

*The 20th International Conference on  
Automated Planning and Scheduling*



## Conference Program

May 12 – May 16

Toronto, ON, Canada

### Sponsors:



**ICAPS-2010 MAIN CONFERENCE AT A GLANCE**

Welcome Reception is on Thursday, May 13, from 19:00–21:00, in Sutton top floor, room stop 33

Friday May 14		Time	Saturday May 15	Time	Sunday May 16
8:30–9:30	ICAPS/AAMAS Invited Talk: <i>Daniele Nardi</i> Sheraton Osgoode Ballroom	9:00–10:00	Invited Talk: <i>Moshe Tardi</i> Queen Victoria Ballroom	9:00 - 10:00	Invited Talk: <i>Holger Hoos</i> Queen Victoria Ballroom
9:30–10:00	Coffee Break	10:00–10:30	Applications QV Ballroom A	Coffee Break	
10:00–12:00	Multi-Agent P&S Sheraton Osgoode Ballroom	10:30–12:30	Classical Planning: Decomposition and Constraints QV Ballroom B	10:30–12:30	Scheduling QV Ballroom A
12:00–12:30	ICAPS/AAMAS Demo Session Sheraton Hall E & F				Planning under Uncertainty QV Ballroom B
12:30–14:00	Lunch Break (individual, no organized lunches provided)				
14:00–14:15	Opening Remarks Queen Victoria Ballroom	14:00–15:30	Abstraction, Learning, and Generalized Planning Queen Victoria Ballroom	14:00–15:30	Heuristic Search Planning Queen Victoria Ballroom
14:15–16:00	Search Queen Victoria Ballroom				
16:00–16:30	Coffee Break	15:30–16:00		Coffee Break	
16:30–17:00	Challenge Papers QV Ballroom A	16:00–17:00	The Present and Future(s) of Planning Queen Victoria Ballroom	16:00–17:00	Plan Explanation and Improvement Queen Victoria Ballroom
	DC Posters QV Ballroom B	17:15–18:30	Community Meeting Queen Victoria Ballroom	17:00–17:15	Closing Remarks Queen Victoria Ballroom
17:00–18:30	Demo Posters QV Foyer	19:00–22:45	Banquet		
	DC and Demo Posters continue				

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# Organizing Committee

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## Conference Chairs

Jörg Hoffmann (INRIA)  
Henry Kautz (University of Rochester)

## Program Chairs

Ronen Brafman (Ben-Gurion University)  
Hector Geffner (Universitat Pompeu Fabra)

## Sponsorship Chairs

Mark Boddy (Adventium Labs)  
Maria Fox (University of Strathclyde)

## Local Organization Chair

Jorge Baier (University of Toronto)

## Publicity Chairs

Alexandre Albore (Universitat Pompeu Fabra)  
Adi Botea (NICTA and the Australian National University)  
Nir Lipovetzky (Universitat Pompeu Fabra)

## Workshop Chair

Stephen Smith (Carnegie Mellon University)

## Tutorial Chair

Carmel Domshlak (Technion)

## System Demonstration Chairs

Ivan Serina (Free University of Bozen-Bolzano)  
Neil Yorke-Smith (American University of Beirut, and SRI International)

