

29th Annual Conference of the International Group for Lean Construction (IGLC29) Conference Program

Wednesday July 14, 2021			
08:00-08:20 Lima Time	<p>Welcome to IGLC29 Chairs: Dr Leonardo Rischmoller; Dr Danny Murguia Technical Chairs: Assoc. Prof. Vicente A. Gonzalez; Prof. Luis F Alarcon</p>		
08:20-09:20 Lima Time	<p>Keynote 1: Trust, emotionality, relationships, and productivity - some reflections for the construction industry - Dr Fernando Flores</p>		
09:30-10:30 Lima Time	<p>PLENARY SESSION 1</p> <p>Chair: Prof. Carlos Formoso</p> <p>SLACK IN CONSTRUCTION - PART 1: CORE CONCEPTS Formoso, Carlos Torres; Tommela, Iris Denise; Saurin, Tarcisio de Abreu; Koskela, Lauri; Fireman, Marcus T.; Barth, Karina Bertotto; Bataglin, Fernanda Saidelles; Viana, Daniela; Coelho, Rafael; Singh, Vishesh; Zani, Carolina; Ransolin, Nátala; Disconzi, Cláudia</p> <p>183 IMPROVING STREET RECONSTRUCTION PROJECTS IN CITY CENTERS THROUGH COLLABORATIVE PRACTICES Seppänen, Olli; Lavikka, Riia; Lehtovaara, Joonas; Peltokorpi, Antti</p> <p>116 REENGINEERING CONSTRUCTION PROCESSES IN THE ERA OF CONSTRUCTION 4.0: A LEAN-BASED FRAMEWORK Bou Hatoum, Makram; Nasserredine, Hala; Badurdeen, Fazleena</p>		
10:45-11:45 Lima Time	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p style="text-align: center;">Parallel Session 1</p> <p style="background-color: #fff9c4; padding: 2px;">CONTRACT AND COST MANAGEMENT</p> <p>Chair: Dr Cynthia Tsao</p> <p>131 DEVELOPMENT OF TARGET COST FOR A HIGH-PERFORMANCE BUILDING Engebe, Alle; Torp, Olav; Lædre, Ola</p> <p>151 EVALUATION OF LEAN PRINCIPLES IN BUILDING MAINTENANCE MANAGEMENT Dragone, Isabela Svicero; Serra, Sheyila Mara Baptista; Biotto, Clarissa Notariano</p> <p>168 PROJECT DELIVERY CONTRACT LANGUAGE, SCHEDULES, AND COLLABORATION Aves, Thais; Martinez, Manuel; Liu, Min; Scala, Natalie</p> <p>162 THE IMPACT OF BVP IN A TVD BASED PROJECT DELIVERY Malvik, Tobias Onshuus; Kalsaas, Bo Terje; Shabani, Rouzbeh; Sandvik, Karl Oscar</p> </td> <td style="width: 50%; vertical-align: top;"> <p style="text-align: center;">Parallel Session 2</p> <p style="background-color: #e0e0ff; padding: 2px;">ENABLING LEAN WITH INFORMATION TECHNOLOGY</p> <p>Chair: Assoc. Prof. Olli Seppanen</p> <p>160 LEAN CONSTRUCTION IN A SERIOUS GAME USING A MULTIPLAYER VIRTUAL REALITY ENVIRONMENT Jacobsen, Emil L.; Teizer, Jochen</p> <p>161 LPS IMPLEMENTATION USING PHYSICAL AND DIGITAL VISUAL MANAGEMENT BASED TOOLS. A CASE STUDY IN LUXEMBOURG Hua, Duan; Schwartz, Thomas</p> <p>179 A FRAMEWORK FOR IMPLEMENTING THE LAST PLANNER SYSTEM IN A VIRTUAL ENVIRONMENT Salhab, Diana; Nouhed, Karim; Fayek, Ahd; Hamzeh, Farook; Ahuja, Ritu</p> </td> </tr> </table>	<p style="text-align: center;">Parallel Session 1</p> <p style="background-color: #fff9c4; padding: 2px;">CONTRACT AND COST MANAGEMENT</p> <p>Chair: Dr Cynthia Tsao</p> <p>131 DEVELOPMENT OF TARGET COST FOR A HIGH-PERFORMANCE BUILDING Engebe, Alle; Torp, Olav; Lædre, Ola</p> <p>151 EVALUATION OF LEAN PRINCIPLES IN BUILDING MAINTENANCE MANAGEMENT Dragone, Isabela Svicero; Serra, Sheyila Mara Baptista; Biotto, Clarissa Notariano</p> <p>168 PROJECT DELIVERY CONTRACT LANGUAGE, SCHEDULES, AND COLLABORATION Aves, Thais; Martinez, Manuel; Liu, Min; Scala, Natalie</p> <p>162 THE IMPACT OF BVP IN A TVD BASED PROJECT DELIVERY Malvik, Tobias Onshuus; Kalsaas, Bo Terje; Shabani, Rouzbeh; Sandvik, Karl Oscar</p>	<p style="text-align: center;">Parallel Session 2</p> <p style="background-color: #e0e0ff; padding: 2px;">ENABLING LEAN WITH INFORMATION TECHNOLOGY</p> <p>Chair: Assoc. Prof. Olli Seppanen</p> <p>160 LEAN CONSTRUCTION IN A SERIOUS GAME USING A MULTIPLAYER VIRTUAL REALITY ENVIRONMENT Jacobsen, Emil L.; Teizer, Jochen</p> <p>161 LPS IMPLEMENTATION USING PHYSICAL AND DIGITAL VISUAL MANAGEMENT BASED TOOLS. A CASE STUDY IN LUXEMBOURG Hua, Duan; Schwartz, Thomas</p> <p>179 A FRAMEWORK FOR IMPLEMENTING THE LAST PLANNER SYSTEM IN A VIRTUAL ENVIRONMENT Salhab, Diana; Nouhed, Karim; Fayek, Ahd; Hamzeh, Farook; Ahuja, Ritu</p>
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Thursday July 15, 2021

