Information management and globalised sport— a South African mega-event model

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Declaration

I, the undersigned, hereby declare that the work contained in this thesis is my own original work and that I have not previously in its entirety or in part submitted it at any university for a degree.

ABSTRACT

Reflecting a general trend in modern society, the world of sport has become information driven, with effective information management becoming an essential part of all sports organisations and sporting activities.

The sophistication of large, multi-sport events - mega-games - such as the Olympic Games and Commonwealth Games demand a high standard of information management to help ensure the smooth running of such events. This is also true of the managing of national teams participating in them.

In this thesis a model of an information management system (IMS) is developed for managing certain types of information in such events and the national team participating in them. The model is based on two conceptual frameworks: Intellectual capital, and secondly the information management cycle.

The model is then tested using a number of case studies where a specific information management system was used to manage the information of different sports teams and events. The degree to which the information management system was effectively implemented in each case is evaluated and the results used to measure the correctness and accuracy of the model.

Lastly suggestions are given as to how the model can be improved in view of the case study findings, and what the future role of information management in sports events may look like in light of the results.

OPSOMMING

Die feit dat inligtingsbestuur 'n noodsaaklike deel geword het in sport organisasies en aktiwiteite is 'n weerspieeling van 'n algemene tendens in die moderne, informasie-gedrewe samelewing.

Die ingewikkeldheid van groot, multi-sport byeenkomste – "mega-games" – soos die Olimpiese Spele en die Gemeenskapspele vereis 'n hoe standaard van inligtingsbestuur om te verseker dat sulke byeenkomste glad verloop. Dieselfde geld in die geval van die bestuur van die nasionale spanne wat daaraan deelneem.

In hierdie tesis word 'n inligtingbestuursmodel ontwikkel om sekere tipes inligting van verskillende sportbyeenkomste en nasionale sportspanne te bestuur. Die model is geskoei op twee konseptuele raamwerke: Intellekteule kapitaal, en tweedens die inligtingsbestuursiklus.

Die model word getoets deur middel van 'n aantal gevallestudies waartydens 'n besondere inligtingstelsel gebruik is on sportspanne en byeenkomste se inligting mee te bestuur. Die mate waartoe die inligtingbestuurstelsel effektief geimplementeer is word ge-evalueer en die resultate gebruik om die korrektheid en akkuraatheid van die model te meet.

Ten slotte word voorstelle gemaak oor hoe die model verbeter kan word in die lig van die gevallestudiebevindinge, en wat die moontlike toekomstige rol van inligtingsbestuur by sportbyeenkomste kan wees in lig van die bevindinge.

Special acknowledgements

Special thanks to the South African Sports Commission for supporting this project financially, as well as allowing me to use their resources and projects as reference and research material. Thanks also to all my colleagues at the SASC for their willingness to be interviewed during the course of my research.

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Preface

This study is based on a number of sport event and team management projects undertaken at the South African Sports Commission (SASC) from 2001 to 2004. To help the reader understand the milieu of the study it is worthwhile to first introduce the SASC and its role in South African sport.

The SASC is a legislated body created by an act of Parliament to provide support products and services to the South African sporting community. Among these services are sport event and team management, which also includes sport information management.

The SASC event and team management projects are comprised of Team SA, the South African national multi-sport team that participates in large international events, and the SA Games, a large, annual junior multi-sport event. Both entail information that needs to be managed in order to succeed, and it is from that perspective that both are discussed here.

Team SA

South Africa participates in international mega-games almost every year, be it the Olympic Games held every four years, or a regional event such as the All Africa Games. There has never before been a coordinated effort to prepare the teams that participate in these events, although all of them share common characteristics. Each time a team attends an overseas event the project is started from scratch with a new infrastructure, management, and most importantly, a new drive for sponsorship. This results not only in extra costs, but also makes coordinating sport talent and assuring continuity for athletes between events extremely difficult.

This is how the concept of Team SA was born. It would be a continuous brand utilised each time a team is sent to a mega-game, giving the team an identity that is timeless and applied to all events. The identity of the event in which the team was participating (for example the Olympics) would then be peripheral to the team identity, rather than being the other way round. This way sponsors were ensured of continuity in the property they sponsored, with commensurate advantages of greater brand recognition and a longer exposure horizon.