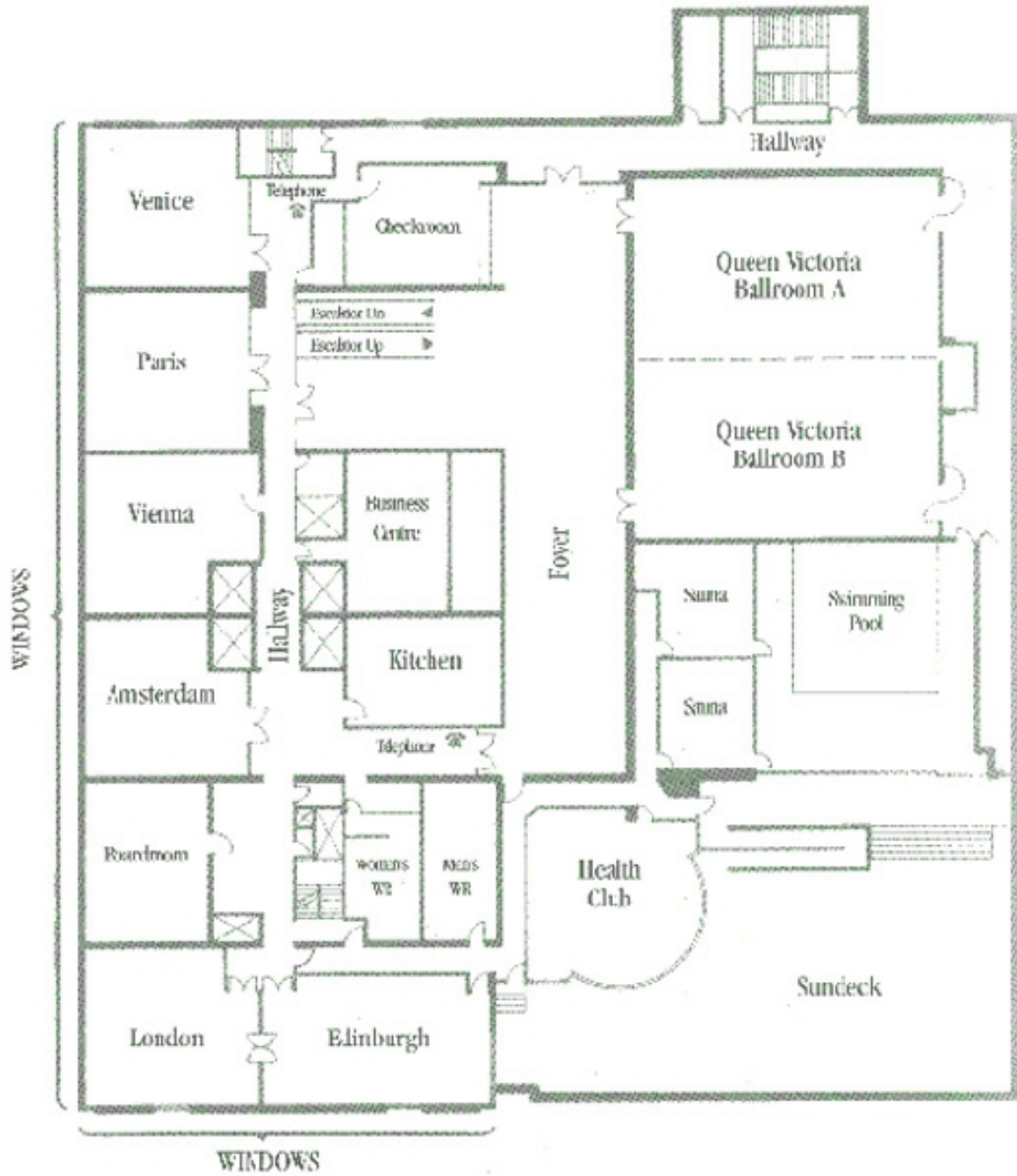
## Doctoral Consortium Chairs

Daniel Bryce (Utah State University)  
Scott Sanner (Australian National University)

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## ICAPS 2010 Meeting Rooms: Sutton Place Hotel 2<sup>nd</sup> Floor

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# ----- **ICAPS 2010 Satellite Events Overview, May 12 & 13, in Sutton** -----

*Wednesday 12*

*Thursday 13*

Room	AM1	AM2	PM1	PM2	AM1	AM2	PM1	PM2
Venice	WS1	WS1	WS1		WS2	WS2	WS2	WS2
Paris	WS3	WS3	WS3	WS3	WS4	WS4	WS4	WS4
Vienna	WS7	WS7			WS5	WS5		
Amsterdam	DC	DC	(DC-F)	(DC-F)	WS6	WS6	WS6	
London	DC-F	DC-F	(DC-F)	(DC-F)	TU4	TU3	TU1	TU2
Edinburgh	DC-F	DC-F	(DC-F)	(DC-F)				
Boardroom	DC-F	DC-F	(DC-F)	(DC-F)				

**AM1: 9:00—10:30; AM2: 11:00—12:30; PM1: 14:00—15:30; PM2: 16:00—17:30.**

**Some exceptions occur. Detailed schedules for Satellite events given at end of brochure.**

**Coffee breaks: 10:30 – 11:00, 15:30 – 16:00.** In individual workshop rooms and/or the Hallway. **Queen Victoria Foyer is occupied by a different group on May 12 and 13.**

**Lunch break: 12:30 – 14:00.** Lunch is not organized on any day of the conference. **List of restaurant recommendations given at end of brochure.**

## **Workshops:**

1. WS1: COPLAS'10 - Workshop on Constraint Satisfaction Techniques for Planning and Scheduling Problems
2. WS2 [**starts at 8:30**]: KEPS - Workshop on Knowledge Engineering for Planning and Scheduling
3. WS3: [**starts at 8:25**] POMDP Practitioners Workshop: solving real-world POMDP problems
4. WS4: SPARK - Scheduling and Planning Applications woRKshop
5. WS5: Planning in Games
6. WS6: Planning and Scheduling Under Uncertainty
7. WS7: CAMP - Combining Action and Motion Planning

## **Tutorials:**

1. TU1: Planning for the Future Internet of Services (Paolo Traverso)
2. TU2: Planning and Scheduling for Traffic Control (Scott Sanner)
3. TU3: Monte-Carlo Planning: Basic Principles and Recent Progress (Alan Fern)
4. TU4: Landmarks in Heuristic-Search Planning (Erez Karpas and Silvia Richter)

## **Doctoral Consortium:**

1. DC: Plenary presentations of invited speakers
2. DC-F: Focus groups – DC student presentations & discussion by topic
3. (DC-F): Space available for focus groups extensions where needed

**Reception: Thursday May 13, 19:00—21:00.** Stop 33. Light appetizers and drinks will be served.

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**Friday, May 14, AM**  
**Joint Programme with AAMAS --- in SHERATON**  
**(to and fro between Sutton and Sheraton: see end of brochure)**

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**8:30 -- 9:30 ICAPS/AAMAS Joint Invited Talk**

**Room: Osgoode Ballroom**

**Chair: Gal Kaminka**

*Robotic Agents for Disaster Response Robotics*  
Daniele Nardi

**9:30 -- 10:00 Coffee Break**

**10:00 -- 12:00 ICAPS/AAMAS Parallel Joint Technical Sessions**

Multi-Agent Planning and Scheduling	Planning under Uncertainty
Room: Osgoode Ballroom Chair: Ronen Brafman	Room: Sheraton Hall C Chair: Daniele Nardi
<i>Point-Based Policy Generation for Decentralized POMDPs</i> (AAMAS) Feng Wu, Shlomo Zilberstein and Xiaoping Chen	<i>Pattern Database Heuristics for Fully Observable Nondeterministic Planning</i> (ICAPS) Robert Mattmüller, Manuela Ortlieb, Malte Helmert and Pascal Bercher
<i>Influence-based Policy Abstraction for Weakly-coupled DEC-POMDPs</i> (ICAPS) Stefan Witwicki and Edmund Durfee	<i>Merging Example Plans into Generalized Plans for Non-deterministic Environments</i> (AAMAS) Siddharth Srivastava, Neil Immerman and Shlomo Zilberstein
<i>Point-Based Backup for Decentralized POMDPs: Complexity and New Algorithms</i> (AAMAS) Akshat Kumar and Shlomo Zilberstein	<i>Approximate Dynamic Programming with Affine ADDs</i> (AAMAS) Scott Sanner, William Uther and Karina Valdivia Delgado
<i>A General, Fully Distributed Multi-Agent Planning Algorithm</i> (AAMAS) Raz Nissim, Ronen Brafman and Carmel Domshlak	<i>Planning for concurrent action executions under action duration uncertainty using dynamically generated Bayesian Networks</i> (ICAPS) Eric Beaudry, Froduald Kabanza and Francois Michaud
<i>Algorithms for Solving the Multiagent Simple Temporal Problem</i> (ICAPS) James Boerkoel and Edmund Durfee	<i>Risk-Sensitive Planning in Partially Observable Environments</i> (AAMAS) Janusz Marecki and Pradeep Varakantham
<i>Distributed Coordination of Mobile Agent Teams: The Advantage of Planning Ahead</i> (AAMAS) Laura Barbulescu, Zachary Rubinstein, Stephen Smith, Terry Zimmerman	<i>When Policies Can Be Trusted: Analyzing a Criteria to Identify Optimal Policies in MDPs with Unknown Model Parameters</i> (ICAPS, Short Paper) Emma Brunskill

**9:30 -- 12:30 ICAPS/AAMAS Joint Demo Session**

**Room: Sheraton Hall E & F**

**NOTE:** There will be a sandwich buffet in the Sheraton, starting 12:00. **This buffet is only for AAMAS registrants.** The ICAPS lunch break is 12:30 -- 14:00, individual lunch, as on the other days.