08:00-10:00 Lima Time	<p>Gregory Howell Lean Game Session</p> <p>Room 1: TVD simulation (TVD for digital fabrication)</p> <p>Room 2: TVD Simulation</p> <p>Room 3: Batch, Pull, Balance</p> <p>Room 4: Mistakeproofing</p> <p>Room 5: 5S Puzzle</p> <p>Room 6: Parade of Trades</p>	<p>Facilitators: Ming Shan Ng (Charmaine) and Daniel M. Hall</p> <p>Facilitators: Ganesh Devkar, Gerogje Jacob, Nimish Sharma and Shaurya Bhatnagar</p> <p>Facilitator: Colin Milberg</p> <p>Facilitator: Iris D. Tommelein</p> <p>Facilitators: Rajeswari Obulam, under guidance of Dr. Zofia K. Rybkowski</p> <p>Facilitator: Cynthia Tsao</p>
10:30-11:30 Lima Time	<p>Parallel Session 1</p> <p>LEARNING AND TEACHING LEAN 1 Chair: Assoc. Prof. Zofia Rybkowski</p> <p>134 POTENTIAL OF GAMIFICATION FOR LEAN CONSTRUCTION TRAINING: AN EXPLORATORY STUDY Pütz, Carla; Lühr, Gunnar; Wenzel, Mona; Helmus, Manfred</p> <p>203 VIRTUAL PARADE GAME FOR LEAN TEACHING AND LEARNING IN STUDENTS FROM BRAZIL AND CHILE Biotto, Clarissa N.; Herrera, Rodrigo F.; Salazar, Luis Arturo; Perez, Cristina T.; Luna, Roberto M.; Rodigheri, Priscila; Serra, Sheyla</p> <p>149 LEAN CONSTRUCTION AND ORGANIZATIONAL KNOWLEDGE CREATION Trentin, Bianca Tais; Etges, Bernardo Martim Beck da Silva</p>	<p>Parallel Session 2</p> <p>PEOPLE, CULTURE, AND CHANGE 1 Chair: Dr James Smith</p> <p>192 DEVELOPING A LEAN CULTURE INDEX IN CONSTRUCTION Kallassy, Jessica; Hamzeh, Farook</p> <p>194 THE TOYOTA KATA METHODOLOGY FOR MANAGING THE MATURITY LEVEL OF LAST PLANNER SYSTEM® Perez Apaza, Jose Fernando; Ramirez Valenzuela, Ronald André; Perez Apaza, Juan Diego</p> <p>114 RESULTS OF KEY INDICATORS FROM LINGUISTIC ACTION PERSPECTIVE IN PANDEMIC: CASE STUDY Salazar, Luis Arturo; Pardo, Daniela; Guzmán, Sebastián</p>
11:45-12:45 Lima Time	<p>Parallel Session 1</p> <p>LEARNING AND TEACHING LEAN 2 Chair: Assoc. Prof. Zofia Rybkowski</p> <p>106 A REVIEW OF COMPONENTS AND CONFIGURATIONS OF SURVEY RESEARCH IN LEAN CONSTRUCTION Koohestani, Kayvan; Poshdar, Mani; Moayedi, Sara; Gonzalez, Vicente; Tzortzopoulos, Patricia; Talebi, Saeed</p> <p>117 TEACHING TARGET VALUE DESIGN FOR DIGITAL FABRICATION IN AN ONLINE GAME: OVERVIEW AND CASE STUDY Ng, Ming Shan; Hall, Daniel Mark</p> <p>190 DEVELOPMENT AND TESTING OF A SIMULATION GAME ON WASTE ELIMINATION USING LEAN PRACTICES Bhatnagar, Shaurya; Devkar, Ganesh</p>	