

# **23rd International Conference on Enterprise Information Systems (ICEIS 2021)**

Online  
26 – 28 April 2021

Volume 1 of 2

## **Editors:**

**Joaquim Filipe  
Michal Smialek**

**Alexander Brodsky  
Slimane Hammoudi**

ISBN: 978-1-7138-3987-3

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2021) by SCITEPRESS – Science and Technology Publications, Lda.  
All rights reserved.

Printed with permission by Curran Associates, Inc. (2021)

For permission requests, please contact SCITEPRESS – Science and Technology Publications, Lda.  
at the address below.

SCITEPRESS – Science and Technology Publications, Lda.  
Avenida de S. Francisco Xavier, Lote 7 Cv. C,  
2900-616 Setúbal, Portugal

Phone: +351 265 520 185

Fax: +351 265520 186

[info@scitepress.org](mailto:info@scitepress.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# CONTENTS

---

## INVITED SPEAKERS

### KEYNOTE SPEAKERS

From Representation to Mediation: Modeling Information Systems in a Digital World <i>Jan Recker</i>	5
Myths and Misconceptions about Machine Learning and How They Are Related to Software Engineering <i>Stefan Kramer</i>	7
What Can We Learn from Play? <i>Panos Markopoulos</i>	9
How AI and Digital Are Key of Manufacturers Survival <i>Eric Prevost</i>	11
Impact of End User Human Aspects on Software Engineering <i>John Grundy</i>	13

## DATABASES AND INFORMATION SYSTEMS INTEGRATION

### FULL PAPERS

Proposal of an Implementation Process for the Brazilian General Data Protection Law (LGPD) <i>Edna Dias Canedo, Anderson Jefferson Cerqueira, Rogério Machado Gravina, Vanessa Coelho Ribeiro, Renato Camões, Vinicius Eloy dos Reis, Fábio Lúcio Lopes Mendonça and Rafael T. de Sousa Jr.</i>	19
Taxi Service Simulation: A Case Study in the City of Santa Maria with Regard to Demand and Drivers Income <i>Andre Brizzi and Marcia Pasin</i>	31
HOUDAL: A Data Lake Implemented for Public Housing <i>Etienne Scholly, Cécile Favre, Eric Ferey and Sabine Loudcher</i>	39
Identifying Suspects on Social Networks: An Approach based on Non-structured and Non-labeled Data <i>Érick S. Florentino, Ronaldo R. Goldschmidt and Maria C. Cavalcanti</i>	51
FakeWhastApp.BR: NLP and Machine Learning Techniques for Misinformation Detection in Brazilian Portuguese WhatsApp Messages <i>Lucas Cabral, José Maria Monteiro, José Wellington Franco da Silva, César Lincoln Mattos and Pedro Jorge Chaves Mourão</i>	63
A Novel Method for Object Detection using Deep Learning and CAD Models <i>Igor Garcia Ballhausen Sampaio, Luigy Machaca, José Viterbo and Joris Guérin</i>	75
A Domain Specific Language to Provide Middleware for Interoperability among SaaS and DaaS/DBaaS through a Metamodel Approach <i>Babacar Mane, Ana Patricia Magalhaes, Gustavo Quinteiro, Rita Suzana Pitangueira Maciel and Daniela Barreiro Claro</i>	83

A Model for Implementing Enterprise Resource Planning Systems in Small and Medium-sized Enterprises <i>Daniela Tapia, Paola Vintimilla, Ximena Alvarez, Juan Llivisaca, Mario Peña, Rodrigo Guamán, Lorena Siguenza-Guzman and Diana Jadan-Aviles</i>	95
Managing Evolution of Heterogeneous Data Sources of a Data Warehouse <i>Darja Solodovnikova, Laila Niedrite and Lauma Svilpe</i>	105
Tracking and Tracing of Global Supply Chain Network: Case Study from a Finnish Company <i>Ahm Shamsuzzoha, Michael Ehres, Richard Addo-Tengkorang and Petri Helo</i>	118
Automatic Construction of Benchmarks for RDF Keyword Search Systems Evaluation <i>Angelo Batista Neves, Luiz André P. Paes Leme, Yenier Torres Izquierdo and Marco Antonio Casanova</i>	126
Towards a Methodological Approach for the Definition of a Blockchain Network for Industry 4.0 <i>Charles Tim Batista Garrocho, Karine Nogueira Oliveira, Carlos Frederico Marcelo da Cunha Cavalcani and Ricardo Augusto Rabelo Oliveira</i>	138
Entity Resolution in Large Patent Databases: An Optimization Approach <i>Emiel Caron and Ekaterini Ioannou</i>	148
<b>SHORT PAPERS</b>	
Machine Learning within a Graph Database: A Case Study on Link Prediction for Scholarly Data <i>Sepideh Sadat Sobhgol, Gabriel Campero Durand, Lutz Rauchhaupt and Gunter Saake</i>	159
Open Data Integration in 3D CityGML-based Models Generation <i>Mcdonnell Araújo Maieron and José Palazzo Moreira de Oliveira</i>	167
An Effective Intrusion Detection Model based on Random Forest Algorithm with I-SMOTE <i>Weijinxia, Longchun, Wanwei, Zhaojing, Duguanyao and Yangfan</i>	175
Activity based Traffic Indicator System for Monitoring the COVID-19 Pandemic <i>Justin Junsay, Aaron Joaquin Lebumfacil, Ivan George Tarun and William Emmanuel Yu</i>	183
Automatic Extraction of a Document-oriented NoSQL Schema <i>Fatma Abdelhedi, Amal Ait Brahim, Hela Rajhi, Rabah Tighilt Ferhat and Gilles Zurfluh</i>	192
A Comparison between Textual Similarity Functions Applied to a Query Library for Inspectors of Extractive Industries <i>Junior Zilles, Jonata C. Wieczynski, Giancarlo Lucca and Eduardo N. Borges</i>	200
Empirical Evaluation of a Textual Approach to Database Design in a Modeling Tool <i>Jonnathan Lopes, Maicon Bernardino, Fábio Basso and Elder Rodrigues</i>	208
Application of Classification and Word Embedding Techniques to Evaluate Tourists' Hotel-revisit Intention <i>Evripides Christodoulou, Andreas Gregoriades, Maria Pampaka and Herodotos Herodotou</i>	216
On Functional Requirements for Keyword-based Query over Heterogeneous Databases on the Web <i>Plinio S. Leitão-Junior, Fábio Nogueira de Lucena, Mariana Soller Ramada, Leonardo Andrade Ribeiro and João Carlos da Silva</i>	224
Visual Analysis Tool for a BLE Technology based Tracking Data <i>Flavia A. Schneider, Adriano Branco, Ariane M. B. Rodrigues, Felipe Carvalho, Simone D. J. Barbosa, Markus Endler and Hélio Lopes</i>	232