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**Friday, May 14, PM --- in SUTTON**  
 (to and fro between Sutton and Sheraton: see end of brochure)

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**14:00 -- 14:15 Opening Remarks**

**14:15 -- 16:00 Plenary Technical Session**

Search
Queen Victoria Ballroom Chair: Malte Helmert
<i>The Joy of Forgetting: Faster Anytime Search via Restarting</i> Silvia Richter, Jordan T. Thayer and Wheeler Ruml
<i>Perfect Hashing for Domain-Dependent Planning on the GPU</i> Damian Sulewski, Stefan Edelkamp and Cengizhan Yücel
<i>On Adversarial Search Spaces and Sampling-Based Planning (Short Paper)</i> Raghuram Ramanujan, Ashish Sabharwal and Bart Selman
<i>Simultaneously Searching with Multiple Settings: An Alternative to Parameter Tuning for Suboptimal Single-Agent Search Algorithms</i> Richard Valenzano, Jonathan Schaeffer, Nathan Sturtevant, Karen Buro and Akihiro Kishimoto

**16:00 -- 16:30 Coffee Break**

**16:30 -- 17:00 Challenge Papers; 16:30 -- 18:30 DC and Demo Posters**

Challenge Papers	DC Posters	Demo Posters
Queen Victoria Ballroom A Chair: Paolo Traverso	Queen Victoria Ballroom B	Queen Victoria Foyer
<i>G-value Plateaus: A Challenge for Planning</i> J. Benton, Kartik Talamadupula, Patrick Eyerich, Robert Mattmueller and Subbarao Kambhampati	(poster presentations)	(poster presentations)
<i>Construction Management Applications: Challenges in Developing Execution Control Plans</i> Nilufer Onder, Amlan Mukherjee and Pei Tang		

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## Saturday, May 15, AM --- in Sutton

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**9:00 -- 10:00 Invited Talk**

**Room: Queen Victoria Ballroom**

**Chair: Ronen Brafman**

*From Automated Verification to Automated Design*  
Moshe Vardi

**10:00 -- 10:30 Coffee Break**

**10:30 -- 12:30 Parallel Technical Sessions**

Applications	Classical Planning: Decomposition and Constraints
Queen Victoria Ballroom A Chair: Steve Chien	Queen Victoria Ballroom B Chair: Shlomo Zilberstein
<i>Choosing Path Replanning Strategies for Unmanned Aircraft Systems</i> Mariusz Wzorek, Jonas Kvarnström and Patrick Doherty	<i>Cost-Optimal Factored Planning: Promises and Pitfalls</i> Loig Jezequel, Patrik Haslum, Eric Fabre and Sylvie Thiebaux
<i>Shopper: a System for Executing and Simulating Expressive Plans</i> (Short Paper) Robert Goldman and John Maraist	<i>An Evolutionary Metaheuristic Based on State Decomposition for Domain-Independent Satisficing Planning</i> Jacques Bibai, Pierre Savéant, Marc Schoenauer and Vincent Vidal
<i>Combined Task and Motion Planning for Mobile Manipulation</i> (Short Paper) Jason Wolfe, Bhaskara Marthi and Stuart Russell	<i>Constraint Propagation in Propositional Planning</i> Andreas Sideris and Yannis Dimopoulos
<i>The Scanalyzer Domain: Greenhouse Logistics as a Planning Problem</i> (Short Paper) Malte Helmert and Hauke Lasinger	
<i>A PDDL+ Benchmark Problem: The Batch Chemical Plant</i> (Short Paper) Giuseppe Della Penna, Benedetto Intrigila, Daniele Magazzeni and Fabio Mercorio	
<i>Genome Rearrangement and Planning: Revisited</i> (Short Paper) Tansel Uras and Esra Erdem	<i>Handling Goal Utility Dependencies in a Satisfiability Framework</i> Richard Russell and Sean Holden
<i>Waking Up a Sleeping Rabbit: On Natural-Language Sentence Generation with FF</i> (Short Paper) Alexander Koller and Jörg Hoffmann	

**12:30 -- 14:00 Lunch Break.** No organized lunch, find restaurant recommendations at the end of this brochure.



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## Saturday, May 15, PM --- in Sutton

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### 14:00 -- 15:30 Plenary Technical Session

Abstraction, Learning, and Generalized Planning
Queen Victoria Ballroom Chair: Enrico Giunchiglia
<i>When Abstractions Met Landmarks</i> Carmel Domshlak, Michael Katz and Sagi Lefler
<b>Best Paper Runner-Up Award:</b> <i>Iterative Learning of Weighted Rule Sets for Greedy Search</i> Yuehua Xu, Alan Fern and Sungwook Yoon
<b>Best Paper Award:</b> <i>Computing Applicability Conditions for Plans with Loops</i> Siddharth Srivastava, Neil Immerman and Shlomo Zilberstein

### 15:30 -- 16:00 Coffee Break

### 16:00 -- 17:00 Panel Session

The Present and Future(s) of Planning
Queen Victoria Ballroom Chair: Hector Geffner
Alan Fern Malte Helmert David Smith Paolo Traverso

### 17:15 -- 18:30 Community Meeting, includes Best Dissertation Talk and Awards Ceremony

### 19:00 Bus Departure from Sutton Hotel to Harbour

The bus departs from the Sutton Hotel Wellesley Street Entrance (NOT the Bay Street Entrance).

### 19:15 -- 22:45 Banquet during Ship Cruise

Bus back to Sutton after cruise.

