Abstract
Visualization, Information Visualization and Visual Analytics share the same pipeline, basically taking data and producing images on displays. There are some minor differences but all in all they’re quite similar.

All three have very similar Grand Challenges (scalability, developing a theory, computing the best presentation, …). I’ve spoken on such and other grand challenges in each of these areas over the last 20 years, identifying what wicked problems really need to be addressed, what big problems would have tremendous impact, and, of course, I am ready to do so again. But progress on these has been quite slow and technology is moving so much more rapidly than anticipated.

In this talk I will identify likely future technologies, technologies that are right around the corner, technologies that will be in need of visualization, for which no good visualizations are currently available. This is an opportunity for visualization, not a grand challenge for visualization. I will compare these with the past grand challenges but the difference will be clear: grand challenges would have tremendous impact on our visualization field, but in the future, at least two decades from now given our pace; opportunistic visualizations will have tremendous impact within the next decade and great payoff defining new visualizations, new interactions, and new paradigms.

Bio-sketch
Georges Grinstein is Professor of Computer Science at the University of Massachusetts Lowell, head of its Bioinformatics Program and Director of its Institute for Visualization and Perception Research. He received his Ph.D. in Mathematics from the University of Rochester in 1978.

His work is broad and interdisciplinary, covering the perceptual and cognitive foundations of visualization, very high-dimensional data visualization, visual analytics and applications. The emphasis is on the modelling, visualization, and analysis of complex information data and systems.
He has over 35 years in academia with extensive consulting, over 250 research grants, products in use nationally and internationally, several patents, numerous publications in journals and conferences, a book on interactive data visualization, founded several companies, been the organizer or chair of national and international conferences and workshops in Computer Graphics, in Visualization, and in Data Mining. He has given numerous keynotes and mentored over 25 doctoral students and hundreds of graduate students. He has been on the editorial boards of several journals in Computer Graphics and Data Mining, a member of ANSI and ISO, a NATO Expert, and a technology consultant for various public agencies and commercial organizations.

For the last eight years he has co-chaired the IEEE VAST contests in visual analytics leading to new research areas. He has developed and taught a new course called Radical Design focused on how to develop radical new products instead of evolutionary ones. He is a member of the Department of Homeland Security’s Center of Excellence CCICADA (Command, Control and Interoperability Center for Advanced Data Analysis), and directs the development of Weave, an open source web-based interactive collaborative visual analytics system incorporating numerous innovations (see iWeave.org).
Abstract
The medieval art of memory was a collection of mnemonic principles and techniques used to organize impressions, improve recall, and assist in the combination and invention of ideas. An essential element of a monk’s education, it was taught for its rhetorical strength. Religious who mastered this art could freely compose lectures, sermons, stories, or poems. Such acts of invention required drawing upon an inventory of knowledge that had been thoroughly consumed, decomposed into manageable chunks, and correlated utilizing the memory principles they had mastered.

Medieval memory methods relied heavily on the image creation – both mental and physical. This presentation will explore many of these physical visualizations, drawing upon imagery found in medieval manuscripts. The talk will review the history of memory practice, explore medieval information and knowledge visualization, and demonstrate the relation of these visualizations to this art.

Bio-sketch
Francis T. Marchese is Professor of Computer Science at Pace University where he teaches courses in computer science and software engineering. His research interests span scientific and information visualization; novel user interfaces for visualization; distributed and collaborative visualization; integration of visualization into lifecycles for scientific research and software engineering; and the development of visualization systems at the intersection of art, science, and technology.

He is founder and Director of Pace’s Center for Advanced Media (CAM) and the Pace Digital Gallery. He has published widely in science, technology, history, and art, including a recent co-edited volume with Ebad Banissi entitled Knowledge Visualization Currents: From Text to Art to Culture, (Springer-Verlag (London, 2013) that explores the current state of knowledge visualization research.

Frank has been a visiting scholar at New York University’s Institute of Fine Arts where he has extended his scholarship into museum curatorial studies, installation of art in alternative spaces,
and the relationship between text and image in medieval art. He has curated seven digital art exhibitions, is an associate editor of ACM JOCCH (*Journal of Computers and Cultural Heritage*), and is currently exploring the artistic origins of information visualization as well as the long term conservation of time-based digital art.
Abstract:
BigData, according to Wikipedia, is “the term for a collection of data set so large and complex that it becomes difficult to process using on-hand database management tools or traditional data processing applications”. Given the scale and complexity of today’s data, visual analytics is rapidly becoming a necessity rather than an option for comprehensive exploratory analysis. According to Gartner 3Vs model, BigData has three characteristics: 1) volume, 2) velocity and 3) variety.

