UT Austin | Portugal

INTERNATIONAL COLLABORATORY FOR EMERGING TECHNOLOGIES, CoLab

2013 Report

Digital Media
Advanced Computing
Mathematics
Emerging Technologies

UT Austin | Portugal

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2013 Report

Contents

DIGITAL MEDIA

Telecommunications and Information Policy Institute, UT-Austin

DIGITAL MEDIA PROGRAM, YEAR 1

September 2012 – August 2013

Key Members, UT Austin:

Sharon Strover, Director (Radio-TV-Film)
Karen Gustafson, Program Manager
Rosental Alves (School of Journalism)
Bruce Pennycook (Butler School of Music)

Key Members, U.Porto and UNL:

Nuno Correia, Director (FCT-UNL, Computer Science)
João Mário Grilo (FCSH-UNL Communication Sciences)
Heitor Alvelos, Outreach Program Director (U.Porto, Design)
José Azevedo, Academic Director (U.Porto Department of Sociology)
Antonio Coelho, Coordinator, Master of Multimedia Program (U.Porto, Dept. Informatics
    Engineering)

Carlos Guedes (ESMAE-IPP)
Raul Moreira Vidal (U.Porto, Dept. of Informatics Engineering)

EXECUTIVE SUMMARY

As the UT Austin | Portugal Digital Media program begins its second phase, it builds on a strong foundation of education, research, and capacity-building activities accomplished in its first period (2007-2012). This foundation includes nine collaborative research projects that have resulted in many international, peer-reviewed publications and conference presentations; a thriving, multidisciplinary doctoral program; and a range of other scholarly, creative, and community projects. The intensive collaboration of the first five years has also borne more intangible benefits, such as the close collegial relationships and sustained scholarly networks that have developed among the faculty and students of the partner institutions.

A summary of the program's activities and projects from Phase I (2007-2012) may be found in the appendix. Highlights include:

- The development of a Digital Media doctoral program that has grown to 84 students
- An innovative Masters in Multimedia program, now numbering 260 students
- 30 intensive, for-credit Summer Institute classes taught by UT faculty
- 14 long semester courses taught by UT faculty, often in collaboration with Portuguese counterparts
- More than 110 faculty and student visits to Austin
- More than 60 scholarly publications and 140 conference presentations resulting from sponsored research projects
- The Future Places Digital Media Festival, occurring annually since 2008 and cultivating relationships among the scholarly and creative communities
- The 2009-2011 International School on Digital Transformation, which attracted top scholars, entrepreneurs, and activists from more than 20 countries
- Collaboration with leading Portuguese and US technology companies

As the program enters its second phase, it looks forward to embracing new, cutting-edge areas including health informatics, videogames, and the Lusophone media market. It also will actively promote entrepreneurial activity through workshops and other programs that will give students and faculty the tools for bringing their research to markets and operational settings. At the same time, Digital Media will sustain and further develop many ongoing educational, research, and capacity-building initiatives, building on its past successes. These include its doctoral and master's programs, collaborative research projects, and industry outreach. This report summarizes the activities of the first year of Phase II, which include meetings and research conferences, a doctoral symposium, Future Places 2013, faculty and student visits, and a considerable body of published research.

PHASE II: RESEARCH

Meetings and Conferences

Digital Media Research Methods Conference (May, 2013)

Austin Digital Media Director Sharon Strover, and Portuguese directors and co-directors Nuno Correia, José Azevedo, Carlos Guedes, Heitor Alvelos, and Artur Pimenta Alves attended the Digital Media Research Methods conference at U.Porto on May 24, 2013. Presented topics included user experience and survey design, social networking dynamics and innovations, and journalism and digital media challenges.

INVITE Research Group Convenes at UT (June, 2013)

Several members of the INVITE project team met at UT in June to perform field experiments and discuss potential directions for the future. INVITE: social Identity and partNership in VirTual Environments, an FCT-funded collaborative project that originated in 2010, explores the development of artificial intelligence mechanisms that can perform well in complex social situations including games and virtual environments. The researchers have produced a strategic game that employs AI and allows a great deal of design flexibility, with potential to be used in the fields of psychology, business, and education. The visitors, including principal investigator Rui Prada, professors Pedro Santos and Carlos Martinho and graduate student Guida Preto, met with co-principal investigator Jorge Peña of UT's Communication Studies and UT graduate student Nick Brody.

INVITE Project Meeting, June 2013

LIFEisGAME Project Presented in Porto (June, 2013)

The LIFEisGAME research team gathered to present the results of its work on June 11 in Porto. The FCT-sponsored project has developed tools to help children with Autism Spectrum Disorder improve their communication skills in an engaging game environment. Innovations produced by the team may be applied to a variety of fields including psychology, entertainment, health, and academia. Led by principal investigator Verónica Orvalho of U.Porto, the researchers include co-PIs Jake Aggarwal of UT Austin, Miguel Sales Dias of Microsoft, Cristina Queirós of U.Porto, and António Marques of IPP.

iDTV Health Holds "Media and Handicap" Colloquium (September, 2012)

Partnering with the Board for the Means of Social Communication, the iDTV team organized a colloquium on September 29, 2012, titled "Media and Handicap."

LIFEisGAME Screen

iDTV Health Holds e-health Conference (November, 2012)

Members of the iDTV Health team held the event Conferências de Outono 2012: e-health: bridging, contact and applications, at Lusófona University.

iDTV Health Seminar and Workshop (November, 2013)

The iDTV Health team organized the seminar and workshop "Smart TV Development" at Lusófona University.

ImTV Second Workshop Meeting
The Immersive Television researchers met in Porto to discuss findings. A presentation from Pedro Ferreira of MOG underscored fruitful future directions for some of the research work. For additional information, see http://imtv.me/news/.

Work Published during this Period

Digital Inclusion and Participation (initiated 2009)
<u>Journal articles</u>
Ponte, C., Simões, J. A., & Jorge, A. (2013). Do questions matter on children's answers about internet risk and safety? *Cyberpsychology: Journal of Psychosocial Research on Cyberspace, 7*(1), article 2. doi: 10.5817/CP2013-1-2

Simões, J. A., C. Ponte, et al. (2013). Online experiences of socially disadvantaged children and young people in Portugal. *Communications: The European Journal of Communication Research*: 85-105.

iDTV Health (initiated 2010)
<u>Special journal issues</u>
Damásio, M. (2013). Special Section editor: Special Section: COST - audience interaction & participation (Volume 10, Issue 1, 2013) in *Participations: Journal of Audience and Reception Studies, 10/1*, 2013.
http://www.participations.org/Volume%2010/Issue%201/contents.htm

Damásio, M. (2012). Special issue editor (with Maria Teresa Cruz), *RCL – Revista de Comunicação e Linguagens,* Special issue "Analítica dos novos media/The analytics of new media", nº 43/44, Spring 2012, Lisboa: Relógio de Água.

<u>Book chapters</u>
Cordeiro, P., Damásio, M., Starkey, G., Botelho, I., Dias, P., Ganito, C., Ferreira, C. & Henriques, S. (2013). Networks of belonging: between mediation and mediatisation. In Carpentier, N. & Schroder, K. (Eds.), *Transforming Audiences, Transforming Societies*, (pp. 101-119). London: Routledge.

Damásio, M. (2013). Tecnología y Sociedad: la modelación social de las tecnologias de información y de comunicación. In José Gomes Pinto & José A. Bragança de Miranda (Eds.), *Perspectivas de la Comunicación: Arte, Cultura, Tecnologia* (pp. 258-297). Madrid: Cream ebooks.

Damásio, M., Henriques, S., Botelho, I., & Dias P. (2013). Mobile Internet in Portugal: Adoption patterns and user experiences. In Rızvanoğlu, K. & Çetin, G. (Eds.), *Research and Design Innovations for Mobile UX*, (pp. 94-113). Hershey PA: IGI Global.