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## Sunday, May 16, AM --- in Sutton

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**9:00 -- 10:00 Invited Talk**

**Room: Queen Victoria Ballroom**

**Chair: Jörg Hoffmann**

*Computer-Aided Algorithm Design:  
Automated Tuning, Configuration, Selection and Beyond*  
Holger Hoos

**10:00 -- 10:30 Coffee Break**

**10:30 -- 12:30 Parallel Technical Sessions**

Scheduling	Planning under Uncertainty
Queen Victoria Ballroom A Chair: Steve Smith	Queen Victoria Ballroom B Chair: Sylvie Thiebaux
<i>Partially Informed Depth-First Search for the Job Shop Problem</i> Carlos Mencia, María Sierra and Ramiro Varela	<i>Classical Planning in MDP Heuristics: With a Little Help from Generalization</i> Andrey Kolobov, Mausam, Daniel Weld
<i>Incrementally Solving STNs by Enforcing Partial Path Consistency</i> Léon Planken, Mathijs de Weerd and Neil Yorke-Smith	<i>A New Approach to Conformant Planning Using CNF</i> Son To, Son Tran and Enrico Pontelli
<i>Towards finding robust execution strategies for RCPSP with durational uncertainty</i> Na Fu, Pradeep Varakantham and Hoong Chuin Lau	<i>Improving Determinization in Hindsight for Probabilistic Planning</i> Sungwook Yoon, J. Benton, Minh Do, Wheeler Ruml
<b>Best Application Paper Award:</b> <i>Timeline-based space operations scheduling with external constraints</i> Steve Chien, Daniel Tran, Gregg Rabideau, Steve Schaffer, Daniel Mandl and Stuart Frye	<i>Self-Taught Decision Theoretic Planning with First Order Decision Diagrams</i> Saket Joshi, Kristian Kersting, Roni Khordon

**12:30 -- 14:00 Lunch Break.** No organized lunch, find restaurant recommendations at the end of this brochure.

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## Sunday, May 16, PM --- in Sutton

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### 14:00 -- 15:30 Plenary Technical Session

Heuristic Search Planning
Queen Victoria Ballroom Chair: Wheeler Ruml
<i>Temporal Planning with Problems Requiring Concurrency through Action Graphs and Local Search</i> (Short Paper) Alfonso Emilio Gerevini, Alessandro Saetti and Ivan Serina
<i>Forward-Chaining Partial-Order Planning</i> Amanda Coles, Andrew Coles, Maria Fox and Derek Long
<i>Using Backwards Generated Goals for Heuristic Planning</i> Vidal Alcazar, Daniel Borrajo and Carlos Linares López
<i>The More, the Merrier: Combining Heuristic Estimators for Satisficing Planning</i> (Short Paper) Gabriele Röger and Malte Helmert

### 15:30 -- 16:00 Coffee Break

### 16:00 -- 17:00 Plenary Technical Session

Plan Explanation and Improvement
Queen Victoria Ballroom Chair: Derek Long
<i>Action Elimination and Plan Neighborhood Graph Search: Two Algorithms for Plan Improvement</i> Hootan Nakhost and Martin Müller
<i>Coming up With Good Excuses: What to do When no Plan Can be Found</i> Moritz Göbelbecker, Thomas Keller, Patrick Eyerich, Michael Brenner and Bernhard Nebel

### 17:00 -- 17:15 Closing Remarks

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## Invited Talks Abstracts

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**Daniele Nardi**

*Robotic Agents for Disaster Response Robotics*

Disaster Response Robotics is a challenging domain, where the need for intelligent robotic agents (as opposed to just robots) is motivated both by technical considerations and in a practical application perspective. In emergency scenarios time is critical. Hence, there is a great demand for tools that improve the effectiveness of operations. Although there are specific actions that can be accomplished by a robot, such as for example bomb disposal, a key goal of disaster response robots is to acquire knowledge about the scenario. In fact, a robot can gather data in places that would be either dangerous or inaccessible to the human operator. This often means that the robot is typically not under the visual control of the operator, and sometimes also not connected by a communication link. Consequently, teleoperation can be difficult, if not impossible, and the need arises for intelligent and autonomous capabilities. Moreover, the use of multiple robots naturally stands as a possible breakthrough, given also that disaster scenarios are typically spatially distributed. New challenges hence come up in terms of autonomy, cooperation and collective behaviors.

In the first part of the talk, I briefly overview the state of the art in the field of disaster response robotics, in order to support the above sketched analysis. In the second part of the talk, I present some of the research we developed at Sapienza Univ. of Rome, also in collaboration with the Italian Firemen Department. Specifically, I describe some results in Distributed Situation Assessment, Action Planning and Monitoring, Context-based Design of intelligent robotic agents, Multi-robot Teams for disaster response robotics, and Performance Evaluation Metrics for intelligent robotic agents. Throughout the discussion, I focus on several open challenges that need to be addressed to provide effective solutions for Disaster Response Robotics.

**Moshe Vardi**

*From Automated Verification to Automated Design*

One of the most significant developments in the area of design verification over the last decade is the development of algorithmic methods for verifying temporal specification of finite-state designs. A frequent criticism against this approach, however, is that verification is done after significant resources have already been invested in the development of the design. Since designs invariably contains errors, verification simply becomes part of the debugging process. The critics argue that the desired goal is to use the specification in the design development process in order to guarantee the development of correct designs. This is called automated design (or synthesis). In this talk I will review 50 years of research on automated design and show how the automata-theoretic approach can be used to solve it.

**Holger Hoos**

*Computer-Aided Algorithm Design: Automated Tuning, Configuration, Selection and Beyond*

High-performance algorithms can be found at the heart of many software systems; they often provide the key to effectively solving the computationally difficult problems encountered in the application

areas in which these systems are deployed. Examples of such problems include planning, scheduling, timetabling, resource allocation, computer-aided design and software verification. Many of these problems are NP-hard and considered computationally intractable; nevertheless, these 'intractable' problems arise in practice, and finding good solutions to them in many cases tends to become more difficult as economic constraints tighten.

In most (if not all) cases, the key to solving such computationally challenging problems lies in the use of high-performance heuristic algorithms, that is, algorithms that make use of mechanisms whose efficacy can be demonstrated empirically, yet remains inaccessible to the analytical techniques used for proving theoretical complexity results.