<p>Parallel Session 2</p> <p>PEOPLE, CULTURE, AND CHANGE 2 Chair: Dr James Smith</p> <p>219 CHOOSING BY ADVANTAGES FOR THE SELECTION OF A NEW MEMBER OF THE PROJECT TEAM Paucair Espinoza, Anthony; Erazo-Rondinel, Andrews Alexander; Yong Zamora, Seiko</p> <p>123 AGENCY PROBLEMS AS A DRIVER FOR CRIME IN THE AEC-INDUSTRY Lohne, Jørdar; Drevland, Frode Olav; Lødre, Ola</p> <p>180 FEASIBILITY OF STAKEHOLDER MANAGEMENT TO IMPROVE INTEGRATION AND COMMUNICATION USING BIG ROOM, LEAN CONSTRUCTION, PMBOK AND PRINCE2 IN MULTIFAMILY PROJECTS IN TIMES OF CHANGE Sosa Córdova, Alvaro Augusto; De La Torre Salazar, Jorge Ronald</p>
13:00-14:00 Lima Time	<p>Parallel Session 1</p> <p>LEARNING AND TEACHING LEAN 3 Chair: Assoc. Prof. Min Liu</p> <p>136 DIGITALIZATION OF LEAN LEARNING SIMULATIONS: TEACHING LEAN PRINCIPLES AND LAST PLANNER SYSTEM Cisterna, Diego; Hergl, Mariana; Oprach, Svenja; Haghsheho, Shervin</p> <p>135 THE EMERGENCE AND GROWTH OF THE ON-LINE SERIOUS GAMES AND PARTICIPATORY SIMULATION GROUP "APLSO" Rybkowski, Zofia K.; da C. L. Alves, Thais; Liu, Min</p> <p>152 DEVELOPMENT AND TESTING OF THE 5S PUZZLE GAME Obulam, Rajeswari; Rybkowski, Zofia</p> <p>185 TARGET VALUE DESIGN: DEVELOPMENT AND TESTING OF A VIRTUAL SIMULATION Jacob, Georgje; Sharma, Nimish; Rybkowski, Zofia K.; Devkar, Ganesh</p>	<p>Parallel Session 2</p> <p>PEOPLE, CULTURE, AND CHANGE 3 Chair: Prof. Emuze Fidelis</p> <p>211 THE IMPORTANCE OF ALIGNMENT Skaar, John; Kalsas, Bo Terje</p> <p>142 MONITORING OF LINGUISTIC ACTION PERSPECTIVE IN ONLINE WEEKLY WORK PLANNING MEETINGS Retamal, Fabian Alejandro; Salazar, Luis Arturo; Alarcon, Luis Fernando; Arroyo, Paz</p> <p>158 TRUST AND CONTROL IN THE CONTEXT OF INTEGRATED PROJECT DELIVERY Haghsheho, Shervin; Vath, Cornelius; Schmidt, Jan-Simon; Hanau, Anna; Frantz, Lena; Budau, Maximilian Rolf-Dieter</p> <p>176 LIVING LABS IN A LEAN PERSPECTIVE Soliman-Junior, Joao; Awwal, Samira; Bridi, Marcelle Engler; Tzortzopoulos, Patricia; Granja, Ariovaldo Denis; Koskela, Lauri; Gomes, Danilo</p>
