

FOCAPO/CPC 2017

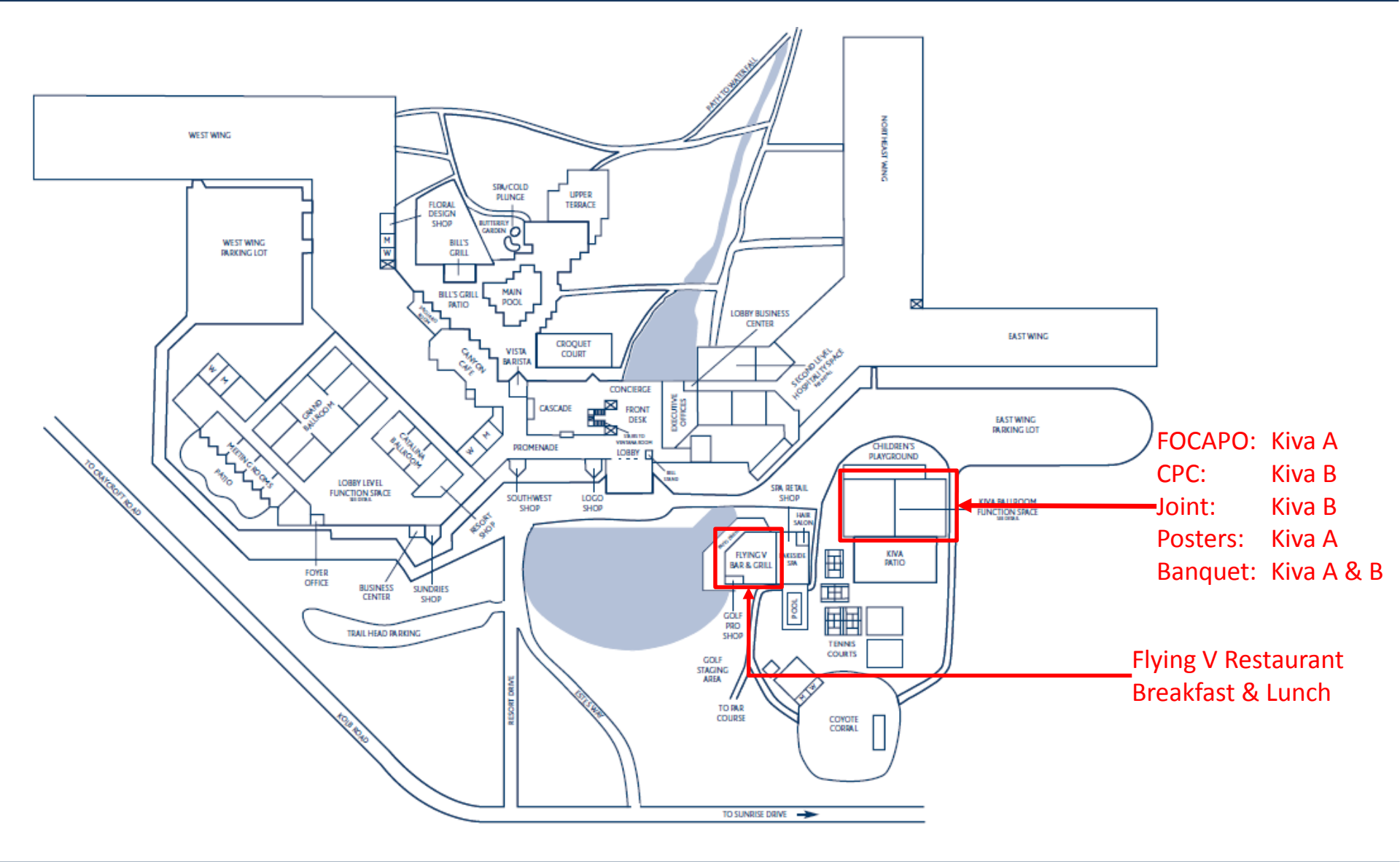
**Bringing Research to Practice
and Practice to Research**