Damásio, M. & Henriques, S. (2013). Social capital and media use: Technology and societal development. In S. Singh (Ed.), *New Media and Development* (pp. 116-156). New Delhi: BRPC Publishing House.

Damásio, M., Teixeira-Botelho, I., Henriques, S., & Dias, P. (2013). The adoption of mobile Internet: Industry and users' experiences. In *Design, User Experience, and Usability. Web, Mobile, and Product Design, Lecture Notes in Computer Science* vol. 8015. (pp. 13-22). Springer-Verlag. doi:10.1007/978-3-642-39253-5_2

Quico, C., Damásio, M. J., Henriques, S. & Veríssimo, I. (2012). Digital terrestrial TV switchover process in Portugal: Viewers between a rock and a hard place. In Sousa, H. & Denicoli, S. (Eds.), *Digital Communication Policies in the Information Society Promotion Stage*. eBook. Universidade do Minho.

www.lasics.uminho.pt/ojs/index.php/digital_communication_polices/index/

Journal articles

Damásio, M. J. & Cordeiro, P. (Forthcoming 2013). Stakeholders and academia: Different modes of interaction", in special section on "Policy implications of academic research on mediated participation. *Comunicazioni Sociali, Rivista di Media, Spettacolo e Studi Culturali, Milan.*

Damásio, M. J., Henriques, S., Botelho, I. & Dias, P. (2013). Mobile Internet in Portugal: Adoption patterns and user experiences. *International Journal of Mobile Media & Communication,* September 2013; 1 (3). (pp. 335-355). London: Sage. DOI: 10.1177/2050157913495690

Henriques, S. & Damásio, M.J. (Forthcoming 2013). Internet social capital: Can social media foster bonding social capital? Validation of a measure for Social Capital in an online era. *SAGE Open Source.*

Mackert, M., Damásio M, J., Champlin, A., Holton, I, & Munoz, I. (2013). E-Health and health literacy: A research methodology review. *Journal of Computer-Mediated Communication.* DOI: 10.1111/jcc4.12043, ISSN: 1083-6101 IF= 1.778

Conference proceedings

Baptista, A., Veríssimo, I., Sequeira, A., Quico, C., Cardoso, M., & Damásio, M. J. (2013). A promoção de saúde e bem-estar via televisão digital interativa. *Proceedings from VIII Congresso SOPCOM,* 17-19 October, Escola Superior de Comunicação Social, Lisboa.

Baptista, A., Veríssimo, I., Quico, C., Cardoso, M., Damásio, M., & Sequeira, A. (2013). Using digital interactive television to promote healthcare and wellness inclusive services. *Proceedings from HCI International*, Las Vegas, EUA, July 21-26. 2013.

Project Breadcrumbs (initiated 2010)

Book chapter

Figueira, Á., Devezas, J., Cravino, N., & Francisco-Revilla, L. (Forthcoming 2013). Creating and analyzing a social network built from clips of online news. In Issa, T., Isaías, P., & Kommers, P. (Eds.), *Information Systems and Technology for Organizations in a Networked Society*. IGI Global.

Journal articles

Devezas, J., & Á. Figueira. (2012). Finding language-independent contextual supernodes on coreference networks. *IAENG International Journal of Computer Science,* 39(2), pp. 200-207.

Devezas, J. & Figueira, Á. (2013). The community structure of a multidimensional network of news clips. *International Journal of Web Based Communities*, Special Issue on Community Structure in Complex Networks.

Conference Proceedings

Cravino, N., & Figueira, Á. (2013). Community detection by local influence. *Proceedings from the 2013 World Conference on Information Systems and Technologies* (WorldCIST 2013), Algarve, Portugal (to be published by Springer).

Cunha, E. & Figueira, Á. (2012). Automatic clustering assessment through a social tagging system. *Proceedings from the 15th IEEE International Conference on Computational Science and Engineering.* Paphos, Cyprus. December, 2012.

Devezas, J., and Figueira, Á. (2012). Interactive Visualization of a News Clips Network: A Journalistic Research and Knowledge Discovery Tool. *Proceedings from the 4th International Conference on Knowledge Discovery and Information Retrieval* (KDIR 2012), Barcelona, Spain.

Gomes, F., Devezas, J., & Figueira, Á. (2013). Temporal Visualization of a Multidimensional Network of News Clips. *Proceedings from the 2013 World Conference on Information Systems and Technologies* (WorldCIST 2013), Algarve, Portugal (to be published by Springer).

ImTV (initiated 2010)
Journal article

Prata, A., & Chambel, T. (Forthcoming.) The design of flexible video-based crossmedia informal learning contexts beyond iTV. *Entertainment Computing*. Elsevier.

INVITE: Social Identity & Partnership in Virtual Environments (initiated 2010)
Conference proceedings

Baptista, M., Dimas, J., Prada, R., Santos, P. & Martinho, C. (2013). A serious game based on a public goods experiment. *Proceedings from 2013 ASE/IEEE International Conference on Economic Computing.*

Dimas, J., Lopes, P. & Prada, R. (2013). One for all, all for one: Agents with social identities. *Proceedings from CogSci - 35th Annual Meeting of the Cognitive Science Society.*

Dimas, J. & Prada, R. (Forthcoming 2013). Dynamic identity model for agents. *Proceedings from the MABS 2013 - 14th International Workshop on Multi-Agent-Based Simulation.*

Dimas, J. & Prada, R. (2013). You are who you hang out with: Agents with dynamic identity. *Proceedings from AAMAS'2013 - 12th Int. Conf. on Autonomous Agents and Multiagent Systems* (AAMAS 2013), IFAAMAS.

Dimas. J., Lopes, P., Preto, G., Santos, P. & Prada, R. (2013). Social identity bias in agents' rational decision. *Proceedings from IVA 2013 - Intelligent Virtual Agents.*

Pereira, G., Prada, R., & Santos, P. A. (Forthcoming 2013). Bases of social power for agents. *Proceedings from the 12th International Conference on Autonomous Agents and Multiagent Systems* (AAMAS 2013).

LIFEisGAME: LearnIng of Facial EmotIons Through Serious GAMEs (initiated 2010)

<u>Journal articles</u>

Serra, J., Ribeiro, M., Freitas, J., Orvalho, V., & Dias, M. S. (2012). A proposal for a visual speech animation system for European Portuguese. *Communications in Computer and Information Science.* Springer.

<u>Conference proceedings</u>

Miranda, J., Alvarez, X., Soleno, J., Augusto Sousa, A., Fernández, I. & Orvalho, V. (2012). *Proceedings from the ACM Symposium on Applied Perception- SAP.* Los Angeles, USA , August 2012.

REACTION: Retrieval, Extraction, and Aggregation Computing Technology for Integrating and Organizing News (initiated 2010)

<u>Journal articles</u>

Batista, D. S., Forte, D., Silva, R., Martins, B. & Silva, M.J. (2013). Extracção de relações semânticas de textos em Português explorando a DBpédia e a Wikipédia. *Linguamática, Revista para o Processamento Automático das Línguas Ibéricas,* 5(1), 2013.

Dias, D., Anastácio, I., & Martins, B. (2012). Geocodificação de documentos textuais com classificadores hierárquicos baseados em modelos de linguagem. *Linguamática, Revista para o Processamento Automático das Línguas Ibéricas, 4(2),* 2012.

<u>Conference proceedings</u>

Batista, D. S., Silva, R., Martins, B., & Silva, M.J. (Forthcoming 2013). *A Minwise hashing method for addressing relationship extraction from text. Proceedings from the International Conference on Web Information Systems Engineering, 2013.*

Laboreiro, G., Bošnjak, M., Mendes Rodrigues, E., Sarmento, L. & Oliveira, E. (2013). "Determining language variant in microblog messages." *Proceedings from the 28th ACM Symposium on Applied Computing, SAC 2013,* Information Access & Retrieval Track (IAR).

