
Technology at The XVII Commonwealth Games

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Project Overview

What's in Scope?

M2002's Technology Division provides all the required Information Technology and Telecommunications to support the Games including a large range of integrated IT applications, data and voice network services and audio-visual and scoreboard technology.

Technology Division also have responsibility for the provision of communications services and results graphics feed to the host broadcasters, although no direct responsibility for the provision of broadcasting itself, which is provided by COMBO (the Commonwealth Games Broadcasting Organisation set up by the BBC for this event).

So Why Does a Multi-Sports Event Need Technology?

The primary drivers are:

- 1) The needs of the competition itself:
 - a) The software that assists the management of the competition and keeps track of scores, results, schedules and progressions.
 - b) The instrumentation that records an athletic performance, or records the assessment of judges.
- 2) The requirement to deliver an information and results service to some key constituencies - particularly the broadcast and written media but also to VIPs, athletes and, indeed, the general public.
- 3) Finally, the 'back of house' operation of the competition requires technology support in such areas as
 - a) The provision of accreditation and logistics databases.
 - b) Fixed and mobile telephony.
 - c) Trunked personal mobile radio.

Network Delivery

The Network Delivery team within Technology is responsible for the implementation of M2002's communications technology at each of the 32 Games Venues, including:

- Voice systems and networks
- Data systems, including wide area and local area networks
- Cable Access Television (CATV)
- Mobile telephony
- Venue structured cabling systems

M2002's *voice systems* provide basic voice communications within and between the Venues. High availability PBX systems have been installed at key venues, including the Sportcity site, the Athletes' Village and the Games Co-Ordination Centre, to ensure that critical communication systems are maintained at all times. At other venues, Centrex services are provided from the local telecom operator.

The M2002 *data network* supports key data users, including the critical timing and scoring systems for the Games. The data network connects all sporting and non-sporting Venues to two core data centre sites, with one data centre acting as back-up in the event of failure of the primary site. High bandwidth links to key Venues carry traffic at 100Mb/s over diversely routed circuits; within the Venues, dual switching and redundant systems ensure resilience is maintained.

A *Cable Access Television system* has been implemented at major Venues, to provide the Host Broadcaster feeds from each of the sporting Venues to Media, Broadcast and VIP visitors. The Head End equipment at the International Broadcast Centre delivers 25 channels of sporting content to the City of Manchester Stadium, the Manchester Aquatics Centre and the Main Press Centre, as well as feeds to M2002 Command Centres for Games-wide monitoring.

Mobile telephony services are utilised by Games staff and Games-time volunteers on the move in, and between, the Venues. A standard contract service satisfies the requirements of the Games staff, whilst a pre-pay package has been utilised for Games volunteers.

Venue structured cabling forms the essential medium for delivery of all voice and data services to the end users. Each Venue implementation is approached individually, with the cabling solution designed to meet the specific and unique needs of each Venue environment. To assist in this approach, all wide area services are delivered to a single location within the Venue (the Technology Equipment Room), from where the structured cabling system distributes these services locally to the users.

The Network Delivery team is also responsible for the implementation of all telecommunications services ordered on the M2002 Rate Card. This includes direct exchange lines, ISDN2 circuits and 'SmartPhones', which are provided free of charge in Media areas but users pay for call charges on credit or pre-paid cards.

What about the Scale?

The size of the technology operation can be appreciated when you look at the following table:

Technology by Numbers		
PBX Extensions	1934	
Centrex Extensions	414	
CATV Outlets	330	
Exchange Lines	862	
ISDN2 Lines	250	
SmartPhones	436	
Mobile Phones	1010	
Data Ports	3,835	
Two-way Radios	2563	
Workstations and Laptop Computers	1125	
Laptops	600	
Televisions	553	
Fax Machines and Copiers	99	
Printers	417	
Technology Team Pre Games	106	
Technology Team Games Time	1215	
Computer Servers	150	
Pages of Printed Reports	6,000,000+	

Approach to Solutions Development

The Manchester 2002 Technology team's role is to project manage the integration of solutions from external vendors and to ensure that they meet the overall requirements of the Games. As such, in-house technical development is minimised. However, there have been particular areas where in-house development has been required; in particular the development of the Games Family Information System, the public web-site and a number of smaller database applications for operational areas.