Management Support Systems Model for Incident Resolution in FinTech based on Business Intelligence <i>María Del Carmen Zúñiga, Walter Fuertes, Hugo Vera Flores and Theofilos Toulkeridis</i>	240
A Practical Guide to Support Predictive Tasks in Data Science <i>José Augusto Câmara Filho, José Maria Monteiro, César Lincoln Mattos and Juvêncio Santos Nobre</i>	248
Facial Expression Recognition System for Stress Detection with Deep Learning <i>José Almeida and Fátima Rodrigues</i>	256
A Text Similarity-based Process for Extracting JSON Conceptual Schemas <i>Fhabiana T. Machado, Deise Saccol, Eduardo Piveta, Renata Padilha and Ezequiel Ribeiro</i>	264
An Applied Risk Identification Approach in the ICT Governance and Management Macroprocesses of a Brazilian Federal Government Agency <i>Edna Dias Canedo, Ana Paula Moraes do Vale, Rogério Machado Gravina, Rafael Leite Patrão, Leomar Camargo de Souza, Vinicius Eloy dos Reis, Fábio Lúcio Lopes Mendonça and Rafael T. de Sousa Jr.</i>	272
Estimated Costs for Single Tuition Fee (STF) using Naïve Bayes Method <i>Juhriyansyah Dalle, Dwi Hastuti, Taufik Rahman, A. Akrim, Sri Erliani, Taufik Hidayat, Siska Devina, Agustina Lestari, B. Baharuddin, Hesti Fibriasari, Akhmad Murjani, Erika Lismayani, Ahmad Yusuf and Candra Kusuma Negara</i>	280
Evaluating the Use of the Open Trip Model for Process Mining: An Informal Conceptual Mapping Study in Logistics <i>Jean Paul Sebastian Piest, Jennifer Alice Cutinha, Rob Henk Bemthuis and Faiza Allah Bukhsh</i>	290
Digital Lighthouse: A Platform for Monitoring Public Groups in WhatsApp <i>Ivandro Claudino de Sá, José Maria Monteiro, José Wellington Franco da Silva, Leonardo Monteiro Medeiros, Pedro Jorge Chaves Mourão and Lucas Cabral Carneiro da Cunha</i>	297
Towards a Blockchain Architecture for Animal Sanitary Control <i>Glenio Descovi, Vinícius Maran, Denilson Ebling and Alencar Machado</i>	305
Architectural Challenges on the Integration of e-Commerce and ERP Systems: A Case Study <i>Fábio Santos and Ricardo Martinho</i>	313
Quality Management in Social Business Intelligence Projects <i>María José Aramburu, Rafael Berlanga and Indira Lanza-Cruz</i>	320
Reference Architecture for Efficient Computer Integrated Manufacturing <i>Abdelkarim Remli, Amal Khtira and Bouchra El Asri</i>	328
On the Evaluation of Classification Methods Applied to Requests for Revision of Registered Debts <i>Helton Souza Lima, Damires Yluska de Souza Fernandes, Thiago José Marques Moura and Daniel Sabóia</i>	335
A Blockchain Approach to Support Vaccination Process in a Country <i>Andrei Carniel, Gustavo Leme, Juliana de Melo Bezerra and Celso Massaki Hirata</i>	343
Challenges of Infrastructure in Cloud Computing for Education Field: A Systemmatic Literature Review <i>Nurma Ayu Wigati, Ari Wibisono and Achmad Nizar Hidayanto</i>	351