See-Through-Sound (initiated 2010)

<u>Journal article</u>

Cavaco, S., Henrique, J. T., Mengucci, M., Correia, N. & Medeiros, F. SonarX - Ver Através do Som. *Ponto e Som, Biblioteca Nacional de Portugal,* n.157, (pp. 11-17).

<u>Conference proceedings</u>

Cavaco, S., Henrique, J. T., Mengucci, M., Correia, N. & Medeiros, F. (2013). Color sonification for the visually impaired. *Proceedings from International Conference on Health and Social Care Information Systems and Technologies* (HCist). Elsevier.

Cavaco, S., Mengucci, M., Henrique, J. T., Correia, N. & Medeiros, F. (2013). From pixels to pitches: Unveiling the world of color for the blind. *Proceedings from the IEEE International Conference on Serious Games and Applications for Health (SeGAH) 2013*. (Best Paper Award.)

Mengucci, M., Henriques, J. T., Cavaco, S., Correia, N., & Medeiros, F. (2012). From color to sound: Assessing the surrounding environment. *Proceedings from the International Conference on Digital Arts* (ARTECH). (pp. 345-348).

PHASE II: EDUCATION

Summer Institute Lisbon (May-July, 2013)
Entrepreneurial Journalism - Rosental Alves
The course included online and offline components. Students looked at how digital media has affected the processes of production, distribution, and consumption in the news industry, and studied specific examples of innovative journalism projects that have taken advantage of the opportunities offered by digital platforms. [10 students]

Research Methods - Sharon Strover
Students studied the basics of conducting systematic research, relying on a social sciences methodological approach. The course addressed theoretical aspects of research such as epistemology, conceptualization, and measurement, and also introduced students to specific methods including focus groups, interviews, online and offline surveys, field experiments, ethnography, and other Internet-oriented approaches. [9 students]

Human-computer interaction and interactive media - William J. Moner
Students explored using the tools of the web to create a story. Students used proprietary and open source software to design a narrative experience that communicated the story of a place, such as a home town, using the web as a data source for materials and platforms. The course addressed both theory and production and included discussion of mobile devices, remix culture, and transmedia storytelling. [9 students]

Summer Institute Porto (May-July, 2013)
Digital Games Design – Bruce Pennycook
The course focused on using a game engine to design and develop a digital game. Students employed the GameSalad game engine to design the game and other open source software to create the graphics and audio. Students explored the distinct tasks involved in digital game design to create an entertainment game that explores a specific narrative. [15 students]

Interaction Design Workshop Porto
Digital Media doctoral students Bruno Nobre and Cláudia Pernencar led a workshop in Interaction Design at FEUP in July. The course was aimed at both students and professionals and focused on practical skills including storyboarding, usability testing, conceptual mapping, prototyping, and project development and gave participants a stronger grasp of interactive design theory and the current state of the art. [10 students]

William Moner and Summer Institute students

Doctoral Symposium (October, 2013)

Fifteen U.Porto and UNL students presented a variety of research projects to their peers and program faculty at the third annual doctoral symposium in Porto. These gatherings created a space for UNL and U.Porto students to learn about shared interests, understand their peers' successes and challenges, and make connections for future collaborations. There have been four symposia—three in Porto, and one for visiting students in Austin. The students' presentations reflected the diversity of the Digital Media program, with topics including senior healthcare, public library outreach programs, digital storytelling, cultural journalism, and facial animation rigging systems. Students from every cohort year participated in the three highly interactive sessions.

Sharon Strover addresses 2012 Doctoral Symposium [Credit: Luis Barbosa]

Faculty Visits

Filmmaker & UNL faculty member João Mário Grilo visits Austin (May, 2013)

Grilo, a professor in the department of Communication Sciences at UNL, met with UT students and faculty and presented some of his latest work. Grilo is researching the potential of using new media to appropriate the landscape images and directors' framing choices, such as through building 3-D models. This may offer a new means to acquaint today's students with influential directors of earlier decades.

Photo 5: Visitor Gustavo Costa

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Student Visits

Spring 2013: Fourteen visitors came to Austin, including 6 visiting researchers, 6 exploratory visitors, and 2 dual-degree students.

Fall 2013: Seven visitors arrived, including 4 visiting researchers, 1 exploratory visitor, and 2 dual-degree students. [Many students canceled exploratory trips, possibly due to funding.]

PHASE II: BUILDING CAPACITY

Future Places (October 2013)

The Future Places MediaLab for Citizenship held participant-driven workshops, symposia, and performances in Porto from October 28 to November 2. The project, which includes activities occurring throughout the year, developed out of the Future Places Digital Media Festival, begun in 2008. The week's sessions included keynote speeches by UT Austin faculty member Nancy Schiesari and UK filmmaker Debbie Anzalone and a roundtable on the state of contemporary filmmaking including Anzalone and Schiesari in addition to doctoral students André Valentim Almeida and Andreia Magalhães and musician and filmmaker Bruce Gelduldig.

Future Places Citizen Lab meeting [Credit: Luis Barbosa]

LOOKING AHEAD

We are currently in the process of planning our course offerings for summer 2014. We will be offering courses to enrolled students as well as qualified early career professionals in both Porto and Lisbon. We also are planning some entrepreneurship training, with possible collaboration with local, Portuguese-based universities (such as the Porto Business School, for example) emphasizing such preparation, as well as the Stockholm School of Entrepreneurship, which has an extensive roster of activities that could be useful to digital media students in particular. We also have been soliciting proposals from the Kelleher Center for Entrepreneurship at UT-Austin. Finally, doctoral students have requested a research methods/doctoral symposium in Lisbon during 2014, and we will facilitate that meeting.

We anticipate that FCT will open a research call in digital media in the calendar year 2014, and plan to cultivate faculty partners at UT who will work with Portuguese faculty in our primary areas of emphasis (videogames, health applications, and the Lusophone media market) in research proposals. In preparation for this call, we have prepared a background paper on videogames that will be available at our site.

Additional specialized workshops will follow on the heels of our successful Computation and Design series based in the Lisbon area. That series brought together faculty and students from multiple schools for intensive presentations and workshops. We have already lined up a visit from one of the best-known videogame designers and entrepreneurs in the United States, and more will be forthcoming. We also plan to convene an agenda-setting workshop in the area of health and communication in order to catalyze research ideas. The workshop will invite several Portuguese professors and professionals working in this area, and also will include personnel from the Fraunhofer Institute.

APPENDIX: PHASE I (2007-2012)

RESEARCH

Nine collaborative research projects were conducted with FCT sponsorship during the first phase. These diverse, interdisciplinary efforts brought together faculty from UT Austin and numerous top Portuguese universities. The projects have resulted in significant benefits:

- Over 60 scholarly publications including books, peer-reviewed journal articles and book chapters, in addition to more than 140 conference presentations, about half of these chosen for publication in proceedings. Full lists of publications for this period are included in previous annual reports.

- Each project's team included graduate students and gave them valuable experience doing rigorous research with experts in the field, making international contacts, and supplying the foundations for many students' dissertations.

- Most research projects included the participation of high profile private companies including Samsung, Duvideo, ZON Multimédia, and Microsoft, strengthening the program's visibility in different areas of the technology industry and creating the foundation for future collaboration with the private sector.

Projects initiated in 2009

Digital Inclusion and Participation

The Digital Inclusion research project is a comparative study of technology access issues in Texas and Portugal. It aims to understand what social, economic, and technical factors create barriers to participation in digital life and to disseminate relevant recommendations for the development of initiatives for digital inclusion and participation and contributing to the public debate on digital and social inclusion of non-users and minority populations.

Kinetic Controller Driven Adaptive and Dynamic Music Composition Systems

This joint research project has focused on the development of new techniques and strategies for computer-assisted composition in the context of real-time user control with non-standard human interface devices for applications in electronic art and digital entertainment systems. GimmeDaBlues, an iPhone App developed by members of the Kinetic team at INESC TEC, won the nationwide Prémio ZON competition in the category of Multimedia Applications in 2012.

