

IAF Business Innovation Symposium 2019

Held at the 70th International Astronautical
Congress (IAC 2019)

Washington, DC, USA
21-25 October 2019

ISBN: 978-1-7138-1503-7

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© (2019) by International Astronautical Federation
All rights reserved.

Printed with permission by Curran Associates, Inc. (2020)

For permission requests, please contact International Astronautical Federation
at the address below.

International Astronautical Federation
100 Avenue de Suffren
75015 Paris
France

Phone: +33 1 45 67 42 60
Fax: +33 1 42 73 21 20

www.iafastro.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
Web: www.proceedings.com

TABLE OF CONTENTS

ENTREPRENEURSHIP AND INNOVATION: THE PRACTITIONERS' PERSPECTIVES

THE RISE OF SPACE ENTREPRENEURSHIP: TRENDS IN THE ENTREPRENEURSHIP AND INVESTMENT COMMITTEE	1
<i>Manny Shar, Paola Belingheri, Gary Martin</i>	
FROM BASIC RESEARCH TO TECHNOLOGICAL APPLICATION IN THE MEXICAN SPACE SECTOR	7
<i>Verania Echaide</i>	
THE NATIONAL AEROSPACE AND AIRSPACE PROGRAM (PNAEA) OF EL SALVADOR AND THE ALTERNATIVE OF USING A LOGICAL FRAMEWORK APPROACH (LFA)	8
<i>Luis Alfaro</i>	
A SWEDISH PERSPECTIVE ON INNOVATION AND GROWTH FOR SPACE.....	9
<i>Johanna Bergstrom Roos, Olle Norberg, Jonas Ekman, Anna Ohrwall Ronnback, Marta-Lena Antti</i>	
ESA BICS: ENABLING SPACE ENTREPRENEURSHIP IN NON-ESA MEMBER STATES	10
<i>Lluc Diaz, Frank M Salzgeber, Cornelis Eldering</i>	
ASTROPRENEURS: SPACE START-UP ACCELERATOR	16
<i>Michal Kunes</i>	
ASSESSING THE POTENTIAL FOR COMMERCIAL SPACE TOURISM: AN ECOSYSTEM STUDY OF AUSTRALIA	18
<i>Joshua Western</i>	
BOOSTING INNOVATION BETWEEN SPACE AND NON-SPACE SECTORS: THE BUSINESS CASE OF SPACEUP PROJECT.....	19
<i>Lorenzo Scatena, Eleonora Lombardi, Erik Steinhöfel</i>	
REVOLUTIONIZING THE COFFEE ROASTING PROCESS IN OUTER SPACE: HOW SPACE TECHNOLOGY AND MICROGRAVITY CAN ENHANCE PRODUCTS ON EARTH	27
<i>Anders Cavallini, Kelli Sullivan, Hatem Alaa Hussein</i>	
INDUSTRY 4.0 STANDARDS FOR RIDESHARE AGGREGATION MANAGEMENT.....	28
<i>Ksenia Lisitsyna</i>	
SPACE TOURISM: EXPLORATION PARK	33
<i>K. Shanthini</i>	
HOW TO BUILD A SPACE CLUSTER	34
<i>Conor Duggan</i>	
DIGITALIZATION AND INDUSTRY 4.0, A COMPARISON BETWEEN OLD SPACE AND NEW SPACE	44
<i>Egbert Jan Van Der Veen, Guy Perez</i>	

EVALUATING THE PROJECTED OVER-SUPPLY WITHIN THE INCREASINGLY CROWDED LAUNCH VERTICAL AND DISCUSSION OF HOW THIS MAY AFFECT THE INFLUX OF INVESTOR CAPITAL INTO THE SECTOR	45
<i>Meagan Crawford, Andrew Granatstein</i>	