XML and Other Architecture Principles

There are many systems in use within the Commonwealth Games. Some of the systems need to pass data amongst themselves. To further complicate matters the individual systems are being developed in Manchester, Italy, Germany, Switzerland and Canada.

Each of the systems is either a data receiver or a data sender, or both. In all cases the receiver of the data has defined a data format in XML (eXtensible Markup Language), which is used by

any sender system to transmit data to the receiver. In this way systems developed around the world can be tested as part of the whole when the system is under development, which saves time when they all come to Manchester, and we have to fit it together.

Microsoft Platform

Many problems could develop in a project of this size and complexity if an inconsistent approach to choosing a platform were taken, too many suppliers were involved, or the complexity of the components were to make the proposed solution difficult to implement and/or manage on an ongoing basis.

Previous large sports events had chosen a multi-vendor, multi-product approach. The decision of Manchester 2002 to choose Microsoft to provide a common platform was aimed at ensuring that a resilient, easy to implement solution was chosen.

Using Microsoft's industry standard operating system, Windows 2000, Microsoft's database SQL, and IIS Web Server, it was possible to build a reliable, high performing, easy to manage infrastructure. The implementation of Active Directory and ISA Server ensure that the environment is highly secure both internally and from any external attacks.

What Makes This Project Different?

The nature of the event also imposes some unusual requirements on the project. Many projects start off with a fixed deadline yet for one reason or another the deadline eventually moves or is re-projected. The date of the Opening Ceremony would not move based on any issues arising from Technology problems – 25 July is as 'fixed' as a milestone can get in project management terms.

In addition to this fixed deadline, the service levels required to support an event that is being televised in real-time are very high, and demand a heavily distributed approach to support, albeit coordinated centrally.

Deliverables

Each sport requires its own specific instrumentation or scoring system; this feeds information into a local results system, which as well as providing the overall event management, also drives local scoreboards, printed output and real-time information to support television commentators.

The local results system also feeds data to a central repository, which provides information for a series of information channels including the Games Family Information System which supports journalists and broadcasters in the production of their stories as well as providing results and other information for other groups, including technical officials, athletes and VIPs.

Technology division not only delivers the results system but manages the results process, including the capture of sports statistical data and the distribution of results output to media and VIPs.

Alongside the results collection and dissemination systems are systems to support the registration of volunteers and the security to ensure that only accredited athletes, suppliers or officials have access to the field of play and other secure areas.

In total, over 25 applications have been procured, or developed, and integrated together to form a distributed suite of results and accreditation applications, available across the games.

Not only is there a major systems integration challenge, the provision of the underlying distributed IT is also a significant undertaking. Each venue requires wide area voice and data as well as a local area network linking PCs, printers and specialised equipment supporting the presentation of the event, such as video boards.

The scale becomes apparent when you consider that there are nearly 30 facilities for the media venues, including non-sports centres, handling, for example, uniform distribution or facilities for the media.

Timing, Scoring and Results

The **Local Results System** (LRS) is made up of several sections:

Event Management

This section of the system deals with sports entries, draws and seedings.

Print Distribution

This is the area where we distribute the printed reports such as results, start lists and schedules.

Summary Scoreboards

These are provided in most venues and display public announcements, results, entry lists, animations, etc

Commentator Information System (CIS)

