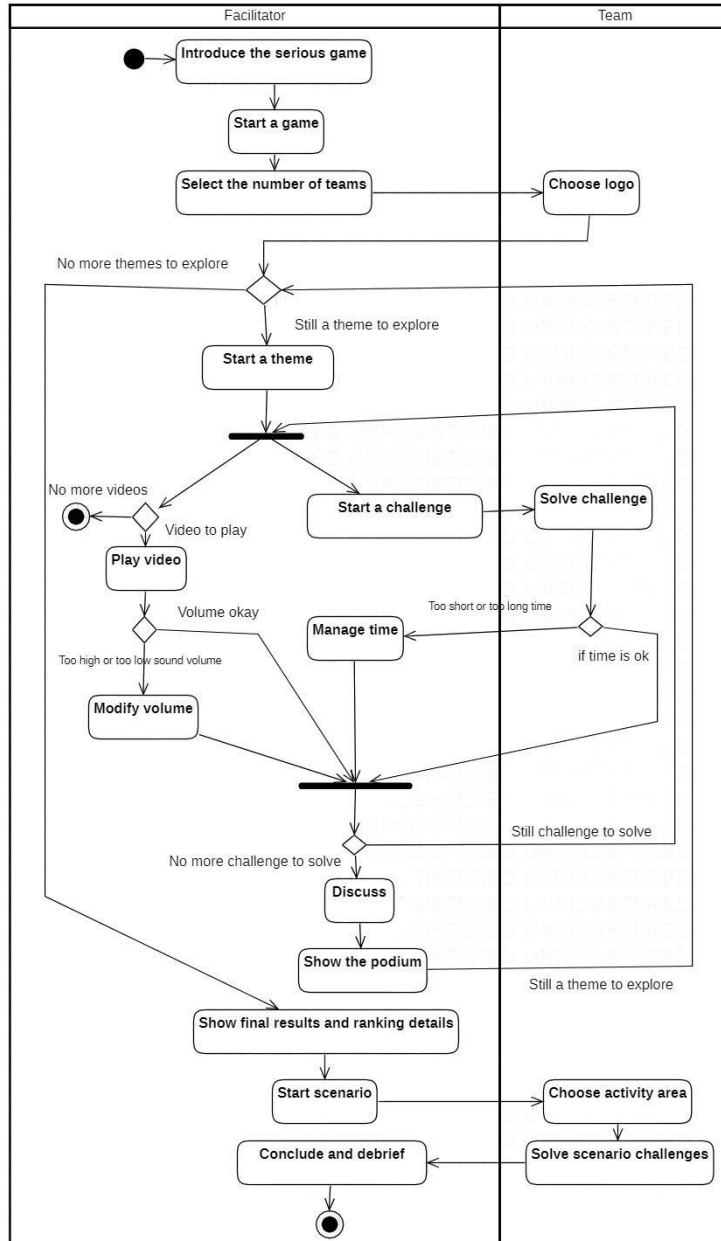


Fig. 1. Activity diagram of the SG-HANDI serious game.

At the beginning of an awareness session, the facilitator presents the game. The facilitator explains the technical aspects and shows how to use the interactive tabletop and

the tangible objects. Then, the facilitator launches the game. Once the players are ready, the facilitator decides to start the game by placing a personal pawn on the tabletop. The facilitator asks the participants (players) to get into two or three teams depending on their number. Each team chooses its (tangible) pawn and its (digital) logo. At this time, the facilitator starts the first part of the game including five themes. Each specific tangible object is equipped with an RFID tag.

In each theme, players are faced with one or more challenges (for instance the 6th challenge of the 1st theme is “In your opinion, who are the people with disabilities, Antoine the masseur with a sight problem, Mireille the dyslexic manager or Bob the handyman with osteoarthritis of fingers?”) to solve in time. Each challenge is most often followed by complementary explanations and/or a discussion. The facilitator can add or reduce the time granted for the resolution of the challenges by using two different tangible objects. For some themes, video sketches are planned. With the pawn, the facilitator can take breaks and replay. The facilitator also can increase or decrease the sound volume thanks to a remote control. During the serious game, the facilitator decides to move from one challenge to another and from one theme to another using the pawn. Generally, a theme is closed by the podium and a discussion which recapitulates and enriches what has just been seen. Once all themes are covered, the facilitator shows final results and ranking details. At this moment the second part of the game can begin.

The first part lasts about 1h30. If there is enough time to continue the session, in the second part of the game, participants choose together a sector to be approached through a real-life scenario: logistics, industry or commerce. Here, players put themselves in the shoes of a company that aims to recruit a new employee. To accomplish this mission, six challenges must be met.

