**Advanced Program**


**IFIP IIP2010**


6th IFIP International Conference

On

# Intelligent Information Processing

13-16, October, 2010

Salford

Greater Manchester, UK

**Advanced Program**

*6th **IFIP** International Conference on*

# *Intelligent Information Processing*

**IIP 2010 – Manchester**

13-16 October, 2010

Salford,

Greater Manchester, UK

**Sponsored by**

International Federation for Information Processing, IFIP TC12

**Co-Sponsored by**

University of Salford, United Kingdom

Institute of Computing Technology, Chinese Academy of Sciences

# Welcome Address

Dear Colleagues,

Welcome to the 6th IFIP International Conference on Intelligent Information Processing. We would like to extend to you our warmest welcome and sincere greetings. As the world proceeds quickly into the Information Age, it encounters both successes and challenges, and it is well recognized nowadays that Intelligent Information Processing provides the key to the Information Age and to mastering many of these challenges. Intelligent Information Processing supports the most advanced productive tools that are said to be able to change human life and the world itself. However, the path is never a straight one and every new technology brings with it a spate of new research problems to be tackled by researchers; as a result we are not running out of topics; rather the demand is ever increasing. This conference provides a forum for engineers and scientists in academia, university and industry to present their latest research findings in all aspects of Intelligent Information Processing.

This is the 6th IFIP International Conference on Intelligent Information Processing. We received more than 50 papers, of which 35 papers are included in this program as regular papers and 4 as short papers. We are grateful for the dedicated work of both the authors and the referees, and we hope these proceedings will continue to bear fruit over the years to come. All the submitted papers were reviewed by 2 referees.

A conference such as this cannot succeed without the help of many individuals who contributed their valuable time and expertise. We want to express our sincere gratitude to the program committee members and referees, who invested many hours for reviews and deliberations. They have provided detailed and constructive review reports that will significantly improve the papers included in the program.

We are very grateful to have the sponsorship of the following organizations: IFIP TC12, the University of Salford and the Institute of Computing Technology, Chinese Academy of Sciences .
We hope all of you enjoy this diverse and interesting Program!

Zhongzhi Shi, China
Sunil Vadera, UK
Aamodt, Norway
David Leake, USA
IIP2010 General Chair and Program Committee Chairs

# Conference Organization

## General Chairs

S. Vadera (UK)　　　　M. Musen(USA)　　　R. Mizoguchi (Japan)

## Program Chairs

Z. Shi (China)　　　　A. Aamodt (Norway)　　　D. Leake (USA)

## Program Committee

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J. Liang (China)

H. Leung (HK)

E.Mercier-Meziani (France)

F. Meziane (UK)

S. Nefti-Meziani (UK)

T. Nishida (Japan)

G. Osipov(Russia)

M. Owoc (Poland)

R. Pfeifer (Switzerland)

A. Rafea (Egypt)

T. Ritchings (UK)

D. Ruan (Belgium)

M. Saraee (UK)

E. Sucar (Mexico)

F. Segond (France)

ZP. Shi (China)

K. Shimohara (Japan)

A. Skowron（Poland）

M. Stumptner (Australia)

K. Su (China)

IJ. Timm (Germany)

S. Tsumoto (Japan)

Z. Vetulani (Poland)

X. Wang (China)

H. Xiong (USA)

J. Yang (Korea)

X. Yao (UK)

Y. Yao (Canada)

J. Yu (China)

J. Zhou (China)

Z-H. Zhou (China)

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# Keynotes Speakers

# Case-Based Reasoning Tomorrow: Provenance, the Web, and Cases in the Future of Intelligent Information Processing

David Leake
School of Informatics and Computing, Bloomington
Indiana University

**Abstract:** The World Wide Web and grid computing provide new opportunities and challenges for artificial intelligence. This talk examines how case-based reasoning can respond to these challenges by leveraging large-scale information sources. It highlights opportunities for exploiting naturally arising cases and augmenting them with additional open sources, to enable robust support for human reasoning. It illustrates with examples from current research, focusing especially on how CBR can leverage frameworks being developed in burgeoning research activity in provenance capture and storage.