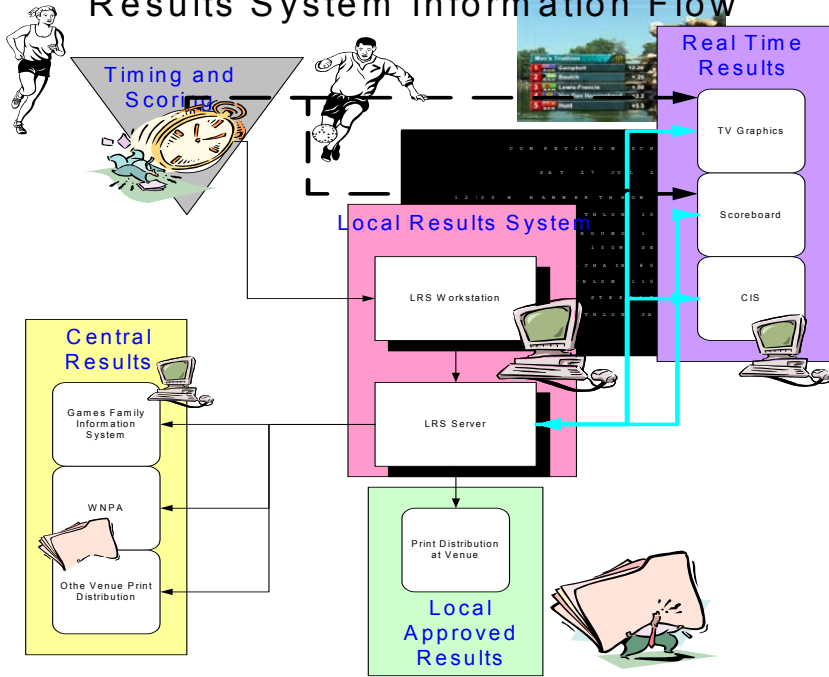
This is a system which is provided to commentators, press, Sport Presentation and Sport in various venues. This system provides real time information such as start lists and results.

TV Graphics

We provide the TV graphics for broadcast to display at the producer's discretion. This includes information such as time, score and results.

The **Central Results System** (CRS) compiles all the information from all sports via the Local Results Systems in the venues. The CRS then sends information to the internet and the Games Family Information System (GFIS) which will be available for the media to use.

Results System Information Flow



Results Systems Providers

The Manchester Organising Committee for the XVII Commonwealth Games has contracted two results providers, Delta Tre and Swiss Timing. These companies have been given the responsibility of delivering results in sports of their expertise.

CIS Provision

Real-time information will be supplied via commentator information systems (CIS) in thirteen of the twenty-one sports being conducted at the XVII Commonwealth Games.

Dependant on the whether the local results system is being provided by Delta Tre or Swiss Timing, CIS will be delivered in three possible forms including intranet, teletext or serial terminal. These terminals will only be available at the specific competition venue, with the exception of a limited number of rate card remote CIS terminals at the IBC which will have access to sports where Delta Tre are providing the service.

Delta Tre CIS

The Delta Tre CIS is an intranet-based system, which will run on a standard M2002 PC. This solution also allows the same terminal to be used to access the Games Family Information System (GFIS) for biographical information, records, historical results etc.

Swiss Timing CIS

Swiss Timing provides two types of CIS terminals dependent on the sport. One uses a teletext system, which displays content on TV monitors, and the other uses a VT320 terminal (see the attached table for more information).

Please see below the CIS provision by sport.

Sport	Service Provider	CIS Provision	<i>Delivery</i>
Aquatics (Swimming)	Swiss Timing	Yes	Serial Terminal
Aquatics (Diving)	Swiss Timing	Yes	Serial Terminal
Aquatics (Synchronised Swimming)	Swiss Timing	Yes	Serial Terminal
Athletics	Delta Tre	Yes	Intranet
Badminton	Delta Tre	No	-
Boxing	Swiss Timing	Yes	Teletext
Cycling (Track)	Delta Tre	Yes	Intranet
Cycling (Road)	Delta Tre	No	-
Cycling (Mountain)	Delta Tre	No	-
Gymnastics	Swiss Timing	Yes	Serial Terminal
Hockey	Delta Tre	No	-
Judo	Swiss Timing	Yes	Teletext
Lawn Bowls	Delta Tre	No	-
Netball	Delta Tre	Yes	Intranet
Rugby 7s	Delta Tre	Yes	Intranet
Shooting	Delta Tre	No	-
Squash	Delta Tre	No	-
Table Tennis	Delta Tre	No	-
Triathlon	Delta Tre	Yes	Intranet
Weightlifting	Swiss Timing	Yes	Teletext
Wrestling	Swiss Timing	Yes	Teletext

Sports Presentation

Technology plays a key part in delivery of sports presentation through Audio and Public Address equipment at each venue. In some venues, the experience is enhanced by provision of Video Production equipment driving giant video screens.

