

ICS Business Meeting

Simge Küçükyavuz

INFORMS 2020



Meeting agenda

- Announcements
- Harvey Greenberg Research Award
- ICS Prize
- ICS Student Paper Prize
- fORged-by-Machines Contest
- Officer nominations
- Treasurer's report
- INFORMS 2020 cluster report
- IJOC report
- Conclusion

Announcements

ICS 2021 is now ICS 2022

Thanks for completing our survey! You asked, we listened.

January XX, 2022

Tampa, Florida

Local organizers: Changhyun Kwon, Hadi Charkhgard, and Tapas Das
Industrial and Management Systems Engineering, University of South Florida

Please give this conference a high priority. ICS needs your engagement.

The Inaugural Harvey J. Greenberg Research Award

The award honors research excellence in the field of computation and operations research applications, especially those in emerging application fields. Honored research would focus on contributions that exhibit the promise of making a significant impact in the scope of OR/MS/Analytics practice.

With generous support from:

Drs. William and Carol Pierskalla Endowment, Georgia Tech, Texas A&M University, AMPL, Lehigh University, Northwestern University, Southern Methodist University, Syracuse University, University of Arizona, University of Pittsburgh, University of Southern California, University of Wisconsin Madison, Virginia Tech, Clemson University, University of Colorado Denver, University of Washington, Allen and Leanne Holder; Ellie, Chari, and Ari Greenberg

Harvey J. Greenberg Research Award

Winners:

Danial Davarnia and Willem-Jan van Hoeve

for their paper "Outer Approximation for Integer Nonlinear Programs via Decision Diagrams," forthcoming in Mathematical Programming Series A.

COMMITTEE:

Dorit Hochbaum (Chair), Pascal van Hentenryck, and Karla Hoffman



Citation

Decision Diagrams have proven to be a useful tool in providing better bounds for integer linear optimization problems and as a heuristic for such problems. This paper extends the use of Decision Diagrams (DDs) to the case where the constraints can be both nonlinear and nonconvex. It exploits the dynamic programming structure of decision diagrams that describe the problem in terms of both a decision and a state space and also uses the concepts of relaxation, bounding and heuristics similar to those used in branch-and-bound and constraint programming. This paper generates new valid inequalities for the convex hull of the feasible region, exploiting the structure of several classes of nonlinear constraints. The cuts are easy to formulate via linear programming and sub-gradient methods. When considered for the Mixed Integer Nonlinear Programs (MINLP), they generalize the outer-approximation framework used for global optimization of nonconvex discrete problems. The cuts consider the entire DD structure, are relatively fast to generate and have the potential to significantly improve the bounds on difficult MINLP problems. Further development of the general framework proposed in this paper is likely to have high impact in the use of optimization to solve real-world problems when some or all of the constraints of the problem are nonlinear.

ICS Prize

Samuel Burer and Renato D. C. Monteiro

for their pioneering work on low-rank semidefinite programming, as detailed in the papers:

- (1) A Nonlinear Programming Algorithm for Solving Semidefinite Programs via Low-Rank Factorization, Mathematical Programming Series B 95: 329-357 (2003);
- (2) Local Minima and Convergence in Low-Rank Semidefinite Programming, Mathematical Programming Series A 103, 427-444 (2005).

COMMITTEE:

Suvrajeet Sen (Chair), Fatma Kılınç-Karzan, Necdet Serhat Aybat



Citation

This body of work focuses on semidefinite programs (SDPs) that are desired to have low rank optimal solutions and introduces the novel idea of reformulating such SDPs as nonconvex quadratically constrained quadratic programs to reduce the dimension of the problem for computational purposes. Their key idea - at first computational, but later was quickly supported by a rigorous theory - is that despite the nonconvexity of the reformulated problem, it can be solved reliably and with high efficiency using standard optimization techniques. This was a remarkable and unexpected insight at its time, but its significance became apparent more recently through the upsurge of very large-scale matrix optimization problems seeking low-rank optimal solutions to promote the distillation of essential simple structure in high dimensional data in machine learning.