FOCAPO / CPC 2017

Foundations of Computer Aided Process Operations / Chemical Process Control
Loews Ventana Canyon Hotel and Resort, Tucson, Arizona, January 8-12, 2017



The Venue



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Announcements

MEALS

- Breakfasts & Lunches are provided as part of your registration fee (sorry, no guests).
- ***Breakfast Monday – Thursday:*** Continental + additional hot food selections each day. There will be one buffet line, so it would be helpful if you did not wait until the last minute to come to breakfast. Breakfast begins each morning at 7:00 am.
- ***Lunches Monday - Thursday*** will have two buffet lines, one inside and one outside.
- There is only room to seat 100 inside the Flying V. There will be seating on the outside patio. To go boxes will be available if you would like to take your meal back to the session rooms.
- ***Dinner.*** The Loews has two venues for dinner. Reservations are recommended for Flying V. The Cascade Lounge (in the Lobby) is also open for a light dinner until 11:30 pm. List of nearby restaurants inside your registration packets.

POSTERS

- You will be able to put up your posters on Monday & Tuesday after 5:30 pm.
- Please remove your poster after the session ends; posters not removed will be discarded.

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Technical Advisory Committees

F O C A P O

Paul Barton	Massachusetts Institute of Technology	Costas Pantelides	Process Systems Enterprise
Matthew Bassett*	Dow AgroSciences	Dimitri Papageorgiou	ExxonMobil Corporation
Brian Besancon	Air Liquide	Lazaros Papageorgiou	University College London
Larry Biegler*	Carnegie Mellon University	Jose Pinto	Praxair
Scott Bury	The Dow Chemical Company	Stratos Pistikopoulos*	Texas A&M University
Soledad Diaz	PLAPIQUI, Argentina	Ana Pova	Instituto Superior Tecnico
Mario Eden	Auburn University	Matthew Realff	Georgia Institute of Technology
Salvador Garcia-Munoz	Eli Lilly	Gintaras Reklaitis	Purdue University
Ignacio Grossmann	Carnegie Mellon University	Nick Sahinidis	Carnegie Mellon University
Iiro Harjunoski*	ABB Corporate Research	Karl Schnelle	Dow AgroSciences
Gabriela Henning	INTEC, Argentina	Jeffrey Sirola	Carnegie Mellon University/Purdue
Marianthi Ierapetritou*	Rutgers University	John Sirola	Sandia National Laboratory
Rafiq Gani	TU Denmark	George Stephanopoulos*	Massachusetts Institute of Technology
Iftekhar Karimi	National University of Singapore	Lixin Tang	Northeastern University, Shenyang
Jeff Kelly	Industrial Algorithms	Metin Turkay	Koc University
Alexander Mitsos	RWTH Aachen	Dimitrios Varvarezos	AspenTech
Il Moon	Yonsei University	Ben Weinstein	Procter & Gamble
Vladimir Mahalec	McMaster University	Fengqi You	Cornell University
Manfred Morari*	University of Pennsylvania		

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Technical Advisory Committees