FINANCE AND INVESTMENT: THE PRACTITIONERS' PERSPECTIVES

INVESTING OR DOING ENTREPRENEURSHIP IN NEWSPACE? WHAT DOES THAT MEAN? DEFINING THE CATEGORIES OF INVESTMENT, FINANCING AND TECHNOLOGY DEVELOPMENT AND WHY IT IS IMPORTANT.....	52
<i>Jose Ocasio-Christian, Ian Christensen, Robert Ronci, Casey Backes, Naz Paul</i>	
START-UP SPACE: GLOBAL INVESTMENT TRENDS.....	63
<i>Manny Shar, Jamil Castillo, Gwen Mazzotta, Luc Riesbeck, Anna Wieger, Carissa Christensen</i>	
HOW TO ACCELERATE DOWNSTREAM AND UPSTREAM STARTUPS?	73
<i>Krzysztof Kanawka, Wojciech Drewczynski, Maciej Mickiewicz, Adam Korybut-Kotulewski, Wojciech Leonowicz, Magdalena Jarosz</i>	
HORIZON 2020: A SIGHT TO THE EUROPEAN ENTREPRENEURIAL DYNAMICS.....	75
<i>Rosa Maria Lucia Parrella, Cristiana Cirina, Augusto Cramarossa, Amalia Ercoli Finzi, Marta Albano</i>	
BOOSTING THE COMPETITIVENESS OF THE EUROPEAN SPACE SECTOR THROUGH ALTERNATIVE FINANCING: THE ESA-EIB INITIATIVE	81
<i>Christina Giannopapa, Ntorina Antoni, Kai-Uwe Schrogl</i>	
FINANCIAL PRODUCTS AND CONSIDERATIONS IN COOPERATION PROPOSALS FOR COUNTRIES WITH NON-AEROSPACE DEVELOPMENT.....	89
<i>Carolina Fernandez Garcia, Yolanda Ceciliano-Jiménez</i>	
INVESTMENT IN THE AUSTRALIAN SPACE SECTOR.....	93
<i>Jacob Hacker, James Digges, John Nixon</i>	
RESULTS OF SPACE INITIATIVES IN PIEMONTE REGION SUPPORTING INNOVATION AND INTERNATIONALIZATION OF SME'S.....	103
<i>Margherita Resce, Piero Messidoro, Diana Giorgini</i>	
BLAST-OFF FOR SPACE BUSINESS IN JAPAN - TOWARD CREATING AND BROADENING THE MARKET	111
<i>Misuzu Onuki</i>	
NEW MODEL OF SPACE FUNDING AND ITS ROLE IN FUTURE CAPACITY BUILDING. TOKENISATION OF SPACE ASSETS AND SECURITY TOKEN OFFERING (STO) AS A KEY DRIVER OF FUTURE SPACE MISSIONS.....	112
<i>Pavlo Tanasyuk</i>	
THE TRAVERSE CITY SPACE ACCELERATOR – A CASE STUDY FOR ECONOMIC GROWTH AND DIVERSIFICATION IN MICHIGAN	113
<i>Charles Lauer</i>	
PREFERRED POLICY INSTRUMENTS TO ACHIEVE U.S. GOVERNMENT GOALS FOR HUMAN SPACE FLIGHT AND PRIVATE SECTOR SPACE MARKETS.....	114
<i>Evan Linck, Sara Carioscia, Keith Crane, Bhavya Lal</i>	