It is quite fair to say that the insights and theoretical developments in this awarded body of work have been not just fundamental but also foundational contributions in reshaping this exceptionally rich and growing research landscape in machine learning, inspiring many new developments in analyzing nonconvex problems that are provably easy to solve. Moreover, as a vital computational tool in solving large scale SDPs, this work has been widely employed in a variety of other applications including network clustering, image analysis, quantum chemistry, robust PCA, and many others.

ICS Student Paper Award

Honorable mentions:

- **Hussein Hazimeh**

Sparse Regression at Scale: Branch-and-Bound rooted in First-Order Optimization

- **Prateek Srivastava**

A Robust Spectral Clustering Algorithm for Sub-Gaussian Mixture Models with Outliers

Runner up:

- **Margarita Castro**

A Combinatorial Cut-and-Lift Procedure with an Application to 0-1 Chance Constraints

COMMITTEE:

Claudia d'Ambrosio (Chair), Georgina Hall and Ruiwei Jiang



ICS Student Paper Award

► Winner:

Tyler Perini

A Criterion Space Method for Biobjective Mixed Integer Programming: the Boxed Line Method

Citation:

The paper presents an exact method for solving bi-objective mixed integer programming problems. It shows a nice balance between theoretical and practical contributions: on one side, a new exact method and its complexity analysis are introduced; on the other side, interesting, extensive computational results are shown. Thus, the paper fits perfectly the spirit of the INFORMS Computing Society Student Paper Award.



fORged-by-Machines Contest - 2020

Suvrajeet Sen

University of Southern California

Kerem Bülbül, EC2 Capacity Optimization

Amazon Web Services

Goals and the Name

- ▶ Emphasize **Computing** to **Integrate Modeling and Optimization**
 - ▶ Descriptive and Diagnostic Analytics
 - ▶ Predictive analytics
 - ▶ Prescriptive analytics
 - ▶ Validation of Results

- ▶ What does “fORged-By-Machines” stand for?
 - ▶ **Coalescing** different aspects of **OR** by using **Computational Machinery**
 - ▶ Statistical Modeling (e.g., Regression, Time Series etc.)
 - ▶ Optimization (e.g., Stochastic Programming, Dynamic Programming etc.)
 - ▶ Simulation

Process for the Contest

- ▶ Phase 1 (Computational Modeling)
 - ▶ Model Building
 - ▶ Report Results
- ▶ Phase 2a: Out-of Sample Validation: Semih Atakan – Amazon (Modeling and Optimization Team);
and Phase 2b: Judging by a Team of Judges: John Carlsson (USC), Anton Kleywegt (Ga. Tech.) and Mauricio Resende (Amazon)
- ▶ Phase 3 (Three Finalists Make Presentations to Judges)
- ▶ Phase 4 (Finalists Ranked by Judges)

Awards Presented by Kerem Bulbul (EC2 Capacity Optimization, AWS)

- ▶ Honorable Mention
 - ▶ Barbara Rodrigues and Malte Billen
Univ. of Edinburgh, Scotland
- ▶ Runner-up
 - ▶ Saranthorn Phusingha and Alexandra Blennerhasset
Univ. of Edinburgh, Scotland
- ▶ Winner
 - ▶ Santiago Nieto-Isaza, Emanuel Herrmann
Technical University of Munich



ICS Officers

Chair: Simge Küçükyavuz (2020-2021); Akshay Gupte (2022-2023)

Vice Chair/Chair-Elect: Akshay Gupte (2020-2021)

Secretary/Treasurer: Mary Fenelon (2018-2021)

Newsletter Editor and Webmaster: Yongjia Song (2017-)

Board of Directors

Kevin Furman (2018-2020)

Illya Hicks (2018-2020)

Willem-Jan van Hoeve (2019-2021)

Juan Pablo Vielma (2019-2021)

Bjarni Kristjansson (2020-2022)

Yongjia Song (2020-2022)

Thanks to Elected Officers whose terms
are ending!