During the games most venues will have a temporary PA system installed which provides good quality sound to each spectator; this includes music and commentator announcements.



Audio and Video Production

Common equipment such as CD Players, Mini Disk players are supplemented by specialist equipment such as an 'instant replay' machine which stores hundreds of audio tracks such as Anthems, 'Stings' and other music on hard disk which can be played instantly at the touch of a button.

Where venue is fitted with a video screen, video production equipment is used to mix what appears on the screen. A 'Silk' (animated video clip comprising a the M2002 logos and an animated background) is used prior to and after the event. This is combined with feed of the action from the BBC, slow motion replays, video clips and highlights packages to give the event that added excitement.

Games Family Information System (GFIS)

GFIS provides information on all aspects of the XVII Commonwealth Games. It is a web-based application that will be accessed from PCs throughout Games venues. These PCs will be for Games Family use only and not accessible to the general public.

What will be covered on GFIS?

News	Up to the minute news and comment from the Games
Schedules	Full coverage of the sporting schedule and other schedules eg welcoming ceremonies
Results	Coverage of all the results from all Games locations
Medals	Details of all medals awarded at the Games
Records	Details of current records, records broken during the Games and record progressions where appropriate.
Biographies	Coverage of athletes, officials and 'True Teams' taking part including performance in M2002 Games, major achievements and general interest.
Guide Book – Manchester	Information about Manchester covering culture, entertainment, history etc.,
Guide Book – Villages	Information about facilities and services available within the Manchester and Bisley Athletes' and Technical Officials' Villages.
Transport	Details of all the transport services available at the Games.
Weather	Weather forecasts for Games time plus historic weather details.
Historical Results	Details on previous Commonwealth Games results and medals.
Medical	Information about medical facilities available to Athletes/Officials at sporting and non-sporting venues.

Catering: Information about catering facilities available to client groups in sporting and non sporting venues.

Rate Card: Information about Rate Card facilities, location points and where to go with problems

Merchandising and Ticketing: Basic Information

Reference: a range of reference information including :-

Country Info and CGA/CGF details

History of the Games

Sports Facts and Figures

M2002 Sporting Venue Facts and Figures

Host Country Information

Local Organising Information

Summary CIS and GFIS

CIS has been designed to support the requirements of commentators, to provide sufficient information for live coverage of an event and hence has information from the local results system as soon as it is available. It is only available for a subset of sports, is only available to broadcast media and with the exception of limited remote access from IBC is only available within the local venue.

GFIS has been designed to support all media and provides more information than CIS, and is available to all media groups and other interested parties. However, results are only available on the system once they are official, hence a time delay while that process happens.

The table below details the availability of information on the systems:

GFIS	CIS
Results at end of complete race/match once authorised by competition management, and intermediate results where indicated.	Immediate results (1 st past the post) Intermediate results as they happen eg Triathlon legs
Schedules	
Start lists	Start lists
Timetable	Timetable
Medal standings	Medal standings
Applies to all sports	Available for 13 out of 21 sports
Results from other sports	Only for sport at local venue
Biographies	
News	
Records	
Official communications eg reasons for disqualification	
Guide Book	

TV Graphics

Manchester 2002, in association with the timing, scoring and results providers, Swiss Timing and Delta Tre, have developed the graphics to be used by the host broadcaster.

The XVII Commonwealth Games graphics have been developed utilising various powerful sub-graphics that will be common across the competition venues to give them a Manchester 2002 identity. This includes the colours used, the pictograms and the 'Sprit of Friendship' logo. Each sport has it's own custom designed set of graphics.

The graphics generators are a component of the Local Results System at a Games venue. Therefore the data shown is always accurate and punctual.

The basic elements of the graphics are:

The Spirit of Friendship logo

Sport Pictograms

Title bars featuring the Manchester 2002 sub-graphic

Bars and boxes for data

National Flags

Website

The aim of providing an internet information service to the public is to promote the 2002 Commonwealth Games in the period leading up to the start of the Games and to deliver information about the organisation, the participants, and the events. During the lead up to the Games the site will deliver information about the Games themselves, the stadia and the Games complex, the countries taking part, and the athletes. During the ten days that the Games will be live, news items and event results will be frequently updated in near real-time.