**Bio-Sketch:** David Leake is a Professor of Computer Science and the Associate Dean for Faculty Affairs of the School of Informatics at Indiana University, as well as a member of the faculty of Indiana University's Cognitive Science and Human-Computer Interaction programs. He received his Ph.D. in Computer Science from Yale University in 1990.

His research interests include case-based reasoning, context, explanation, human-centered computing, intelligent user interfaces, introspective reasoning, and knowledge management.

# Knowledge Mining Biological Network Models

S.H. Muggleton
Department of Computing
Imperial College London

**Abstract:** In this talk we survey work being conducted at the Centre for Integrative Systems Biology at Imperial College on the use of machine learning to build models of biochemical pathways. Within the area of Systems Biology these models provide graph-based descriptions of bio-molecular interactions which describe cellular activities such as gene regulation, metabolism and transcription. One of the key advantages of the approach taken, Inductive

Logic Programming, is the availability of background knowledge on existing known biochemical networks from publicly available resources such as KEGG and Biocyc. The topic has clear societal impact owing to its application in Biology and Medicine. Moreover, object descriptions in this domain have an inherently relational structure in the form of spatial and temporal interactions of the molecules involved. The relationships include biochemical reactions in which one set of metabolites is transformed to another mediated by the involvement of an enzyme. Existing genomic information is very incomplete concerning the functions and even the existence of genes and metabolites, leading to the necessity of techniques such as logical abduction to introduce novel functions and invent new objects. Moreover, the development of active learning algorithms has allowed automatic suggestion of new experiments to test novel hypotheses. The approach thus provides support for the overall scientific cycle of hypothesis generation and experimental testing.

**Bio-Sketch:** Professor Stephen Muggleton FREng holds a Royal Academy of Engineering and Microsoft Research Chair (2007-) and is Director of the Imperial College Computational Bioinformatics Centre (2001-) (www.doc.ic.ac.uk/bioinformatics) and Director of Modelling at the BBSRC Centre for Integrative Modelling at Imperial College. Prof. Muggleton's career has concentrated on the development of theory, implementations and applications of Machine Learning, particularly in the field of Inductive Logic Programming. Over the last decade he has collaborated increasingly with biological colleagues, in particular Prof Mike Sternberg, on applications of Machine Learning to Biological prediction tasks. These tasks have included the determination of protein structure, the activity of drugs and toxins and the assignment of gene function. Previous posts were as Professor of Machine Learning at the Computer Science Department, University of York (1997-2001) ; Reader in Machine Learning and Research Fellow at Wolfson College Oxford (1993-1997); EPSRC Advanced Research Fellow (1993-1997); Visiting Associate Professor (Fujitsu Chair) at the University of Tokyo. EPSRC Post-doctoral Fellow and Turing Institute Fellow (1987-1992); PhD in Artificial Intelligence Edinburgh University (1986); BSc in Computer Science Edinburgh University (1983). Professional positions: Fellow of the American Association for Artificial Intelligence (2002-), Editor-in-Chief of the Machine Intelligence series; panel member for the DTI Functional Genomics ininitiative (2002-2005) and the BBSRC EBI Committee (2004-2006).

[1] H. Lodhi, S.H. Muggleton, and M.J.E. Sternberg. Multi-class protein fold recognition using large margin logic based divide and conquer learning. SIGKDD Exploration, 11(2):117-122, 2010.
[2] A. Tamaddoni-Nezhad and S.H. Muggleton. The lattice structure and refinement operators for

the hypothesis space bounded by a bottom clause. Machine Learning, 76(1):37-72, 2009.

[3] J-W. Bang, D.J. Crockford, E. Holmes, F. Pazos, M.J.E. Sternberg, S.H. Muggleton, and J.K. Nicholson. Integrative top-down system metabolic modeling in experimental disease states via data-driven bayesian methods. Journal of Proteome Research, 7(2):497-503, 2008.