High-performance heuristic algorithms are typically constructed in an iterative, manual process in which the designer gradually introduces or modifies components or mechanisms whose performance is then tested by empirical evaluation on one or more sets of benchmark problems. During this iterative design process, the algorithm designer has to make many decisions, ranging from choices of the heuristic mechanisms to be used and the details of these mechanisms to lower-level implementation details, such as data structures. Some of these choices take the form of parameters, whose values are guessed or determined based on limited experimentation.

This traditional approach for designing high-performance algorithms can and often does lead to satisfactory results. However, it tends to be tedious and labour-intensive; furthermore, the resulting algorithms are often unnecessarily complicated, yet fail to realise the full performance potential present in the space of designs that can be built using the same underlying set of components and mechanisms.

As an alternative to the traditional, manual algorithm design process, we advocate an approach that uses fully formalised procedures, implemented in software, to permit a human designer to explore large design spaces more effectively, with the aim of realising algorithms with desirable performance characteristics. *Computer-aided algorithm design* allows human designers to focus on the creative task of specifying a design space in terms of potentially useful components. This design space is then explored using optimisation and machine learning techniques, in combination with significant amounts of computing power, in order to find algorithms that perform well on given sets or distributions of input instances.

Automated parameter tuning, algorithm configuration, algorithm portfolios and per-instance algorithm selection are prominent special cases of computer-aided algorithm design and have recently played a pivotal role in improving the state of the art in solving a broad range of challenging combinatorial problems, ranging from propositional satisfiability (SAT) and mixed integer programming to protein structure prediction, course timetabling and planning problems.

In this talk, I will introduce computer-aided algorithm design and discuss its main ingredients: *design patterns*, which provide ways of structuring potentially large spaces of candidate algorithms, and *meta-algorithmic optimisation procedures*, which are used for finding good designs within these spaces. After explaining how this algorithm design approach differs from and complements related approaches in program synthesis, genetic programming and so-called hyper-heuristics, I will illustrate its success using examples from our own work in SAT-based software verification, timetabling and mixed integer programming. Furthermore, I will argue why this approach can be expected to be particularly useful and effective for building better solvers for rich and diverse classes of combinatorial problems, such as planning and scheduling. Finally, I will outline out how *programming by optimisation* -- a design paradigm that emphasises the automated construction of performance-optimised algorithm by means of searching large spaces of alternative designs -- has the potential to transform the design of high-performance algorithm from a craft that is based primarily on experience and intuition into a principled and highly effective engineering effort.

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**Schedule WS1, May 12:**  
**COPLAS'10 - Workshop on Constraint Satisfaction Techniques  
for Planning and Scheduling Problems**

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**8:55 -- 9:00 Welcome**

Chair: Miguel A. Salido

**9:00 -- 10:30 Technical Session: Planning**

Chair: Miguel A. Salido

- **9:00** *AI Planning with Time and Resource Constraints*  
Filip Dvorak, Roman Bartak
- **9:30** *Cost-Optimal Planning using Weighted MaxSAT*  
Nathan Robinson, Charles Gretton, Duc-Nghia Pham, Abdul Sattar
- **10:00** *A Pseudo-Boolean approach for Solving Planning Problems with IPC Simple Preferences*  
Enrico Giunchiglia, Marco Maratea

**11:00 --12:30 Technical Session: Scheduling and Temporal reasoning**

Chair: Roman Bartak

- **11:00** *Tabu Search and Genetic Algorithm for Scheduling with Total Flow Time Minimization*  
Miguel A. González, Camino R. Vela, María Sierra, Ramiro Varela
- **11:30** *Casting Project Scheduling with Time Windows as a DTP*  
Angelo Oddi, Riccardo Rasconi, Amedeo Cesta
- **12:00** *Weak and Dynamic Controllability of Temporal Problems with Disjunctions and Uncertainty*  
K. Brent Venable, Michele Volpato, Bart Peintner, Neil Yorke-Smith

**14:00 -- 15:00 Technical Session: Constraints**

Chair: Neil Yorke-Smith

- **14:00** *On two perspectives in decomposing constraint systems: Equivalences and computational properties*  
Cees Witteveen, Wiebe van der Hoek, Michael Wooldridge
- **14:30** *A Filtering Technique for the Railway Scheduling Problem*  
Marlene Arangú, Miguel A. Salido, Federico Barber

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## **Schedule WS2, May 13:**

### **KEPS - Workshop on Knowledge Engineering for Planning and Scheduling**

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**8:25 -- 8:30 Introduction and Welcome.** Roman Bartak and Tiago S. Vaquero

**8:30 -- 10:30 Technical Session: Planning Problem Formulation**

Chair: Tiago S. Vaquero

- **8:30** *An XML-based Forward-Compatible Framework for Planning System Extensions and Domain Problem Specification*  
Eric Cesar E. Vidal, Jr., Alexander Nareyek; Commentary by Li Ji
- **9:00** *Eliciting Planning Information from Subject Matter Experts*  
Pete Bonasso, Mark Boddy; Commentary by Eric Cesar E. Vidal, Jr.
- **9:30** *Ontology Oriented Exploration of an HTN Planning Domain through Hypotheses and Diagnostic Execution*  
Li Jin, Keith S. Decker; Commentary by Juan Fdez-Olivares
- **10:00** *Model Updating in Action*  
Maria V. de Menezes, Leliane N. de Barros, Silvio L. Pereira; Commentary by Simone Fratini

**11:00 -- 12:30 Technical Session: Exploitation, Verification, and Analysis of Plans**

Chair: Roman Bartak

- **11:00** *Integrating plans into BPM technologies for Human-Centric Process Execution*  
Juan Fdez-Olivares, Inmaculada Sánchez-Garzón, Arturo González-Ferrer, Luis Castillo;  
Commentary by Tiago Stegun Vaquero
- **11:30** *How Hard is Verifying Flexible Temporal Plans for the Remote Space Agent?*  
Amedeo Cesta, Alberto Finzi, Simone Fratini, Andrea Orlandini, Enrico Tronci; Commentary  
by Leliane N. de Barros
- **12:00** *Improving Planning Performance Through Post-Design Analysis*  
Tiago Stegun Vaquero, José Reinaldo Silva, J. Christopher Beck; Commentary by Pete Bonasso