At the end (whether the session consisted of one or two parts), the facilitator proposes a debriefing and concludes the awareness-raising session.

4 Implementation

4.1 The SG-HANDI serious game design

As explained in Section 3, the SG-HANDI serious game consists of two parts. Before starting, the facilitator asks players to form a certain number of teams (two or three), each with its pawn and its logo. In the first part, teams confront each other with challenges covering several facets of the disability field such as basic concepts, legislation, company resources, professional disinsertion, compensation, etc. Challenges are grouped into five themes and each theme is closed by a podium: (1) situational disability, (2) disability typologies, (3) disability recognition, (4) compensation and (5) job displacement. The second part of the SG-HANDI serious game concerns a real-life scenario. Participants try to succeed in the hiring mission of a new employee. First of all, they have to choose one of these sectors: logistics, commerce, or industry. Then, they have to accomplish five challenges: (1) job description, (2) job offer, (3) the interview, (4) communication and (5) testimony.

The themes and messages were chosen in working groups with experts in the field. Themes and messages are inspired by the experience and recurring questions encountered by SG-HANDI project partners (working to promote the inclusion of vulnerable people, particularly people with disabilities) during their interventions. The various challenges were selected on the basis of playful activities that the SG-HANDI project partners had previously implemented and which had proved successful.

4.2 The SG-HANDI serious game characteristics

In our design approach, we have turned to diversify (1) tangible objects, (2) types of questions, as well as (3) the temporality in order to avoid monotony.

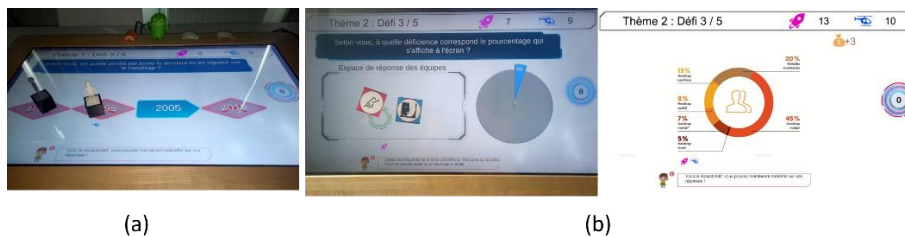


Fig. 2. (a) Players use pawns to solve the 3rd challenge of the 2nd theme (quiz) and result is provided directly after time runs out, (b) players use disability logos to solve the 3rd challenge of the 3rd theme (drag and drop) and results are provided at the end. “*Thème 1 : Défi 3/6 - Selon vous, en quelle année est sortie la dernière loi en vigueur sur le handicap ?*” translated by : “Theme 1: Challenge 3/6 - When do you think the latest disability law?”, “Voici le récapitulatif, vous pouvez maintenant debriefer sur vos réponses !” translated by : “Here is the summary, you can debrief your answers now!”, “*Thème 2 : Défi 3/5 - Selon vous, à quelle déficience correspond le pourcentage qui s'affiche à l'écran ?*” translated by : “Theme 2: Challenge 3/5 - Which disability do you think the percentage shown on the screen corresponds to?”, “Espace de réponse” translated by : “Response space”, “Utilisez les étiquettes de la boîte LOGOS pour les poser sur la table. Vous ne pouvez poser qu'un seul logo à la fois.” translated by : “Use the labels in the LOGOS box to place them on the table. You can only place one logo at a time.”, “5% Handicap visuel, 7% Handicap mental, 8% Handicap auditif, 13% Handicap psychique, 20% Maladies invalidantes, 45% Handicap moteur” translated by : “5% Visual disability, 7% Mental disability, 8% Hearing disability, 13% Psychological disability, 20% Disabling diseases, 45% Motor disability”, “Voici le récapitulatif, vous pouvez maintenant debriefer sur vos réponses !” translated by : “Here is the summary, you can debrief your answers now!”

Thus, players can use tangible objects printed on paper such as terms, disabilities logos, poker chips as well as tangible objects in the form of a 3D-printed characters (pawns). These different types of objects are used to solve different kinds of questions (challenges) such as quiz and drag and drop. From challenge to challenge the temporality is varied to avoid dullness and boredom. For example, in the third challenge of the first theme (Fig. 2.(a)), as soon as the time is up, the score is assigned to teams. However, in the third challenge of the second theme (Fig. 2.(b)), participants must choose a type of

handicap based on a percentage, without knowing the other percentages, and only receive the result at the end of all the questions. Moreover, a countdown with background sound has been integrated into the game to motivate players.