[4] T. Dietterich, P. Domingos, L. Getoor, S.H. Muggleton, and P. Tadepalli. Structured machine learning: the next ten years. Machine Learning, 73(1):3-23, 2008.

[5] J. Chen, S.H. Muggleton, and J. Santos. Learning probabilistic logic models from probabilistic examples. Machine Learning, 73(1):55-85, 2008.

[6] A.P. Cootes, S.H. Muggleton, and M.J.E. Sternberg. The identification of similarities between biological networks: Application to the metabolome and interactome prediction. Journal of Molecular Biology, 369(4):1126-1139, 2007. DOI: 10.1016/j.jmb.2007.03.013.

[7] A. Tamaddoni-Nezhad, R. Chaleil, A. Kakas, and S.H. Muggleton. Application of abductive ILP to learning metabolic network inhibition from temporal data. Machine Learning, 64:209-230, 2006. DOI: 10.1007/s10994-006-8988-x.

[8] R.D. King, K.E. Whelan, F.M. Jones, P.K.G. Reiser, C.H. Bryant, S.H. Muggleton, D.B. Kell, and S.G. Oliver. Functional genomic hypothesis generation and experimentation by a robot scientist. Nature, 427:247-252, 2004.

# Multivariate Bandits and their Applications

John Shawe-Taylor
Centre for Computational Statistics and Machine Learning
University College, London, UK

**Abstract:**    We will review the multi-armed bandit problem and its application to optimising click-through for Web site banners. We will present multi-variate extensions to the basic bandit technology including the use of Gaussian Processes to model relations between different arms. This leads to the consideration of infinitely many arms as well as applications to grammar learning and optimisation.

**Bio-Sketch:**    John Shawe-Taylor obtained a PhD in Mathematics at Royal Holloway, University of London in 1986. He subsequently completed an MSc in the Foundations of Advanced Information Technology at Imperial College. He was promoted to Professor of Computing Science at Royal Holloway in 1996. He has published over 200 research papers and co-authored two books on the use of kernel methods in machine learning. He moved to the University of Southampton in 2003 to lead the ISIS research group. He was appointed the Director of the Centre for Computational Statistics and Machine Learning at University College, London in July 2006. This centre is promoting research at the intersection of theoretically well-founded machine learning and computational statistics, linking groups in the departments of Computer Science and Statistical Sciences with the Gatsby Computational

Neuroscience Unit. He is the Scientific Coordinator of the PASCAL Network of Excellence linking over 50 groups in Europe and beyond promoting well-founded approaches and applications of machine learning.

# Image Semantic Analysis and Understanding

Zhongzhi Shi
Key Laboratory of Intelligent Information Processing
Institute of Computing Technology, Chinese Academy of Sciences
Beijing, China
shizz@ics.ict.ac.cn

**Abstract:**    Image understanding is widely used in many areas likes satellite imaging, robotic technologies, sensory networks, medical and biomedical imaging, intelligent transportation systems, etc. But it is difficult by traditional image processing. Recently semantic analysis has become an active research topic    aimed at resolving the gap between low level image features and high level semantics which is a promoting approach in image understanding.

This talk highlights the sophisticated methodologies of image semantic analysis, including discriminative, generative, cognitive methodology. Discriminative methodology is a data driven and uses classical machine learning, such as Kernel function, ensemble method, multi-instance, etc. Generative methodology is model driven and utilises graphical models with text semantic analysis and each note with conceptual definition. Cognitive methodology can achieve four levels of generic computer vision functionalities: detection, localization, recognition, and understanding which are very useful for semantic knowledge exploration and image understanding. The feature binding computational model proposed by the Intelligence Science Laboratory will be presented in this talk.