**14:00 -- 15:30 System Demonstrations**

Chair: Amedeo Cesta

- *Constraint and Flight Rule Management for Space Mission Operations*  
Javier Barriero, John Chachere, Jeremy Frank, Christie Bertels, Alan Crocker (presented by  
Tristan Smith)
- *Using Knowledge Engineering for Planning Techniques to leverage the BPM life-cycle for  
dynamic and adaptive processes*  
Juan Fdez-Olivares, Arturo González-Ferrer, Inmaculada Sánchez-Garzón, Luis Castillo
- *Analyzing Plans and Comparing Planners in itSIMPLE3.1*  
Tiago Stegun Vaquero, José Reinaldo Silva, J. Christopher Beck
- *Visual design of planning domains*  
Jindrich Vodrazka, Lukas Chrupa (presented by Roman Bartak)

**16:00 -- 17:00 Discussion Panel: Past, Present, and Future of ICKEPS**

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**Schedule WS3, May 12:**  
**POMDP Practitioners Workshop:**  
**solving real-world POMDP problems**

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**8:25 -- 8:30 Introduction**

**8:30 -- 9:15 Invited Talk:** Milos Hauskrecht

**9:15 -- 9:45 Short Talks**

- **9:15** A POMDP Approach to P300 Brain-Computer Interfaces  
Park, Kim and Jo
- **9:30** A POMDP for Optimal Motion Planning with Uncertain Dynamics  
Meuleau, Plaunt, Smith, and Smith

**9:45 -- 10:30 Invited Talk:** Jesse Hoey

**10:45 -- 11:15 Poster Spotlights for Poster Session 1**

**11:15 -- 12:30 Poster Session 1**

Park, Meuleau, Erez, Marthi, Zhang, Spaan, Reyes, Atrash

**14:00 -- 14:45 Invited Talk:** Emma Brunskill

**14:45 -- 15:30 Invited Talk:** Jason Williams

**15:45 -- 16:15 Poster Spotlights for Poster Session 2**

**16:15 -- 17:15 Poster Session 2**

Shani, Theocharous, Du, Zia Khan, Van Gerven, Hoey, Ardakanian

**17:15 -- 17:45 Discussion**

Moderator: Joelle Pineau



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## Schedule WS4, May 13: SPARK - Scheduling and Planning Applications woRKshop

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### **9:15 -- 9:30 Welcome and Introductory Remarks**

### **9:30 -- 10:30 Technical Session: Distributed and Parallel P&S**

Chair: Yorke-Smith

- **9:30** *Distributed Scheduling Agents for Disaster Response*  
Terry Zimmerman, Laura Barbulescu, Zachary Rubinstein, Stephen Smith and David Wilkins
- **9:55** *Exploring Parallelization Options for Planning and Scheduling*  
Bradley Clement and Tara Estlin
- **10:20** *Session commentaries and discussion*  
Moderator: Cesta

### **11:00 -- 12:30 Technical Session: Space Applications**

Chair: Johnston

- **11:00** *Planning for Human Execution of Procedures Using ANML*  
Mark Boddy and Russell Bonasso
- **11:25** *Simulating On-Board Autonomy in a Multi-Agent System with Planning and Scheduling*  
Amedeo Cesta, Jorge Ocon, Riccardo Rasconi and Ana Maria Sanchez Montero
- **11:50** *Scheduling Targeted and Mapping Observations for the THEMIS Instrument Onboard Mars Odyssey*  
Gregg Rabideau, Steve Chien, David McLaren and Russell Knight
- **12:15** *Session commentaries and discussion*  
Moderator: TBA

### **14:00 -- 15:30 Technical Session: Planning and Control**

Chair: Chien

- **14:00** *Decision-Theoretic Control of Crowd-Sourced Workflows*  
Peng Dai, Mausam Mausam and Daniel Weld
- **14:25** *Online Planning to Control a Packaging Infeed System*  
Minh Do, Lawrence Lee and Rong Zhou
- **14:50** *TIMIPLAN: An Application to Solve Multimodal Transportation Problems*  
Jose Eloy Florez, Javier Garcia, Alvaro Torralba, Daniel Borrajo, Carlos Linares and Angel Garcia
- **15:15** *Session commentaries and discussion*  
Moderator: Terry Zimmermann

### **16:00 -- 16:30 Discussion: Increasing the interchange between applications and theory**

Moderator: TBA

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## Schedule WS5, May 13: Planning in Games

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### **9:00 -- 9:04 Welcome and Introductory Remarks**

### **9:04 -- 10:25 Technical Session**

- **9:04** *Real-Time Planning for Video-Games: A Purpose for PDDL*  
Olivier Barthele and Éric Jacopin
- **9:31** *Layer-Abstraction for Symbolically Solving General Two-Player Games*  
Peter Kissmann and Stefan Edelkamp
- **9:58** *Towards Planning the History of a Virtual Agent*  
Lucie Kučerová, Cyril Brom and Rudolf Kadlec

### **10:25 -- 10:35 Coffee Break**

### **10:35 -- 11:29 Technical Session**

- **10:35** *Planning for Individualized Experiences with Quest-Centric Game Adaptation*  
Boyang Li and Mark Riedl
- **11:02** *GPU Exploration of Two-Player Games with Perfect Hash Functions*  
Damian Sulewski, Cenghizhan Yücel and Stefan Edelkamp

### **11:29 -- 12:30 Invited Talk: Jeff Orkin**

*The Evolution of Planning in Games*

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## Schedule WS6, May 13: Planning and Scheduling Under Uncertainty

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### **9:00 -- 9:30 Invited Talk: Alan Fern**

*Uncertainty in Real-Time Strategy Games: Can your Planner Play?*

### **9:30 -- 10:30 Technical Session**

- **9:30** *Solving Policy Conflicts in Concurrent Markov Decision Processes*  
Corona–Xelhuantzi, Morales, Sucar
- **9:50** *Observation planning with on-line algorithms and GPU heuristic computation*  
Boussard, Miura
- **10:10** *High-Quality Policies for the Canadian Traveler's Problem*  
Eyerich, Keller, Helmert