14:15-15:15 Lima Time	<p>Parallel Session 1</p> <p>PRODUCT DEVELOPMENT AND DESIGN MANAGEMENT 1 Chair: Dr Dani Dietz</p> <p>172 THE BUILT ENVIRONMENT INFLUENCE ON THE RESILIENCE OF HEALTHCARE SERVICES: LESSONS LEARNED FROM THE COVID-19 PANDEMIC Ransolin, Natália; Stigler Marczyk, Carlos Emilio; Parmeggiani Gering, Rafael; Abreu Saurin, Tarcísio; Torres Formoso, Carlos; Olav, Tor</p> <p>144 STABILITY OF DESIGN PROCESS – OBSERVATIONS OF BATCH SIZE, THROUGHPUT TIME AND RELIABILITY IN DESIGN Lappalainen, Eeloo Mikael; Uusitalo, Petteri; Seppänen, Olli; Peltokorpi, Antti</p> <p>202 STRENGTHENING TARGET VALUE DESIGN BENEFITS IN REAL ESTATE MARKET THROUGH LIVING LABS Oliveira, Carolina Assensio; Granja, Ariovaldo Denis; Bridi, Marcelle Engler; Junior, João Soliman; Ayo-Adejuyigbe, Morolake; Tzortzopoulos, Patricia</p>	<p>Parallel Session 2</p> <p>PEOPLE, CULTURE, AND CHANGE 4 Chair: Prof. Emuze Fidelis</p> <p>154 DEVELOPING A FRAMEWORK FOR SYSTEMIC TRANSFORMATION OF THE CONSTRUCTION INDUSTRY Peltokorpi, Antti; Seppänen, Olli; Lehtovaara, Joonas; Pikas, Ergo; Alhava, Otto</p> <p>207 ASSESSING IMPACT OF ORGANIZATIONAL CHANGE FOR A SYSTEMS APPROACH TO QUALITY Gordon, Elizabeth Ann; Rawlinson, Kella; Reed, Dean</p> <p>216 A SCENARIO-BASED MODEL FOR THE STUDY OF COLLABORATION IN CONSTRUCTION Garcia, Alejandro; Murguía, Danny</p> <p>221 COMPETITIVE CAPABILITY-BUILDING FOR INTEGRATED DESIGN SCHEDULING AND MANAGEMENT Reed, Dean; Powell, Will; Berg, Peter</p>
15:30-16:30 Lima Time	<p>Parallel Session 1</p> <p>PRODUCT DEVELOPMENT AND DESIGN MANAGEMENT 2 Chair: Dr Dani Dietz</p> <p>130 LEAN DESIGN IN HYDRAULIC INFRASTRUCTURE – RIVER DEFENSES AND DIKES - A CASE STUDY FROM PERU Chuquin Montoya, Frank Roberto</p> <p>186 APPLICATION OF JI KOUTEI KANKETSU IN HIGHWAYS DESIGN PROCESS IMPROVEMENT Nguyen, Quynh Anh; Koskela, Lauri; Potter, Doug; Tezel, Algan; Pedo, Barbara; Tzortzopoulos, Patricia</p> <p>133 PRODUCT VARIETY IN CONSTRUCTION: CRITICAL REVIEW AND A NEW PROPOSITION Gravina da Rocha, Cecilia; Kemmer, Sergio</p>	<p>Parallel Session 2</p> <p>PEOPLE, CULTURE, AND CHANGE 5 Chair: Prof. Emuze Fidelis</p> <p>213 EXPLORATORY STUDY OF THE MAIN LEAN TOOLS IN CONSTRUCTION PROJECTS IN PERU Huaman Orosco, Cristian; Erazo-Rondinel, Andrews Alexander</p> <p>145 THE EFFECT OF CLASSROOM ENVIRONMENT ON SATISFACTION AND PERFORMANCE: TOWARDS IOT-SUSTAINABLE SPACES Hao, Xinyue; Florez Perez, Laura</p> <p>140 USING STORYTELLING TO UNDERSTAND A COMPANY'S LEAN JOURNEY Mourão, Carlos Alexandre Martiniano do Amaral; Miranda Filho, Antônio Nunes de; Nogueira, Rebeca Nara; Barros Neto, Jose de Paula; Moreira da Costa, Jorge</p>

