In the three short years since the inauguration of the Info-Metrics Institute, we have expanded our activities and research beyond our expectations. We have organized and sponsored seven conferences and workshops, each one exploring a specific topic within info-metrics, including basic information-theoretic estimation; information processing and inference in the natural sciences; information and information processing in networks; basic philosophical meaning of information and information processes; and big data. We ran seven summer tutorials (hands-on classes), which we expanded in the last year with a more cross-disciplinary emphasis. These initiatives have helped establish a common language to link disciplines in solving similar info-metric problems.

In the next year, we plan to expand our activities in three different ways: First, we will make a special effort to reach young researchers and researchers from the natural, medical and engineering sciences. Second, we will initiate activities outside the Washington, D.C. area, such as the forthcoming November conference in Riverside. Third, we will work on improving the interdisciplinary nature of the tutorials by utilizing multiple instructors for each workshop (as we did with the information and data mining class provided last summer).

With these milestones achieved, and with the establishment of the necessary infrastructure, we are also ready to move to the next phase of pushing the research frontiers of info-metrics and of building our role as a leading interdisciplinary institute. In the next year, we will engage in open discussion among our affiliates, and others, about our overall goal and long term direction. Please bookmark our website and check in frequently to find information about our activities. We are always open to new ideas and new initiatives.

As always, we thank the Office of the Comptroller of the Currency for its continued financial support. With this assistance, we are carrying the most important objectives of the Institute: helping to shape info-metrics research and future generations of researchers.

- Amos Golan, Director, Info-Metrics Institute

In Memoriam: Halbert White (1950 – 2012)

Halbert (Hal) White, an active member of the Info-Metrics Institute and a member of its Advisory Board, passed away on March 31, 2012, following a four-year battle with cancer.

Hal was a true scholar, one of the world’s leading econometricians, and a kind and humble person. His numerous contributions in econometrics include original and path-breaking work in, among other topics, neural networks, entropy and information, asymptotic theory, semi-parametric methods, causality, and robustness and mis-specification issues.

His 1980 *Econometrica* paper, suggesting a method for computing robust standard errors and a related test statistic, made him a household name among the economics profession. Now commonly referred to as “White standard errors”, this brilliant contribution is just one example of how he changed the direction of empirical work. He will be greatly missed.

Esfandiar (Essie) Maasoumi, Hal’s good friend and colleague, penned a touching tribute in his memory. Read the article on our website at [http://www.american.edu/cas/economics/info-metrics/white-obit-maasoumi.cfm](http://www.american.edu/cas/economics/info-metrics/white-obit-maasoumi.cfm).

Graduate Students In Their Own Words

“My research topic was about the Social Accounting Matrix, which is an instrument to model the ‘circular flow’ of a market economy. The estimation of the matrix is a classic example of an ill-posed estimation problem: the number of estimated values exceeds the number of available data points. The principle of maximum entropy provides a solid criteria for the estimation for such an ill-posed problem. Furthermore, in comparison to other methods available, this application is flexible and efficient. That is, various forms of information and an incomplete set of available data may be incorporated into the estimation, while alternative methods are unable to. It is easier said than done. The implementation involves an intensive data collection process, detailed knowledge about SAM designs, and the use of non-linear optimization. The resources and funding from the Info-metrics Institute have been very helpful, and particularly the support from the senior researchers have been the most valuable for me to tackle those challenges.”

- Kentaro Murayama, Summer 2012 Fellow

“During this past summer, I studied the information-theoretic approach to estimating interval-valued data. The aim of the research is to propose an interval estimation method in which realistic distributions within the interval-valued data are preserved. In the future, I would like to use my newly acquired knowledge from this research in order to apply these principles to high-frequency financial data and data from developing countries.

The Info-Metrics Institute’s Summer Graduate Fellowship provided me a chance to not only expose myself to the information and entropy literature, but also to sharpen my research skills under the guidance of Prof. Amos Golan. I am extremely grateful to the Info-Metrics Institute for giving me this great opportunity.”