Projects initiated in 2010

iDTV Health

The iDTV Health project looks at the potential of digital interactive television (iDTV) to promote original services, formats and content relevant to the support of personal health care and wellness of individuals over 55 years of age in the Portuguese territory. The project has evaluated the satisfaction and potential generated by a iDTV service as a way to support personal health care and wellness and facilitate access to information visualization and content, looking especially at the service's ability to increase levels of social capital among the target group. The research focuses on individuals over 55 years of age with low levels of technological literacy and health professionals.

Project Breadcrumbs

Project Breadcrumbs investigates new software interfaces for organizing and sharing news items. Breadcrumbs has intended to improve the ability of journalists to understand the interests of their readers and the implicit relationships readers perceive between different articles, phrases and events. Research activities have included designing and evaluating interfaces that support advanced reading behaviors such as clipping and annotating; designing and developing mechanisms that can detect relationships based on the news clipping; and noting the behavior of user groups.

ImTV

High-quality entertainment video shows are now created by professionals, independent producers and amateurs that publish their media online and free of charge. While this new media workflow creates added-value services for end-users, it also breaks traditional TV concepts and affects key economic functions such as program scheduling, audience measurement, and targeted advertising. This project first focuses on how young people in Portugal and the United States view television today, and second, develops new interfaces for streaming TV content and interactive cable systems. The long-term vision of this project is to exploit the full potential of new trends in media production and consumption.

INVITE: Social Identity and Partnership in Virtual Environments

Project INVITE explores the development of artificial intelligence mechanisms to create artificial players (autonomous agents) that can perform well in complex social situations provided in games and virtual environments. The research focuses on interactions between agents and human players, specifically on the creation of agents able to display believable human-like behavior including comprehension of the different social groups in a game, the game itself, and the other players. The goal of the INVITE project is to see how a networked virtual environment can be used to teach and nurture interpersonal "soft skills."

LIFEisGAME: Learning of Facial Emotions Using Serious Games

The ability of socially and emotionally impaired individuals to recognize and respond to emotions conveyed by the face is critical to improve their communication skills. LIFEisGAME is an endeavor to develop a serious game to help autistic children understand human emotions. The project applies a serious game approach to teach people with Autism Spectrum Disorder (ASD) to recognize facial emotions, using real time synthesis and automatic facial expression analysis. LIFEisGAME advances the synthesis of realistic virtual characters and markerless motion capture technology, and creates a non-stressful game to help individuals recognize facial emotions in an interactive way.

REACTION: Retrieval, Extraction, and Aggregation Computing Technology for Integrating and Organizing News

News is no longer simply produced and consumed, but instead continually evolves over time as a cooperative dialog between news outlets and the public at-large. News presentation must fundamentally reflect this, providing any-time organization of the latest events, conveying how story elements developed over time, and integrating the story in the larger world context. The REACTION project investigates new tools for providing greater automation in newsgathering, analysis, and delivery, while respecting practical constraints of news producers and consumers. The project also focuses on the relationships between news and social networks, both explicit and implicit, which underlie the news and significantly shape its content, quality, and authority.

See-Through-Sound

This exploratory research project examines how computer audio technology can provide useful ways of understanding the physical environment. The three channels of composition of color images—hue, saturation, and value—are translated into matrices of numbers, and this information is translated into sound. The researchers have worked on a prototype that incorporates spatial-sensing technology to help users navigate physical spaces.

EDUCATION

Doctoral Program

The Digital Media PhD program officially began in fall 2009 and currently has 84 students. The four-year degree program at U.Porto and the New University of Lisbon was designed with a multidisciplinary structure supporting four specializations:

- Creation of Audiovisual and Interactive Content
- Technology

- Journalism
- Industry, Publics, and Markets

Many students come to UT for a semester or more as registered non-degree students and visiting researchers, guided by advisors at their home universities as well as by UT faculty who act as co-advisors. Some students have also joined a full doctoral program at UT, pursuing dual degrees.

UT Austin faculty members have taught 14 long-semester courses for the doctoral program students, sometimes in collaboration with U.Porto and UNL faculty. Courses have included Research Methods, Generative Music, Communication Theory, Sound Design for Digital Media, and Visual Effects, among others.

Multimedia Masters Program

A special Multimedia Master's degree is offered by the program through the University of Porto. It began in 2009. Students can choose one of four specializations:

- Arts and Culture
- Education
- Interactive Music and Sound Design
- Technologies

New courses created to support the MA program include Digital Interactive Systems, Sound Design for Digital Media, Music Information Retrieval, and Automatic Music Generation.

Summer Institute

The program has offered 30 Digital Media Summer Institute courses between 2008 and 2012, giving the students an opportunity to take intensive courses for credit each the summer. Courses typically last 3 weeks and have an average enrollment of 12 students per class. Examples of courses have included Digital Cinema, Entrepreneurial Journalism, Film and Media Scoring, and The Information Society.

Steve Mims' 2012 Summer Institute course

Doctoral Symposia

Since 2011, the program has organized formal doctoral symposia where students have the opportunity to present their projects to an academic audience of their peers and faculty advisors. An average of fifteen students have presented at each event on a wide range of research topics including ubiquitous computing; geographic mapping and cognition; generative, interactive music applications; human-computer interaction and social networks; and animated 3D facial rigging systems.

Visits

Between the spring semesters of 2009 and 2012, the program hosted an average of just over 20 visitors per semester. This total includes two students who enrolled in the RTF PhD program as well as 14 visiting researchers, many of whom stayed multiple semesters. Many doctoral students have made short-term visits, meeting with UT faculty and prospective advisors over a one-week period. The program has also hosted 7 post-doctoral researchers.

Students come to study with UT professors on topics including 3D printing; digital media and community journalism; open data and government; informatics and healthcare; bioengineering; interface design; and electronic music generation, among others.

Exploratory visitors from the New University of Lisbon

Exploratory Visitors

Exploratory visitors receive support for roundtrip airfare and 7 nights hotel stay, as well as administrative support from the Digital Media program team. During exploratory visits, students spend 7 days meeting with faculty from UT programs including the Department of Radio-TV-Film, the Department of Art and Art History, the Department of Theater and Dance, the School of Information, the School of Music, and the College of Engineering. These meetings allow the students to speak with various faculty members in person, discuss their work plans, and identify Austin-based co-advisors for their thesis development. The students have the opportunity to explore UT Austin campus resources and the city of Austin as well, with a view toward returning as visiting researchers or registered non degree-seeking students.

Visiting Researchers

Visiting researchers may stay for several weeks or semesters, depending on their research and plan approved by their advisors. Students doing thesis research in Austin devote their visits to deepening their understanding of the digital media field, working under the supervision of faculty co-advisors, and developing their dissertation proposals. Registered students and visiting researchers take advantage of the University's extensive system of libraries, including access to a comprehensive collection of online databases, and diverse research facilities. Students with developed research plans undergo the University's rigorous Institutional Review Board process to approve the use of human subjects, with the support of their UT faculty co-advisors.

BUILDING CAPACITY

International School on Digital Transformation, 2009-2011

From 2009-2011, ISDT drew scholars, journalists, NGO workers, designers, and community activists from over 20 countries including Canada, the United Kingdom, Brazil, Egypt, and India, as well as the United States and Portugal, with about 55 participants a year. The intensive residential program brought together a diverse collection of established and emerging scholars and other professionals from around the world, fostering a sustainable network of scholars and activists committed to exploring ways digital media can strengthen civil society.

ISDT 2011 faculty and students

The School has featured talks, discussions, and hands-on exercises focused on themes such as:
- Democratic transformations of society through digital media
- Grassroots civic activities
- Digital communication in developing regions
- "Open cities" and municipal participation
- Internet content regulation

A social networking research study of 2009 attendees suggested the program was quite successful in fostering lasting collaborations between participants, supporting 35 reported active research relationships in the months following the program.