Kevin Furman and Illya Hicks for their service to
the ICS Board!!



Nominations

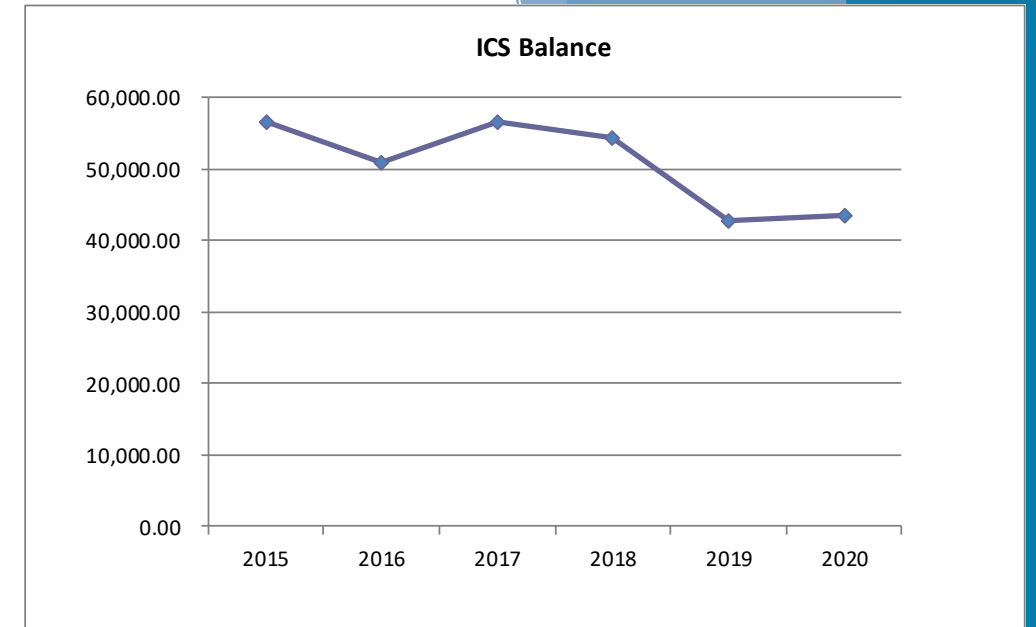
ICS Board of Directors

Two positions for 3-year terms

ICS Newsletter Editor and Webmaster

Treasurer's Report

Membership	Nov. 2020	Dec. 2019
Regular	369	434
Student	281	947
Retired	29	32
Total	679	--



	2015	2016	2017	2018	2019	Sept. 2020
Revenue	5,100.00	4,944.00	4,991.00	6,474.00	5,382.00	2,657.00
Expense	4,400.00	10,470.00	3,443.00	4,086.00	6,979.00	64.00
Meeting Profit	12,603.03	0.00	3,927.00	(4,425.00)	(10,142.00)	(1,758.00)
P/L	13,303.03	(5,526.00)	5,475.00	(2,037.00)	(11,739.00)	835.00
Balance	56,543.07	51,017.00	56,491.00	54,454.00	42,715.00	43,550.00

2020 Computing Society Cluster

Chaired by Akshay Gupte

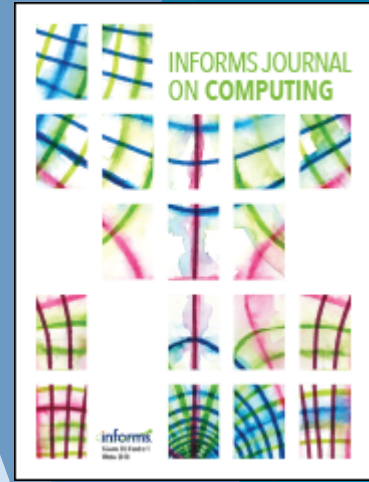
- 15 sessions (35 last year), 58 talks
- 3 joint sessions (w/ OPT society)
- 22 sessions scheduled before going virtual
- Topics include computational aspects of:
 - Mathematical Optimization
 - Machine Learning
 - Quantum Computing
 - Applications in Graphs and Networks
 - Software and Data