People understand the nature of the image scene is through the internal syntactic structure of image. Originally syntactic structure of the sentence is generated through a series of production rules that the words are divided into a number of interrelated terms portfolio, reflecting the constraints between words within syntactic relations. Image parsing studies  the image semantics directly. An image with certain hierarchical entities can be represented by and-or graph, that is, the parse tree. Syntactic reasoning with and-or graphs usually adopts a top-down and bottom-up strategy. Semantic Web technology promotes the development of image semantic analysis.   In particular, the Web Ontology Language OWL provides a rich syntactic structure of semantics for image syntactic description in which different ontologies have

explicit knowledge of dependencies, different text by OWL ontology mapping connected with high reusability. In terms of OWL and-or graphs are usually converted to RDF format. The semantic representation of image syntactic structure will achieve image-text standardized output possible. In this talk event exploring will be used to illustrate the procedure and principle ideas of visual syntax analysis which is easy to catch the scenic context.

This talk also concerns granular computing which is a new viewpoint and will impact on image understanding. We have proposed a tolerant granular space model and applied it to image processing. Finally, the directions for further research on image semantic analysis and understanding will be pointed out and discussed.

**Bio-Sketch:** Zhongzhi Shi is a professor at the Institute of Computing Technology, Chinese Academy of Sciences, leading the Intelligence Science Laboratory. His research interests include intelligence science, image processing and cognitive computing, machine learning, multi-agent systems, semantic Web and service computing. Professor Shi has published 14 monographs, 15 books and more than 450 research papers in journals and conferences. He has won a 2nd-Grade National Award at Science and Technology Progress of China in 2002, two 2nd-Grade Awards at Science and Technology Progress of the Chinese Academy of Sciences in 1998 and 2001, respectively. He is a senior member of IEEE, member of AAAI and ACM, Chair for the WG 12.2 of IFIP. He serves as Vice President for Chinese Association of Artificial Intelligence and Chief Editor of Series on Intelligence Science.

# Overview of Technical Program

| | October 13 Wednesday | October 14 Thursday | | October 15 Friday | | October 16 Saturday |
|---|---|---|---|---|---|---|
| **8:00-8:30** | | Registration | | Registration | | |
| **9:00-10:30** | | IIP2010 Opening Ceremony And Plenary Session 1 | | Plenary Session 2 | | |
| **10:30-11:00** | | Coffee Break | | | | |
| **11:0-12:30** | | Session A1 **Semantic Web Services** | Session B1 **Automatic Reasoning** | Session A4 **Web Search** | Session B4 **Natural Language Processing** | Social Activity |
| **12:30-14:00** | | Lunch | | | | |
| **14:00-15:30** | Registration | Session A2 **Case-Based Reasoning** | Session B2 **Data Mining** | Session A5 **Image Processing** | Session B5 **Pattern Recognition** | |
| **15:30-16:00** | Registration | Coffee Break | | | | |
| **16:00-17:30** | Registration | Session A3 **Web Mining** | Session B3 **Knowledge Representation** | | | |
| **18:00-20:00** | Reception | | | Banquet | | |

# Technical Program

**Wednesday October 13, 2010**

2:00pm – 5:00pm: Registration

**Place:**     The Salford Lowry, Salford Quays, , UK


**Thursday October 14, 2010**

8:00am – 5:00pm: Registration


**9:00am-9:30am:   IIP2010 Opening Ceremony**
**Place: Hexagon Room**
**Chair:** Sunil Vadera,    General Chair

Sunil Vadera: Greetings from General Chairs
Martin Hall: Welcome from Vice Chancellor of the University
Zhongzhi Shi: Introduction to IIP2010 Program

**9:30-10:30 Plenary Session 1**
**Room:   Hexagon Room**
**Chair:** Zhongzhi Shi

David Leake: Case-Based Reasoning Tomorrow: Provenance, the Web, and Cases in the Future of Intelligent Information Processing

Stephen .H. Muggleton: Knowledge Mining Biological Network Models


**10:30am-11:00am    Coffee Break**


**11:00am-12:30pm: Parallel Sessions**

**Session A1: Semantic Web Services**

**Room:   Hexagon Room**
**Chair:** Guangjun Cai


1. Collaboration in Agent Grid Based on Dynamic Description Logics
   *Limin Chen and Zhongzhi Shi*
2. Requirement Driven Service Composition: An Ontology-Based Approach
   *Guangjun Cai*
3. Multi-agent and Workflow-based Web Service Management Model
   *Wenjia Niu, Quansheng Dou, Xu Han and Zhongzhi Shi*
4. Semantical Approach for Service Oriented Requirements Modeling
   *Bin Zhao, Guangjun Cai and Zhi Jin*