Faculty Mentors have included internationally recognized scholars and activists:
- Andy Carvin from National Public Radio in the United States
- Sunil Abraham of the Center for Internet and Society, Bangalore
- Jillian York of the Electronic Frontier Foundation
- Tiago Peixoto, participatory budgeting expert
- Micah Sifry, co-founder of the Personal Democracy Forum
- Katrin Verclas of Mobileactive

Future Places

The Future Places Digital Media Festival is now in its 6th year. Developed from an annual international competition that attracted attendees from over a dozen countries in Europe and the Americas, it has become an ongoing, inclusive program that has given birth to and supported local and international arts and activist groups, and also reached out to the local community of Porto and beyond, forming a sustained community of creative and engaged citizens. It has offered workshops, speaker panels, keynote speakers, performances, and digital art exhibits. Advanced digital media students from around Portugal exhibit their work and there is also a strong local community orientation with participant-driven Citizen Labs. Workshop topics have included:

Negativland at Future Places 2012

- Arduino and physical computing
- Interaction design for mobile devices
- Storytelling with location-aware mobile devices
- Digital audio and field recordings

Keynote speakers have included internationally known digital media scholars, artists, and activists:

Keynote speakers Elizabeth Stark and Peter Sunde at Future Places 2011

- Siva Vaidhyanthan, author of *The Googlization of Everything*
- Hugh Forrest, director of Austin's world-renowned SXSWi festival, which attracted over 30K people in 2013
- Peter Sunde, co-founder of The Pirate Bay
- Free culture legal expert and activist Elizabeth Stark
- Experimental music and copyright activist group Negativland

Design and Computation series

In 2011, the program brought 7 international experts to Lisbon to address student and public audiences, speaking on the future of interactive entertainment, digital media and performance, interaction design and videogames, ambient intelligence, and mapping and design. Speakers included:

- Yacov Sharir (Theatre and Dance Department, UT Austin)
- Ernest Adams (independent game design consultant, formerly of Electronic Arts)
- Dan Olsen and Peter Hall (Design Program, UT Austin)
- Panos Markopoulos (Eindhoven University of Technology)
- Anthony Brooks (Aalborg University)
- Bill Buxton (Principal Researcher at Microsoft Research)

Rádio e Televisão de Portugal

In the summer of 2012, Radio-TV-Film production faculty members Stuart Kelban and Richard Lewis led intensive classes in scriptwriting at the Academy RTP, a transmedia program produced by Rádio e Televisão de Portugal and intended to give interns and

professionals the opportunity to develop projects and take workshops.

ZON Labs

ZON Multimédia, a leading Portuguese communications company, sponsored two intensive media summer schools at UT Austin for competitively selected students and emerging professionals from around Portugal. The summer school sessions were held in June and July of 2010 and 2011 and were jointly funded by ZON, which paid for all direct student expenses, and the UT Austin-Portugal program, which covered instructional costs. Courses were led by veteran instructors from the Radio-TV-Film Department.

The summer schools are a principal example of how the UTA-Portugal program has worked with Portuguese companies to cultivate the next generation of media talent in Portugal and tailor education to the Portuguese media industry's needs. Both the 2010 and 2011 programs resulted in award-winning student productions.

ZON Intensive Script Development Lab (2010)

The first summer program included three concurrent courses addressing script development, with participants studying production management, budgeting, and character development as well as applied technical skills such as cinematography and non-linear editing. Upon returning to their home institutions, the students spent August and September in production and postproduction and submitted completed works to the nationwide Prémio ZON Criatividade em Multimédia short film competition in the fall. Two ZON Lab students were among the ten finalists in 2010.

ZON Digital Animation Advanced Lab (2011)

The 2011 ZON Lab brought 10 professional animators from Portugal to Austin, where they participated in an intensive residential program of study led by UT Austin instructors. For several weeks, the participants studied animated film writing, character design, storyboarding, the integration of image, video, and 3D surfaces, with compositing and projection in Maya and After Effects, and met with some of Austin's top animation experts. The animators developed individual projects that were later submitted to the annual Prémio ZON Creatividade em Multimédia competition. Two alumni from this workshop won Prémio Zon awards—second and third place for Digital Animation.

Internships

The Digital Media Leadership Program has funded and facilitated the visits of 19 early-career professionals and advanced students in digital media to visit Austin, Texas for 3 months, interning at one of the city's media companies. Interns have held positions in a variety of areas including computer programming, filmmaking, marketing, and journalism. Partners include:

Intern Teresa Vieira

- Mercury Mambo, Latino-focused marketing agency
- Innovagency, which helps businesses manage patents and other IP

- InfoChimps, tech firm helping companies leverage Big Data
- 501 Post, a film postproduction company

Many interns embraced the local creative and high tech communities in Austin, attending meetings and networking with their professional counterparts.

Events

<u>SXSW Media Festival</u>
Several members of the program have attended and participated in this major media festival. In 2013, it attracted over 30K people from 58 countries. Heitor Alvelos, Nuno Correia, and Monica Mendes presented research in 2011 at SXSW Interactive. Alvelos also chaired the Portugal Technology Summit at SXSW, which was attended by former Secretary of State Manuel Heitor and U.Porto faculty member Artur Pimenta Alves. PhD student João Beira presented performances at SXSW events in 2012.

<u>International Symposium on Online Journalism</u>
Students visiting Austin have regularly participated in the annual event, which attracts hundreds each year from around the world, bringing together news professionals and scholars to discuss emerging issues like mobile journalism, data visualization, and social media.

<u>Monstra Animated Film Festival</u>
UT faculty gave three workshops in 3D animation and scriptwriting in 2011.

<u>UFrame Film Festival</u>
UT faculty member Andrew Shea acted as a juror and gave a Master Class.

Advanced Computing

Activities in Advanced Computing

Winter Workshop at IST Lisbon (December 6-8, 2012)

Adelia Sequeira (IST, Portugal) and Chandrajit Bajaj (UT Austin) organized a workshop on Modeling and Simulation of Physiological Systems (MSPS 2012) during December 6-8, 2012 at the Instituto Superior Técnico, Lisbon, Portugal (http://cemat.ist.utl.pt/). This workshop was held to celebrate the successful completion of their CoLab project UTAustin/CA/0047/2008, "Cardiovascular Imaging, Modeling and Simulation: SIMCARD."

State of the art in a wide range of research topics regarding physiological systems was addressed, principally in the fields of advanced computing and mathematics. Numerical models and simulations for varied topics including hemodynamics, mathematical and computational modeling, clinical intervention, computational fluid mechanics, thrombosis, fluid-structure interaction, heart mechanics, continuous and discrete models, experimental studies, medical imaging and processing, cell behavior, prognosis and diagnosis practices were discussed.

Participants from 10 different countries attended the workshop and included academic professors, undergraduate and postgraduate students, and medical doctors. National interest in the event meant that around half of the participants were from Portuguese institutions, giving them the possibility of meeting and discussing with eminent researchers with relative ease. The total number of participants was around sixty, with more than thirty speakers.

Participants at MSPS 2012 (IST Lisbon)

Chandrajit Bajaj (UT Austin) presenting at MSPS 2012

Summer internships

In July-August 2013, the program hosted 9 graduate students from the University of Minho at The University of Texas at Austin. They did research with faculty members at the Institute for Computational Engineering and Science, the Department of Computer Science, and the Texas Advanced Computing Center (TACC).

Student	Faculty supervisor
1. Cristiano Rafael da Silva Sousa	Professor Keshav Pingali
2. Daniel Jose Taveira Gomes	Professor Don Fussell
3. David dos Santos Pereira	Professor Keshav Pingali
4. Diogo Alberto Rocha Lopes	Dr. Paul Navratil (TACC)
5. Fabio Jose Goncales Correia	Dr. Paul Navratil (TACC)
6. Jose Carlos da Silva Alves	Professor Don Fussell
7. Luis Manuel Ramos Gomes	Professor Don Fussell
8. Rui Miguel Magalhaes Brito	Professor Keshav Pingali
9. Bruno Silvestre Medeiros	Professor Keshav Pingali

Sousa and Pereira worked on implementing a graph partitioning algorithm called Metis on a 24 core multicore processor, using Pingali's Galois system to parallelize their code. Graph partitioning is an important routine used in all finite-element computations to

partition the finite-element mesh between the processors of a parallel machine. They obtained speedups of up to 16 on the 24 core machine.