Although many significant works have been done in information visualization that could deal with the visual analytics of large-scale (or extreme-scale or ultra-scale) data that addressed the ‘volume’ issue in 3Vs model, not many previous works done that focused on providing visual solutions that address the ‘velocity’ issue in BigData visual analytics.

The key challenge for BigData analysis is its speed (velocity). Rapid generation of big data can lead to significant business insight and prediction, but only when real-time data can be quickly analyzed in a few minutes (or few hours) rather than weeks or months. Accordingly, the reduce of the processing time in both the data collection and visual display becomes extremely important.

Stream data visualization could be the one of a few existing visual solutions that could address the ‘velocity’ issue. However, stream data processing does not visit every data item in the data stream. Therefore, it is hard to generate visual patterns (e.g. the density patterns) for analysis.

In this talk, we propose an alternative approach called 5Ws model. By using this model, we can minimize the access (or visit) time by collecting some basic information from the head (the 1st package) of the ‘life (or moving)’ data. We only visit each data item once. We don’t need to access the content of the data. Therefore, we can collect and visualize these data in real-time.

The collected information include What type of the data is, Why the data occurred, Where the data came from, When the data occurred, Who received the data and How the data was transferred. From these behaviours of the data, we may create some density patterns for visual analytics. The model is tested by using the network security ISCX2012 dataset. The experiment
shows that this new model worked efficiently with appropriate visualization methods, that well addresses the ‘velocity’ issue for BigData visual analytics.

Bio-sketch
Dr Mao Lin Huang is an Associate Professor and Director of Information Visualization Lab, in the University of Technology, Sydney, Australia. His research interests include graph drawing, multi-dimensional data visualisation, visual analytics and visual data mining. He has published more than 160 research publications, including high quality journal articles, book chapters and conference papers. These publications have received more than 900 citations according to Google Scholar. Dr Huang has supervised (and is supervising) 2 Post-Doctors and 12 PhD students, working on the above areas. Dr Huang has chaired various international conferences/symposiums, and has been involved in the program committees of many international conferences. He is an editor of various conference proceedings. He has also been a reviewer for several well-known IEEE Transactions and other journals, including the IEEE Trans. on Computer Graphics and Visualization, IEEE Trans. on Knowledge & Data Engineering, the IEEE Trans. on Systems, Mans and Cybertics, and Journal of Information Visualization (IVS).
An Artisanal Approach to Interactive Heritage Visualization

Alan Potkin
Northern Illinois University
Center for Southeast Asian Studies

Artisanal indicates comparatively low-tech, low-cost, steep-learning-curve* tools, applications and deliverables for digital visualization in cultural and environmental conservation: typically when there is limited funding — or none — for specialized personnel and equipment; and where the primary content provider is also the media producer, the graphics designer and the software developer.

We’ll present exemplary content from our recent projects/in-progress eBooks, including:

• Post facto evaluation of the reluctantly-adopted aesthetic release regime for the long-delayed Upper Kotmale Hydroelectric Project, which in its original version would have “necessarily-sacrificed” several impressive waterfalls in the tea country near Talewakelle, Sri Lanka;

• Visualizing the iconography and historiography of highly-revered Lao Buddha sculptures in four important Thai Buddhist temples: mapping their “confiscation” during the periodic sackings of Vientiane by the Siamese, their movements overland and by water, and also providing an urbanization time series of Wat Pathumwanaram and environs in Bangkok;

• Layered interactive displays of site evaluations and proposed plans for rehabilitating Giants Tank: taken from the extensive VoC archives of water engineering in Dutch-period (1658-1796) Ceylon;

• Re-establishing the Phralak-Phralam (the “Lao Ramayana”) as the traditional touchstone of Lao literary, visual and performance culture, and digitally replicating the demolished murals inside a new Image Hall;

• Virtualizing the Pak Mun Dam Museum in Ubon Ratchathani, Thailand: an archival elegy to the distinctive material, cultural, geographic, and ecological aspects of the way of life which prevailed throughout the impacted Mun River basin prior to the dam’s construction, and a compelling prototype for creating similar museums addressing massively-transformative water resources projects elsewhere.
• “People often speak of a ‘steep learning curve’ when they mean the opposite. A steep learning curve is one in which skill improves quickly, meaning something is easy to learn.”