Friday July 16, 2021

08:00-09:00 Lima Time	<p>Keynote 2: Integrating Industry 4.0 into Lean Dr Guilherme Luz Tortorella</p>
09:15-10:15 Lima Time	<p>PLENARY SESSION 2</p> <p>Chair: Prof. Iris Tommelein</p> <p>177 SHIFTING THE FOCUS OF DISCUSSION: FROM COST (UNDER) ESTIMATION TO COST REDUCTION Koskela, Lauri; Ballard, Glenn</p> <p>113 IMPLEMENTING TAKT PRODUCTION IN RENOVATION PROJECTS Sahlberg, Jenni; Lehtovaara, Joonas; Seppänen, Olli</p> <p>146 EXPLORING VISUAL MANAGEMENT PURPOSES Brandalise, Fernanda Marisa Pasinato; Pedó, Bárbara; Viana, Daniela Dietz; Formoso, Carlos Torres</p>

10:30-11:30
Lima Time

Parallel Session 1

Parallel Session 2

Parallel Session 3

- SUPPLY CHAIN MANAGEMENT AND OFF-SITE CONSTRUCTION 1**
Chair: Dr Emmanuel Daniel
- 189 USE OF VALUE STREAM MAPPING IN A CASE STUDY IN BASEMENT CONSTRUCTION
Espinoza, Lisseth R.; Herrera, Rodrigo F.; Brioso, Xavier
- 121 A CONCEPTUAL MODEL TO DETERMINE THE IMPACT OF OFF-SITE CONSTRUCTION ON LABOUR PRODUCTIVITY
Dijkhuizen, Martin J. van; Vrijhoef, Ruben; Bakker, Hans L.M.
- 132 REVIEW OF CONSTRUCTION SUPPLY CHAIN OPTIMIZATION PAPERS FOR PERFORMANCE IMPROVEMENT
Atiq Ur Rehman, Muhammad; Chaabane, Amin; Ahmed Khan, Sharfuddin
- 155 CHALLENGES IN INDUSTRIALIZED RENOVATION OF APARTMENT BUILDINGS
Pikas, Ergo; Seppänen, Olli; Koskela, Lauri; Peltokorpi, Antti

- PEOPLE, CULTURE, AND CHANGE 6**
Chair: Annett Schöttle
- 104 GETTING SOUTH AFRICAN CONTRACTORS TO THINK AND ACT LEAN: A CASE STUDY
Emuze, Fidelis Abumere; Mpenbe, Willem
- 125 LEAN TEAMS AND BEHAVIORAL DYNAMICS: UNDERSTANDING THE LINK
Asadian, Elnaz; Leicht, Robert M.
- 129 CHALLENGES OF VIRTUAL DESIGN AND CONSTRUCTION IMPLEMENTATION IN PUBLIC PROJECTS
Prado Lujan, Guillermo
- 173 AN EXPLORATORY STUDY OF THE MAIN BARRIERS TO LEAN CONSTRUCTION IMPLEMENTATION IN PERU
Huaman Orosco, Cristian; Erazo-Rondinel, Andrews Alexander

