ICELW 2017

The International Conference on E-Learning in the Workplace

Conference Proceedings

Dear Reader

I founded ICELW in 2008 with the goal of bringing together research and practice. ICELW has been designed to bring together people from the academic world and the business world, in order to further explore and share ways in which technology is used in workplaces to improve job performance. As ICELW is now in its sixth year, I have been pleased to see growth in the field overall, as well as collaborations springing forth based on past ICELW events.

ICELW 2017's program continued to build on previous ICELW conferences, including demonstrations of e-learning work and research studies, and a variety of excellent presentations given by experts from around the world.

We are still at a critical point in the field of online learning and performance; we are seeing more and more movement within organizations away from traditional academic models of teaching, toward approaches that focus on performance improvement and the application of knowledge. I'm pleased to see more and more practical work that stems from a basis in theory, and draws from a variety of disciplines. I have long believed that the design of successful online learning and performance technology is both an art and a science. That belief remains at the heart of ICELW and its existence.

These proceedings contain all academic papers that were accepted into ICELW 2017. Since ICELW mixes academia and the business world, our proceedings also includes, in addition to academic papers, presentation slides from those presenters who chose to include them in this volume.

I hope to see you back next year for ICELW 2018!

David Guralnick, Ph.D.

New York, NY, USA

June 2017

Committees

Conference Chair: David Guralnick, Kaleidoscope Learning, New York, NY, USA

Executive Committee
Carme Anguera Iglesias, Open University of Catalonia, Barcelona, Spain
Michael E. Auer, Carinthia Tech Institute, Villach, Austria
John Black, Teachers College, Columbia University, New York, NY, USA
Patrick Blum, Inside Business Group, Aachen, Germany
Hal Christensen, QuickCompetence, New York, NY, USA
Gary J. Dickelman, EPSSCentral, Annandale, VA, USA
Marga Franco i Casamitjana, Open University of Catalonia, Barcelona, Spain
Christine Levy, Kaleidoscope Learning, Chicago, Illinois, USA
Anders Morch, InterMedia, University of Oslo, Oslo, Norway
Andreas Pester, Carinthia Tech Institute, Villach, Austria
Sabine Seufert , Swiss centre for innovations in learning (scil), Universität St.Gallen (HSG), St. Gallen, Switzerland

Program Committee
Mohammed Ali Akour, A'Sharqiyah University, Ibra, Oman
Sarah Appleby, Online Learning International, New York, NY, USA
Fahriye Altınay Aksal, Near East University, Nicosia, Cyprus
Zehra Altınay Gazi, Near East University, Nicosia, Cyprus
Patricia Behar, Federal University of Rio Grande do Sul, Brazil
Kenneth G. Brown, University of Iowa, Iowa City, Iowa, USA
Martha Burkle, Southern Alberta Institute of Technology, Calgary, Canada
Robert Campbell, Propio language Services, Kansas City, Missouri, USA
Mihai Caramihai, University Politehnica Bucharest, Bucharest, Romania
Mark Cassetta, Pfizer, New York, NY, USA
Nunzio Casalino, LUISS Guido Carli University, Rome, Italy
Miroslaw Czapka, University of Economics and Administration, Bytom, Poland
Arthur Edwards, University of Colima, Mexico
Samir El-Seoud, The British University in Egypt (BUE), Egypt
David Foster, ExecOnline, Chapel Hill, North Carolina, USA
Sarah Frame, University of East London, London, England
Genevieve Gallant, GG Consultants Limited, St. John's, Newfoundland, Canada
Christian Guetl, Graz University of Technology, Austria
Manir Abdullahi Kamba, Bayero University, Kano, Nigeria
Okba Kazar, Biskra University, Algeria
JC Kinnamon, Practising Law Institute, New York, New York, USA
Molly Koenen, Cargill, Minneapolis, Minnesota, USA
Maria Lambrou, University of the Aegean, Greece
Mark J. W. Lee, Charles Sturt University, Australia
Stacy Lindenberg, Talent Seed Consulting, Columbia, South Carolina, USA
Allison Littlejohn, Glasgow Caledonian University, Glasgow, Scotland
Grace O'Malley, National College of Ireland, Dublin, Ireland
Rikke Orngreen, Aalborg University,Copenhagen, Denmark
Luis Ochoa Siguencia, Jerzy Kukuczka Academy of Physical Education, Katowice, Poland
Michael Paraskevas, Technological Educational Institute of Western Greece, Antirrio, Greece

ICELW 2017 Program

The ICELW 2017 program includes:

- An opening keynote speech by simulation and game expert Dr. Alicia Sanchez.
- A keynote speech by world-renowned learning and development expert Donald H Taylor.
- A panel discussion entitled "The Future of Online Learning: Upcoming Trends and Passing Fads," moderated by conference chair David Guralnick, Ph.D.
- Presentations given by experienced presenters from around the world.
- The announcement of the winners of the International E-Learning Awards - Business Division.

Wednesday, June 14th, 2017

Location:
Faculty House at Columbia University, on 116th Street between Amsterdam Avenue and Morningside Drive.

Directions:
Enter the Columbia campus through the gates at 116th St. and Broadway, near the 116th St. subway stop on the "1" train. Continue walking through the campus, past Amsterdam Avenue towards Morningside Drive. You'll see Jerome Greene Hall on the left; just after Jerome Greene Hall, you will see a courtyard on your left called the Wien courtyard. Enter the courtyard through the gates. Walk through the courtyard, back and around to the right. Faculty House will be the last building on the right.