The SASC's task involved all logistical arrangements, as well as managing the physical preparation of the athletes, from the time South Africa's participation is announced, through to the time the team returns home from the event.

From an information management point of view this approach has two particular advantages:

- Only one information management system need be constructed catering to the team's needs across many events;
- It would provide a historical database of information, keeping information from past events together.

While one department was tasked with the overall management, various other sections within the SASC contributed to each project. Obviously outside contractors are also involved; they are responsible for providing specialist products and services.

The SASC decided at the outset to design and implement an information management system to gather, collate, store, and distribute Team SA information to different audiences. The heart of this system is *SportOrganiser*, a database system developed at the SASC specifically for this purpose. Developing it, as well as managing the use of it, lay with the Information and Research sub-unit within the SASC.

The SASC's other tasks in managing Team SA include:

- Financial control – seeking sponsorship and funding, ensuring payment of suppliers and contractors.
- Logistical arrangements – these include travel arrangements for all team members, supplying clothing to all, and accommodation.
- Public relations – this may be sub-contracted, but remains the responsibility of the Commission.
- Coordinating the medical and physical testing of athletes through high performance centres, mostly located at universities.
- Liaison with the national or international organisers of the events.
- Team protocol and discipline.

Many aspects of the above are required to be captured in an information system. They are noted here to show the diversity of the potential beneficiaries of such a system.

Since commencing with the management of Team SA, the SASC has worked on several projects where Team SA has competed in major events. All of them contained an information management aspect and many lessons were learnt during each project. Five such projects are used here as case studies.

The concept of the SA Games

The SA Games is an annual junior multi-sport event – a 'national' mega-games – conceptualised by the SASC to serve as a conduit for identifying young talent to be channelled into the development process meant to produce medal-winners at prestigious international events, such as the Olympics.

The SA Games is a relatively large event, attracting several thousand athletes and officials. It is held in a different provincial city each year. While it is not a true mega-game, since it does not have international participation, the sheer scale of the event places it among mega-games in terms of scope and size, and therefore it is included here as a case study.

In the case of the SA Games the SASC is responsible, in collaboration with the host city, for the overall event management. As a case study here, the focus is therefore not on management of a particular team, but of all participants, in particular the accreditation of them. The added size and extra scope of the project obviously means that its information management processes are also more complicated, both in terms of breadth and depth.

For the purposes of the above, a database called *SportOrganiser* was developed and implemented in each project. The case studies discussed later are the implementations of information management systems (IMS) incorporating *SportOrganiser* in each of six team and event management projects.

The author, as an employee of the SASC, participated in most of the projects as part of the team that developed and implemented information management systems. Being part of these processes, as opposed to an objective observer, has implications in the choice and type of research methodology followed here, in the sense that use is made primarily of qualitative, participatory observation rather than quantative, measuring research methods.

Chapter One

Setting the scene

Sport is no doubt one of life's activities that have changed dramatically with the onset of the technological revolution that shaped the information-driven society. A largely localised, recreational activity, since the beginning of the industrial age it has become a major international role player in a globalised, borderless world.

One of the ways that global sport finds expression is through high profile, multi-code[1] sporting events, referred to here as 'mega-games', where a relatively large number of athletes – normally a thousand or more, often representing any number of countries – compete.[2] The prime examples of these types of events are the Summer Olympic Games, held in a different country and city each leap year, and the Commonwealth Games, held every four years, in between the Olympics. Other examples of similar events that take place on a continental or regional basis are the Asian Games and the All Africa Games, the latter being a continental event in which all African nations participate. Another category of mega-games is specialist games that focus on a particular interest group, such as the Gay Games, the University Games, or the Deaflympics.

The Olympics is used as an example here because its characteristics as a mega-game are particularly prominent, making analysis and explanation more vivid. However, there are thousands of smaller, less dramatic multi-sport events that take place around the world, which also mirror these characteristics—only on a reduced scale.