INFORMS Journal on Computing

INFORMS Annual Conference

November 2020



Journal Background

First published in 1989 as *ORSA Journal on Computing*

1546 total papers published so far

The theory and practice of computing and operations research are necessarily intertwined. The INFORMS Journal on Computing publishes high quality papers that expand the envelope of operations research and computing. We seek original research papers on relevant theories, methods, experiments, systems, and applications. We also welcome novel survey and tutorial papers, and papers describing new and useful software tools. We expect contributions that can be built upon by subsequent researchers or used by practitioners.

2013-2018: David L. Woodruff

2007-2012: John W. Chinneck (term began July 2007)

2007-2007: W. David Kelton (April-May 2007, interim)

2007-2007: Prakash Mirchandani (January-March 2007)

2000-2006: W. David Kelton

1992-1999: Bruce Golden (term began with Issue 3 of 1992)

1987-1992: Harvey J. Greenberg (founding editor)

IJOC was originated in 1987 via the ORSA Computer Science Technical Section, and is still affiliated with that group's successor, the INFORMS Computing Society.

Leadership Team

EIC, Alice Smith

Managing Editor, Kelly Kophazi



Advisory Board

- ▶ John Chinneck
- ▶ Bill Cook
- ▶ Bruce Golden
- ▶ Jim Orlin
- ▶ Pascal Van Hentenryck
- ▶ David Woodruff



Areas and Area Editors

- ▶ Applications in Biology, Medicine, and Healthcare, Paul Brooks
- ▶ Stochastic Models and Reinforcement Learning, Nicola Secomandi
- ▶ Design and Analysis of Algorithms - Continuous, Antonio Frangioni
- ▶ Design and Analysis of Algorithms - Discrete, Andrea Lodi
- ▶ Heuristic Search, Erwin Pesch



- ▶ Knowledge Management and Machine Learning, Ram Ramesh
- ▶ Modeling: Methods and Analysis, Pascal Van Hentenryck
- ▶ Network Optimization: Algorithms and Applications, David Alderson
- ▶ Simulation, Bruno Tuffin
- ▶ Software Tools, **Ted Ralphs**

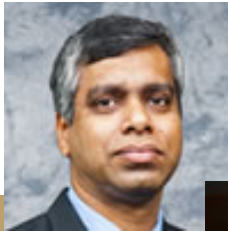


More on Editors

- ▶ 62 Associate Editors
- ▶ Editors from U.S., Canada, Brazil, Italy, France, Germany, Great Britain, Austria, Belgium, Belarus, Turkey, China, Singapore, Australia



- ▶ ~ 80% INFORMS members (or lapsed INFORMS members)



Some Pertinent Statistics

- ▶ Acceptance rate 2020 = **33.6%**, through 3rd quarter
- ▶ Downloads = **30,512**, through 3rd quarter, slight decrease from 2019
- ▶ Backlog = ~**29** months, highest by far of any INFORMS journal, and this is increasing too
- ▶ Increase of **160** pages in 2020 annual page budget (up to 1056)
- ▶ Requested going to bi-monthly format to reduce publishing backlog however this will not be considered until after the pandemic. Our page budget for 2021 has increased however by 608 papers which is about a 55% increase!