Automated Data Extraction from PDF Documents: Application to Large Sets of Educational Tests <i>Karina Wiechork and Andrea Schwertner Charão</i>	359
Data Mining, Business Intelligence, Grid and Utility Computing: A Bibliometric Review of the Literature from 2015 to 2020 <i>Ernani Damasceno, Ana Azevedo and Manuel Pérez-Cota</i>	367
A Consortied Ledger-based Cloud Computing Provider Users Reputation Architecture <i>Gabriel Escobar Vasques and Adriano Fiorese</i>	374

## ARTIFICIAL INTELLIGENCE AND DECISION SUPPORT SYSTEMS

### FULL PAPERS

Detecting Non-routine Customer Support E-Mails <i>Anton Borg and Jim Ahlstrand</i>	387
LDBNN: A Local Density-based Nearest Neighbor Classifier <i>Joel Luís Carbonera</i>	395
A Global Density-based Approach for Instance Selection <i>Joel Luís Carbonera</i>	402
Greedy Scheduling: A Neural Network Method to Reduce Task Failure in Software Crowdsourcing <i>Jordan Urbaczek, Razieh Saremi, Mostaan Lofalian Saremi and Julian Togelius</i>	410
A Decision Support System to Evaluate Suppliers in the Context of Global Service Providers <i>Bruno P. Bruck, Dario Vezzali, Manuel Iori, Carlo Alberto Magni and Daniele Pretolani</i>	420
Real-time Periodic Advertisement Recommendation Optimization under Delivery Constraint using Quantum-inspired Computer <i>Fan Mo, Huida Jiao, Shun Morisawa, Makoto Nakamura, Koichi Kimura, Hisanori Fujisawa, Masafumi Ohtsuka and Hayato Yamana</i>	431
Agent-based Decentral Production Planning and Control: A New Approach for Multi-resource Scheduling <i>Martin Krockert, Marvin Matthes and Torsten Munkelt</i>	442
CC-separation Measure Applied in Business Group Decision Making <i>Jonata C. Wiczynski, Giancarlo Lucca, Eduardo N. Borges, Graçaliz P. Dimuro, Rodolfo Lourenzutti and Humberto Bustince</i>	452
An Integrated Task and Personnel Scheduling Problem to Optimize Distributed Services in Hospitals <i>Nicolas P. Campana, Giorgio Zucchi, Manuel Iori, Carlo Alberto Magni and Anand Subramanian</i>	463
Assessing the Effectiveness of Multilingual Transformer-based Text Embeddings for Named Entity Recognition in Portuguese <i>Diego Bernardes de Lima Santos, Frederico Giffoni de Carvalho Dutra, Fernando Silva Parreiras and Wladmir Cardoso Brandão</i>	473
An Improved Deep Learning Application for Leaf Shape Reconstruction and Damage Estimation <i>Mateus Coelho Silva, Servio Pontes Ribeiro, Andrea Gomes Campos Bianchi and Ricardo Augusto Rabelo Oliveira</i>	484

Embedded Edge Artificial Intelligence for Longitudinal Rip Detection in Conveyor Belt Applied at the Industrial Mining Environment <i>Emerson Klippel, Ricardo Augusto Rabelo Oliveira, Dmitry Maslov, Andrea Gomes Campos Bianchi, Saul Emanuel Delabrida Silva and Charles Tim Batista Garrocho</i>	496
PlaceProfile: Employing Visual and Cluster Analysis to Profile Regions based on Points of Interest <i>Rafael Mariano Christófano, Wilson Estécio Marcílio Júnior and Danilo Medeiros Eler</i>	506
Global Reward Design for Cooperative Agents to Achieve Flexible Production Control under Real-time Constraints <i>Sebastian Pol, Schirin Baer, Danielle Turner, Vladimir Samsonov and Tobias Meisen</i>	515
Edge Deep Learning Applied to Granulometric Analysis on Quasi-particles from the Hybrid Pelletized Sinter (HPS) Process <i>Natália F. de C. Meira, Mateus C. Silva, Ricardo A. R. Oliveira, Aline Souza, Thiago D'Angelo and Cláudio B. Vieira</i>	527
Performance Analysis of Different Operators in Genetic Algorithm for Solving Continuous and Discrete Optimization Problems <i>Shilun Song, Hu Jin and Qiang Yang</i>	536
Predicting Type Annotations for Python using Embeddings from Graph Neural Networks <i>Vladimir Ivanov, Vitaly Romanov and Giancarlo Succi</i>	548
<b>SHORT PAPERS</b>	
NEWRITER: A Text Editor for Boosting Scientific Paper Writing <i>João Ribeiro Bezerra, Luís Fabrício Wanderley Góes and Wladmir Cardoso Brandão</i>	559
Variational Autoencoder for Anomaly Detection in Event Data in Online Process Mining <i>Philippe Krajsic and Bogdan Franczyk</i>	567
Comparing Feature Engineering and Deep Learning Methods for Automated Essay Scoring of Brazilian National High School Examination <i>Aluizio Haendchen Filho, Fernando Concatto, Hércules Antonio do Prado and Edilson Ferneda</i>	575
Visual Analytics for Industrial Sensor Data Analysis <i>Tristan Langer and Tobias Meisen</i>	584
Ontology-based Approach for Business Opportunities Recognition <i>Vinicius Ferreira Salgado, Diego Bernardes de Lima Santos, Frederico Giffoni de Carvalho Dutra, Fernando Silva Parreiras and Wladmir Cardoso Brandão</i>	594
CHILDATTEND: A Neural Network based Approach to Assess Child Attendance in Social Project Activities <i>João Vitor Andrade Estrela and Wladmir Cardoso Brandão</i>	602
Evaluating a Session-based Recommender System using Prod2vec in a Commercial Application <i>Hasan Tercan, Christian Bitter, Todd Bodnar, Philipp Meisen and Tobias Meisen</i>	610
RECAID: A Sponsorship Recommendation Approach <i>William Johnny Bernardes de Oliveira and Wladmir Cardoso Brandão</i>	618
Opportunities and Challenges in Fall Risk Management using EHRs and Artificial Intelligence: A Systematic Review <i>Henrique D. P. dos Santos, Juliana O. Damasio, Ana Helena D. P. S. Ulbrich and Renata Vieira</i>	626