C P C

Frank Allgower	University of Stuttgart	Mike Henson	University of Massachusetts - Amherst
Michael Baldea	University of Texas - Austin	Rui Huang	United Technologies
Don Bartusiak	ExxonMobil Corporation	Marianthi Ierapetritou*	Rutgers University
Matthew Bassett*	Dow AgroSciences	Alf Isaksson	ABB Corporate Research
Larry Biegler*	Carnegie Mellon University	Mayuresh Kothare	Lehigh University
Rahul Bindlish	The Dow Chemical Company	Aditya Kumar	General Electric
Richard Braatz	Massachusetts Institute of Technology	Carl Laird	Purdue University
Benoit Chachuat	Imperial College London	Jay Lee	KAIST
Panagiotis Christofides	University of California - Los Angeles	Manfred Morari*	University of Pennsylvania
Duncan Coffey	DuPont	Michael Nikolaou	University of Houston
Prodromos Daoutidis	University of Minnesota	Robert Parker	University of Pittsburgh
Jim Davis	University of California - Los Angeles	Stratos Pistikopoulos*	Texas A&M University
Denis Dochain	UCL - Louvain	Si-Zhao "Joe" Qin	University of Southern California
Frank Doyle	Harvard University	Jim Rawlings	University of Wisconsin - Madison
Tom Edgar	University of Texas - Austin	Sigurd Skogestad	NTNU
Sebastian Engell	TU - Dortmund	Tyler Soderstrom	ExxonMobil
Christos Georgakis	Tufts University	Masoud Soroush	Drexel University
Juergen Hahn	Rensselaer Polytechnic Institute	George Stephanopoulos*	Massachusetts Institute of Technology
Iiro Harjankoski*	ABB Corporate Research	Gregory Troup	Merck & Co.
John Hedengren	Brigham Young University	Subbarao Varigonda	Cummins, Inc.
		Doug White	Emerson

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Sponsors

AIChE



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iLS
Industrial Learning Systems

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Thank You

▪ Students

- Wei Dai (Auburn)
- Braulio Brunaud, Nikos Lappas, Anirudh Subramanyam, Yixin Ye (Carnegie Mellon)
- Lisia Dias (Rutgers)
- Dhruv Gupta, Nishith Patel, Michael Risbeck, Yachao Dong (University of Wisconsin – Madison)

▪ Workshop Instructors

- FOCAPO: Ignacio Grossmann
- CPC: Jay Lee, Joseph Lu
- Machine learning: Lyle Ungar

▪ Wayne Bequette, *the Super-Chair*

▪ Robin Craven

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Statistics

- Total Number of Participants = 206
 - Student & post-docs: 55
 - International: 50
 - Female: 21
 - Academia: 132, Industry: 68, Government & National Labs: 6
- 56 Invited Talks
- 86 Contributed Papers
 - FOCAPO: 55
 - CPC: 31

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Programming

- Strong support for joint conference.
- But how much integration?
- Feedback from Technical Committee Members:
Questionnaire, meetings at AIChE 2015, and multiple planning teleconferences
- Top topic for joint session: *Integration of Scheduling and Control*
- Top topics for

FOCAPO

- 1 Energy systems (operations)
- 2 Big-data / computing
- 3 Uncertainty/risk modeling
- 4 Multi-scale modeling
- 5 Smart manufacturing

CPC

- 1 Smart manufacturing
- 2 Big-data / computing
- 3 Energy systems
- 4 Enterprise-wide optimization
- 5 Process control education

Other feedback:

- Have time for discussion
- Overview and forward-looking talks; identify new challenges
- Discuss how to impact practice

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Future Research Directions

We need your input!

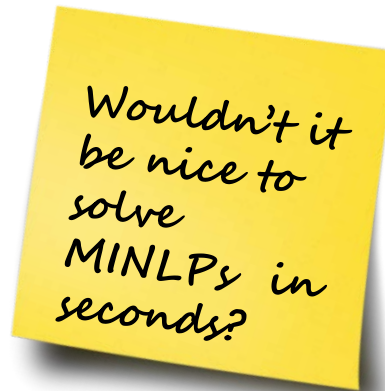
Imperative that we coalesce the wisdom of this group of thought leaders into setting a strategic direction for the community

As the conference progresses, we will be collecting your ideas around needs and opportunities for future research directions for process control and operations.