Preparing a nation's national team to participate and win medals in these extremely competitive sporting events is a huge undertaking. Such projects typically take more than a year of careful planning, training, and administration before a team finally leaves the airport

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1 A sport type such as rugby or netball is referred to here as a 'sport code'.

2 Roche (2001) mentions five characteristics of what he calls 'mega-events': It has international participation; is held in an urban area; has high media involvement; is large in scale; and is held over a fixed period of time. What distinguishes a *mega-event* from a mega-game, however, is the fact that the former hosts a number of sport codes, as opposed to a single sport code in the case of mega-events such as the Rugby World Cup or the Soccer World Cup.

for the event's host city. Effective management of information plays a pivotal role in the success of these projects.[3]

The subject here is an information management system used by the SASC to manage the data of the national teams it sends to these events. The same system was also used at smaller 'mega-games' at regional and national level to manage all participants, including athletes, coaches, and administrators. Given the nature of mega-games, information managing these events is typically complex and multifaceted undertakings that can only be understood fully when examined within the context of the information-driven society in which we live.

This thesis consists of four sections that are all part of a process of building, testing, and refining a model that represents the IMS as mentioned. An illustration outlining the relationship of these four sections is shown below:[4]

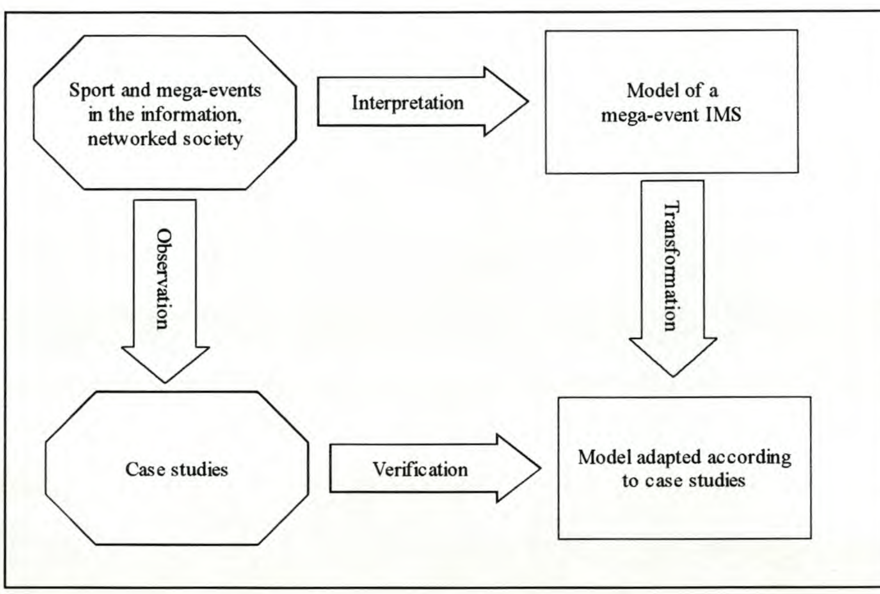

Figure 1: Outline of the model building process. Adapted from Stockburger (1998).

The section in the top left hand corner examines mega-games – and inter alia sport – in the context of modern society driven by information. The historical processes that gave rise to modern sport, and the growing importance of leisure in society are shown. Based on the work of sociologist Manuel Castells on the network society, a discussion follows about the way mega-games have adapted to mirror new meanings of time and space in modern times.

[3] Toohey & Halbwirth, 2002

[4] The process is based on four stages of statistical model building proposed by David Stockburger (1998). The original illustration can be seen at www.psychstat.smsu.edu/introbook/sbk04m.htm.

Later in this section we zoom in on the specific characteristics of mega-games in terms of information management and the problems most often encountered in this process. All of this is covered in Chapter One.

In the second section, top right, a model is designed for a mega-game IMS, described here in Chapter Two. In it the insights gained in the first section, together with theoretical frameworks of information management and intellectual property, are used to define a number of parameters against which real life occurrences of mega-game IMS implementations can be evaluated. Reasons are also given why modelling is chosen as the preferred scientific method used here.