PUBLISHING BACKLOG IS OUR MAIN CURRENT ISSUE

Year	Median of # Days Between Original Submission & First Decision	Median of # Days Between Original Submission & Final Decision
2013	148	382
2014	145	362
2015	161	406
2016	153	421
2017	170	519
2018	163	474
2019	146	394
2020	132	386

Percent desk reject
is about 33%

Time in Review
(does not include Desk Rejects)

AREA	Number
Applications in Biology, Medicine, and Healthcare	22
Design and Analysis of Algorithms - Continuous	18
Design and Analysis of Algorithms - Discrete	67
Heuristic Search	23
Software Tools	6
Knowledge Management and Machine Learning	32
Modeling: Methods and Analysis	25
Network Optimization: Algorithms and Applications	16
Simulation	7
Stochastic Models and Reinforcement Learning	8
No Area Chosen or Other Reason	4
Grand Total	228

New
Submissions
During 2020
through 3rd
quarter

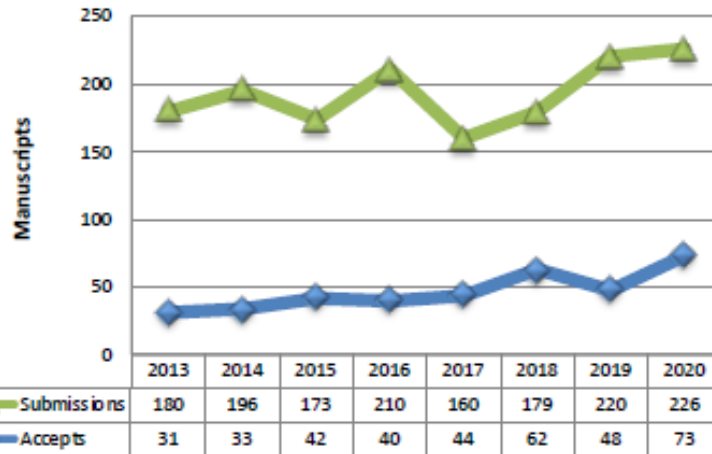
AREA	Number	Editors
Network Optimization: Algorithms and Applications	36	4
Applications in Biology, Medicine, and Healthcare	40	7
Design and Analysis of Algorithms - Continuous	37	4
Design and Analysis of Algorithms - Discrete	149	15
Heuristic Search	37	4
Software Tools	13	2
Knowledge Management and Machine Learning	70	10
Stochastic Models and Reinforcement Learning	13	5
Simulation	32	5
Modeling: Methods and Analysis	45	6
No Area Chosen or Other Reason	7	Total = 62

Number of
Associate
Editors

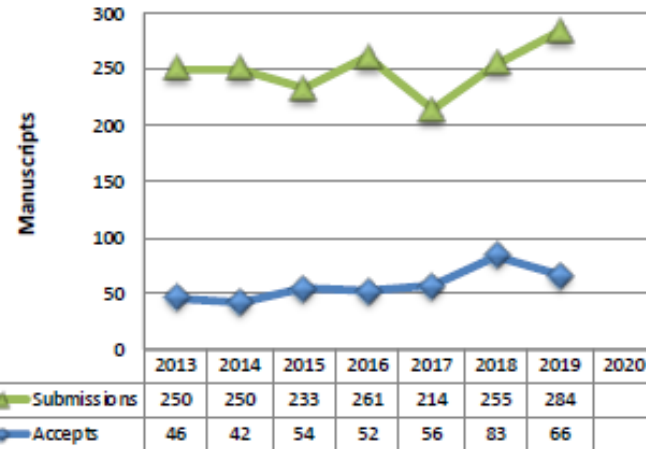
Papers Handled / Responsible for During 2020
through 3rd quarter