12:30-1:45 PM

Registration

3rd Floor ("Presidential Level") Reception Area

1:45-3:00 PM

Opening Session

3rd Floor

1:45-2:00 PM

ICELW 2017 Welcome Address
Conference chair David Guralnick, Ph.D., Kaleidoscope Learning, New York, New York, USA

2:00-3:00 PM

Opening Keynote Address
"Games for Today, Tomorrow, and the Day after That"
Alicia Sanchez, Ph.D., Games Czar, Defense Acquisition University and CEO, Czarina Games
Alexandria, Virginia, USA

3:00-3:45 PM

Coffee Break

1st Floor - Ivy Lounge

3:45-5:45 PM

Parallel Sessions

Session 1A

3rd Floor - Presidential Room 1
Session Chair: Fernando Salvetti, Logosnet, Lugano, Switzerland

3:45-4:15 PM

The Role of Emotion in Online Learning
David Guralnick, Kaleidoscope Learning, New York, New York, USA
Slides

4:15-4:45 PM

Workplace Learning with eduBeacons
Patrick Blum, inside Business Group, Aachen, Germany

4:45-5:45 PM

60-minute session

Learning Ecosystem: Shifting from Create to Curate
Gina Richter, Conduent, Greater New York City Area, New York, USA
Slides

Session 1B

3rd Floor - Presidential Room 2
Session Chair: Keyonda Smith, Maryland University of Integrative Health, Laurel, Maryland, USA

3:45-4:45 PM

60-minute session

Driving Home the Point: Using Problem-Based Learning Principles for Routine Training
Gail Radecki, Executive Director, Inc., Milwaukee, Wisconsin, USA

4:45-5:15 PM

An Evaluation of Online Delivery Methods to the Success of Technology Programs: A Case Study
Stuart Simmons and Melissa Dobson, Northern Alberta Institute of Technology, Edmonton, Alberta, Canada

5:15-5:45 PM

Data Envelopment Analysis (DEA) as an Approach to Defining an Efficient Assessment Methodology in Distance Education
Jean Claude Callens, VIVES, Kortrijk, Belgium

5:45-6:45 PM

Conference Drinks

1st Floor - Ivy Lounge

Thursday, June 15th, 2017

Location:
Faculty House at Columbia University, on 116th Street between Amsterdam Avenue and Morningside Drive.

Directions:
Enter the Columbia campus through the gates at 116th St. and Broadway, near the 116th St. subway stop on the "1" train. Continue walking through the campus, past Amsterdam Avenue towards Morningside Drive. You'll see Jerome Greene Hall on the left; just after Jerome Greene Hall, you will see a courtyard on your left called the Wien courtyard. Enter the courtyard through the gates. Walk through the courtyard, back and around to the right. Faculty House will be the last building on the right.

10:00-11:00 AM

Plenary Session

3rd Floor - Presidential Room 1

10:00-11:00 AM

Keynote Address
"Learning Today: Why Nothing and Everything Has Changed"
Donald H Taylor, Chairman, Learning and Performance Institute, London, UK
Slides

11:15 AM-12:45 PM

Parallel Sessions

Session 2A

3rd Floor - Presidential Room 1
Session Chair: Darren Gray, Sticky Training Media, Melbourne, Australia

11:15 AM - 12:15 PM

60-minute session

Bloody Good! The Impact of Elearning on Medical and Nursing Practice
David Peterson, Tracey Clark, Richard Sprod, Trudi Verrall, and Louise English, BloodSafe eLearning Australia, North Adelaide, Australia
Paper

12:15-12:45 PM

SIEducation – How to somehow immerse your teaching
Kai Erenli, UAS bfi Vienna, Vienna, Austria

Session 2B

3rd Floor - Presidential Room 2
Session Chair: Gina Richter, Conduent, Greater New York City Area, New York, USA

11:15 AM - 12:15 PM

60-minute session

Build a Performance Support Coaching App to Extend Training into the Workplace: A Mini-Workshop
Hal Christensen, QuickCompetence, Forest Hills, New York, USA

12:15-12:45 PM

An Overview of Competency Management for Learning and Performance Support: Workplace Learning and Beyond
Irina Kondratova, Helene Fournier, and Heather Molyneaux, National Research Council Canada, Fredericton, New Brunswick, Canada
Paper
Slides

Session 2C

3rd Floor - Presidential Room 3
Session Chair: Patricia Behar, Universidade Federal do Rio Grande do Sul (UFRGS), Porto Allegre, Brazil

11:15-11:45 AM

3.5 Aspects to Keep in Mind When Designing Training for a Global Audience
Cecilia Iros, SumaLatam, Cordoba, Argentina
Slides

11:45 AM-12:15 PM

A Pedagogical Architecture for Designing Digital Musical Instruments'
Fatima Weber Rosas, Patricia Alejandra Behar, and Neusa Regina Klein Palma, Universidade Federal do Rio Grande do Sul (UFRGS), Porto Allegre, Brazil
Paper
Slides

12:15-12:45 PM

A University for Refugees: Education without Boundaries
Maria Amata Garito, International Telematic University UNINETTUNO, Rome, Italy

12:45-2:00 PM

Lunch

2nd Floor

2:00-3:30 PM

Parallel Sessions

Session 3A

3rd Floor - Presidential Room 1
Session Chair: Anna Hemsworth, Eisai Inc., Woodcliffe Lake, New Jersey, USA

2:00-3:00 PM

60-minute session

Designing and Creating Meaningful, Realistic Videos for Learning
JC Kinnamon, Practising Law Institute, New York, New York, USA and David Guralnick, Kaleidoscope Learning, New York, New York, USA
Slides

3:00-3:30 PM

Reimagining STEM Education and Training: 3D and Holographic Visualization, Immersive and Interactive Learning for Effective Flipped Teaching
Fernando Salvetti and Barbara Bertagni, Logosnet, Lugano, Switzerland
Paper
Slides

Session 3B

3rd Floor - Presidential Room 2
Session Chair: David Peterson, BloodSafe eLearning Australia, North Adelaide, Australia

2:00-3:00 PM

60-minute session

Lather, Rinse, Repeat: A Case Study on Content Optimization Across Audiences and Modalities
Carmen James, General Assembly, New York, New York, USA