- Use the sticky notes and marker to capture and add your ideas to the poster boards during/after sessions
- We will collect and post in the conference area.
- It's best if you add your name or registration #



Thursday AM session: facilitated discussion on *Future Research Directions* using your ideas to seed the discussion & write white paper



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From Research to Practice

From questionnaires and planning meetings:

- ... *discuss how to impact industry ...*
- ... *big gulf exists between academic research and industrial implementation ...*
- *[Goal should be] ... practical solutions to real operations issues ...*

Wed PM2 Session: *Enabling the Transition from Research to Practice*

- **Not** an educational panel
- Workforce development
- Academic-industrial collaborations

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Program at a Glance

	Sunday	Monday	Tuesday	Wednesday	Thursday
	FOCAPO CPC	FOCAPO CPC	FOCAPO CPC	FOCAPO CPC	FOCAPO CPC
		Continental Breakfast	Continental Breakfast	Continental Breakfast	Continental Breakfast
AM1		Enabling Technologies I Perspectives on Process Control	Planning & Scheduling Emerging Technologies	Emerging Technologies Bio & Pharma	Discussion on Future Research Directions
		Coffee Break	Coffee Break	Coffee Break	
AM2		Enabling Technologies II Grand Challenge Energy & Sustainability	Supply Chain Management I Emerging Technologies in Control	Young Investigators Young Investigators	
		Lunch	Lunch	Lunch	Lunch
PM1	FOCAPO Workshop CPC Workshop	Enabling Technologies III Distributed Control and Risk Management	Supply Chain Management II Next Generation MPC	Selected Contributed Papers Selected Contributed Papers	
		Coffee Break	Coffee Break	Coffee Break	
PM2	Machine Learning Workshop	Smart Manufacturing & Energy Systems	Integration of Scheduling and Control	Enabling the Transition From Research To Practice	
	Dinner On Own	Dinner On Own	Dinner On Own	Free Time	
	Opening Remarks & Keynote Address			Conference Banquet	
	Welcome Reception	Joint Poster Session A	Joint Poster Session A		
		Extended Hospitality	Extended Hospitality		

FOCAPO	Kiva A
CPC	Kiva B
JOINT	Kiva B
Social	Kiva A

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Highlights

	Sunday	Monday	Tuesday	Wednesday	Thursday
	FOCAPO CPC	FOCAPO CPC	FOCAPO CPC	FOCAPO CPC	FOCAPO CPC
AM1		Continental Breakfast	Continental Breakfast	Continental Breakfast	Continental Breakfast
		Enabling Technologies I Perspectives on Process Control	Planning & Scheduling Emerging Technologies	Emerging Technologies Bio & Pharma	Discussion on Future Research Directions
AM2		Coffee Break	Coffee Break	Coffee Break	
		Enabling Technologies II Grand Challenge Energy & Sustainability	Supply Chain Management I Emerging Technologies in Control	Young Investigators Young Investigators	
PM1	FOCAPO Workshop CPC Workshop	Lunch	Lunch	Lunch	Lunch
		Enabling Technologies III Distributed Control and Risk Management	Supply Chain Management II New Generation MPC	Selected Contributed Papers Selected Contributed Papers	
PM2	Machine Learning Workshop	Coffee Break	Coffee Break	Coffee Break	
		Smart Manufacturing & Energy Systems	Integration of Scheduling and Control	Enabling the Transition From Research To Practice	
	Dinner On Own	Dinner On Own	Dinner On Own	Free Time	
	Opening Remarks & Keynote Address			Conference Banquet	
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Workshops: Provide basic background so that CPC/FOCAPO researchers can follow FOCAP0/CPC talks