Bio-sketch
Alan Potkin holds a doctorate in environmental planning from the University of California, Berkeley, following previous post-graduate training in limnology and estuarine ecology. As he has always been interested in media applications towards improved natural resources management, in 1995 he founded —and has since led— the Digital Conservation Facility, Laos (DCFL); affiliated since 2003 with the Center for Southeast Asian Studies (CSEAS) at Northern Illinois University, US, where he’s an Adjunct Research Fellow. Having lived and worked for decades in South and Southeast Asia, he’s been continuously developing “artisanal”, i.e., low-tech/constrained budget, interactive visualization and virtual reality (VR) tools for ecological and cultural conservation. Foreseen USge includes impact assessment, heritage preservation, and museological and site interpretive materials; and also accessible institutional memory for public participation, government agencies, multilateral development banks, corporations, and NGOs. Ongoing DCFL initiatives have included replication at Vat Oub Mong (Vientiane, Lao PDR) of the demolished Phralak-Phralam (“PLPL”, the Lao Ramayana) murals with the recent digitization and re-illustration of the original 2,100-page bailane (palm leaf MSS) PLPL text; archiving of the restored Sri Thanonchái paintings at Wat Pathumwanaram (Bangkok) and of the physical and historical geography of the temple venue; the post-facto evaluation of the Nam Theun 2 hydroelectric project’s effects on the Nam Phitbasin (Khammouane, Lao PDR); an interactive urbanization mapping of wetlands and waterfront development in Vientiane and in Phnom Penh, Cambodia, and producing extensive new oral histories and an online annotated catalog of the collections and décor of the Pak Mun Dam Museum (Ubon Ratchathani, Thailand), and soon of the 1817 BalasankahyaJataka murals at the Vat Sisaket Museum in Vientiane. In 1991-92, he was the senior environmental consultant for the UpperKotmale Hydropower Project (Talewakelle, Sri Lanka), which outputs now comprise the baseline image package for DFCL’s upcoming eBook on the reluctantly-accepted aesthetic release regime for the three culturally-significant, Project-impacted waterfalls: originally consigned to being “necessarily sacrificed”, but now at least minimally protected.
How the History of Automotive Industry could Inspire Information Visualization

Benoît Otjacques, deputy scientific director of the department of the Public Research Centre, Gabriel Lippmann, Luxembourg

This talk aims to inspire the audience by adopting an unusual perspective to think about the information visualization domain. More concretely, it will draw relationships between the automotive industry and infovis.

• Both domains have myths based on memorable items that became instantly famous or underestimated ideas that have surprisingly proven to be very robust ones.

• The automotive industry was founded by a few people who had a passion for fast running and technology and infovis also has founding fathers, like Bertin or Shneiderman who loved graphics and interaction.

• The automotive industry has evolved to integrate new concepts or new technologies, like disk brakes or turbocharged diesel engines and infovis has faced revolutions like Apps and tablets.

From several points of view, infovis could be inspired by what automotive industry has already achieved.

• In terms of integration of components designed and produced by a myriad of suppliers, infovis still stays far behind the automotive industry. This refers to formal specifications, API documentation.

• In the 60’s in the US, Ralph Nader became famous with his book “Unsafe at any speed” that raised the public awareness about the poor safety of automobiles of that time... Graphics and infovis techniques can also be dangerous. Where is the neutral NCAP organization that give ratings to the visualization propositions?
• Modern cars place connectivity and user experience at the heart of their design. Although infovis share common roots with HCI, we sometimes forget that the proposed techniques should at least be useful, hopefully efficient and also increasingly engaging, sexy and funny.

• The automotive industry has seen revival of very old ideas, like the electric car who was already there in the beginning of the 20th century. Shouldn’t we also review the infovis history to assess whether the reasons that prevents some of the very ancient proposals to be successful some decades ago are still valid today?

Bio-sketch
Since 2002, Dr Benoît Otjacques is deputy scientific director of the “Informatics, Systems and Collaboration” department of the Public Research Centre - Gabriel Lippmann, located in Luxembourg. He has been active in applied research for almost twenty years. For more than 10 years, he has focused his research on human-computer interaction and information visualization. More recently, he also added Visual Analytics to the scope of his interests.

Dr Otjacques has authored or co-authored more than 60 papers in journals and international conferences. He was also the initiator of the team who designed and implemented the Calluna visualization tool. He has been involved in dozens of various projects: scientific projects based on competitive funding as well as applied projects with private companies and public administration.

Dr Otjacques holds an engineering degree from the University of Louvain, Belgium; a PhD in computer science, specialized in information visualization from the University of Namur, Belgium and three Masters in relationship with information technologies, innovation and management from Universities of Nancy (France), Mons (Belgium) and Namur (Belgium). As the keynote may suggest it, he also has a passion for classic cars.