3:00-3:30 PM

Taiwanese In-Service Pharmacists' Attitudes toward Online Professional Development and their Internet Self-efficacy
Tzung-Jin Lin, National Taiwan Normal University, Taipei, Taiwan (R.O.C.); Pili Chih-Min Mao, Kaohsiung Medical University, Kaohsiung, Taiwan (R.O.C.); Jyh-Chong Liang, National Taiwan University of Science and Technology, Taipei, Taiwan (R.O.C.); Min-Hsien Lee, National Sun Yat-sen University, Kaohsiung, Taiwan (R.O.C.); Chin-Chung Tsai, National Taiwan University of Science and Technology, Taipei, Taiwan (R.O.C.); and Yen-Yuan Chen, National Taiwan University College of Medicine, Taipei, Taiwan (R.O.C.);

3:30-4:15 PM

Coffee Break

3rd Floor

4:15-5:45 PM

Parallel Sessions

Session 4A

3rd Floor - Presidential Room 1
Session Chair: Kai Erenli, UAS bfi Vienna, Vienna, Austria

4:15-5:15 PM

60-minute session

Applying Advanced Dramatic Techniques to Ensure eLearning Video Outcomes
Darren Gray, Sticky Training Media, Melbourne, Australia
Slides

5:15-5:45 PM

Providing Meaningful Live-Virtual Interactions that Scale
Steven Shaklan, ExecOnline, New York, New York, USA

Session 4B

3rd Floor - Presidential Room 2
Session Chair: Gail Radecki, Executive Director, Inc., Milwaukee, Wisconsin, USA

4:15-5:15 PM

60-minute session

Institutional Culture and Faculty Perceptions of Online Learning in Healthcare Higher Education
Keyonda Smith, Maryland University of Integrative Health, Laurel, Maryland, USA
Slides

5:15-5:45 PM

Bridging Digital Divides in Workplace Training by Offering Workers Personalized Micro-learning over any Mobile Phone
Jessica Rothenberg-Aalami, Cell-Ed, Palo Alto, California, USA

Session 4C

3rd Floor - Presidential Room 3
Session Chair: Isabel Araujo, Kaleidoscope Learning, New York, New York, USA

4:15-5:15 PM

60-minute session

Once Upon a Time in eLearning: Engage Learners, Demonstrate Relevance & Increase Retention
Anna Hemsworth, Eisai Inc., Woodcliffe Lake, New Jersey, USA

5:15-5:45 PM

A Blended Learning Model Combining MOOCs, Face-to-Face Teaching, and Practice in Professional Training
Gang Chen, Wei Zhang, and Ruimin Shen, Shanghai Jiaotong University, Shanghai, P.R. China
Paper
Slides

8:00 PM

Conference Dinner

Location:
Rue 57
60 W. 57th Street (corner of 6th Avenue/Avenue of the Americas)
212.307.5656, www.rue57.com

Friday, June 16th, 2017

Location:
Faculty House at Columbia University, on 116th Street between Amsterdam Avenue and Morningside Drive.

Directions:
Enter the Columbia campus through the gates at 116th St. and Broadway, near the 116th St. subway stop on the "1" train. Continue walking through the campus, past Amsterdam Avenue towards Morningside Drive. You'll see Jerome Greene Hall on the left; just after Jerome Greene Hall, you will see a courtyard on your left called the Wien courtyard. Enter the courtyard through the gates. Walk through the courtyard, back and around to the right. Faculty House will be the last building on the right.

10:00-11:30 AM

Parallel Sessions

Session 5A

3rd Floor - Presidential Room 1
Session Chair: JC Kinnamon, Practising Law Institute, New York, New York, USA

10:00-10:30 AM

Best Practice Focused Occupationally-Directed Education, Training and Development Practice Prospects Linked to Workplace e-Learning
Jason Le Grange and Cindy Londt, Omni Academy for Education, Training and Development, Cape Town, South Africa

10:30-11:30 AM

60-minute session

Redefining Compliance Training using Simulations and Big Data
Austin Kenny, EmpowerTheUser, South Boston, Massachusetts, USA

Session 5B

3rd Floor - Presidential Room 2
Session Chair: Hal Christensen, QuickCompetence, Forest Hills, New York, USA

10:00-10:30 AM

Studies of e-learning in Practice
Manfred Rechberger, University of Music and Performing Arts Graz, Graz, Austria
Paper
Slides

10:30-11:00 AM

Cultivating Connected Communities for Workforce Learning and Development Success within a MOOC
Dominic Mentor, Year Up, New York, New York, USA

11:00-11:30 AM

Lessons Learned with a Neuroscience-based Platform Focused on Students' Motivation
Agustin Cuenca, ASPgems S.L., Madrid, Spain
Slides

11:30 AM-12:30 PM

Plenary Session

3rd Floor

11:30 AM-12:30 PM

Panel Discussion
"The Future of Online Learning: Upcoming Trends and Passing Fads"

Panel Chair: David Guralnick, Kaleidoscope Learning, New York, New York, USA

Panelists:
Gina Richter, Conduent, Greater New York City Area, New York, USA
Alicia Sanchez, Games Czar, Defense Acquisition University and CEO, Czarina Games Donald H Taylor, Learning and Performance Institute, London, UK

12:30-1:45 PM

Lunch

2nd Floor

1:45-2:45 PM

Parallel Sessions

Session 6A

3rd Floor - Presidential Room 1
Session Chair: Austin Kenny, EmpowerTheUser, South Boston, Massachusetts, USA

1:45-2:45 PM

60-minute session

Micro-Learning: Why We Like It, Who It Works For, and How To Get Started
Tanya Seidel, Artisan E-Learning, St. Augustine, Florida, USA and Tara Medeiros, LogMeIn, Boston, Massachusetts, USA

Session 6B

3rd Floor - Presidential Room 2
Session Chair: Christine Levy, Kaleidoscope Learning, Chicago, Illinois, USA

1:45-2:15 PM

A Best-Practice Mobile E-Learning Approach for Application Prototyping
Sigrid Schefer-Wenzl and Igor Miladinovic, University of Applied Sciences Campus Vienna, Vienna, Austria
Paper