**Session B1: Automatic Reasoning**

**Room:   South Room**
**Chair:** Zhenhua Duan

1. Extend Atomic Action Definitions of DDL to Support Occlusions and Conditional Post-conditions
   *Liang Chang*
2. Preservative translations between logical systems
   *Yuming Shen, Yue Ma, Cungen Cao, Yuefei Sui and Ju Wang*
3. The description logic for relational databases
   *Yue Ma, Yuming Shen ,Yuefei Sui and Cungen Cao*
4. Non-Functional Requirements Elicitation and Incorporation into Class Diagrams

   *Zhenhua Duan and Cong Tian*
5. Formal Specification of Autonomic Elements Using RSL
   *Mohammad Reza Nami*

## 12:30pm-2:00pm: Lunch Break

## 2:00pm– 3:30pm: Parallel Sessions

### Session A2: Case-Based Reasoning
**Room:** Hexagon Room
**Chair:** Agnar Aamodt

1. Architectures for Integrating Case-Based Reasoning and Bayesian Networks
   *Tore Bruland, Agnar Aamodt and Helge Langseth*
2. Event Extraction for Legal Case Building and Reasoning
   *Nikolaos Lagos, Frederique Segond, Stefania Castellani and Jacki O'Neill*
3. Applications of CBR in oil well drilling "A general overview"
   *Samad Valipour Shokouhi, Agnar Aamodt and Pal Skalle*

### Session B2: Data Mining
**Room:** South Room
**Chair:** Shusaku Tsumoto

1. Associated Clustering and Classification method for Electric Power Load Forecasting
   *Quansheng Dou, Kailei Fu, Haiyan Zhu, Ping Jiang and Zhongzhi Shi*
2. Two Improvement Strategies for PSO
   *Quansheng Dou, Shasha Liu, Ping Jiang, Xiuhua Zhou and Zhongzhi Shi*
3. Mining Temporal Patterns of Technical Term Usages in Bibliographical Data
   *Hidenao Abe and Shusaku Tsumoto*
4. Automated Empirical Selection of Rule Induction Methods based on Recursive Iteration of Resampling Methods
   *Shusaku Tsumoto, Shoji Hirano and Hidenao Abe*

## 3:30pm-4:00pm: Coffee Break

## 4:00pm-5:30pm: Parallel Sessions

### Session A3: Web Mining
**Room:** Hexagon Room
**Chair:** Frans Coenen

1. Adaptive Web-Based Instruction for Enhancing Learning Ability

*Wawta Techataweewan*

2. Extracting Comparative Commonsense from the Web
   *Cao Yanan, Cungen Cao, Liangjun Zang, Shi Wang and Dongsheng Wang*
3. Detecting Temporal Pattern and Cluster Changes in Social Networks: A study focusing UK Cattle Movement Database
   *Puteri Nohuddin, Frans Coenen, Rob Christley and Christian Setzkorn*
4. Unstructured P2P-enabled Service Discovery in the Cloud Environment
   *Jing Zhou and Zhongzhi Shi*

## Session B3: Knowledge Representation
**Room: South Room**
**Chair:** Mieczyslaw Owoc

1. Knodedge Engineering for Non-engineers
   *Tatiana Gavrilova*
2. Attribute Exploration Algorithms on Ontology Construction
   *Ping Qin, Zhongxiang Zhang, Hualing Gao and Ju Wang*
3. Intelligent Business Transaction Agents for Cross-Organizational Workflow Definition and Execution
   *Mohammad Saleem, Paul.W.H. Chung, Shaheen Fatima and Wei Dai*
4. Knowledge granularity and representation of knowledge. Towards knowledge grid
   *Maria Mach and Mieczyslaw Owoc*