Lead Time Forecasting with Machine Learning Techniques for a Pharmaceutical Supply Chain <i>Maiza Biazon de Oliveira, Giorgio Zucchi, Marco Lippi, Douglas Farias Cordeiro, Núbia Rosa da Silva and Manuel Iori</i>	634
Early-identification of Human Resource Trends and Innovations through Web-scraping Technology <i>Alexander Smirnov, Nikolay Shilov, Alexey Kashevnik, Mikhail Petrov, Simon Brugger and Tefik Ismaili</i>	642
Exploring the Relationships between Data Complexity and Classification Diversity in Ensembles <i>Nathan Formentin Garcia, Frederico Tiggeman, Eduardo N. Borges, Giancarlo Lucca, Helida Santos and Graçaliz Dimuro</i>	652
Machine Learning Algorithms for Breast Cancer Detection in Mammography Images: A Comparative Study <i>Rhaylander Mendes de Miranda Almeida, Dehua Chen, Agnaldo Lopes da Silva Filho and Wladmir Cardoso Brandão</i>	660
Systematic Selection and Prioritization of Communication Channels in the Healthcare Sector <i>Francisco Casaca and André Vasconcelos</i>	668
Application of Machine Learning Methods to Improve of the Roller Press Performance in the Pelletizing Process <i>Thiago Nicoli de Abreu, Andrea G. Campos Bianchi and Saul Emanuel Delabrida Silva</i>	677
IDiSSC: Edge-computing-based Intelligent Diagnosis Support System for Citrus Inspection <i>Mateus Coelho Silva, Jonathan Cristóvão Ferreira da Silva and Ricardo Augusto Rabelo Oliveira</i>	685
A Robust Real-time Component for Personal Protective Equipment Detection in an Industrial Setting <i>Pedro Torres, André Davys, Thuener Silva, Luiz Schirmer, André Kuramoto, Bruno Itagyba, Cristiane Salgado, Sidney Comandulli, Patricia Ventura, Leonardo Fialho, Marinho Fischer, Marcos Kalinowski, Simone Barbosa and Hélio Lopes</i>	693
Social, Legal, and Technical Considerations for Machine Learning and Artificial Intelligence Systems in Government <i>Richard Dreyling, Eric Jackson, Tanel Tammet, Alena Labanava and Ingrid Pappel</i>	701
Towards the Automation of Industrial Data Science: A Meta-learning based Approach <i>Moncef Garouani, Adeel Ahmad, Mourad Bouneffa, Arnaud Lewandowski, Gregory Bourguin and Mohamed Hamlich</i>	709
SPOT: Toward a Decision Guidance System for Unified Product and Service Network Design <i>Joost Bottenbley and Alexander Brodsky</i>	717
Multi-object Tracking for Urban and Multilane Traffic: Building Blocks for Real-World Application <i>Nikolajs Bumanis, Gatis Vitols, Irina Arhipova and Egons Solmanis</i>	729
Online Non-metric Facility Location with Service Installation Costs <i>Christine Markarian</i>	737
Algorithmic View of Online Prize-collecting Optimization Problems <i>Christine Markarian and Abdul Nasser El-Kassar</i>	744
Electronic Circuits Extrinsic Evolutionary Platform <i>Pedro Henrique Gouvea Coelho, J. F. M. do Amaral and M. C. Bentes</i>	752
Application Development for Mask Detection and Social Distancing Violation Detection using Convolutional Neural Networks <i>Gokul Sudheesh Kumar and Sujala D. Shetty</i>	760