2:15-2:45 PM

An Innovative Managerial Model for the Digital Culture
Nunzio Casalino, Marisa Ciarlo, Fabrizia Fontana, Mattia Panico and Simone Sassetti, LUISS Guido Carli University, Rome, Italy
Paper

2:45-3:15 PM

Closing Session
Announcement of the Winners
2017 International E-Learning Awards, Business Division

3rd Floor

Conference chair David Guralnick, Kaleidoscope Learning, New York, New York, USA

An Innovative Managerial Model for the Digital Culture

Nunzio Casalino[1], Marisa Ciarlo[2], Fabrizia Fontana[3], Mattia Panico[4] and Simone Sassetti[5]
[1] LUISS Guido Carli and Guglielmo Marconi Universities, Rome, Italy
[2] Invitalia, Rome, Italy
[3] Università degli Studi "G. d'Annunzio", Chieti - Pescara, Italy
[4] Unfraud, Rome, Italy
[5] La Sapienza University, Rome, Italy

***Abstract*—This paper aims to analyse the research scenario related the innovation and reference policies, to provide an innovative Digital Culture Model (DCM - Digital Culture Model) that will respond effectively to those needs. The goal is to establish a model at European level to make a research system, the entrepreneurial/manufacturing model and the Public Administration cooperation. This, to promote a sustainable development of territories and to attract public and/or private capital, enhancing the best experiences in the area (industrial research infrastructures, advanced production facilities and high added value services). The system of cultural heritage highlights Italy, compared with other countries, for quantitative consistency and qualitative varieties. Italy has the largest number of World Heritage Sites. It has an important landscape heritage and can play on the two levels of history and contemporaneity thanks to industrial brands, design, food, wine, fashion, and "The Italian Lifestyle". The creation, management, protection and enhancement of this heritage has to be better developed, especially by a flourishing market primarily characterized by SMEs (other than few large enterprises) with strong technological knowhow: new materials, innovative construction techniques, measurement and diagnostic tools, 3D modelling and digital platforms are few of the innovations brought by these companies.**

***Index Terms*—Culture Heritage, Societal Challenges, Research Infrastructures, Smart communities, Smart glasses and Smart watch apps.**

I. Introduction

In the "Io Sono Cultura" 2016 Report, the cultural and creative production system worth 6.1% of GDP, with 1.5 million jobs and an economic multiplier of 1.8: the entire cultural chain represents around 17% of National Added Value. The 2016 European Culture Forum showed that the ecosystem of cultural heritage promotes sustainable development and social cohesion, facilitating circulation and exchange of ideas and values.

In this scenario, prompted by European guidelines, it becomes essential that the sector related to culture must be able to exploit the opportunities of technological innovation, in synergy with the Regions, in a view of homogeneity between spatial strategies (structural funds and FSC) and national targets.

This paper focuses on Digital Cultures Model, a multidisciplinary cultural hub designed to foster strategic thinking and to stimulate the growing interest on innovative approaches of cultural planning and regeneration of cultural heritage. The model has been created to back businesses and the entities in the design and in the creation of a strong support network. The goal is to shake the Italian industry, prompting companies to use art and culture as tools capable of providing a contemporary view of the cities, urban centres, museums and universities.

This paper aims to promote the idea of a strategic vision based on the ability to generate a model like the industrial district, where companies and local authorities can co-exist and develop new systemic logics; they are based on a perspective of aggregation that aims to create real "cultural centres", supported by the entire territorial system that hosts them, revaluing cultural heritage as "value creator" to exploit and assimilate at a central level.

In this context, the importance of cultural institutions, if recognized, can become a powerful value booster, that promote a new ethical, effective and sustainable development model. In this scenario both the tangible characteristics of the industrial sphere of a territory, and the social and cultural peculiar intangible characteristics, become a powerful catalyst of creativity and resources.

The creation of a "Cultural Brand" would give the opportunity to reassess the potential of cultural sector, boosting the skills and the capabilities – both direct and induced – of a territory, to produce shared value.

II. Research, Innovation Policies and Reference Scenario

EU guidelines consider strategic objectives both the strengthening of the technological-scientific basis and the development of the conditions for industrial competitiveness. The relation "Towards an integrated approach to cultural heritage for Europe" recognizes the importance of cross-sectoral cultural heritage and recommends a long-term plan that incorporates its protection and enhancement in other programs. In this way, it contributes to the objectives of regional development policies, social cohesion, environment, tourism, education and the digital agenda.

In Horizon 2020, the culture has a central position both in the third pillar of the Societal Challenges (SC3, SC4, SC5 and SC6) and inside the Research Infrastructures (Pillar 1) and LEIT (Pillar 2). In EU2020 the Cultural and Creative Industries (CCI) are considered strategic resources for excellence and catalyst for new areas and business models with great potential in terms of

employment (especially youth employment), with high added value. This challenge is supported by the Creative Europe framework program which envisages a budget of 1.46 billion for the period 2014-2020.

According to data of "Io Sono Cultura" (I Am Culture) 2016 Report, the ICC in Europe could produce 415 billion euros of profits per year and hundreds of thousands of workplaces. Decisive in this area will be two upcoming legislative measures proposed by the Culture Commission: reform of copyright law and the Directive on audio-visual media and services, aimed at creating a level playing field among operators.

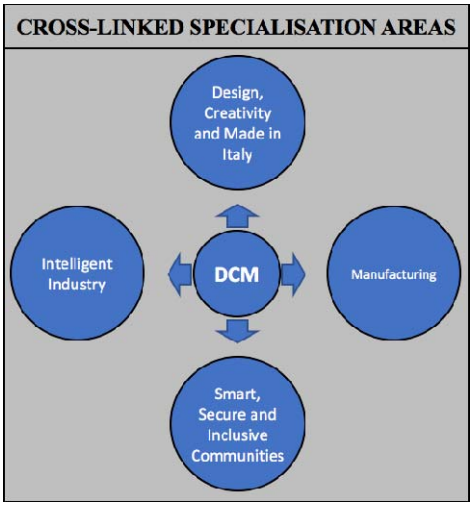

Figure 1. Cross-linked specialisation areas

III. Terms and Condition For the Creation of DCM

The complex of museums, monuments and Italian archaeological sites amounts to 4,588 sites, visited by more than 40 million people in 2014, but the potential of many regions is often unexpressed. The 86% of the proceeds from ticket and additional services is in fact produced by only 3 Italian regions: Lazio, Tuscany and Campania.