The site also provides some online applications such as the registration of volunteers, sign-up for emailed newsletters, the merchandising of Games-related items, the purchase of tickets for Games events and nomination forms for runners to carry The Queen's Jubilee Baton.

Technology Games Workforce

Whilst all functional areas at the Games require large numbers of volunteers to ensure they deliver their services many of the volunteers are regarded as "generalist" roles. i.e. Could be done by virtually anyone with a minimal amount of training.

Whilst Technology do need a number of generalists, there is a large requirement for people with some specialist skills, gained either from their day-time jobs, courses or from experience at previous sporting events.

There are many facets to the role of Mobilisation in ensuring that a happy, trained, motivated technology workforce are in place. It is also essential that volunteers *remain* happy and motivated throughout and attrition is minimised.

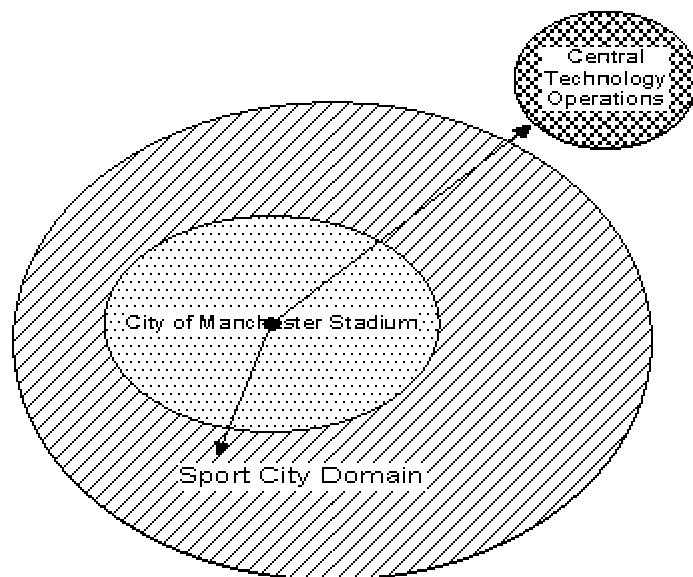
How many volunteers and what will they do?

Of the Games time technology workforce 870 will be volunteers, handling a variety of roles in venue/sport or centrally orientated roles.

Most venues operate a last a two shift system to allow for adequate cover across the sporting schedule, and some non-sports venues such as The Commonwealth Games Village have overnight cover also.

An idea of the size of the operation can be appreciated when we look at the roles and requirements for the largest sports venue The City of Manchester Stadium where the following volunteer resource is required:

Assistant Venue Technology Managers	4
Technology Support Coordinators	1 (plus 1 permanent)
Help Desk Assistants	2
Technology Support Assistants	44
Timing & Scoring Assistants	10
Results Operators	12
Print Room Supervisors	2
Print Room Operators	12
Print Distribution Runners	28



As well as the resource at the venue The City of Manchester Stadium (CMS) will tap into shared resource. The Sport City Domain provides Radio Distribution facilities for other venues in the domain (as well as CMS) – Table Tennis, Squash, Track Cycling.

Central technology operations will provide a Mobile Response Team that will help with the transitions required at CMS and help cope with any unusual technology demands. The stadium goes through transitions from Opening Ceremony – Athletics – Rugby – Closing Ceremony as well as number of rehearsals.

M2002 Technology Project Office

The purpose of the Project Office within Technology Division of the Manchester 2002 Commonwealth games is to ensure that consistent approaches are taken to the managing of the deliverable elements of Technology and that work being undertaken is monitored, regularly reported upon, and delivered within budget.

Technology Asset Management

Thousands of technology items such as computers, printers, faxes etc. are being purchased and delivered to various venues. Equipment is also being moved between venues as staff move. The organisation needs to keep track of what assets M2002 Ltd owns and where these assets are at any given time. An Asset Tracking System is in place to uniquely identify equipment and log any movement around Games venues.