## Friday October 15

## 9:00am-10:00am Plenary Session 2
**Room: Studio 3**
**Chair:** Sunil Vadera

John Shawe-Taylor: Multivariate Bandits and their Applications

Zhongzhi Shi: Image Semantic Analysis and Understanding

## 10:00am-10:30am:    Coffee Break

## 10:30am-12:00am Parallel Sessions

## Session A4:    Web Search
**Room: Studio 3**
**Chair:** Farid Meziane

1. Using Global Statistics to Rank Retrieval Systems without Relevance Judgments
   *Zhiwei Shi, Bin Wang, Peng Li    and Zhongzhi Shi*
2. Rule Learning With Negation: Issues Regarding Effectiveness
   *Stephanie Chua, Frans Coenen and Grant Malcolm*
3. Integrating Web Videos for Faceted Search based on Duplicates, Contexts and Rules
   *Zhuhua Liao, Jing Yang, Chuan Fu and Guoqing Zhang*
4. An Efficient Data Indexing Approach on Hadoop using Java Persistence API
   *Lai Yang and Zhongzhi Shi*

## Session B4:    Natural Language Processing
**Room: Studio 2**

1. Combining the Missing Link: an Incremental Topic Model of Document Content and Hyperlink
   *Huifang Ma, Zhixin Li and Zhongzhi Shi*
2. A General Approach to Extracting Full Names and Abbreviations for Chinese Entities from the Web
   *Guang Jiang, Cungen Cao, Yuefei Sui, Han Lu and Shi Wang*
3. An English-Arabic Bi-Directional Machine Translation Tool in the Agriculture Domain: A Rule-based transfer approach for translating expert systems
   *Khaled Shaalan, Ashraf Hendam and Ahmed Rafea*
4. A Laplacian Eigenmaps Based Semantic Similarity Measure between Words
   *Yuming Wu, Cungen Cao, Shi Wang and Dongsheng Wang*

## 12:00pm-2:00pm:   Lunch

## 2:00pm-3:30pm Parallel Sessions

### Session A5: Image Processing
**Room: Studio 3**
**Chair:** Laura M. Cannas

1. A Filter-based Evolutionary Approach for Selecting Features in High-Dimensional Micro-array Data
   *Laura M. Cannas, Nicoletta Dess and Barbara Pes.*
2. A Novel Distribution of Local Invariant Features for Classification of Scene and Object Categories
   *LiJun Guo and JieYu Zhao*
3. Adult Image Detection Combining BoVW Based on Region of Interest and Color Moments
   *Yizhi Liu, Shouxun Lin, Sheng Tang and Yongdong Zhang*

### Session B5: Pattern Recognition
**Room: Studio 2**
**Chair:** David Calder

1. Multimedia Speech Therapy Tools and Other Disability Solutions as Part of a Digital Ecosystem Framework
   *David Calder*
2. Noise Estimation and Noise Removal Techniques for Speech Recognition in Adverse Environment
   *Urmila Shrawankar and Vilas Thakare*
3. Proximity User Identification Using Correlogram
   *Shervin Shahidi, Navid Nasr Esfahani, Parisa Mazrooei and Mohamad Saraee*

# Conference Venue

## Location:
## how do I get to The Lowry?

**Arriving by car**

The Lowry is 10 minutes drive from Manchester City Centre, 20 minutes drive from Manchester Airport, and a quarter of a mile from the motorway network, giving access from all over the North West and beyond.

From the M60 take junction 12 for the M602. Salford Quays is a quarter of a mile from junction 3 of the M602. Follow the brown Lowry logo signs.



**Where do I park?**

There is a passenger drop-off point immediately in front of The Lowry. Secure parking is available in The Lowry Outlet Mall multi-storey car park. There are designated areas for disabled parking on every level. We recommend that to reduce your waiting time at the end of the evening you should either:

*- Pre-purchase your parking at time of booking*

You can pre-pay for your parking when you book your tickets either on the phone, in person, or online from The Lowry. The cost is £5. On payment we will send you a parking

voucher along with your tickets, which you can then insert at the barrier as you are entering and exiting The Lowry Outlet Mall car park.