Brito and Medeiros worked on implementing the Metis graph partitioner on an NVIDIA Graphical Processing Unit (GPU) board called the Tesla. GPUs are designed for fast vector and matrix computations, so it is challenging to implement a complex graph algorithm like Metis on a GPU. However, the students did an excellent job of implementing this code in CUDA, the programming notation used for NVIDIA GPUs, and were able to obtain good performance for this complex code. They are preparing a paper submission based on this work.

Gomes, Alves and Gomes worked with Don Fussell on his parallel ray-tracing engine called Jackrabbit. They improved the performance of this ray-tracer by optimizing the cache memory usage of this application.

Lopes and Correia implemented finite-element computations on the Stampede cluster at the Texas Advanced Computing Center (TACC) with Dr. Paul Navratil. Stampede is one of the largest parallel computers in the world (it is currently number 7 on the list of top 500 fastest machines in the world), and it has 462,462 cores operating in parallel.

The faculty members at UT Austin were impressed with the excellent training that had been given the students in Portugal, and they were also impressed with their dedication and hard work during their internships.

Summer interns from Portugal (summer 2013)

Mathematics

2013 CY Report and Future Plans

CoLab, a long-term collaborative project, was established more than five years ago with the goal of increasing research collaborations in emerging technologies with an emphasis on media and digital content, advanced computing, and mathematics.

This is a report on the research activities in Mathematics during 2013, the first year of Phase II of the program. The UT-Portugal Mathematics Program involves the Department of Mathematics at UT-Austin and The Institute for Computational Sciences and Engineering (ICES) at The University of Texas at Austin, along with mathematical research centers and groups in four Portuguese universities, namely at the Mathematics Department of Instituto Superior Técnico (IST) of the Technical University of Lisbon, the Mathematics Department of the School of Sciences of the University of Lisbon (FCUL), the Mathematics Department of the School of Sciences and Technology of the New University of Lisbon (FCTUNL), and the Department of Mathematics of the School of Sciences and Technology of the Universidade de Coimbra (FCTUC). In this second phase of the program the Mathematics Department of the School of Sciences of the University of Porto is also one of the main partners.

Through ongoing collaborations, Portuguese and UT-Austin faculty strengthened their academic connections, resulting in a number of joint publications, postdoctoral visits, long-term visits by Portuguese faculty members to UT-Austin, and ongoing research projects. In addition, the program has increased the international recognition of Portuguese scientists, as well as bringing to Portugal top researchers in a diverse class of topics for summer schools, workshops and research seminars.

Here are the specific actions that have been undertaken during 2013 toward the stated goals of mathematical research under Phase II of the UT | Portugal Collaborative Program.

Senior Faculty Research Collaborations

In April 2013, Prof. Juha Videman, IST Lisbon and current Associate Director at the Portugal Co-Lab component in Mathematics, visited The University of Texas at Austin, Department of Mathematics and ICES to continue his collaboration with Prof. Clint Dawson, ICES, head of the Computational Hydraulics Group. The Computational Hydraulics Group (CHG) at The University of Texas at Austin is a leading research center in the modeling of aqueous environments, including problems related to shallow water hydrodynamics, hurricane storm surges, and groundwater pollution. For more information see: http://chg.ices.utexas.edu. This joint research has been published as:

Clint Dawson, Juha H. Videman, A streamline diffusion finite element method for the viscous shallow water equations. *Journal of Computational Applied Mathematics 251: 1-7* (2013)

For the fall semester, CoLab Mathematics was pleased to host Prof. Claudia Valls Angles of IST Lisbon to begin a collaboration with Prof. Hans Koch of the Department of Mathematics at UT. Their research aims to extend the renormalization group techniques that up to now were developed to finite-dimensional vector fields to the well-known Boussinesq equation. This is a partial differential equation that models long waves propagating on the surface of a fluid layer under the action of gravity. This model is Hamiltonian and depends on a parameter. Their research will try to prove that for a large number of values of the parameter, it determines an analytic manifold of infinitely renormalizable Hamiltonians and each Hamiltonian on the analytic manifold has an invariant torus. Prof. Koch expects this joint research project to be an ongoing collaboration.

Visits by Postdoctoral Researchers: In support of a strong component of joint research at the junior levels, there has continued to be postdoctoral researchers who visit UT to foster the development of common research interests and projects under the program.

During the spring semester, Dr. Stefania Patrizi was again in residence at UT to continue her collaboration with Prof. Luis Caffarelli (UT) and Prof. P. Souganidis at the University of Chicago in the area of optimal control. At this time, she also mentored PhD candidate Veronica Quitalo, IST Lisbon. Dr. Quitalo received her PhD in August of 2013, and is now a Golomb Visiting Assistant Professor at Purdue University in Indiana.

From the Universidade de Coimbra, Centre of Mathematics (CMUC), Dr. Raimundo Leitao visited The University of Texas at Austin for a month during the spring semester. This visit was a continuation of the collaboration between Prof. Jose Miguel Urbano (CMUC) and the doctoral adviser of Dr. Leitao, Prof. Eduardo Teixeira of the Departamento de Matematica, Universidade Federal do Ceara, Fortaleza, Brazil in problems involving nonlocal optimal control. This 3-way collaboration is an exciting development that had been a natural progression for the UT | Portugal Program. The first series of findings of this project has resulted in an article which has been submitted as:

Luis Caffarelli, Raimundo Leitao and Jose Miguel Urbano: Regularity for anisotropic fully nonlinear integro-differential equations, to appear at *Mathematische Annalen 2013*. (also at arXiv:1311.0795).

In a related development, The University of Texas at Austin, through the office of Prof. Juan M. Sanchez, VP for Research, has just formalized a cooperative program for academic and research interchange with the Universidade Federal do Ceara, Fortaleza, Brazil. We expect this to yield benefits in a synergistic way with the UT | Portugal Program in Mathematics.

For the Fall semester, 2013 the program has in residence Dr. Farid Bozorgnia, a postdoc from IST Lisbon. He is collaborating with Prof. Luis Caffarelli in the area of numerical simulation of segregation.

Over the summer, UT | Portugal CoLab co-sponsored a meeting in Portugal, "Statistical dynamics of complex systems." This was cosponsored with *Fundacao Oriente XIV Arrabida Meeting* and held from July 1 - 3, 2013 at the Convento da Arrabida, Portugal and July 4 and 5 at the University of Lisbon. Organizers included T. Araujo (ISEG, Technical

University of Lisbon, Portugal), M. C. Carvalho (University of Lisbon, Portugal) I. M. Gamba (The University of Texas at Austin, USA) and R. V. Mendes (Complexity Sciences Institute, Portugal). The program included nineteen invited international speakers.

There were also visits from former CoLab graduate students Dr. Diego Marcon Farias and Dr. Levon Nurbekyan to continue their collaboration with Prof. Alessio Figalli, UT Austin. Dr. Nurbekyan earned his PhD in Portugal under the direction of Prof. Diogo Gomes, IST. His research in nonlinear PDE sought to study Hamilton-Jacobi equations and Hamiltonian systems on infinite dimensional spaces, with the goal of understanding the dynamical properties of systems with a large number of particles. During his recent visit, Prof. Figalli reported that Dr. Nurbekyan had begun to work on dynamical systems and Aubry-Mather theory in infinite dimensional spaces, a very delicate and challenging problem.