Configurable Process Mining: Semantic Variability in Event Logs <i>Aicha Khannat, Hanae Sbai and Laila Kjiri</i>	768
Fever Status Detection using Artificial Neuron Network <i>Linos Nchena and Dagmar Janacova</i>	776
How to Identify the Infeasible Test Requirements using Static Analyse? An Exploratory Study <i>João Choma Neto, Allan Mori, Ricardo Ferreira Vilela, Thelma E. Colanzi and Simone R. S. de Souza</i>	782
Hybrid Prototypical Networks Augmented by a Non-linear Classifier <i>Anas El Ouardi, Maryem Rhanoui, Anissa Benlarabi and Bouchra El Asri</i>	790
Strategies for Electric Location-routing Problems Considering Short and Long Term Horizons <i>Victor Hugo Vidigal Corrêa, André Gustavo dos Santos and Thiago Henrique Nogueira</i>	795
Analysing Clustering Algorithms Performance in CRM Systems <i>Indrit Enesi, Ledion Liço, Aleksander Biberaj and Desari Shahu</i>	803
Streetwise: Mapping Citizens' Perceived Spatial Qualities <i>Moreno Colombo, Jhonny Pincay, Oleg Lavrovsky, Laura Iseli, Joris Van Wezemaal and Edy Portmann</i>	810
<b>SOFTWARE AGENTS AND INTERNET COMPUTING</b>	
<b>FULL PAPERS</b>	
A Hybrid IoT Analytics Platform: Architectural Model and Evaluation <i>Theo Zschörnig, Jonah Windolph, Robert Wehlitz and Bogdan Franczyk</i>	823
An Endogenous and Self-organizing Approach for the Federation of Autonomous MQTT Brokers <i>Marco Aurélio Spohn</i>	834
Similarity-inclusive Link Prediction with Quaternions <i>Zuhal Kurt, Ömer Nezi̇h Gerek, Alper Bilge and Kemal Özkan</i>	842
LISSU: Integrating Semantic Web Concepts into SOA Frameworks <i>Johannes Lipp, Siyabend Sakik, Moritz Kröger and Stefan Decker</i>	855
<b>SHORT PAPERS</b>	
Process-aware Decision Support Model for Integrating Internet of Things Applications using AHP <i>Christoph Stoiber and Stefan Schönig</i>	869
Exploring Differential Privacy in Practice <i>Davi Grossi Hasuda and Juliana de Melo Bezerra</i>	877
Using Academic Genealogy for Recommending Supervisors <i>Gabriel Madeira, Eduardo N. Borges, Giancarlo Lucca, Washington Carvalho-Segundo, Jonata C. Wiczynski, Helida Santos and Graçaliz Dimuro</i>	885
Faceshield HUD: Extended Usage of Wearable Computing on the COVID-19 Frontline <i>Mateus C. Silva, Ricardo A. R. Oliveira, Thiago D'Angelo, Charles T. B. Garrocho and Vicente J. P. Amorim</i>	893
Searching for Weak Signals in the Web to Support Scenarios Building for Future Studies <i>Rodrigo Teixeira dos Santos, Edilson Ferneda, Hercules Antonio do Prado, Aluizio Haendchen Filho, Ana Paula Bernardi da Silva, Roseane Salvio and Elaine Coutinho Marcial</i>	901



# **23rd International Conference on Enterprise Information Systems (ICEIS 2021)**

Online  
26 – 28 April 2021

Volume 2 of 2

## **Editors:**

**Joaquim Filipe  
Michal Smialek**

**Alexander Brodsky  
Slimane Hammoudi**

ISBN: 978-1-7138-3987-3

# CONTENTS

---

## INVITED SPEAKERS

### KEYNOTE SPEAKERS

From Representation to Mediation: Modeling Information Systems in a Digital World <i>Jan Recker</i>	5
Myths and Misconceptions about Machine Learning and How They Are Related to Software Engineering <i>Stefan Kramer</i>	7
What Can We Learn from Play? <i>Panos Markopoulos</i>	9
How AI and Digital Are Key of Manufacturers Survival <i>Eric Prevost</i>	11
Impact of End User Human Aspects on Software Engineering <i>John Grundy</i>	13

## INFORMATION SYSTEMS ANALYSIS AND SPECIFICATION

### FULL PAPERS

Improve Classification of Commits Maintenance Activities with Quantitative Changes in Source Code <i>Richard V. R. Mariano, Geanderson E. dos Santos and Wladimir Cardoso Brandão</i>	19
A Risk Management Framework for Scrum Projects <i>Samuel de Souza Lopes, Rogéria Cristiane Gratão de Souza, Allan de Godoi Contessoto, André Luiz de Oliveira and Rosana Teresinha Vaccare Braga</i>	30
Digital Legacy Management Systems: Theoretical, Systemic and User's Perspective <i>Eduardo Akimitsu Yamauchi, Cristiano Maciel, Fabiana Freitas Mendes, Gustavo Seiji Ueda and Vinicius Carvalho Pereira</i>	41
A PMBoK Extension Proposal for Data Visualization in Software Project Management <i>Julia Colleoni Couto, Josiane Kroll, Duncan Ruiz and Rafael Prikładnicki</i>	54
Evaluating Random Input Generation Strategies for Accessibility Testing <i>Diogo Oliveira Santos, Vinicius H. S. Durelli, Andre Takeshi Endo and Marcelo Medeiros Eler</i>	66
C++ Web Framework: A Web Framework for Web Development using C++ and Qt <i>Herik Lima and Marcelo Medeiros Eler</i>	76
Technical Debt Tools: A Systematic Mapping Study <i>Diego Saraiva, José Gameleira Neto, Uirá Kulesza, Guilherme Freitas, Rodrigo Reboucas and Roberta Coelho</i>	88
A Well-founded Ontology to Support the Preparation of Training and Test Datasets <i>Lucimar de A. Lial Moura, Marcus Albert A. da Silva, Kelli de Faria Cordeiro and Maria Cláudia Cavalcanti</i>	99

