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# Information Technology of Control and Support for Functional Sustainability of Distributed Man-Machine Systems of Critical Application

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## Abstract

The paper considers information technology for control and support of the functional sustainability (FS) of man-machine systems of critical application, which complements the theory and methods for solving the tasks of ensuring system's fault tolerance and liveness, based on the interaction of a set of operation security indicators, as well as human factor indicators, in managing and making decisions on its each hierarchical level. A Bayesian Trust Network was built to evaluate the entire system's FS, with the help of which, on the basis of expert knowledge, an assessment of the state probability of both individual components of the structural organization and a comprehensive FS assessment of the entire distributed system was performed. For practical substantiation of the obtained results, an experiment was carried out, the results of which confirmed the practical importance of the proposed information technology, which can be used for the control and support of the FS of man-machine distributed systems of critical application. © Springer Nature Switzerland AG 2020.

## Author keywords

Complex organizational and technical objects; Decision making; Fault tolerance of the system; Functional sustainability; Human factor; Information technology; Man-machine systems; System's liveness

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## References (15) [View in search results format](#)

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- 1 Dotson, W., Norwood, F., Taylor, C.  
**Reliability Polynomial for a Ring Network**  
 (1993) *IEEE Transactions on Communications*, 41 (6), pp. 825-827. [Cited 2 times](#).  
 doi: 10.1109/26.231902  
[View at Publisher](#)
- 2 Koval, D.O., Zhang, X., Propst, J.  
**Spreadsheet reliability model applied to gold book standard network**  
 (2002) *Conference Record of Industrial and Commercial Power Systems Technical Conference*, pp. 66-72. [Cited 5 times](#).  
[View at Publisher](#)
- 3 Mashkov, O.A., Barabash, O.V.  
 Topological criteria and indicators of functional stability of complex hierarchical systems. Collection of scientific works of the National Academy of Sciences of Ukraine (2003) *IPEM-"modeling and Information technologies"*, 25, pp. 29-35. vol, pp, (in Ukrainian)
- 4 Floyd, S., Paxson, V.  
**Difficulties in simulating the Internet**  
 (2001) *IEEE/ACM Transactions on Networking*, 9 (4), pp. 392-403. [Cited 567 times](#).  
 doi: 10.1109/90.944338  
[View at Publisher](#)
- 5 Lee, C.Y., Cho, H.K.  
**Multicast routing considering reliability and network load in wireless ad-hoc network**  
 (2001) *IEEE Vehicular Technology Conference*, 3 (53ND), pp. 2203-2207. [Cited 4 times](#).
- 6 Liu, B., Iwamura, K.  
**Topological optimization models for communication network with multiple reliability goals**  
 (2000) *Computers and Mathematics with Applications*, 39 (7-8), pp. 59-69. [Cited 44 times](#).  
 doi: 10.1016/S0898-1221(00)0065-1  
[View at Publisher](#)
- 7 Shao, F.-M., Zhao, L.-C.  
**Optimal design improving a communication network reliability**  
 (1997) *Microelectronics Reliability*, 37 (4), pp. 591-595. [Cited 3 times](#).  
<https://www.journals.elsevier.com/microelectronics-reliability>  
 doi: 10.1016/s0026-2714(96)00087-x  
[View at Publisher](#)
- 8 Rossi, M., Vicenzi, R., Zorzi, M.  
**Accurate Analysis of TCP on Channels With Memory and Finite Round-Trip Delay**  
 (2004) *IEEE Transactions on Wireless Communications*, 3 (2), pp. 627-640. [Cited 17 times](#).  
 doi: 10.1109/TWC.2004.825360  
[View at Publisher](#)
- 9 Lukova-Chuiko, N.V.  
 (2018) *Methodological Bases for Ensuring the Functional Stability of Distributed Information Systems to Cyber Threats (Phd Thesis in Specialty 05.13*, p. 06.  
 State University of Telecommunications, Kyiv (in Ukrainian)
- 10 *A Brief Introduction to Graphical Models and Bayesian Networks. Technical Report 2001-5-10*  
 Department of Computer Science, University of British Columbia, Canada
- 11 Fefelov, A.O.  
 Models and methods for solving the problems of technical diagnostics on the basis of artificial immune systems and bayesian networks (PhD The-sis)  
 (2008) *National Technical University of Ukraine, Kyiv Polytechnic Institute, Kyiv*, 2008. (in Ukrainian)
- 12 Perederyi, V., Borchik, E.  
 (2019) *Information Technology for Determination, Assessment and Correction of Functional Sustainability of the Human-Operator for the Relevant Decision-Making in Human-Machine Critical Application Systems. In: Theoretical and Practical Aspects of the Development of Modern Science: the Experience of Countries of Europe and Prospects for Ukraine: Monograph*, pp. 490-509. [Cited 3 times](#).  
 Baltija Publishing, Latvia, Riga, pp
- 13 Perederyi, V.I., Babichev, S.A., Lytvynenko, V.I.  
 The use of the Bayesian network to assess the degree of significance of influencing factors on the DM in automated systems for making relevant decisions. *Bull Natl Univ "Lviv Poly-technic" (733):120-128. Computer Science and Information Technologies (2012) Lviv (in Ukrainian)*
- 14 Lomov, B.F.  
 (1982) *Handbook of Engineering Psychology*. [Cited 12 times](#).  
 Machine Building, Moscow (in Russian)
- 15 Shtovba, S.D.  
*Introduction to the Theory of Fuzzy Sets and Fuzzy Logic (In Russian)*. [Cited 41 times](#).  
<http://matlab.exponenta.ru/fuzzylogic/book>

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