- Tual Tuang, Summer 2012 Fellow

How Info-Metrics Helps the OCC

The Office of the Comptroller of the Currency (OCC) has supported the Info-Metrics Institute since its creation. The Institute promotes research and scholarly interaction in areas of modeling and analysis that directly apply to the bank supervision work of the OCC. With insights gained in part through our association with the Institute, OCC staff is better able to evaluate the methods used by banks, to suggest new approaches, and to encourage better practices.

In addition to oversight of bank modeling and analysis, the OCC has ongoing analytical needs of its own. The OCC has significantly expanded its collection of highly granular, standardized data from banks. Effective use of such data could fundamentally change the practice of bank supervision, but that in turn requires development of appropriate methods of analysis and presentation. OCC staff members have incorporated approaches based in information theory into their own research, in part by drawing on the insights of scholars associated with the Institute.

Finally, the Institute is in a position to foster broader methodological improvements that could make a material difference in the operation of banks and other financial firms. Improvements in financial modeling play an important role in making the global financial system safer and less susceptible to failure. The OCC has been pleased to support the development and growth of the Institute, in view of its potential for broad and substantial benefits to banks, the financial system, and the public.

- Mark Levonian, Senior Deputy Comptroller, Office of the Comptroller of the Currency
What a year! In the 2011-2012 Academic Year, the Info-metrics Institute generated a remarkable amount and range of activity. By any measure, we had an extraordinarily successful year. From staging conferences, to hosting scholars for seminars and research collaborations, and to delivering advanced material to graduate students and professionals, the Institute confirmed its niche as the go-to place for advancing and disseminating insights on info-metrics. One of the most satisfying aspects of the Institute’s mission has been to demonstrate that info-metrics is a multidisciplinary enterprise. The Institute provides a rare venue for genuine and fruitful interactions across disciplines.

The extent of participation in our activities reached new highs. Scholars came from far and wide, from outstanding universities and government agencies to learn more about developments in info-metrics and how they apply across several disciplines. We attracted 67 participants to our October 2011 Philosophy of Information workshop, followed by 83 to our November 2011 Shrinkage Estimation workshop, and then topped by 146 participants at our March 2012 Information and Econometrics of Networks workshop. In addition, we made significant progress in developing our website and in involving PhD students. For a small Institute, this record is extraordinary. For the coming year, we plan to accomplish more in disseminating interesting findings from our workshops, conferences, and research activities.

We are proud of our efforts so far to establish a home for scholars and others eager to innovate and learn about info-metrics. At the same time, we look forward to a future that extends the field and communicates the valuable and continuing contributions of info-metrics.

- Robert Lerman, Chair

Notes from the Advisory Board

The past year has been fruitful for the Info-Metrics Institute. We organized two workshops on the philosophy of information (one at the Institute and one as a special session at the centennial Turing conference in Cambridge). There were also interesting developments on the theoretical front.

The Fall 2011 workshop, Philosophy of Information, brought together many researchers representing a broad range of disciplines, varying, amongst others, from philosophy to physics and statistics, to computer science, complexity and the social sciences.

The philosophy of information, a natural component of info-metrics, is also rapidly gaining momentum, but as a young discipline it goes through a process of defining its central subject matter and core research questions. Three issues, in my view, are important in this respect:

1) The notion of information should be studied in the context of its various rigorous mathematical formulations. Any attempt to treat information as a general philosophical notion, without any formal exactness, immediately collapses into the traditional conundrums of epistemology and metaphysics;

2) The notion of information has deep historical roots that go back to the pre-Socratics; and

3) Theoretical complexity theory, as it emerged in the second half of the twentieth century, sheds new light on important philosophical problems, notably induction.

The Info-Metrics Institute is an ideal environment to discuss and develop these ideas and the philosophical connections between information, information processing and complexity. We look forward to continuing those discussions and furthering related research in the coming years.