Evaluation of Non-Functional Requirements for IoT Applications <i>Joseane O. V. Paiva, Rossana M. C. Andrade and Rainara Maia Carvalho</i>	111
Querying Brazilian Educational Open Data using a Hybrid NLP-based Approach <i>Marco Antoni, Andrea Schwertner Charão and Maria Helena Franciscatto</i>	120
Exploring Big Data Analytics Adoption using Affordance Theory <i>Veena Bansal and Shubham Shukla</i>	131
Empirical Research on Customer Communication Challenges in the Companies Adopting Agile Practices <i>Paolo Ciancarini, Shokhista Ergasheva, Ilyuza Gizzatullina, Vladimir Ivanov, Sergey Masyagin and Giancarlo Succi</i>	139
<b>SHORT PAPERS</b>	
In Continuous Software Development, Tools Are the Message for Documentation <i>Theo Theunissen, Stijn Hoppenbrouwers and Sietse Overbeek</i>	153
SMartyTesting: A Model-Based Testing Approach for Deriving Software Product Line Test Sequences <i>Kleber L. Petry, Edson Oliveira Jr, Leandro T. Costa, Aline Zanin and Avelino F. Zorzo</i>	165
Controlling Personal Data Flow: An Ontology in the COVID-19 Outbreak using a Permissioned Blockchain <i>Paulo Henrique Alves, Isabella Z. Frajhof, Fernando A. Correia, Clarisse de Souza and Helio Lopes</i>	173
How to Mock a Bear: Honeygot, Honeygot, Honeygot & Honeygot: A Survey <i>Paul Lackner</i>	181
Project Management Processes Used during the Development of Software Projects in Home Office Format: A Field Research in Multinational It Companies <i>Laura S. C. Claro, Ana Carolina D. Ferreira and Alessandra C. S. Dutra</i>	189
Software Product Line Traceability and Product Configuration in Class and Sequence Diagrams: An Empirical Study <i>Thais S. Nepomuceno and Edson Oliveira Jr</i>	197
Challenges Women in Software Engineering Leadership Roles Face: A Qualitative Study <i>Karina Kohl and Rafael Prikladnicki</i>	205
A System Architecture in Multiple Views for an Image Processing Graphical User Interface <i>Roberto Wagner Santos Maciel, Michel S. Soares and Daniel Oliveira Dantas</i>	213
Challenges in using Machine Learning to Support Software Engineering <i>Olimar Teixeira Borges, Julia Colleoni Couto, Duncan Ruiz and Rafael Prikladnicki</i>	224
A Blockchain-based Architecture for Enterprise Ballot <i>Paulo Henrique Alves, Isabella Frajhof, Élisson Michael Araújo, Yang Ricardo Miranda, Rafael Nasser, Gustavo Robichez, Alessandro Garcia, Cristiane Lodi, Flavia Pacheco and Marcus Moreno</i>	232
Using Combined Techniques for Requirements Elicitation: A Brazilian Case Study <i>Naiara C. Alfken, Ligia C. M. C. Santos, Edmir P. V. Prado and Alexandre Grotta</i>	241
Design and Implementation of a Test Tool for PSD2 Compliant Interfaces <i>Gloria Bondel, Josef Kamysek, Markus Kraft and Florian Matthes</i>	249