Future plans 2014 - 2015

Workshops and schools: There will be a month of concentration and workshops involving senior participants, junior researchers, postdocs, and graduate students. It will take place at UT Austin in April 2014 organized jointly by NSF funded programs "Focus Research Group" (FRG) in "Emerging issues in the sciences involving non-standard diffusions" and the Research Network in Mathematical Sciences (RNMS) in "Kinetic description of emerging challenges in multiscale problems of natural sciences" (Ki-Net).

The FRG group includes co-PIs Prof. Fang-Hua Lin at the Courant Institute of Mathematical Sciences, New York University; Prof. Yanyan Li at Rutgers University New Jersey; Henry Berestycki and Luis Silvestre at the University of Chicago; and Luis Caffarelli at UT Austin.

The RNMS group includes Co-PIs Eitan Tadmor at the University of Maryland, Shi Jin at the Unversity of Wisconsin, Madison, and Irene M. Gamba at UT Austin, in addition to 13 nodes within the United States and Europe, including the University of Cambridge and Imperial College, United Kingdom, and the University of Paris VI, France.

These NSF-sponsored activities will be open to CoLab participants from Portugal and CMU at every level, supported by UT Austin CoLab funds

Some Planned Senior Faculty Research Collaborations

Prof. Rui Vilela Mendes from the University of Lisbon will visit the Applied Math Group at ICES and the Physics Department to collaborate with Phil J. Morrison at the Institute of Fusion Studies and Prof. Irene M. Gamba from Mathematics, and Director of The Applied Math Group at ICES. They will focus on recent development from analytical and numerical viewpoint of magnetized collisional and collisionless plasmas, and new numerical methods by Discontinuous Galerkin solvers for strongly advected transport modeling.

Prof. Claudia Valls Angles of IST Lisbon will continue her collaboration with Hans Koch in the Mathematics Department at UT Austin on renormalizable Hamiltonian dynamics applied to the Boussinesq equation, as a follow up of the collaboration initiated in fall 2013.

Activities for Summer 2014

A summer school and workshop in Portugal are tentatively planned on "Numerical simulations and related issues on Cardio-Vascular modeling" The UT-Austin Organizers include Prof. Michael Sacks of the Simulation-Based Engineering and Sciences group at ICES and Biomedical Engineering Department, Dr. Joao Soares, Research Associate, Center for Cardiovascular Simulation, at ICES, UT Austin and Prof. Adelia Sequeira in the Mathematics Department at IST Lisbon.

A one-week summer school in probability methods and kinetic transport theory related to statistical flows will be organized by Prof. Maria C. Carvalho, Prof. Ana Jacinta Soares at the University of Minho, and Prof. Eric Carlen at Rutgers University in New Jersey.

Activites for Summer 2015

Planning is underway for a summer school and workshop for two weeks on a follow-up of the successful workshop "Statistical dynamics of complex system" held at Arrabida and The University of Lisboa in summer 2013.

EMERGING TECHNOLOGIES

EXECUTIVE SUMMARY

The program is pleased to announce a strong start to the UT Austin | Portugal Emerging Technology program's first phase of activity. At this time, the emerging technology component of the UT Austin | Portugal Emerging Technology program is focused on the platform field of nanotechnology. This is particularly relevant to the concept of supporting emerging technologies at a national level in Portugal, due to the broad applicability of nano-sciences across disciplines including chemical and materials engineering, biomedical engineering, energy, medical devices, and coatings to name a few. It is important to note that the Emerging Technology program, while new, builds on a strong foundation of collaboration between The University of Texas at Austin faculty researchers and commercialization staff from the past five years, largely through its interface with the UTEN phase one program focused on commercialization and broad research collaboration.

Previous activities that have seeded the Emerging Technology program include:
- UTEN Workshop 2010 Commercialization of NanoSciences
- National Science Foundation-supported "University of Texas Center for Nano Materials and Iberian Nanotechnology Laboratory Joint Research Planning Grant on Hypothermic Nano-material" concluded July, 2012
- Extensive collaboration between key nanotechnology and emerging technology actors from both The University of Texas at Austin and multiple institutions in the country of Portugal.

A summary of the program's activities and projects from Pre-Phase I (2007-2012) may be found in the Appendix. Highlights of previous activities related to emerging technology:

- In November, 2010, Professor Brian Korgel of UT Austin's Center for Nano- and Molecular Science and Technology (CNM) helped organize a 2-day workshop on nanotechnology commercialization held at the University of Minho as part of the UTEN program, "Portugal's 1st Annual National Workshop on Nanotechnology: Fostering Industry Involvement in Sustaining Nanotechnology Research and Valorization."
- In August, 2011, Prof. Paulo Ferreira started a two-year research project in Li-ion batteries with the Portuguese nanotechnology company "Innovnano."
- Prof. Brian Korgel attended and presented in Lisbon at the 4th UTEN Workshop 2011: Research Collaboration & Network Building for Commercialization: Nanotechnology and Life Sciences.
- The NSF-sponsored nanotechnology research collaboration planning meeting was held at INL in February, 2012.
- Dr. Colin Hessel, postdoctoral student at The University of Texas at Austin, conducted a US National Science Foundation research collaboration visit to the Iberian Nanotechnology Laboratory to further collaborative research on Hypothermic Nano-materials in June, 2012.

As the Emerging Technology program begins in earnest, the Director looks forward to building on the previous relationships across the country to build new technology research collaborations internationally. The Emerging Technology program will actively promote entrepreneurial activity through workshops and other programs that will give students and faculty the tools for bringing their research to markets and operational

settings. The Emerging Technology program hopes to spark increased faculty and educational research exchange between countries while building capacity for new and novel technologies that transcend boarders from both a scientific and commercial perspective.

Emerging Technology Activities in 2013:

As a new program component of the UT Austin | Portugal collaboration, the Emerging Technology program largely focused on identifying and setting up the appropriate structures for running the program successfully for the next 5 years. Early activities for 2013 included:

- Dr. Korgel as Co-PI for Emerging Technology worked with UT Austin | Portugal staff to identify his counterpart in Portugal. After extensive deliberation, the Portugal Lead for this program was announced as being Dr. Paula Vilarinho from the University of Aveiro.
- Early collaboration between US and Portuguese co-chairs took place in Porto, Portugal at the kick off meeting for UT Austin | Portugal in 2013. Topics of discussion included: research programs to be established, educational needs and potential collaborators in Emerging Technology from both UT Austin and Portugal.
- Discussion with INEB, Porto and Portuguese Co-Chairs has begun to discuss upcoming FCT calls appropriate for the Emerging Technology track of the UT Austin | Portugal collaboration. It is expected that these conversations will continue through 2014 with a formal FCT call to be produced in 2014.
- An initial UT delegation for Emerging Technology (CV's in Appendix) has been identified and will be traveling to Portugal with Dr. Korgel to formally participate in the Strategic Kick Off meeting to be held January 24, 2014.

Proposed New Activities 2014

Many of the formal activities to be conducted in 2014 will be finalized at the strategic kick off meeting on January 24th, 2014 to be held in Portugal. Early discussions with Portuguese Co-Chair have produced a number of potential future activities for the UT Austin | Portugal Emerging Technology track. Proposed activities include:

- Joint Portuguese/US research projects across Emerging Technology Fields.
- Inter-institutional collaboration with the MIT-Portugal and CMU-Portugal program to support enhanced faculty/student exchange between institutions.
- Develop a method for identifying potential projects of commercial validity in conjunction with the UT Austin | Portugal program.
- Additional activities will be defined in early 2014.