An analysis of RIS3 documents shows that many Italian regions consider the cultural heritage as a specialisation area worth to invest in for the preservation of existing buildings and for the adoption of new forms of promotion of cultural heritage in interaction with the tourism industry and with the ICC.

In this perspective, the use of digital technologies is the liaison of the regional plans that identify in RIS3 the conditions for the development of territories in synergy with the European cohesion policy.

They underpin the Structural Funds and are oriented to implement the intelligent, sustainable, inclusive growth and the ability to implement enabling technologies in new products, processes and business.

The Digital Culture model aims to become the core of the national innovation ecosystem as part of cultural heritage, serving as a link between supply and demand for innovation, transforming the enabling technologies for application solutions "ready to be marketed" for the main regional production systems, also in an integrated and multidisciplinary way.

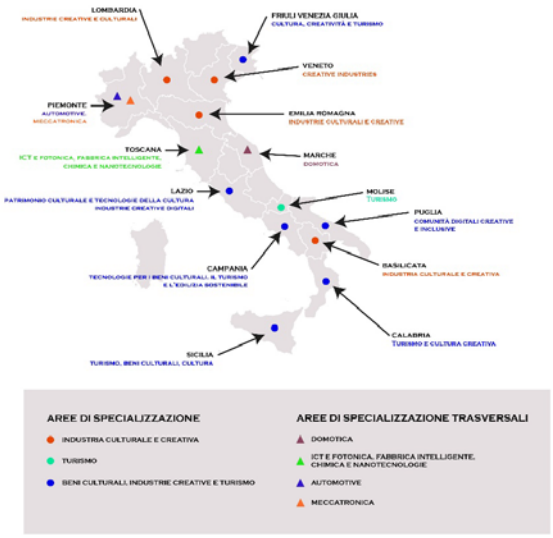

Figure 2. Specialisation and cross-specialisation areas

IV. Technological Trajectories

	TRAJECTORIES
	1. ICT technologies for the acquisition, fruition, recovery, categorization, diffusion and social web communication, also in terms of social marketing through virtual interactive places and gaming.
	2. GIS- Cloud technologies for the integrated management, sharing and diffusion (through Open Data Projects) of cultural heritage and related initiatives involving natural sites.
	3. Technologies related to innovative materials, visual and environmental intelligent sensors, electronic devices and «remote sensing».
	4. Innovation linked to the Future Internet field (Internet of Things, Internet of Services, Participatory Sensing), Information Extraction/Retrieval, Semantic Indexing, Big Data Mining and Linked Open Data (LOD).
	5. Innovation linked to the diagnostic and Building Information Modelling topics.
	6. Innovation related to new business models and ecosystem services for the management and the use of cultural and environmental heritage.
	7. Innovation linked to entrepreneurship in the cultural and creative world: integration of businesses and creative, artistic and cultural organizations, diffusors of local knowledge related to productive and economic chains bound to the most traditional and / or high-tech sectors.

Figure 3. Technological Trajectories

A. *Technologies for the knowledge and conservation of cultural heritage*

Knowledge, diagnostics and conservation of cultural heritage are of prime importance for the development of the territories.

Researches aimed at understanding the geomorphological, historical, archaeological and monumental landscape and heritage are used to start appropriate policies for monitoring, management and protection. To define the best strategies for prevention and conservation, there will be used GIS technologies,

remote sensing, geophysics, non-invasive diagnostic, advanced materials, geo-archaeological and archaeometry reliefs in underwater sites and intelligent optoelectronic devices.

In addition, the chemical and physical varieties of Italian cultural heritage is an enormous wealth but also a difficulty: the development of non-invasive analytical techniques for the study of the materials used in works of historical and artistic interest, together with the study of the interactions that these materials develop when protective and consolidating materials are used, it is an activity with important practical outcomes. These comprehend the study and the inhibition of degradation mechanisms, the interpretation of the enforcement proceedings, the knowledge of the artistic techniques evolution, the authentication and dating (also through the Accelerator Mass Spectrometry, AMS) of all cultural heritage sites in the area.

To learn more of the individual cultural heritage about composition, structural integrity, actions to change / modify the structure and colour, there will be used biomolecular and microbiological diagnostic methods, spectrophotometric and images, as well as nuclear analysis. At the same time, to ensure the protection functions and consolidation of substrates of historical interest, new micro and nano-materials will be developed. Finally, to quantify the economic, environmental and social impact of these solutions throughout the life cycle, there will be used methods of Life Cycle Assessment (LCA), Life Cycle Costing (LCC) and Social Life Cycle Assessment (S-LCA).

B. Monitoring Technologies of Natural and Anthropogenic Factors Impact on Cultural Heritage

Seismic, geological, hydrogeological and environmental hazards affect most of the territories for the presence of volcanoes, geological faults, landslides, industrial plants and other degradation factors that threaten large portions of the cultural heritage. The trials of conservative monitoring to develop stabilization and conservation systems, with lower environmental impact and greater energy efficiency, will allow the definition of a specific cultural protocol and the creation of instruments for the control of microclimatic parameters. Among the techniques for the monitoring of the seismic risk there are: semiotic methods, the maps of iso-vulnerabilities and iso-risks, non-invasive diagnostic morphometric techniques, SAR interferometry techniques, Permanent Scatters, geophysical techniques, FEM methods, DEM and limit-analysis for security checks, sensors and array of innovative sensors with high sensitivity, low cost, low power and minimal invasiveness.

Other than the seismic, there are other risks resulting from air pollution and bio-deterioration that require consequences assessments of hydrophobic and non-toxic antimicrobial treatments also by means of photonics and analytical chemistry, to detect the presence of organic and inorganic contaminants.