5 Evaluation

First series of the serious game uses started at the end of March 2023. Three groups of participants were involved during disability awareness workshops, with the same animator. The number of participants was respectively 10 (Group 1), 8 (Group 2) and 10 (Group 3). The duration of each workshop was approximately one and a half hours (with a focus on the first part of the serious game, due to a temporal constraint).

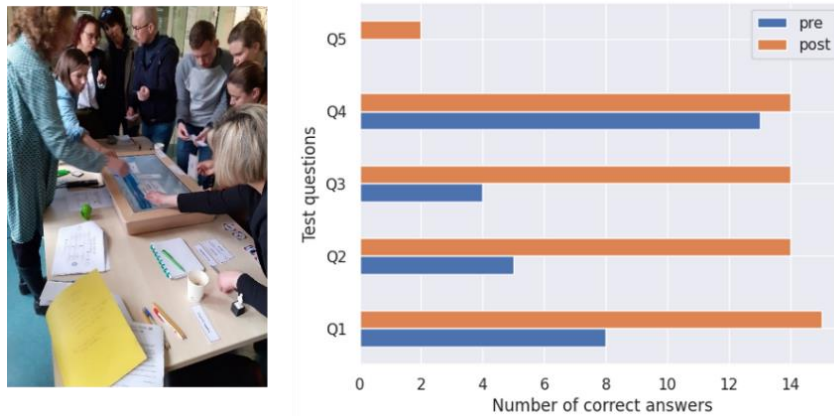


Fig. 3. (a) A situation giving insight into participant engagement. The facilitator is visible on the right side. (b) Pre-post test results.

For evaluation purposes, the sessions were filmed. A consent form as well as authorization for image rights were signed by each participant (15 participants) before the workshop. Furthermore, pre-post test (consisting of 5 questions) and satisfaction questionnaires were addressed to each of them. The pre-test and the post-test were used to evaluate and compare the knowledge of the participants before and after the serious game use. To do this, the questions were formulated in the same way for both tests: (Q1) Which of these proposals never existed?, (Q2) In your opinion, what is the proportion of invisible disabilities?, (Q3) In your opinion, when was the lastest disability law?, (Q4) What proportion of disabilities do you think occur in adulthood and childhood? and (Q5) In your opinion, how many out of 8 disabled people have a job?

For the satisfaction questionnaire, SUS (System Usability Scale) was used [16] [17]. The facilitator also completed an evaluation questionnaire after the three workshops: CSUQ (Computer Usability Satisfaction Questionnaires) [16] [18].

The first observations showed a promising engagement of the participants (see Fig. 3(a)). Comparison of pre-test and post-test results by question shows a significant

progression in post-test (as seen in Fig. 3(b)) proving the serious game effectiveness. Several possible improvements were also proposed by the facilitator: for instance it would be useful to shortcut one or several collective challenges, in case the available time for a workshop is not sufficient. Other part of collected data is being analyzed.

6 Conclusion and future work

The management of disability in companies leads to new important challenges for corporate governance. To prepare different types of action, it is important to raise the awareness of various stakeholders (e.g., executives, managers, staff representatives, employees) to integration, prevention of professional disintegration and job retention of people with disabilities. One of the possible activities is to organize workshops for raising awareness of disability in the workplace. For supporting such workshops, a serious game on RFID interactive tabletop with tangible objects was proposed. A first prototype has been realized.

The first uses of the serious game started at the end of March in several companies. Three groups of participants were involved in disability awareness workshops.

These first uses led to promising results, showing a commitment of the participants throughout the game. Several improvements of the serious game were also highlighted. The perspectives concern first of all the analysis of all the data collected during these first evaluations. It would also be useful to study how activities related to serious games can be articulated with other awareness-raising activities suggested in [11].

As part of our upcoming study, we plan to conduct interviews with facilitators who have gained experience in both conventional facilitation methods and the use of serious games on interactive tabletop. The aim of these interviews is to gain insight into the impact of technology, particularly serious games, during awareness sessions, and compare the two approaches.

Acknowledgment

The authors are very grateful to Agefiph for the financial support provided to the SG-HANDI project. They thank also the facilitators and participants who were present at the awareness sessions.