- Pieter Adriaans, Member

Even though the interdisciplinary approach is one of the appealing features of the Institute, I am glad, as a financial econometrician, to report how much the Institute research agenda is topical in my field. While Mark Levonian, Senior Deputy of the Office of the Comptroller of the Currency (OCC) was emphasizing the importance of control of “model risk” (see fall 2011 Newsletter of Info-Metrics institute), this concern underlies many recent developments of modern econometrics that are at the core of our research agenda. Under the general terminology of “ill-posed inverse problems”, econometricians include various needs of inference regarding infinite dimensional objects with limited information. This implies dangerous discontinuities in calibration procedures that make the model risk even more detrimental. An information-based approach is typically well-suited as compellingly exemplified in recent conferences of the Institute about shrinkage and nonparametric approaches. Applications to financial econometrics include portfolio choice with a large number of assets, derivative pricing with time-varying parameters, etc. The Advisory Board would gladly consider and support even more initiatives and interactions with practitioners of quantitative finance on these topics.

- Eric Renault, Member
Our Work – Advancing Interdisciplinary Info-Metrics Research

Following is a list of representative research and recent publications by some of the Institute’s affiliates. More detailed information can be found in the 2011-12 Info-Metrics Annual Report, which will be available on our website in November 2012.

Pieter Adriaans (University of Amsterdam)

Current Research
- Exploring the complexity of scientific data sets related to the COMMIT project, a large Dutch cooperative effort in computer science
- Investigating various classes of complexity measures and developing software to analyze RDF databases
- Developing a sound theoretical model of the concept of facticity

Other Updates
- Contributed a section on the philosophy of information for the Stanford Encyclopedia of Philosophy (SEP).

Rossella Bernardini Papalia (University of Bologna)

Current Research
- Entropy-based methods in ecological inference with spatial dependence
- Small area estimation problems
- Spatial econometric models for panel data

Recent Publications
- An information theoretic approach to ecological inference in presence of spatial dependence, Springer.
- Non-linearities in economic growth and club convergence, Empirical Economics (with S. Bertarelli).

Mehmet Caner (NC State University)

Current Research
- Adaptive lasso with heteroskedastic data
- Instrumental variable selection

Recent Publications

Marine Carrasco (University of Montreal)

Current Research
- Generalization of empirical likelihood estimation to handle a continuum or a countable infinite number of moment conditions
- Regularization techniques of the covariance matrix and its application to portfolio selection in finance

Luciano Floridi (University of Hertfordshire)

Current Research
- Understanding information quality standards and their challenges
- Ethics between online security and civil rights

Recent Publications
- The Philosophy of Information (volume one of the quadrilogy Principia Philosophiae Informationis), Oxford University Press.
- Turing’s three philosophical lessons and the philosophy of information, Royal Society's Philosophical Transactions A.
- Semantic information and the network theory of account, Synthese.

Duncan Foley (New School for Social Research and Santa Fe Institute)

Current Research
- Ensemble complexity and its applications

Other Updates
- Teaching Graduate Econometrics at New School for Social Research in Spring 2013

A. Bowen Garrett (McKinsey & Co. and Urban Institute)

Current Research
- Economic and applied econometric modeling of health care and policy
- Using info-metric methods in micro-simulation modeling of health reforms

Ramo Gencay (Simon Fraser University)

Current Research
- Testing serial correlations with wavelets
- Testing jumps with wavelets

We welcome Luciano Floridi, from the University of Oxford and University of Hertfordshire, to the Institute Advisory Board.

Luciano Floridi at the October 2011 Philosophy of Information workshop roundtable

continues on page 5
Testing structural change with wavelets
Counterparty risk and financial networks

Recent Publications
- Hierarchical information and the rate of information diffusion, *Journal of Economic Dynamics and Control* (with Y. Xue)

**Amos Golan (American University)**

Current Research
- The foundations of info-metrics
- Value of information
- Information dynamics
- The basics of modeling

Recent Publications
- Information Dynamics, Minds and Machines
- An Entropic Estimator for Linear Inverse Problems, *Entropy* (with H. Gzyl)
- On the Foundations and Philosophy of Info-Metrics, *LNCS*

**Alastair Hall (University of Manchester)**

Current Research
- Info-metric approaches to inference about the parameters of economic and statistical models based on the information in moment conditions
- Applications of info-metric methods to economic models examining issues related to monetary policy, health expenditures by the UK government, and the returns to education

**Atsushi Inoue (NC State University)**

Current Research
- Time series econometrics, including identification and misspecification of macroeconomic models, forecasting, and factor models

**George Judge (University of California – Berkeley)**

Forthcoming/Recent Publications
- Not all empirical divergence are created equal, forthcoming in *Proceedings of the American Institute of Physics* (with M. Grendar).
- A minimum means squared error semi parametric convex combining estimator, forthcoming in *Advances in Econometrics* (with R. Mittelhammer).
- A risk superior semi parametric estimator for over identified models, forthcoming in *Advances in Econometrics* (with R. Mittelhammer).