INNOVATION: THE ACADEMICS' PERSPECTIVES

WHAT IS COMMERCIAL SPACE? AND WHY DOES THAT MATTER?	115
<i>Bhavya Lal</i>	
ANALYTICAL OUTLOOK OF THE COMMERCIAL SPACE INDUSTRY FOR THE LAST FRONTIER: AN ENTREPRENEURIAL POTENTIAL EVALUATION OF THE AFRICAN SPACE SECTOR	116
<i>Oyedamola Asiyabola, Imane El Khantouti, Abraham Akinwale, Kingsley Ahenkora-Duodu, Rayan Imam, Rania Toukebri, Joshit Mohanty</i>	
APPLYING THE DIAMOND APPROACH TO THE COMPETITIVENESS OF THE AFRICAN SPACE INDUSTRY - A CASE STUDY OF GHANA	132
<i>Kwaku Sumah</i>	
FINANCE AND INVESTMENT NEEDS OF SPACE SMES IN EUROPE: A SURVEY-BASED ANALYSIS	139
<i>Yasen Iliev, Lluc Diaz</i>	
HOW DOES NEW SPACE ACCELERATE MANAGERIAL INNOVATION. A SOCIOLOGICAL ANALYSIS OF THE “AGILE TRANSFORMATION” IN THE EUROPEAN SPACE INDUSTRY	143
<i>Morgane Baladron</i>	
DRIVERS AND BARRIERS FOR CROSS-SECTORAL COLLABORATION BETWEEN THE AEROSPACE AND THE SECURITY/DEFENCE SECTORS.....	144
<i>Ntorina Antoni, Derya Elmacioglu, Sharon Dolmans, Christina Giannopapa, Isabelle Reymen</i>	
THE EFFECTS OF INSTITUTIONAL LOGICS ON ENTREPRENEURSHIP IN THE SPACE SECTOR. THE CASE OF THE CZECH REPUBLIC	158
<i>Nathalie Kerstens, Maarten Adriaansen, Christopher Vasko, Christina Giannopapa</i>	
RESEARCH ON THE DEVELOPMENT PATH OF AEROSPACE INDUSTRY BASED ON BUSINESS MODEL INNOVATION.....	173
<i>Wenyi Cai, Lidong Xu, Rao Cheng Long, Chang Liu</i>	
ENABLERS, EQUIPPERS, SHAPERS AND MOVERS: A TYPOLOGY OF INNOVATION INTERMEDIARIES INTERVENTIONS AND THE DEVELOPMENT OF AN EMERGENT INNOVATION SYSTEM.....	178
<i>Matjaz Vidmar</i>	
REFLECTIONS ON THE DEVELOPMENT OF THE INDONESIAN SPACE INDUSTRY	195
<i>Yunita Permatasari</i>	
FOSTERING CREATIVITY AND INNOVATION WITHIN SCIENCE AND TECHNOLOGY TEAMS	206
<i>Crystal Forrester</i>	
WHY SOLVE NASA OPEN INNOVATION CHALLENGES? AN ANALYSIS OF SOLVER MOTIVATIONS FROM NASA’S ASTROBEE CHALLENGE SERIES	220
<i>Lihui Lydia Zhang, Zoe Szajnfarber</i>	
DOES ONLY INNOVATION STIMULATES NEW SPACE?	228
<i>Dirk-Roger Schmitt, Sven Kaltenhaeuser, Juergen Drescher</i>	

STRATEGIC RISK MANAGEMENT FOR SUCCESSFUL SPACE & DEFENCE PROGRAMMES

KEYNOTE: MANAGING RISK IN THE EFFORT TO MAINTAIN ORBITAL SUSTAINABILITY	233
<i>Chris Blackerby</i>	
IMPACTS OF HIGH-VOLUME PRODUCTION (HVP) ON SPACE SYSTEMS	237
<i>David Eccles</i>	
ERM AND COGNITIVE BIASES IN THE SPACE PROJECTS FIELD	252
<i>Massimo De Angelis</i>	
ENTERPRISE RISK MANAGEMENT AND SPACE INSURANCE	253
<i>Nishant Choksi</i>	
WILL COMMERCIAL SPACEFLIGHT DELIVER?	265
<i>Mike Lutomski</i>	
INDUSTRY SUPPORT MECHANISMS FOR AEROSPACE: THE ROADMAPPING APPROACH	270
<i>Marie Botha, Erik Wegman, Busisiwe Nkonki</i>	
KNOWLEDGE MANAGEMENT AS MITIGATION OF STRATEGIC RISKS	276
<i>Andrea Vena, Gianluigi Baldesi</i>	
RISK MITIGATION BASED ON INNOVATIVE SOLUTIONS	284
<i>Marina Pokrovskaya</i>	
CREATING STARTUPS WITH NASA TECHNOLOGY: REDUCING RISKS FOR NASA, INVESTORS AND ENTREPRENEURS THROUGH A PUBLIC-PRIVATE PARTNERSHIP	287
<i>Sidney Nakahodo, Steven Gonzalez</i>	
THE ROLE OF NATIONAL SPACE POLICY IN ADDRESSING OUTER SPACE SECURITY CHALLENGES	298
<i>Fatima Alshamsi, Sumaya Alhajeri, Naser Alrashedi</i>	
CERTIFICATION OF A POINT TO POINT SPACE TRANSPORTATION VEHICLE	304
<i>Marc Vales, Patrice Desvallées, Pierre Georges, Marie-Christine Bernelin, Alexandre Israel</i>	
TRADE CONTROLS AND RISK MANAGEMENT	310
<i>Megan Kane</i>	
PROBABILISTIC RISK ASSESSMENT AS PART OF THE RISK MANAGEMENT PROCESS AT JPL	313
<i>Todd Paulos</i>	