Faculty Interactions

At this time, the Co-Chairs (Korgel and Vilarinho) are working closely to build faculty engagement across universities. Prospective faculty collaborators for the UT Austin | Portugal Emerging Technology program include:

UT Austin

Paulo Jorge Ferreira is currently Associate Professor, Robert & Jane Mitchell Endowed Faculty Fellowship in Engineering at the University of Texas at Austin, USA and the Director of the Electron Microscopy facility at the Texas Materials Institute. He has a Ph.D in Materials Science and Engineering from the University of Illinois, USA and has done his Post-doctoral work at MIT in Materials Science and Engineering. He concentrates his scientific research in the areas of Nanomaterials, Nanotechnology and Electron Microscopy applied to Alternative Energy Technologies. At the educational level, he teaches graduate courses in Nanotechnology and is the Assistant Advisor to the Graduate Program in Materials Science and the University of Texas at Aus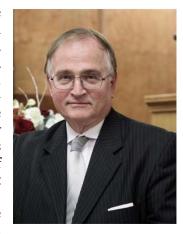tin. In parallel, he has been involved in initiatives with various American and Portuguese institutions in the areas of Education and Higher Education, Systems of Innovation, and Science and Technology. He has more than 100 papers in scientific journals and conference proceedings. He is also the co-author of three books, namely "Materials 2000", IST Press, 2003, "Investing in the Future: University-Industry Collaborations in USA and Portugal"; and "Nanotechnology for Architects, Designers and Engineers" with co-authors D. Schodek (Harvard University) and Michael Ashby (University of Cambridge, UK). He is part of the Editorial Board of Review of "Metallurgical and Materials Transactions". Prof. Ferreira has also acted as a special advisor to the Minister of Economics and Innovation, Portugal, on Government Strategy for Science & Technology.

Delia J. Milliron is currently an Associate Professor at the University of Texas at Austin and a Staff Scientist at Lawrence Berkeley National Laboratory's Molecular Foundry, a research center and user facility for nanoscience supported by the U. S. Department of Energy. She received her PhD in Chemistry from the University of California, Berkeley, in 2004. From 2004 to 2008 she worked for IBM's research division, initially as a postdoctoral researcher and subsequently as a member of the research staff. Her research is motivated by the potential for nanomaterials to introduce new functionality to and reduce manufacturing costs of energy technologies. Her group's activities span from the fundamental chemistry of nanomaterials to device integration and characterization. She is the recent recipient of two R&D 100 Awards, an MDV Innovators Award, and a DOE Early Career Research Program grant.

Nicholas Peppas is the Fletcher Pratt Professor in the Departments of Chemical, Biomedical Engineering and Pharmacy, and Chairman of the Department of Biomedical Engineering of the University of Texas at Austin. He is a leading authority in biomaterials, biopolymers, nanotechnology and biomedical, chemical and pharmaceutical engineering. Over the past 35 years he has set the fundamentals and rational design of drug delivery systems. His work has been cited more than 58,000 times with an H=119. In 2012 he received the Founders Award of the National Academy of Engineering (NAE), the highest recognition of the Academy. Peppas is a member of the NAE, the Institute of Medicine of the National Academies, the National Academy of France, the Royal Academy of Spain, and the Academy of Texas. In addition to serving as Chair of the BME Department at UT, he is Director of the Biomaterials Center at UT, President of the International Union of Societies of Biomaterials Science and Engineering, Chair-elect of the Engineering Section of the American Association for the Advancement of Science (AAAS), and Past-Chair of the Council of BME Chairs. Previously, he served as President of SFB and the Controlled Release Society. For his research he has been recognized with awards from AIChE (Founders Award, William Walker Award, Institute Lecture, Jay Bailey Award, Bioengineering Award, Materials Award), the Biomedical Engineering Society (Distinguished Scientist Award), the AIMBE (Galletti Award), the Society for Biomaterials (Founders, Clemson and Hall Awards) and other societies. In 2008, AIChE named him as one of the "One Hundred Chemical Engineers of the Modern Era". He is a fellow of AAAS, AIChE, APS, ACS, MRS, SFB, BMES, AIMBE, CRS, AAPS, and ASEE. He has supervised the research of 95 PhDs and about 180 postdocs and graduate students. Peppas holds a Dipl. Eng. from the National Technical University of Athens (1971), a Sc.D. from MIT (1973), and honorary doctorates from the Universities of Ghent, Parma, Athens and Ljubljana.

Carolyn Conner Seepersad is an Associate Professor of Mechanical Engineering and General Dynamics Faculty Fellow at the University of Texas at Austin. She received a PhD in Mechanical Engineering from Georgia Tech in 2004, an MA/BA in Philosophy, Politics and Economics from Oxford University in 1998, and a BS in Mechanical Engineering from West Virginia University in 1996. She is a former Rhodes Scholar, Hertz Fellow, and NSF Graduate Fellow. Dr. Seepersad's research involves the development of methods and computational tools for engineering design and additive manufacturing. Her research interests include simulation-based design of complex systems and materials, design for additive manufacturing, innovation, and environmentally conscious design of products and energy systems. In 2009, Dr. Seepersad was the inaugural recipient of the International Outstanding Young Researcher Award in Freeform and Additive Manufacturing from the additive manufacturing community. In 2010, she received the University of Texas Regents' Award for Outstanding Teaching by an Assistant Professor, the highest teaching award for faculty in The University of Texas System. In 2013, she received ASEE's

Outstanding New Mechanical Engineering Educator award. Dr. Seepersad is the recipient of a Best Paper Award for the 2009 ASME Design Theory and Methodology Conference and two best paper awards for the 2010 ASEE Annual Conference and Exposition. She is also the author of more than 80 peer-reviewed conference and journal publications and one book. She co-organizes the annual Solid Freeform Fabrication Symposium. She has also been a participant (2010) and session organizer (2011) for the annual NAE Frontiers of Engineering Symposium, a symposium organized by the NAE for a select group of emerging engineering leaders ages 30-45, and an invited speaker for the 2013 German-American FOE. She teaches courses on product design, additive manufacturing, and design of complex engineered systems.

Thomas M. Truskett, Professor & Dept. Chair, McKetta Dept. of Chemical Engineering, The University of Texas at Austin. Dr. Truskett's research focuses on understanding how interfacial and interparticle interactions at the nano- or mesoscale can be rationally designed using, e.g., inverse methods of statistical mechanics, to guide the synthesis of novel materials with targeted structural, thermodynamic, and transport properties. Recent applications include concentrated, low-viscosity nanocluster dispersions of active therapeutic proteins for administration via subcutaneous injection, biodegradable gold nanoclusters as contrast agents for biomedical imaging, and low-coordinated superlattices assembled from solutions of ligand-passivated nanocrystals

Michael Baldea is an Assistant Professor in the Department of Chemical Engineering at the University of Texas, Austin. Prior to joining the University of Texas, he held industrial research positions with Praxair Technology Center in Tonawanda, NY and GE Global Research in Niskayuna, NY. He has received several research and service awards, including the Model-Based Innovation Prize from Process Systems Enterprise and the Best Referee Award from the Journal of Process Control and has co-authored over 60 papers and presentations. The objective of Baldea's research is to develop theory, models and algorithms for the solution of important and fundamental problems in the area of Energy Systems Engineering. In particular, he is interested in the development of modeling approaches for robust and efficient simulation and optimization of energy generation and storage units; the development of proactive energy management strategies for building systems; and developing efficient model-based fault detection and isolation schemes. Baldea received his doctorate in chemical engineering from the University of Minnesota.

Portugal

Paula Vilarinho, Universidade de Aveiro
Pedro Granja, Universidade de Porto, INEB Porto
Albano Cavaleiro, Universidade de Coimbra
Rogério Gaspar, Universidade de Lisboa
Rui Reis, Universidade de Minho
Antonio Almeida, Universidade de Lisboa
Mario Barbosa, Universidade de Porto
Elvira Fortunato, Universidade Nova de Lisboa

LOOKING AHEAD

As we look forward to building the capacity and activity of the UT Austin | Portugal Emerging Technology program in 2014 and beyond, we are excited about the historical linkages and recent activity focused on building a developed research and commercialization ecosystem focused on Emerging Technology between UT Austin and Portugal. We look forward to continuing to expand the research capacity and capabilities of Portuguese faculty, students and institutions through our established and emerging collaborations with many hopes for a bright future ahead.