### **11:00 -- 11:30 Invited Talk: Chris Beck**

*Scheduling under Uncertainty by Building on Operations Research Approaches*

### **11:30 -- 12:30 Technical Session**

- **11:30** *Investigating Two-Machine Dynamic Flow Shops Based on Queueing and Scheduling*  
Terekhov, Tran, Beck
- **11:50** *Probabilistic Strengthening of Distributed Multi-Agent Schedules*  
Hiatt, Zimmerman, Smith, Simmons
- **12:10** *Enabling Flexible Human Strategic Guidance for Multi-Agent Planning and Scheduling in Dynamic Uncertain Domains*  
Maheswaran, Rogers, Sanchez, Szekely

### **14:00 -- 15:00 Technical Session**

- **2:00** *Assessing and Generating Robust Plans with Partial Domain Models*  
Nguyen, Kambhampati, Do
- **2:20** *Hierarchical Solution of Large Markov Decision Processes*  
Barry, Pack Kaelbling, Lozano-Perez
- **2:40** *All that Glitters is not Gold: Using Landmarks for Reward Shaping in FPG*  
Buffet, Hoffmann

### **15:00 -- 15:30 Discussion**

*IPPC-2011 Discussion and Proposal for Next Version of PPDDL*

Scott Sanner

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## Schedule WS7, May 12: CAMP - Combining Action and Motion Planning

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### **9:00 -- 9:10 Opening Speech**

Chair: Mike Stilman

### **9:10 -- 10:30 Technical Session**

- **9:10** *TLplan-C: An Extended Temporal Planner for Modeling Continuous Change*  
Serdar Kecici and Sanem Sariel Talay
- **9:30** *Planning for Improving Throughput in Autonomous Intersection Management*  
Tsz-Chiu Au, Michael Quinlan, Nicu Stiuca, Jesse Zhu and Peter Stone
- **9:50** *Hierarchical Planning for Mobile Manipulation*  
Jason Wolfe, Bhaskara Marthi and Stuart Russell
- **10:10** *Combining Action and Motion Planning via Semantic Attachments*  
Patrick Eyerich, Thomas Keller and Bernhard Nebel

### **11:00 -- 12:00 Technical Session**

- **11:00** *Combining Planning and Motion Planning*  
Jaesik Choi and Eyal Amir
- **11:20** *Interleaving Symbolic and Geometric Reasoning for a Robotic Assistant*  
Samir Alili, Amit Kumar Pandey, E. Akin Sisbot and Rachid Alami
- **12:40** *Creating A Uniform Framework for Task and Motion Planning: A Case for Incremental Heuristic Search*  
Sven Koenig

### **12:00 -- 12:30 Round Table**

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**Doctoral Consortium Programme**  
**Wednesday, May 12, 09:00 – 12:30: Main Event**  
**Friday, May 14, 16:30 – 18:30: Poster Presentations**

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**Main Event Schedule:**

**9:00 -- 9:05 Welcome & DC Reimbursement Instructions**

Room: Amsterdam

**9:05 -- 9:35 Invited Talk: Derek Long**

*How to keep your advisor on a tight leash*

Room: Amsterdam

**9:35 -- 10:35 Focus Group Breakout Session 1**

First 3 presentations, ca. 20 min. each

Rooms: Amsterdam, London, Edinburgh, Boardroom

**11:00 -- 11:30 Invited Talk: Wheeler Ruml**

*Job Hunting*

Room: Amsterdam

**11:30 -- 12:30 Focus Group Breakout Session 2**

Last 3 presentations, ca. 20 min. each

Rooms: Amsterdam, London, Edinburgh, Boardroom

**Afternoon of May 12: Focus Group discussions as/if required**

Rooms: Amsterdam, London, Edinburgh, Boardroom

Focus Group Breakout Session Assignment:

**Planning and Scheduling Applications**

Room: Amsterdam

Mentors: Sven Koenig, Steve Smith, Wheeler Ruml

- *Integrating Planning and Scheduling: From A Resource Perspective*  
Debdeep Banerjee, Australian National University
- *Metric-Space Negotiation for Distributed Scheduling Problems*  
Lei Duan, University of Toronto
- *Local Plan Execution and Repair in a Hierarchical Structure of Sub-Teams of Heterogeneous Autonomous Vehicles*  
Thibault Gateau, ONERA-DCSD, Toulouse
- *Interaction between Action and Motion Planning for an Agile Earth-observing satellite*  
Romain Grasset-Bourdel, ONERA-CNES, Toulouse
- *Large-Scale Parallel State Space Search on the GPU*  
Damian Sulewski, Technologie-Zentrum Informatik und Informationstechnik, Bremen
- *Integrating a High-Level Planner with a Low-Level Robot*  
Kartik Talamadupula, Arizona State University

## **Classical Planning Techniques**

Room: London

Mentors: Malte Helmert, Neil Yorke-Smith, Derek Long

- *On the Inference of Intermediate Goals in Automated Planning*  
Vidal Alcazar Saiz, University of Madrid
- *Integrating Landmarks in Partial Order Planners*  
Bram Ridder, University of Strathclyde
- *Monte-carlo search for deterministic planning*  
Hootan Nakhost, University of Alberta
- *Continual On-line Planning*  
Sofia Lemons, University of New Hampshire
- *Learning to Choose Instance-Specific Macro operators*  
Maher Alhossaini, University of Toronto
- *On the Impact of Belief State Representation in Conformant Planning*  
Son To, New Mexico State University

## **Multiagent / Partial Observations**

Room: Edinburgh Room

Mentors: Shlomo Zilberstein, Mausam, Emma Brunskill / Bhaskara Marthi

- *Integrating Multiagent Dialogues; Planning and Plan Execution*  
Yuqing Tang, City University of New York (CUNY)
- *Solving the Multiagent Selection and Scheduling Problem*  
James Boerkoel, University of Michigan
- *Planning with Partial Preference and Domain Models*  
Tuan Nguyen, Arizona State University
- *All for One or One for All? Distributed Planning for Selfish or Cooperative Agents*  
Raz Nissim, Ben Gurion University
- *Symbolic Search in Planning and General Game Playing*  
Peter Kissmann, Technologie-Zentrum Informatik und Informationstechnik, Bremen
- *Decision-Theoretic Control of Crowd-Sourced Workflows*  
Peng Dai, University of Washington