On the one hand the model is an interpretation of the facts and conditions of the first section. On the other it provides standards for the case studies of the third section.

Chapter Three, or the third section in the graphic, bottom left, presents the case studies, and also sketches the environment from which they are selected.

Chapter Four presents evidence from the case studies in the form of personal observation, interviews, and documentation, used for dual purposes here. Firstly, the model shows where shortcomings in the case studies exist, as measured against the parameters in the model. It therefore helps with making improvements in future similar projects. Secondly, the case studies show where the model has shortcomings and gaps, such as parameters that lack definition, or where additions need to be made in order to guide the building of future systems. The total process is thus one of continuous learning, rather than creating an ideal or final benchmark, which simply is not possible in the dynamic world of technology, and the cultural changes that accompany it. This is the most appropriate approach in a field that is relatively unexplored and ill-documented.

The last section proposes the improvements that can be made to the model to enhance its usefulness, while suggestions for improving the value of IMS systems—not only for mega-games, but also for the organisation driving them—are also made. This is covered in Chapter Five.

We also zoom out again and look at the larger implications of the process here, in the light of recent developments in knowledge management. This is tied into some of the discussions of the first part of the thesis, examining whether the findings confirm the broader trends in society, and positing future developments in view of them.

The question asked here is whether information systems used at mega-games really produce a worthwhile return on investment in terms of material and human resources. To be facetious: wouldn't it be easier – and cheaper – for everyone just to use plain old pens and paper to write everything down on and share information with each other that way? Are we really better off at the end of the day? Creating a model to test and guide the development of real-life systems will hopefully provide some answers to these questions.

1.1 The changing role of sport in society

To notice the gigantic changes in sport since early times one only has to look at the history of the Olympic Games—the event that is without doubt the embodiment and metaphor of sport from its earliest roots to its present globalised form.

Changes wrought in sport – the Olympic Games[5]

The first recorded Olympic Games took place in 776BC as a religious festival, and consisted of one event, a 200 yard stadium race. The only prize was an olive branch, and women were not allowed to participate. The Games gradually grew in status, drawing spectators from afar, and became an inspiration for poets, artists, and storytellers. Metaphysics and art expression played a large part in the proceedings and in the very existence of the Games.

In its modern form the Games was revived by French aristocrat Baron Pierre de Coubertin, who believed that the Games could serve to promote friendly relations between nations. The first modern-day Olympics took place in Athens in 1896 and was attended by 12 countries.

By 1924, the number of participants had risen to 4,000 athletes from 44 nations. In 1932, the first photo-finish technology was used at the Games. Despite political differences participation grew rapidly—more than 160 countries took part in the 1992 Barcelona Games.

Organisationally, the Olympic Games has grown into a complex enterprise that draws in the totality of a hosting city. During the 2000 Olympics in Sydney, more than 9,120 administrative staff members, and 46,967 volunteers were employed to help manage the many aspects of the Games. At the 2004 Olympics an estimated 200,000 participants of all types had to be accredited.

Worldwide spectatorship of the Games through electronic media dwarfs the number of onsite visitors, with 'per event' viewership time estimated at over 40 billion hours.

[5] Statistics and facts in this section are taken from the following sources: Fisher (1995); Meridian Management SA, 2004; Olympic Marketing Matters 2000 & 2001; McDougal, 2003, Wakefield, 2004; Phillips, 2004.

The 2000 Olympics was also dubbed the first "mobile Olympics", with Samsung supplying more than 25,000 mobile phones to Olympic Games volunteers. More than one million mobile phone calls were made on the two most important days of the Games. Other statistics, such as the 4,800km of optical cable laid down, show how far the Games has come since 1932, when the telecommunications infrastructure consisted of twenty-eight telephone operators on two switchboards.

The Olympics is not just a technological innovator; it is also a global issue thermometer. Reflecting global security concerns since 9/11, the 2004 Games had a record 70,000 policemen all linked via satellite global positioning systems. The organisers also opted not to use the latest computer technology – wireless networking – for fear of security breaches.