C. Interoperability Technologies for the Creation of a Digital Eco-System Linked to Cultural Heritage

The analysed model aims to set up and build an "enabling platform" of services for knowledge management and enhancement of cultural heritage, which will provide a set of innovative services, both cross-function and vertical. In the cross-function services the basic mechanisms will be implemented to enable the delivery of superior services ensuring the safety and reliability of the data, interoperability of functions and accessibility of services. The vertical instead, will be employed to support specific functionality areas. The platform will also provide services for collaborative development of services and will allow end users to take advantage of simplified deployment, immediate availability, integrated release cycles, efficient testing, automatic scalability, semantic annotation and extreme portability for new applications management.

Among the vertical innovative services, a major focus will point to the production of cultural transmedia and cross-media content; the technologies and intelligent production platforms of audio / video material and innovative services for the fruition of experiences through multimedia products, are critical both for the creation of a widespread cultural identity and to support the creative cultural industry, raising the employment rate in the sector. Within the DC Model will be deepened policies of management and preservation of digital cultural resources (DCH preservation), as well as audience development, benchmarking methods, analysis results and evaluation of user experience and customer satisfaction from digital channels. Another focus area is the testing of technologies that allow the drainage of digital materials, their storage and use, in compliance with copyright, to allow a knowledge increase of the historical and cultural heritage available for research, education, security and tourism.

In the definition of the Digital Culture Model platform, should be considered both the implications related to the handling of Public Sector Information, and the data and products information gathered. There would be necessary the elaboration of specifically designed privacy solutions, considering recent changes in European legislation, both to preserve the peculiarities of the cultural heritage and to define digital fruition conditions, referring alto to the local political context.

D. Technologies to Enhance and Exploit the Cultural Heritage Through Digital Channels

Frontier technologies for the development of digital services for the enjoyment of the cultural heritage and its promotion are:

- Edutainment based on the use of digital facsimiles of the works or their virtual prototypes, storytelling techniques and "gamification" approach to access the digital content;
- New multi-modal user interfaces (gesture and eye tracking based, brain-computer interfaces) and multi-sensory (haptic and tactile displays can provide a cutaneous feedback, 3D sound displays) can promote social inclusion and accessibility of cultural content to people with physical and cognitive disabilities (blind, visually impaired, elderly);
- Tangible and immersive systems based on Virtual Reality technology, augmented reality and holographic technologies. In addition, mobile technologies, together with the

availability of broadband connection, offer an important opportunity to provide prompt information to tourists on-situ, activating social processes that enable the economic development of the artistic and cultural heritage, natural beauty and tourist facilities. In fact, the encounter between "mobile devices" and cultural heritage allows the creation of innovative promotion methods and preservation techniques of the immense artistic and cultural heritage. The systems so conceived, can understand the interests and needs of users, interacting with them in a natural way, to provide the information requested in the right place and time, plan and propose accurate tourism / cultural itineraries.

Among the objectives of the model, there is the construction of a Digital Platform for Mobility, with high levels of integration both intermodal and multimodal, enabling the creation of a network based on the connection and dynamic translation of data, information and services to connect and optimize public and private transport, accompanying the travel experience of the tourists. For this purpose, there will be used ICT technologies and will be implemented and developed APIs to exploit IoT tools.

V. Consistency with National and Regional Specialization Strategies

A. *Coherence with National Priorities*

The Strategia Nazionale di Specializzazione Intelligente (National Strategy of Smart Specialisation, SNSI) has identified five priority areas, of which two in line with the research objectives of the model analysed:

- Tourism, cultural heritage and creative industry;
- Digital Agenda, Smart Communities, infrastructure and intelligent transport systems.

The Digital Culture Model, in line with the SNSI, will take the following actions:

- Enhancement and specialization of the national research system on technologies applied to cultural heritage, through the organization and development of a network of industrial research and technology transfer that can enhance the investment already made in previous periods and orient the priorities of the PNR;
- Human capital enhancement and strengthening;
- To promote the complementarity of planned and financed activities at central and local level, to reduce the risk of duplication or overlap and enhance the impact and sustainability, not only in economic terms but also in terms of results.

B. *Coherence with Regional Priorities*

The objectives of DCM are in line with the priorities highlighted in the Italian RIS3 and refer to:

- Design and implement multi-channel communication platforms able to raise awareness and anticipate needs of different target audience (web-based technologies for the story telling, country-specific perspective social network and so on);
- Create a digital ecosystem (characterized by an interoperability standard) connected to the culture, open, competitive, non-discriminatory and competitive for the development of integrated software applications;
- Mobile, smart glasses, smart watch apps and digital services development to make more attractive the visiting experience of a site/museum (augmented reality, new media, smart museum and so on);
- Technologies and materials development for the conservation and maintenance of cultural heritage (advanced diagnostics, remote control systems and so on);
- Definition and implementation of monitoring techniques of the effects of pollutants on cultural heritage (sensors, risk assessment, early warning and so on).

VI. DCM Organizational Model

The DCM organizational model is designed to meet the following requirements:

- To work in a perspective of neutrality and impartiality, ensuring the involvement of all stakeholders through appropriate representation mechanisms;
- Light structure to minimize management costs;
- To develop adequate procedures to:
    - Ensure that the proactive role towards national and regional stakeholders are based on a careful analysis on the state of specific technological trajectories;
    - Ensure that the coordination role is the result of a continued and methodical consultation among the participants;
    - Support the multiplicity of actions linked to the area of specialization.

The identification of the organizational structure is based on previous experiences in this field, with particular reference to the projects concerning 'technologies for smart communities'.