Using Binary Strings for Comparing Products from Software-intensive Systems Product Lines <i>Mike Mannion and Hermann Kaindl</i>	257
Lex-Libras: Morphosyntactic Model of the Brazilian Sign Language to Support a Context-based Machine Translation Process <i>Antônio M. Silva, Tanya A. Felipe, Laura S. García, Diego R. Antunes and André P. Guedes</i>	267
An Empirical Study on the Impact of Aspect-oriented Model-driven Code Generation <i>André Menolli, Luan de Souza Melo, Maurício Massaru Arimoto and Andreia Malucelli</i>	275
Towards a Data-Driven Requirements Elicitation Tool through the Lens of Design Thinking <i>José Cezar de Souza Filho, Walter Takashi Nakamura, Lígia Márcia Teixeira, Rógenis Pereira da Silva, Bruno Freitas Gadelha and Tayana Uchôa Conte</i>	283
A Literature-based Derivation of a Meta-framework for IT Business Value <i>Sarah Seufert, Tobias Wulfert, Jan Wernsdörfer and Reinhard Schütte</i>	291
Investigating Information about Software Requirements in Projects That Use Continuous Integration or Not: An Exploratory Study <i>Rafael Nascimento, Luana Souza, Pablo Targino, Gustavo Sizílio, Uirá Kulesza and Márcia Lucena</i>	303
A Self-protecting Approach for Service-oriented Mobile Applications <i>Ronaldo Rodrigues Martins, Marcos Paulo de Oliveira Camargo, William Filisbino Passini, Gabriel Nagassaki Campos and Frank José Affonso</i>	313
Communication Channels in Brazilian Software Projects: An Analysis based on Case Study <i>Leandro Zocaratto Rezende, Edmir Parada Vasques Prado and Alexandre Grotta</i>	321
Performance Variability Analysis on Road Accident in Yangon <i>Kyi Pyar Hlaing, Nyein Thwet Thwet Aung, Swe Zin Hlaing and Koichiro Ochimizu</i>	329
Project based on Agile Methodologies by DMAIC <i>Bianca G. Salvadori, Patricia F. Magnago and Alessandra C. S. Dutra</i>	337
Lessons Learned from a Lean R&D Project <i>Bianca Teixeira, Bruna Ferreira, André Damasceno, Simone D. J. Barbosa, Cassia Novello, Hugo Villamizar, Marcos Kalinowski, Thuener Silva, Jacques Chueke, Hélio Lopes, André Kuramoto, Bruno Itagyba, Cristiane Salgado, Sidney Comandulli, Marinho Fischer and Leonardo Fialho</i>	345
Design Thinking Techniques Selection in Software Development: On the Understanding of Designers and Software Engineers Choices <i>Lauriane Pereira, Rafael Parizi, Sabrina Marczak and Tayana Conte</i>	353
Asynchronous Data Provenance for Research Data in a Distributed System <i>Benedikt Heinrichs and Marius Politze</i>	361
Using Blockchain to Trace PDO/PGI/TSG Products <i>Luis Alves, Tiago Carvalhido, Estrela Ferreira Cruz and António Miguel Rosado da Cruz</i>	368
Database-Conscious End-to-End Testing for Reactive Systems using Containerization <i>Denton Wood and Tomáš Černý</i>	377
A Hybrid Approach using Progressive and Genetic Algorithms for Improvements in Multiple Sequence Alignments <i>Geraldo Francisco Donegá Zafalon, Vitoria Zanon Gomes, Anderson Rici Amorim and Carlos Roberto Valêncio</i>	384

Success Factors of Business Intelligence and Performance Dashboards to Improve Performance in Higher Education <i>Asmaa Abduldaem and Andy Gravell</i>	392
PLASMA: Platform for Auxiliary Semantic Modeling Approaches <i>Alexander Paulus, Andreas Burgdorf, Lars Puleikis, Tristan Langer, André Pomp and Tobias Meisen</i>	403
Transitions in Information Systems Development: SME's Issues and Challenges <i>Lakshminarayana Kompella</i>	413
Technical Due Diligence as a Methodology for Assessing Risks in Start-up Ecosystems <i>Iván Sanz-Prieto, Luis de-la-Fuente-Valentín and Sergio Rios-Aguilar</i>	421
Psychological Contracts in Business Process Transformation Effect: Structure of Psychological Contracts <i>Kayo Iizuka and Chihiro Suematsu</i>	429
<b>HUMAN-COMPUTER INTERACTION</b>	
<b>FULL PAPERS</b>	
Knowledge Sharing Live Streams: Real-time and On-demand Engagement <i>Leonardo Mariano Gravina Fonseca and Simone Diniz Junqueira Barbosa</i>	441
Vis2Learning: A Scenario-based Guide to Support Developers in the Creation of Visualizations on Educational Data <i>Maylon Pires Macedo, Ranilson Oscar Araújo Paiva, Isabela Gasparini and Luciana A. M. Zaina</i>	451
Assessing a Technology for Usability and User Experience Evaluation of Conversational Systems: An Exploratory Study <i>Guilherme Corredato Guerino, Williamson Alison Freitas Silva, Thiago Adriano Coleti and Natasha Malveira Costa Valentim</i>	463
Mapping Personality Traits through Keystroke Analysis <i>Felipe Valadão Goulart and Daniel Oliveira Dantas</i>	474
An Interface Design Catalog for Interactive Labeling Systems <i>Lucas Viana, Edson Oliveira and Tayana Conte</i>	483
End-user Evaluation of a Mobile Application Prototype for Territorial Innovation <i>Eliza Oliveira, André C. Branco, Daniel Carvalho, Eveline Sacramento, Oksana Tymoshchuk, Luis Pedro, Maria J. Antunes, Ana M. Almeida and Fernando Ramos</i>	495
<b>SHORT PAPERS</b>	
Digital Generation and Posthumous Interaction: A Descriptive Analysis in Social Networks <i>Juliana Micolino Cabral, Cristiano Maciel, Vanice Canuto Cunha, Jivago Medeiros Ribeiro and Daniele Trevisan</i>	507
The Usability of Mobile Enterprise Resource Planning Systems <i>Thomas Wüllerich and Alexander Dobhan</i>	517
It's a Match! A Knowledge based Recommendation System for Matching Technology with Events <i>Genildo Gomes, Isabelle Rêgo, Moises Gomes, Júlia Conceição, Artur Andrade, Tayana Conte, Thaís Castro and Bruno Gadelha</i>	525