**Nick Kiefer (Cornell University)**

Current Research
- Bayesian foundations for nonparametric methods

**Robin Lumsdaine (American University)**

Current Research
- Exploring the relationship between financial market perceptions and reality, and the role of news and information in shaping those perceptions
- Testing conventional wisdoms in the inflation-linked bond market
- How survey design affects participant responses and subsequent inference
- The impact of the changing demographic landscape on the global financial markets

**Essie Maasoumi (Emory University)**

Forthcoming Publications
- Forthcoming paper with Levent Bulut in a significant Springer volume in honor of the late Halbert White, Jr. (Demonstrates the application of metric entropy measures for evaluation of exchange rate models and theories and similar debates about model selection and prediction.)

**Ilya Nemenman (Emory University)**

Forthcoming/Recent Publications
- Not all empirical divergence are created equal, forthcoming in *Proceedings of the American Institute of Physics* (with M. Grendar).
- A minimum means squared error semi parametric convex combining estimator, forthcoming in *Advances in Econometrics* (with R. Mittelhammer).
- A risk superior semi parametric estimator for over identified models, forthcoming in *Advances in Econometrics* (with R. Mittelhammer).

**Jeffrey Racine (McMaster University)**

Current Research
- Bandwidth selection for mixed data conditional and unconditional CDF and quantile functions

*continues on page 6*
Nonparametric kernel estimation of mixed data copula functions
Nonparametric instrumental variable estimation of functions and their derivatives

Forthcoming/Recent Publications
- Additive regression splines with irrelevant categorical and continuous regressors, forthcoming in *Statistica Sinica* (with S. Ma).
- A smooth nonparametric conditional density test for categorical responses, forthcoming in *Econometric Theory* (with C. Li).
- Smooth constrained frontier analysis: A festschrift in honour of Halbert L. White, Jr., forthcoming in *Springer Verlag*, X. Chen and N.E. Swanson Eds. (with C. Parmeter).
- Categorical semi parametric varying coefficient models, forthcoming in the *Journal of Applied Econometrics* (with Q. Li and D. Ouyang).

**Eric Renault (Brown University)**

**Current Research**
- Volatility modeling with transaction data
- Stochastic volatility models for option pricing
- Inference with implied probabilities
- Multivariate volatility models
- Non-parametric inference in inverse problems

**Recent Publications**
- Efficient minimum distance estimation with multiple rates of convergence,
  *Journal of Econometrics* (with B. Antoine).

*Congratulations to Eric in his move to Brown as the C.V. Starr Professor of Economics.*

**Other Updates**
- Co-editor of *Econometric Theory*
- Associate Editor of *Econometrica*
- President Elect of the *Society for Financial Econometrics*

**Richard Smith (University of Cambridge)**

**Current Research**
- General theory of estimation and inferential methods for econometric models specified through moment conditions
- Development of reliable inferential methods in the moment condition context based on the bootstrap and neglected heterogeneity in moment condition models

**Forthcoming/Recent Publications**
- GEL criteria for moment condition models, *Econometric Theory*.

**David Wolpert (NASA Ames Research Center and Santa Fe Institute)**

**Forthcoming Publications**
- Co-author of a book to be published by Springer of classic papers on information theory and game theory.

**Other Updates**
- Held “Combining Information Theory and Game Theory,” a 2012 workshop co-sponsored by the Santa Fe Institute and the New Mexico Consortium.

**Ximing Wu (Texas A&M University)**

**Current Research**
- Nonparametric and information-theoretic methods in econometrics
- Data-driven information-theoretic methods of distributional and specification hypotheses
- Nonparametric estimation of multivariate density and copula density functions
- Semi parametric estimation of shape-constrained functions

**Recent Publications**

**Victor Yakovenko (University of Maryland)**

**Forthcoming/Recent Publications**
- International studies in money and banking, *Proceedings of the Workshop “Money - Interdisciplinary Perspectives”*, Department of Sociology, Free University of Berlin.