Year over Year Comparisons

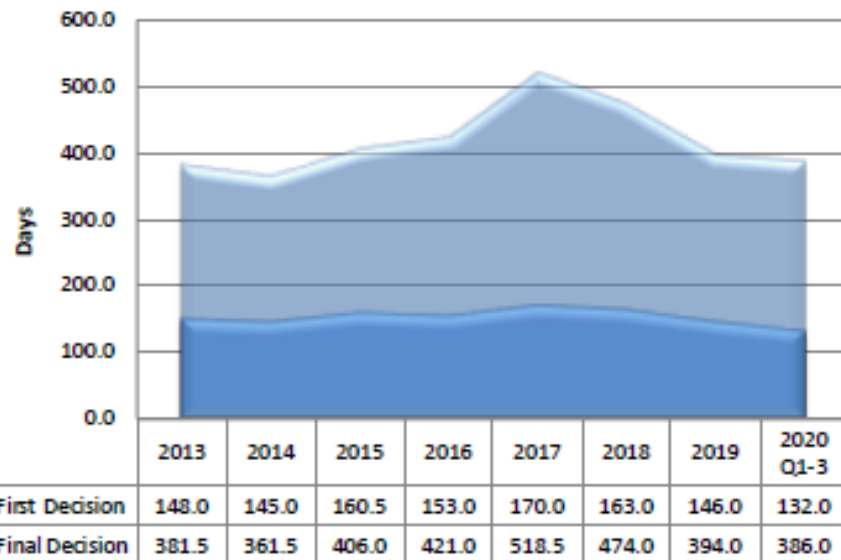
Q1-3 Original Submissions : Accepts



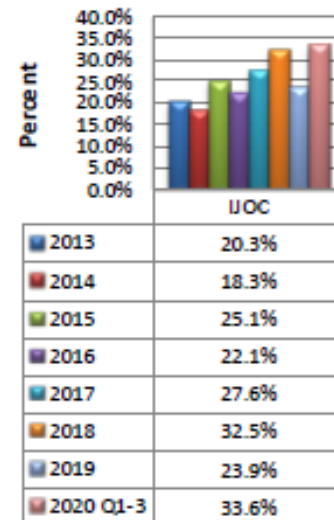
Full-Year Original Submissions : Accepts



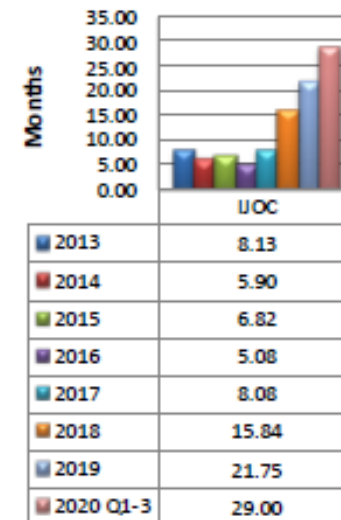
Median Time to First and Final Decisions
(for submissions sent for external review)