ENTREPRENEURSHIP AROUND THE WORLD

INTRODUCING A TECHNICAL FEASIBILITY FRAMEWORK FOR A COMMERCIALIZED, LOW-LATITUDE SPACEPORT IN COSTA RICA	314
<i>Saunon Malekshahi, Luis Monge</i>	

ANALYSIS OF THE NEWSPACE MARKET IN THE 21ST CENTURY - A PROPOSAL FOR A NEWSPACE ACTOR CLASSIFICATION SYSTEM AND ENVIRONMENT ASSESSMENT FRAMEWORK.....	324
<i>Kangsan Kim</i>	
SPACE ENTREPRENEURSHIP IN IRAN.....	337
<i>Sajjad Ghazanfarinia</i>	
PLANETARY PROTECTION ISSUES OF PRIVATE ENDEAVOURS IN RESEARCH, EXPLORATION, AND HUMAN ACCESS TO SPACE: A PILOT STATED PREFERENCE VALUATION STUDY.....	338
<i>Georgios Profitiliotis</i>	
A STUDY OF HOW TO IMPLEMENT INNOVATIVE SPACE PROJECTS IN THE BITCOIN ERA.....	353
<i>Luis Ángel Castellanos Velasco</i>	
ASTRAX UNIVERSAL SERVICES PLATFORM BY USING BLOCKCHAIN TECHNOLOGY.....	354
<i>Taichi Yamazaki</i>	
MANAGING THE RISK OF THE SPACE PROJECTS FROM THE PERSPECTIVE OF NEWSPACE SME. BURDEN OF CHANGING LANDSCAPE.....	361
<i>Katarzyna Malinowska, Aleksandra Bukala</i>	
CHALLENGES AND THE CONQUERING THEREOF IN THE SPACE INDUSTRY IN SOUTH AFRICA.....	366
<i>Ana-Mia Louw</i>	
SPACEONEERS: ENABLING A NEW GENERATION OF SPACE PIONEERS.....	372
<i>Sebastian Davis Marcu, Björn Brockmann, Ryan Laird, Irene Bejenke Walsh</i>	
THE CHALLENGES IN FUNDING SPACE AND INNOVATION AND THE UNIQUE PROGRAMMES AND SOLUTIONS WITHIN LESSER DEVELOPED AFRICAN COUNTRIES.....	373
<i>Carla Sharpe</i>	
WHAT DOES IT TAKE TO RUN A NEW SPACE STARTUP? AN EMPIRICAL STUDY ON THE CHALLENGES AND OPPORTUNITIES IN THE EUROPEAN NEW SPACE MARKET.....	374
<i>Lihui Lydia Zhang</i>	
<u>INTERACTIVE PRESENTATIONS - IAF BUSINESS INNOVATION SYMPOSIUM</u>	
ESA PARTNERSHIPS: A RISKY BUSINESS?.....	383
<i>Maria-Gabriella Sarah</i>	
HIRING PROCESS, CHALLENGES AND OPPORTUNITIES FOR NEWSPACE STARTUPS - RECRUITER PERSPECTIVES AND INDUSTRY BEST PRACTICES TO IDENTIFY AND HIRE BETTER TALENT.....	384
<i>Bernd Weiss</i>	
ATTRACTING MORE INVESTMENT TO SPACE: THE UAE SPACE INVESTMENT PROMOTION PLAN.....	385
<i>Naser Alrashedi, Talal Al Kaissi</i>	
THE PRELIMINARY CONCEPT OF COMMERCIAL LAUNCH SERVICE PROVIDER ALLIANCES.....	386
<i>Yawei Xu</i>	

ROLE OF INSURANCE IN MITIGATION RISK IN SPACE OPERATIONS - FOCUSING
PARTICULARLY ON NEWSPACE 387
Helen Tung

Author Index