FOCAPO	Kiva A
CPC	Kiva B
JOINT	Kiva B
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	Sunday	Monday	Tuesday	Wednesday	Thursday
AM1	FOCAPO CPC	FOCAPO CPC Continental Breakfast	FOCAPO CPC Continental Breakfast	FOCAPO CPC Continental Breakfast	FOCAPO CPC Continental Breakfast
AM2		Enabling Technologies I Perspectives on Process Control Coffee Break	Planning & Scheduling Emerging Technologies Common coffee breaks & lunch	Emerging Technologies Bio & Pharma	Discussion on Future Research Directions
PM1	FOCAPO Workshop CPC Workshop	Enabling Technologies II Grand Challenge Energy & Sustainability Lunch	Supply Chain Management I Emerging Technologies in Control Synchronized slots	Young Investigators Young Investigators	
PM2	Machine Learning Workshop Dinner On Own Opening Remarks & Keynote Address Welcome Reception	Enabling Technologies III Distributed Control and Risk Management Coffee Break Smart Manufacturing & Energy Systems Dinner On Own Joint Poster Session A Extended Hospitality	Supply Chain Management II Next Generation MPC Coffee Break Joint Session: Smart manufacturing & Energy Systems Tribute in Honor of Chris Floudas Joint Poster Session & Hospitality Chris Floudas Best Poster Award Please vote	Selected Contributed Papers Selected Contributed Papers Coffee Break Enabling the Transition From Research To Practice Free Time Conference Banquet	

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AM2		Coffee Break	Coffee Break		
		Enabling Technologies II Grand Challenge Energy & Sustainability	Supply Chain Management I Emerging Technologies in Control	Young Investigators Young Investigators	
		Lunch	Lunch	Lunch	Lunch
PM1	FOCAPO Workshop CPC Workshop	Enabling Technologies III Distributed Control and Risk Management	Supply Chain Management II Next Generation MPC	Selected Contributed Papers Selected Contributed Papers	
		Coffee Break	Coffee Break		
PM2	Machine Learning Workshop	Smart Manufacturing & Energy Systems	Integration of Scheduling and Control	Joint Session: Enabling the Transition from Research To Practice	
	Dinner On Own	Dinner On Own	Dinner On Own		
	Opening Remarks & Keynote Address				
	Welcome Reception	Joint Poster Session A	Joint Poster Session A	Conference Banquet	FOCAPO Kiva A Kiva B Kiva C Kiva D Kiva E Kiva F Kiva G Kiva H Kiva I Kiva J Kiva K Kiva L Kiva M Kiva N Kiva O Kiva P Kiva Q Kiva R Kiva S Kiva T Kiva U Kiva V Kiva W Kiva X Kiva Y Kiva Z
		Extended Hospitality	Extended Hospitality		

Common coffee breaks & lunch

Synchronized slots

Joint Session:
Scheduling-control Integration
Panel Discussion

Joint Poster Session & Hospitality
Chris Floudas Best Poster Award
Please vote

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		Young Investigators		Young Investigators Young Investigators	
		Lunch	Lunch	Lunch	Lunch
PM1	FOCAPO Workshop CPC Workshop	Selected Contributed Papers	Selected Contributed Papers	Selected Contributed Papers Selected Contributed Papers	
		Coffee Break	Coffee Break	Coffee Break	
PM2	Machine Learning Workshop	Joint Session: From Research to Practice Industrial & Academic Perspectives	Joint Session: From Research to Practice Industrial & Academic Perspectives	Enabling the Transition From Research To Practice	
	Dinner On Own	Dinner On Own	Dinner On Own	Free Time	
	Opening Remarks & Keynote Address			Conference Banquet	
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AM1	Emerging Research Opportunities in Process Systems Engineering <i>Lakis Mountziaris , NSF</i> Summary of Identified Research Challenges <i>John Wassick</i>	Continental Breakfast	Continental Breakfast	Continental Breakfast	Continental Breakfast
		Enabling Technologies I Perspectives on Process	Planning & Scheduling Emerging Technologies	Technologies	Discussion on Future Research Directions
AM2		Coffee Break	Coffee Break	Coffee Break	
		Enabling Technologies II Grand Challenge Energy & Sustainability	Supply Chain Management I Emerging Technologies in Control	Young Investigators Young Investigators	
		Lunch	Lunch	Lunch	Lunch
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White Paper

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