Overall Accept Rate

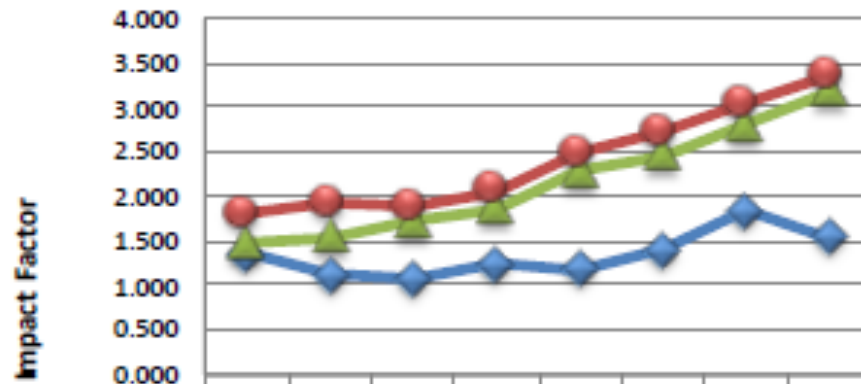


Issue Backlog



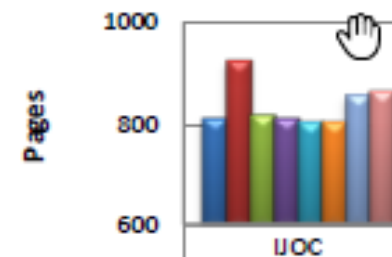
Year over Year Comparisons

Impact Factor vs Aggregate Impact Factor



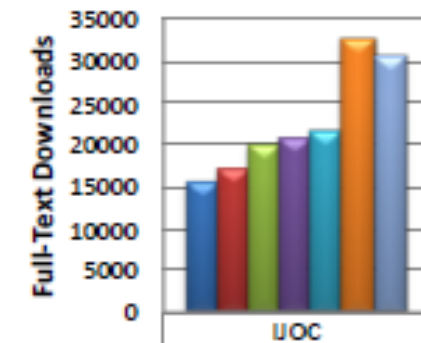
UOC Impact Factor	2012	2013	2014	2015	2016	2017	2018	2019
OPERATIONS RESEARCH & MANAGEMENT SCIENCE - SCIE	1.481	1.532	1.721	1.863	2.282	2.472	2.799	3.176
COMPUTER SCIENCE, INTERDISCIPLINARY APPLICATIONS - SCIE	1.812	1.926	1.886	2.056	2.482	2.733	3.053	3.362

Pages Published in Issues



2013	808
2014	924
2015	818
2016	808
2017	800
2018	800
2019	856
2020 Q1-3	864

Q1-3 Usage



2014	15622
2015	17194
2016	20119
2017	20595
2018	21437
2019	32588
2020	30512

Some Accomplishments of 2020

- ▶ IJOC news regularly posted to INFORMS listservs
- ▶ Renamed and enlarged Stochastic Models to include Reinforcement Learning
- ▶ Software Tools now considers short, focused papers along with regular length ones
- ▶ Software Tools has developed a GitHub repository for data/software
- ▶ Software Tools has developed a procedure for citing and organizing data/software using the IJOC DOI and a Zenodo DOI
- ▶ We hope to expand this repository/procedure later in 2021 to all areas of IJOC to offer a uniform format and location for data/software associated with IJOC published articles
- ▶ EIC term extended by one year at request of INFORMS Board
- ▶ Working on trying to get the 1989 to 1994 papers indexed by Web of Science. This is very challenging.

Awards and Recognition

- ▶ **Meritorious Reviewer** - nominated by associate or area editors - 1 awarded so far during 2020
- ▶ **Test of Time Paper Award** - looking at a rolling 5-year window of 10 years prior - 2 awarded so far during 2020
- ▶ **Meritorious Paper Awards** - nominated by reviewer, associate editor or area editor - 1 to be awarded as soon as the paper is online with another nominated

Test of Time Paper Award

Committee

- ▶ John Chinneck (chair)
- ▶ Bill Cook
- ▶ Bruce Golden
- ▶ Pascal Van Hentenryck
- ▶ David Woodruff



- ▶ 2003-07
- ▶ *Juan Feng, Hemant K. Bhargava, and David M. Pennock*
- ▶ *Implementing Sponsored Search in Web Search Engines: Computational Evaluation of Alternative Mechanisms*
- ▶ *INFORMS Journal on Computing* 19(1):137-148, 2007

Test of Time Paper Award

Committee

- ▶ John Chinneck (chair)
- ▶ Bill Cook
- ▶ Bruce Golden
- ▶ Pascal Van Hentenryck
- ▶ David Woodruff



- ▶ 2002-06
- ▶ *Joseph Abate and Ward Whitt*
- ▶ *A Unified Framework for Numerically Inverting Laplace Transforms*
- ▶ *INFORMS Journal on Computing* 18(4):408-421, 2006

From EIC Meeting This Week

- ▶ Report and greater awareness of diversity on INFORMS journals' editorial boards, not just on demographics but on interconnectivity amongst board members from two groups investigating this
- ▶ How to improve reviews and reviewing cycle times from a task force on this
- ▶ Associate editors should convey their expectations re reviews to reviewers was a main recommendation
- ▶ Ted shared our GitHub initiative
- ▶ For production, the average is 6.4 months with a target of 1.75 months. Production moving to India early next year.
- ▶ INFORMS journals plan to move to accommodation of visually impaired people which will require authors to provide extra information (alt text) for tables and figures
- ▶ Still looking at manuscript transfer where a rejected paper from an INFORMS journal can go more easily to another INFORMS journal for consideration

Thank you, and have a wonderful conference!