## **Symbolic / Factored / Logical Representations**

Room: Boardroom

Mentors: Carmel Domshlak, Alan Fern, Scott Sanner

- *MacroSatPlan: Combining macros and SAT planning*  
Mauro Vallati, Universita degli Studi di Brescia
- *Domain Independent Goal Recognition*  
David Pattison, University of Strathclyde
- *Hidden Structure of Factored MDPs*  
Andrey Kolobov, University of Washington
- *Planning as QBF*  
Michael Cashmore, University of Strathclyde
- *Solving Relational MDPs with First-order Decision Diagrams*  
Saket Joshi, Tufts University
- *Integrating Scheduling and Queueing For Dynamic Scheduling Problems*  
Daria Terekhov, University of Toronto

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**System Demonstration Programme**  
**Presented May 14, 9:30 -- 12:30 (Sheraton) and 16:30 – 18:30 (Sutton)**

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*A Demonstration of Timeline-based Scheduling for the Earth Observing One Mission*  
Steve Chien, Daniel Tran, Gregg Rabideau, Steve Schaffer, Daniel Mandl and Stuart Frye

*Timetabling: RIA in Action*  
Florent Devin and Yannick Le Nir

*A Demonstration of Multi-agent Event Detection, Communications, and Planning and Scheduling to  
Enable Coordinating Multiple Spacecraft Assets for Joint Science Campaigns*  
Tara Estlin, Steve Chien, Rebecca Castano, Daniel Gaines, Charles de Granville, Joshua Doubleday,  
Robert C. Anderson, Russell Knight, Benjamin Bornstein, Gregg Rabideau and Benyang Tang

*Visualization Tools for Multi-Objective Algorithms*  
Mark E. Giuliano and Mark D. Johnston

*The Scanalyzer Domain: Greenhouse Logistics as a Planning Problem*  
Malte Helmert and Hauke Lasinger

*Real-Time Multi-Agent Planning and Scheduling in Dynamic Uncertain Domains*  
Rajiv T. Maheswaran, Craig M. Rogers, Romeo Sanchez and Pedro Szekely

*Shopper: A System for Executing and Simulating Expressive Plans*  
John Maraist and Robert Goldman

*Planning for Data Mining Tool (PDM)*  
Javier Ortiz, Ruben Suarez, Tomas de la Rosa, Susana Fernandez, Fernando Fernandez, Daniel Borrajo  
and David Manzano

*Automated Program Checking via Action Planning*  
Damian Sulewski, Stefan Edelkamp and Cengizhan Yücel

*Conformant Planners: Approximation vs. Representation*  
Son Thanh To, Dang-Vien Tran, Hoang-Khoi Nguyen, Tran Cao Son and Enrico Pontelli

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## To and From the Sheraton (AAMAS)

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The 9th International Conference on Autonomous Agents and Multiagent Systems (AAMAS'10) will be held on May 10–14 at the Sheraton Centre Hotel, 123 Queen Street West. Joint Programme AAMAS&ICAPS is at the Sheraton in the morning of May 14.

### By Bus

*To the Sutton:* Walk east to Bay street and take Bus 6 northbound. Get off at the Wellesley stop.

*To the Sheraton:* Walk to Bay street and take Bus 6 southbound. Get off at the Queen stop. Walk one block to the west.

**Note:** Make sure you have tokens or change for one ride (\$ 3.00). Tokens are available at Subway Stations.

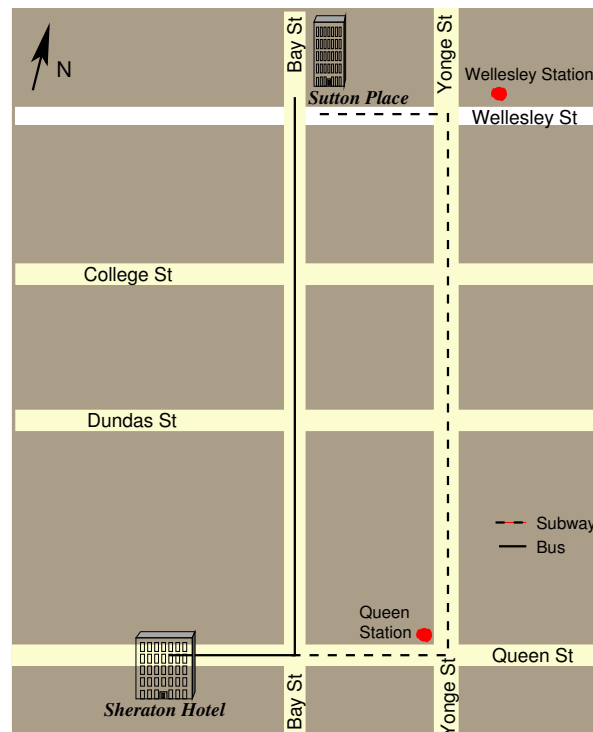
### By Subway

*To the Sutton:* Walk east to Yonge street and take the northbound subway (*Finch*). Get off at Wellesley station. Walk west to Bay St.

*To the Sheraton:* Walk east to Yonge street and take the southbound subway (*Downsview*). Get off at Queen station. Walk west for one and a half blocks.

### Walking

It should take 15-20 minutes to walk the 1.6 Km (1 mile) between both venues.





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## Nearby Places to Eat

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There are many restaurants close to the conference venue. Most of them are located along Yonge Street. Here is a list of suggestions. The respective numbers appear in the map.

### Affordable International

1. **Garlic Pepper Szechuan Cuisine & Seafood** (Chinese)  
578 Yonge Street
2. **Sushi BBQ** (Japanese)  
590 Yonge Street
3. **Papaya Restaurant** (Thai)  
545 Yonge Street
4. **Biryani House** (Indian)  
25 Wellesley Street East

### Quick Options

5. **McDonalds Restaurants**  
552 Yonge Street
6. **Pita Break**  
565 Yonge Street
7. **The Bagel Stop**  
875 Bay Street

### Nicer / Fancy

8. **Bistro 990 Restaurant**  
990 Bay Street
9. **Segovia Restaurant**  
5 St Nicholas Street