- SAFETY, QUALITY, AND GREEN-LEAN 1**
Chair: Dr Laura Florez
- 193 THE IMPACT OF IMPLEMENTING A SYSTEM APPROACH TO QUALITY: A GENERAL CONTRACTOR CASE STUDY
Gordon, Elizabeth; Rawlinson, Kella; Eldamhouri, Ebrahim; Reed, Dean; Marosszeky, Marton
- 201 BUILDING QUALITY BUILDERS: LESSONS LEARN FROM A COMPANYWIDE TRAINING ON BEHAVIOR-BASED QUALITY
Arroyo, Paz; Gomez, Sulyn
- 138 CONTRIBUTION OF UAS MONITORING TO SAFETY PLANNING AND CONTROL
Lima, Mahara Iasmine Sampaio Cardoso; Melo, Roseleia Rodrigues Santos de; Costa, Dayana Bastos

11:45-12:45
Lima Time

Parallel Session 1

Parallel Session 2

Parallel Session 3

- SUPPLY CHAIN MANAGEMENT AND OFF-SITE CONSTRUCTION 2**
Chair: Dr Emmanuel Daniel
- 120 REDUCING CONSTRUCTION LOGISTICS COSTS AND EMBODIED CARBON WITH CCC AND KITTING: A CASE STUDY
Berroir, Fabrice; Guernacconi, Pierre; Boje, Calin; Maatar, Omar
- 128 EARLY DUE LOW UNCERTAINTY (EDLU) FOR IMPROVING SUPPLY CHAIN PERFORMANCE UNDER ORDER VARIABILITY IN PRECAST CONCRETE PRODUCTION
Kim, Taehoon; Kim, Yong-Woo
- 122 IMPLEMENTATION OF BIM AND LEAN CONSTRUCTION IN OFFSITE HOUSING CONSTRUCTION: EVIDENCE FROM THE UK
Marte, Jose; Daniel, Emmanuel; Fang, Yanqing
- 171 BUFFER TYPES AND METHODS OF DEPLOYMENT IN CONSTRUCTION
Bataglin, Fernanda Saidelles; Viana, Daniela Dietz; Coelho, Rafael Vigarino; Tommelein, Iris Denise; Formoso, Carlos Torres

- PRODUCTION SYSTEM DESIGN**
Chair: Assoc. Prof. Frode Drevland
- 118 TAKT PRODUCTION AS OPERATIONS STRATEGY: CLIENT'S PERSPECTIVE TO VALUE-CREATION AND FLOW
Lehtovaara, Joonas; Heinonen, Aleks; Ronkainen, Miika; Seppänen, Olli; Peltokorpi, Antti
- 150 LEAN RENOVATION – A CASE STUDY OF PRODUCTIVITY, FLOW, AND TIME IMPROVEMENTS
Johansen, Peder; Christensen, Søren; Neve, Hasse H.; Wandahl, Søren
- 205 PROPOSAL MODEL FOR THE MANAGEMENT OF CONSTRUCTION BASED ON FLOWS – A COMPLEX ADAPTIVE SYSTEM
Ramirez Valenzuela, Ronald Andre; Gamarra Diaz, Giancarlo Gilberio; Erazo-Rondinel, Andrews Alexander
- 209 APPLYING CBA TO DECIDE THE BEST EXCAVATION METHOD: SCENARIO DURING THE COVID-19 PANDEMIC
Espinoza, Lisseth R.; Brioso, Xavier; Herrera, Rodrigo

- SAFETY, QUALITY, AND GREEN-LEAN 2**
Chair: Dr Laura Florez
- 215 IMPLEMENTATION OF LEAN CONSTRUCTION AS A SOLUTION FOR THE COVID-19 IMPACTS IN RESIDENTIAL CONSTRUCTION PROJECTS IN LIMA, PERU
Veran, Daniel; Brioso, Xavier
- 198 TAKTING THE SUSTAINABILITY OF CONSTRUCTION PROCESSES: AN ENVIRONMENTAL ASSESSMENT METHOD
Slosharek, Benjamin; Dioury, Janosch; Schneider-Marin, Patricia; Lang, Werner

13:00-15:00
Lima Time

IGLC Business Meeting - open to all registered conference participants
Chair: Thais Alves

15:00-15:30
Lima Time

Conference Closing Session
Chairs: Dr Leonardo Rischmoller; Dr Danny Murguia
Technical Chairs: Assoc. Prof. Vicente A. Gonzalez; Prof. Luis F Alarcon