The objectives of DCM can be summarized in the following points:

- To develop and update specific technology roadmaps, intervention priorities and suggestions related to the implementation of innovation policies in the industrial sectors, with particular reference to the creative industry;
- To carry out coordination activities in negotiated planning processes with the public administration for the activities associated to the reference cluster, while assisting stakeholders involved in the development of project activities drawn on public funding (regional, national, European and so on) in the R&D areas;
- To carry out research and plan actions to selectively support the research infrastructures, strengthening their role in the fields related to cultural heritage;

- To develop initiatives for the protection and exploitation of intellectual property of the parties involved in the DCM;
- To facilitate public-private joint ventures and promote the convergence of technologies and applications of the CH, even with matching funds aimed at participating in European opportunities and testing of demand policies (pre-commercial procurement, challenge prize, living labs);
- To encourage the creation and consolidation of new industrial realities also through the acceleration of spin-offs and industrial start-up;
- To promote the internationalization of research results and the companies operating in the cultural heritage sector, through the creation of international research networks;
- To conduct cultural, publishing and communication activities to disseminate the results of research and innovation;
- To develop an effective monitoring and self-assessment system of the participation to the model activities;
- To monitor the activities of the innovation requirements for re-functionalization of "minor cultural heritage".

VII. Economic Model and Financial Sustainability

The model of economic sustainability is related to the DCM's ability to create value for the benefit of all its members, through an action of integration and coordination of the research system in the field of cultural heritage on a national and international scale.

The second pillar of sustainability is related to business services both for private and for the public administration, bridging the difficulties that the Italian system highlights in terms of innovation commercialization. This strategy will allow to decrease, more and more, the percentage of public finance necessary to ensure the sustainability of the model.

VIII. Research Exploitation Actions

DCM will implement continuous exploitation of research actions in three main areas:

- Dissemination of knowledge;
- Supporting to professional profiles placement;
- Supporting of start-ups and spin-offs.

A. Dissemination and Knowledge Transfer Plan

The dissemination plan includes internal communication (to involve targeted to involve internal subject of the model) and outer communication (targeting different stakeholders of the sector). It takes the form of public engagement (business conferences, participation in scientific public events, media presence, social media dissemination) and the open and continuing education through new technologies. The use of massive open online courses, allows the building of a knowledge database opened to all parties interested in the research and development of the model. There will be closed active partnership with the ICOM network (International Council of Museums), UNESCO, with the digiculther network and Italian research infrastructure in the ESFRI roadmap 2016, concerning the social and cultural sector innovation. An "Atlas of Exploitation" will be yearly released to made accessible all the activities of the model in terms of dissemination and knowledge transfer.

B. Professional Placement and Start-up Phase Support Plan

DCM will work to develop professional profiles that combine technological expertise with the specific features inherent to the different areas of the sub-fund (conservation, protection, enhancement and enjoyment). These are "hybrid profiles" will have bases in engineering, architecture, anthropology or economics and must be able to convey the technological and organizational innovations in enterprises operating in the cultural field. Among the initiatives that will be covered, there will be an annual placement event to promote matching between profiles, businesses and cultural workers.

C. Business Creation Support Initiatives (Spin-off and Start-up)

The support activities for business will consist in the supplying of expertise services to researchers interested in enhancing the research activities through spin-offs or start-ups. Moreover, the establishment of incubators aimed at training on the job specific figures, will be an essential resource for start-uppers in the cultural and creative industry.

The support to high-tech new ventures consistent with the DCM mission may take various forms and intensities:

- Services of scientific validation of the idea feasibility and its economic, financial and organizational viability;
- Initial logistic support. The model will offer its participants the opportunity to host the initiative in its facilities and laboratories, for a period to be defined according to the specific case;
- Inserting of the new reality, with a visible role in open innovation communities, linked to the search results of DCM.

Regarding financial support, DCM will present promising initiatives to the entire network of specialised privates or institutions investing in start-ups, with the aim of attracting the largest possible deals.

IX. Conclusions

The implementation of a system such as DCM, would allow the correct appreciation of Italian cultural heritage and growth of cultural areas with high added value, currently underdeveloped.

The importance of this model is also underlined by the European guidelines clarifying definitively how important is the cultural and creative system for the entire economic system.

The support of advanced technologies such as augmented reality and 3D, which can enhance the unique characteristics of each site, can undoubtedly lead to the creation of a digital ecosystem that can bring out the uniqueness of the Italian territory. These technologies can be widely supported by the Italian industrial reality, characterised by the high intake of technology and know-

how on the market: all stakeholders, from universities to research centres, may be involved as actors in the context of one of the focus of the DCM.

Finally, the entire model is relevant from a financial point of view as it responds to the needs of two groups of subjects which are complementary each other, so that it is self-sustainable in the short term and profitable in the medium-long term.

REFERENCES

[1] Benkler, Yochai (2002). Coase`s Penguin, or: Linux and the nature of the firm. Online publication atBenkler, Yochai (2006). The Wealth of Networks. How Social Production Transforms Markets and Freedom. Yale University Press. New Haven and London.

[2] Buhse, W. and U. Reinhard (2010). DNAdigital. Wenn Anzugträger auf Kapuzenpullis treffen. Die Kunst aufeinander zuzugehen. Whois verlags- & vertriebsgesellschaft Ulrike Reinhard (Ed.).

[3] Neckarshausen. Chesbrough, Henry et al. (2008). Open Innovation. Researching a New Paradigm. Oxford University Press. New York.

[4] Dapp, T. (2010). The pirate inside us. In the depths of copyright. Deutsche Bank Research. Current Issues, August. Frankfurt am Main.

[5] Dapp, T. und P. Ehmer (2011). Cultural and creative industries. Deutsche Bank Research. Current Issues, April 2011. Frankfurt am Main.

[6] Drossou, O. et al. (2006). Die wunderbare Wissensvermehrung. Wie Open Innovation unsere Welt revolutioniert.

[7] Jarvis, Jeff (2009). What would Google do? HarperCollins Publishers. New York.

[8] Kruse, Peter (2010). Next practice. Erfolgreiches Management von Instabilität. Veränderung durch Vernetzung. 5 th edition 2010. GABAL Verlag GmbH. Offenbach.