Augmented Reality Applied to Reducing Risks in Work Safety in Electric Substations <i>Victor Menezes Rocha and Saul Delabrida</i>	533
Immersive UX: A UX Evaluation Framework for Digital Immersive Experiences in the Context of Entertainment <i>Franciane Alves, Brenda Aguiar, Vinicius Monteiro, Elizamara Almeida, Leonardo Marques, Bruno Gadelha and Tayana Conte</i>	541
LogMe: An Application for Generating Logs in Immersive Interactions for UX Evaluation <i>Victor Klisman, Luan Souza Marques, João Pedro de Lima, Leonardo Marques, Genildo Gomes, Tayana Conte and Bruno Gadelha</i>	549
Stressed by Boredom in Your Home Office? On „Boreout“ as a Side-effect of Involuntary Distant Digital Working Situations on Young People at the Beginning of Their Career <i>Ioannis Starchos and Anke Schüll</i>	557
Adaptive Complex Data-Intensive Web Systems via Object-oriented Paradigms: A Real-life Case Study <i>Alfredo Cuzzocrea and Edoardo Fadda</i>	565
Promising Technologies and Solutions for Supporting Human Activities in Confined Spaces in Industry <i>Taynan Roger Silva, Bruno Nazário Coelho and Saul Emanuel Delabrida</i>	573
A Dempster–Shafer Big Data Readiness Assessment Model <i>Natapat Areerakulkan and Worapol Alex Pongpech</i>	581
<b>ENTERPRISE ARCHITECTURE</b>	
<b>FULL PAPERS</b>	
Demonstrating GDPR Accountability with CSM-ROPA: Extensions to the Data Privacy Vocabulary <i>Paul Ryan and Rob Brennan</i>	591
Retailer’s Dual Role in Digital Marketplaces: Towards Architectural Patterns for Retail Information Systems <i>Tobias Wulfert and Reinhard Schütte</i>	601
Does Fractal Enterprise Model Fit Operational Decision Making? <i>Victoria Klyukina, Ilia Bider and Erik Perjons</i>	613
The Data Quality Index: Improving Data Quality in Irish Healthcare Records <i>David Hickey, Rita O. Connor, Pauline McCormack, Peter Kearney, Roosa Rosti and Rob Brennan</i>	625
Synchronous and Asynchronous Requirements for Digital Twins Applications in Industry 4.0 <i>Rafael F. Vitor, Breno N. S. Keller, Débora L. M. Barbosa, Débora N. Diniz, Mateus C. Silva, Ricardo A. R. Oliveira and Saul E. Delabrida S.</i>	637
An Agri-Food Supply Chain Traceability Management System based on Hyperledger Fabric Blockchain <i>Angelo Marchese and Orazio Tomarchio</i>	648
An Agile Approach for Modeling Enterprise Architectures <i>Petrônio Medeiros, Alixandre Santana, Myllena Lima, Hermano Moura and Miguel Mira da Silva</i>	659



## SHORT PAPERS

Deriving a Process for Interorganizational Business Capability Modeling through Case Study Analysis <i>Fatih Yilmaz, Julian Feldmeier and Florian Matthes</i>	673
Predictive Maintenance Model based on Asset Administration Shell <i>Salvatore Cavalieri and Marco Giuseppe Salafia</i>	681
An Evolution-based Approach towards Next-Gen Defence HQ and Energy Strategy Integration <i>Ovidiu Noran and Peter Bernus</i>	689
Benefits of the Enterprise Data Governance in Industry: A Qualitative Research <i>Rodrigo Prado, Edmir P. V. Prado, Alexandre Grotta and Andre Montoia Barata</i>	699
An Open Platform for Smart Production: IT/OT Integration in a Smart Factory <i>Dan Palade, Charles Moller, Chen Li and Soujanya Mantravadi</i>	707
Enterprise Architecture Patterns for GDPR Compliance <i>Clara Teixeira, André Vasconcelos, Pedro Sousa and M<sup>a</sup> João Marques</i>	715
Dual Capability EAM for Agility in Business Capability Building: A Systems Theoretical View <i>Jouko Poutanen and Mirja Pulkkinen</i>	726
Boost the Potential of EA: Essential Practices <i>Hong Guo, Jingyue Li, Shang Gao and Darja Smitc</i>	735
Privacy by Design Enterprise Architecture Patterns <i>Maria Dias Coelho, André Vasconcelos and Pedro Sousa</i>	743
A Conceptual Reference Framework for Data-driven Supply Chain Collaboration <i>Anna-Maria Nitsche, Christian-Andreas Schumann and Bogdan Franczyk</i>	751
Complexity and Adaptive Enterprise Architecture <i>Wissal Daoudi, Karim Doumi and Laila Kjiri</i>	759
An IT Infrastructure for Small- and Medium-sized Enterprises Willing to Compete in the Global Market <i>Francesco Pilotti, Gaetanino Paolone, Daniele Di Valerio, Martina Marinelli, Roberto Cocca and Paolino Di Felice</i>	768
Future ERP Systems: A Research Agenda <i>Benedict Bender, Clementine Bertheau and Norbert Gronau</i>	776
InfoMINDS: An Interdisciplinary Framework for Leveraging Data Science upon Big Data in Surface Mining Industry <i>Vitor Afonso Pinto and Fernando Silva Parreiras</i>	784
Crowd-Innovation: Crowdsourcing Platforms for Innovation <i>Roberta Cuel</i>	792
Organizational Readiness Assessment for Open Source Software Adoption <i>Lucía Méndez-Tapia and Juan Pablo Carvallo</i>	800
AUTHOR INDEX	809