References

1. Y. Lebrun, N. Vispi, S. Lepreux, S. Chaabane and C. Kolski: "Simulation on an RFID Interactive Tabletop with Tangible Objects of Future Working Conditions: Prospects for Implementation in the Hospital Sector," in S. Chaabane, E. Cousein, P. Wieser (Ed.), *Healthcare Systems: Challenges and Opportunities*, ISTE & Wiley, London, pp. 115-127 (2022).
2. N. Vispi, Y. Lebrun, S. Lepreux, S. Chaabane and C. Kolski: Simulation on RFID interactive tabletop of working conditions in industry 4.0. In *International Workshop on Service Orientation in Holonic and Multi-Agent Manufacturing*. p. 343-354. Springer, Cham (2020).

3. Y. Lebrun, A. Adam, R. Mandiau and C. Kolski: A model for managing interactions between tangible and virtual agents on an RFID interactive tabletop: case study in traffic simulation. *Journal of Computer and System Sciences* 81 (3), 585-598 (2015).
4. Y. Mourali, B. Barathon, M. Bourgois Colin, S. Chaabane, R. Fassi, Y. Guerrier, D. Guilain, C. Kolski, Y. Lebrun, S. Lepreux, and J. Sauve: Conception centrée utilisateur d'un jeu sérieux sur table interactive avec objets tangibles: application au handicap en entreprise. 34^{ème} Conférence Internationale Francophone sur l'Interaction Humain-Machine (2023).
5. Y. Mourali, B. Barathon, M. Bourgois Colin, S. Chaabane, R. Fassi, A. Ferrai, Y. Guerrier, D. Guilain, C. Kolski, Y. Lebrun, S. Lepreux, and J. Sauve: Design and prototyping of a serious game on interactive tabletop with tangible objects for disability awareness in companies. AAATE: Assistive Technology: Shaping a sustainable and inclusive world (2023).
6. H. D. Harder and T. Geisen: "Disability Management and Workplace Integration International Research Findings," Routledge (2016).
7. ILO: "Business as unusual: Making workplaces inclusive of people with disabilities. Working Paper No 3. Bureau for Employers' Activities and Skills and Employability Department, Geneva (2014). Accessible at: https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/publication/wcms_316815.pdf
8. ILO: Disability in the Workplace, Company Practices. Working Paper No 3, Bureau for Employers' Activities and Skills and Employability Department, Geneva (2010). Accessible at: https://www.ilo.org/wcmsp5/groups/public/@ed_emp/@ifp_skills/documents/publication/wcms_150658.pdf
9. C. Riley: Disability and Business: Best Practices and Strategies for Inclusion. UPNE (2006).
10. ERI: 10 Ways for Employers to Promote a Disability-Friendly Workplace. Advocacy, Featured, News, (2020). Accessible at: <https://eri-wi.org/blog/2020/10/01/national-disability-awareness-month-2020/>
11. L. Wolberger: Ways To Promote Disability Awareness In The Workplace. Forbes, (2022). Available at: <https://www.forbes.com/sites/forbestechcouncil/2022/09/13/ways-to-promote-disability-awareness-in-the-workplace/?sh=7f3616463f24>
12. Thriiver: Your Guide To Disability Awareness in the Workplace. (2023). Accessible at: <https://thriiver.co.uk/disability-awareness-in-the-workplace/>
13. J. Alvarez, and D. Djaouti: Serious Game: An Introduction. *Questions Théoriques* (2012).
14. J. Alvarez, D. Djaouti, S. Louchart, Y. Lebrun, N. Zary, S. Lepreux, and C. Kolski: A Formal Approach to Distinguish Games, Toys, Serious Games & Toys, Serious Re-purposing & Modding and Simulators. *IEEE Transactions on Games* (2022).
15. A. Dimitriadou, N. Djafarova, O. Turetken, M. Verkuyl, A. Ferworn. Challenges in Serious Game Design and Development: Educators' Experiences. *Simulation & Gaming*. 2021;52(2):132-152. doi:10.1177/1046878120944197
16. Lewis JR. Measuring Perceived Usability: The CSUQ, SUS, and UMUX. *International Journal of Human-Computer Interaction*, 34(12), 1148-1156. doi:10.1080/10447318.2017.1418805 (2018).
17. J. Brooke: SUS: A "Quick and Dirty" Usability Scale. In P.W. Jordan, B. Weerdmeester, A. Thomas, I.L. McLelland (eds.), *Usability Evaluation In Industry*; CRC Press, 189-194 (1996).
18. J.R. Lewis: IBM Computer Usability Satisfaction Questionnaires: Psychometric Evaluation and Instructions for Use. *International Journal of Human-Computer Interaction*, 7 (1), 57-78, <https://doi.org/10.1080/10447319509526110> (1995).