Check out our website for updates on the Institute’s work and upcoming events. Bookmark our site and visit often!

www.american.edu/info-metrics
Affiliate Profiles

Ariel Caticha

Ariel Caticha is professor at the Department of Physics, University at Albany – SUNY. In recent years his research has focused on the connection between physics and information.

One research goal has been to develop a general framework of entropic inference that allows one to tackle in a unified manner the central issues – the nature of information, how it ought to be processed, and the relation between Bayesian and entropic methods.

The other goal has been to explore to which extent the laws of physics might reflect the rules for processing information – the ambitious objective is to derive the laws of physics from information theory. This approach has already yielded multiple insights into statistical, quantum and classical mechanics.

Caticha devotes a considerable effort preparing lectures and tutorials on the subject of entropic inference and information physics. He has received the SUNY Chancellor’s Award for Excellence in Teaching and the UAlbany Excellence in Teaching and Advising Award.

Michael Stutzer

Michael Stutzer is professor of finance at the University of Colorado in Boulder. He is an editorial board member for the Journal of Futures Market, and served as executive director of the Burridge Center for Securities Analysis and Valuation.

His theoretical work has focused on the application of mathematical information theory, and its frequent interpretation from the statistical theory of large deviations to well-known problems in parameter estimation, derivative security pricing, and portfolio choice.

His work is also well known among practitioners; he has won two awards from the CFA Institute for work published in the Financial Analysts Journal. He is listed among the most frequently read contributors to the Institutional Investor group of journals.

His current research projects include a large deviations approach to optimal futures hedging, and a project exploring entropic methods for interbank financial fragility analysis.

Aman Ullah

Aman Ullah is Distinguished Professor of Economics and Chair at the University of California, Riverside. He is an associate editor of, among others, Econometric Reviews, Empirical Economics, American Journal of Mathematical and Management Sciences, and Macroeconomics and Finance in Emerging Market Economies. He has been Fellow of Journal of Econometrics, American Association for Advancement of Sciences (AAAS), National Academy of Sciences (India), and Royal Society of Statistics.

Aman advances the objectives of the Institute by sharing his extensive knowledge in the disciplines of economics, econometrics, statistics, and information theory.

Aman’s wide-ranging areas of research include nonparametric and semi-parametric methods, finite sample econometrics, panel data econometrics, financial econometrics, and econometrics of happiness Recently he has co-edited Handbook of Empirical Economics and Finance, Taylor and Francis (2011).
Recent Institute Events

Workshops and Conferences

Philosophy of Information
October 3, 2011, American University
Program committee: Pieter Adriaans (U. Amsterdam), Duncan Foley (New School for Social Research and Santa Fe Inst.), Amos Golan (American U.), Esfandiar Maasoumi (Emory)

Information Theory and Shrinkage Estimation
November 12, 2011, American University
Program committee: Mehmet Caner (NC State U), Amos Golan (American U), George Judge (UC Berkeley), Robin Lumsdaine (American U), Peter Phillips (Yale), Eric Renault (Brown)

Information and Econometrics of Networks
March 30-31, 2012, American University
Program committee: Anil Bera (U Illinois, Urbana-Champaign), Amos Golan (American U), Robin Lumsdaine (American U), Esfandiar Maasoumi (Emory), Michael J. Stutzer (U. Colorado-Boulder)

Summer Tutorials

Microeconometrics with focus on Panel Data and Discrete Choice: Theory and Practice
William Greene* (NYU)

Data Mining and Information: Theory and Practice

A Special Two Day Tutorial on Info-Metrics
Amos Golan* (American U)

* Info-Metrics affiliate

Support the Institute!

The Info-Metrics Institute is happy to receive donations toward its different activities. Contributions to the Info-Metrics Institute are tax deductible, subject to federal and state guidelines.

With these resources, we hope to establish more long-term fellowships for students and junior and senior researchers. We also hope to be able to expand our classes and knowledge dissemination activities.

For more information on how to donate, please contact Aisha Khan at info-metrics@american.edu or 202-885-3770.