*- Validate your ticket when you arrive at the car park*

If you have not pre-purchased your car park voucher when booking, you can validate the ticket you receive on the way into the car park by visiting the car park office (open between 5pm and 8pm). This is located in the basement car park at the foot of the escalator outside Marks and Spencer and Nike. By validating your ticket at a cost of £5 there is no need to queue to pay at the parking machines at the end of your visit. (please note ticket validation is valid for parking between 5pm - 1am).

*Please note that there is no facility to pay for parking, or validate your ticket within The Lowry.*

## Can I use public transport?

The Lowry is accessible by train, tram and bus.

*Metrolink*

From national railway stations, Manchester Piccadilly and Victoria you can travel to The Lowry by Metrolink tram. You should alight at Harbour City, a 10 minute walk from The Lowry.

Alternatively Metrolink can be contacted on 0161 205 2000.

*Train Information*

After exiting the train at Oxford Road walk up Oxford Road towards St Peter's Square. At St Peter's Square board an Eccles tram, alighting at Harbour City.

After exiting the train at Piccadilly Station head towards the tram station which is clearly signposted and located beneath the train station. Board an Eccles tram alighting at Harbour City.

*Bus Information*

Buses that go along the Quays and past The Lowry:
69 - Eccles – Stretford. A regular service until 6pm excluding Sundays and Bank Holidays.

Buses that stop on Eccles New Road (20 mins walk to The Lowry):
27 – Swinton – Manchester. A regular service excluding Sundays and Bank Holidays.
25 – Bolton – Manchester. An evening, Sunday and Bank Holiday service.
33 – Wigan – Manchester. A regular service.
63 – Brookhouse – Manchester. An evening, Sunday and Bank Holiday service.

Buses that stop on Trafford Wharf Road (10 mins walk to The Lowry):
290 & 291 – Flixton – Manchester. An early morning and regular afternoon & evening service. No weekend or Bank Holiday service.

Buses that stop on Trafford Road (20 mins walk to The Lowry):

51 – Old Trafford – Manchester. A regular service excluding evenings, Sundays and Bank Holidays.
52 – Old Trafford – Manchester. A regular service excluding evenings.
Please check bus routes and timetables with GMPTE on 0870 608 2 608 before you travel.

*Missed the last tram and need a taxi?*

There are a number of local **taxi** firms which are regularly used by The Lowry.
**Swan Taxis** (private hire) can be contacted on 0161 707 3000
**Saltax Taxis** (black cabs with full wheelchair access) can be contacted on 0161 737 2222
**Defelice Travel** (private hire and shuttle service between The Lowry, train stations and hotels) can be contacted on 0161 872 2725 or 07894 649 122.
**Quays Taxis** (visit www.quaystaxis.co.uk for more details). There is a cab rank outside The Lowry and a contact system which allows you to speak directly to a driver. Contact on 0161 660 6666.
**1010 Taxis** (private hire) can be contacted on 793 / 794 1010

*Arriving on Foot*

There are several walkways navigating the rejuvenated waterways of Salford Quays. The Lowry Footbridge offers access from Trafford Wharfside and provides spectacular views of The Quays.

*Cycling*

The Lowry is accessible by bicycle from Manchester city centre, and via various cycle paths across the city. For information on cycle routes from Manchester to Salford Quays visit

# Social Activities

Here list possible social activities for your reference. You can make your own arrangements and all payments by yourselves.

- Old Trafford   - guided tour last approx 1 hour + museum = £13 per adult
- Imperial war museum – free entrance to museum, Approx length of visit: 2 Hours
- Museum of Science and Industry: free
- BBC Manchester tours: Admission (Adult) Price: £5.50, last 2 hours
- Manchester town hall
- The Trafford centre
- Manchester cathedral
- Guided tours of Manchester which costs £6 per person:

http://www.visitmanchester.com/discover/walks/guided-walks.aspx#