[9] Lessig, Lawrence (2004). Free Culture. The Nature and Future of Creativity. Penguin Group. New York.

[10] Prahalad, C. and M. Krishnan (2008). The New Age of Innovation. Driving Cocreated Value Through Global Networks. McGraw-Hill. New York.

[11] Qualman, Erik (2010). Socialnomics. Wie Social Media Wirtschaft und Gesellschaft verändern. Mitp. Hüthig Jehle Rehm GmbH. Heidelberg.

[12] Reichwald, R and F. Piller (2009). Interaktive Wertschöpfung. 2 nd edition. Gabler. GWV Fachverlage GmbH. Wiesbaden 2009.

[13] Rogers, E.M. (1995) Diffusion of innovations, 4th edition, New York.

[14] Smith, A (1776). The wealth of nations: An inquiry into the natureand causes of the wealth of nations. London. Stratton & Cadell 1776 (reprint from Oxford University Press. 1976.

[15] Stobbe, A. (2010). Enterprise 2.0. How companies are tapping the benefits of Web 2.0. Deutsche Bank Research. Economics 78. Frankfurt am Main.

[16] Casalino N. (2002) Corporate e-learning, the end of learning as we know it, Proc. International Symposium on Learning Management and Technology Development in the Information and Internet Age. The convergent paths of Public and Private Organizations, 25-28 October, Facoltà di Economia, Bologna.

[17] Casalino N. (2003) Le decisioni nella gestione del corporate e-learning, Proc. 4° Workshop Organizzazione Aziendale: I processi decisionali nell'organizzazione d'impresa, 13-14 February, Firenze.

[18] Casalino N. (2004) Analisi del cambiamento dei modelli didattici e del concetto di apprendimento organizzativo in funzione delle nuove tecnologie formative, conferenza "5° Workshop dei Docenti e Ricercatori di Organizzazione Aziendale - Innovazione Organizzativa e Tecnologie Innovative", 5-6 February, Università Luiss Guido Carli, Roma.

[19] Casalino N. (2004) Integrating medical services, training and education: the Hermes project platform, in ATL - Advanced Technology for Learning Journal, ACTA Press, n.3.

[20] Casalino N. (2005) Processi di apprendimento e metodologie di valutazione per l'adozione e l'impiego di sistemi informativi, capitolo XIV del volume Lo sviluppo dei sistemi informativi nelle organizzazioni. Teoria e casi, a cura di Franca Cantoni e Gianluigi Mangia, Franco Angeli Editore, Milano.

[21] Casalino N. (2006) Innovazione e organizzazione nella formazione aziendale, Volume, Cacucci Editore, Bari.

[22] Casalino N., D'Atri A. (2004) High transfer rate medical and educational services by satellite. A successful experience of an european project, conferenza internazionale "ED-MEDIA 2004 - World Conference on Educational Multimedia, Hypermedia & Telecommunications", AACE 21-26 giugno, Università di Lugano, Svizzera.

[23] Casalino N., D'Atri A. (2007) A Quality Management Training System on ISO Standards for Enhancing Competitiveness of SMEs in Proc. 9th Interna-tional Conference on Enterprise Information Systems, ICEIS'07, Funchal-Madeira, Portugal.

[24] Casalino N., Di Persio F. (2004) The Hermes project: integrating medical services, training and education on an innovative satellite web-platform, conferenza internazionale "Web-Based Education – WBE 2004", 16-18 Febbraio, Innsbruck, Austria.

[25] Casalino N., Mazzone G. (2008) Externalization of a banking information systems function. Features, regulatory and critical aspects, in The Interdisciplinary Aspects of Information Systems Studies, Springer, Heidelberg, Germany.

[26] Casalino N., Negri D. (2004) E-learning: non solo formazione a distanza, ma incubatore di metodi per la gestione della conoscenza e del cambiamento organizzativo, I Workshop Celebrativo "La conoscenza nelle relazioni tra aziende", AIDEA Giovani 2004 28-29 maggio, Università Cà Foscari di Venezia.

[27] AA.VV., Il futuro delle città, in Le Scienze, n. 519, Nov. 2011 AA. VV., (2014), Sociologia dei new media, Novara

[28] Cogo G., La cittadinanza digitale. Nuove opportunità tra diritti e doveri, Edizioni della Sera

[29] Kelly K. (2011), Quello che vuole la tecnologia, Codice

AUTHORS

Nunzio Casalino, (Ph.D. in Management – Information Systems) is Associate Professor of Organization Studies at LUISS Guido Carli and Guglielmo Marconi Universities in Rome. Scientific responsible and coordinator of several national and European funded projects, counsellor and advisor of public administrations for the management of special governmental projects or of innovation, projects' evaluator on behalf for several Ministries. Member of program committees of several international conferences and of editorial boards for scientific journals. Member of scientific societies including: EGOS (European Group of Organization Studies), ASSIOA (Italian Association of Business Organization), AoM (Academy of Management), AIS (Association of Information Systems). Author of manuals, essays and scientific papers at national and international level, his main activities and fields of research are: business organization; business information systems; innovative management of human resources and high-tech systems for learning and training, Rome, 00198, Italy (e-mail: ncasalino@luiss.it).

Marisa Ciarlo, project manager at Invitalia, previously project manager at Infratel Spa and senior consultant at Pwc Spa, Rome 00146, Italy (e-mail: mciarlo@invitalia.it).

Fabrizia Fontana, is Associate Professor of Business Organization at Università degli Studi "G. d'Annunzio" Chieti - Pescara, Italy (e-mail: fabrizia.fontana@unich.it).

Mattia Panico, is a cybersecurity expert, former Manager at Unfraud, Rome, 00153 Italy (e-mail: mattia.panico@unfraud.com).

Simone Sassetti, Ph.D. candidate in Management, Banking and Commodity Sciences at "La Sapienza" University of Rome, is a chartered accountant and Auditor in PTS Consulting S.p.A. Rome 00161, Italy (e-mail: simone.sassetti@ptsconsulting.it).

Published as submitted by the authors.