Today sport is a major content provider for electronic media, with the latter adding millions of people to the audiences of international sporting events. In a world where product brand identity has taken over from manufacturing as an economic driver, particularly in the leisure industry, sport is one of the primary carriers of the trademark message.

Add to this on-track performances that ratchet up the records year after year, boosted by new advances in everything from diets to shoes, racquets, and balls. In the 1900 Olympics the pole vault was won with a height of 3.3m. In 2000 the winning height was 5.9m—an improvement of almost 90%. The quest for going higher, further, and faster in the pursuit of new records in sport is driving the development of technologies that – sometimes controversially – makes the difference between winning a gold medal and not making the podium at all.

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The history of sport is closely linked with social, economic, and political changes in society over time.[6] Before the advent of modern times, sport was primarily an informal recreational pastime done for relaxation. The societal changes that benefited the growth of organised sport began with the rise of industrial society and its concomitant philosophical principles, including equality, rationalisation, and specialisation. These were reflected in sport through things like the developing of rules, setting of timetables, and so on. In Renaissance societies, sport was largely a pastime of the aristocratic classes—something in which only the well off and privileged could indulge. The type of sport people played was dictated by their social class. In Marxist terms one can generally say that sport was a function of class society

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[6] Townson, 1997

indicative of the imbalances that existed. To quote historian George Macaulay Trevelyan: "*If the French noblesse had been capable of playing cricket with their peasants, their chateaux would never have been burnt.*"[7]

The rise of a middle class in industrial society began the process of breaking down class and economic barriers, as people gained mobility and access to opportunities that had previously been artificially limited. The result was the 'massification' of sport, as spectatorship grew and the diversification of the types of sport played increased. In socialist states sport became a political weapon used to demonstrate the might and power of the classless society. While it is not linked to industrial development *per se*, South Africa's exclusion of the majority of the population from active participation in sport was a highly visible indicator of the inequalities that existed until the fall of Apartheid. Since then the overall participation numbers in South African sport has jumped significantly.[8]

Maguire[9] defines five historical periods of sport development that support the present analysis. The first, starting in the early 1700s, saw the emergence of sport in organised form. Subsequent stages see the advent of urbanisation as well as colonialisation, culminating in the present era where he highlights the influence of feminism and professionalisation on sport.

Moving on to the present day, the growth and increasingly high profile of sport, as illustrated in the Olympic Games example above, is a reflection of a major shift in society away from industrialism to one where services and leisure are the predominant activities in a globalised, networked economy.[10] This trend has changed the face of sport significantly during the past two or three decades.

This societal shift was first named in the late fifties by sociologist David Riesman, who coined the term 'post-industrial society'.[11] Later authors such as Daniel Bell[12] and Alvin Toffler[13] wrote about fundamental changes where the services sector in first world economies were becoming the predominant employer. Manufacturing, the driving force behind industrialisation for more than a century, was slowing down.

More importantly, post-industrial society was characterised by 'post-scarcity'—for the first time in history the general population in these societies were able to generate a surplus to

[7] Howard, 1986
[8] According to statistics from the 2002 SportTrack report, sport participation among the black population more than doubled between 1990 and 2001, while more or less remaining constant among the white population.
[9] Maguire, 2004
[10] Jones, 1983
[11] Riesman, 1969
[12] Bell, 1976
[13] Toffler, 1980

the minimum necessary for sustaining themselves materially. Sport as a recreational activity directly benefited from this, and thus sport participation became an everyday experience.

At the same time major changes in the work and labour patterns of these societies were taking place. Increased machine automation in manufacturing lead to job cuts. Robots took over mechanical processes done manually during the early stages of industrialisation. Then in the post-World War II era came the information technology revolution that displaced not only physical human power, but also mind power.[14] Specifically, administrative and communication processes performed by human beings were taken over by communication and information technologies.

The net result of this is that the average working day is shrinking and people have more time to spend on leisure activities. Studies in England, Canada, and Australia confirm that around 75% of their populations participate in sport and leisure activities, although this has dropped recently, due to the growth of leisure alternatives such as video games.[15] Not only that, but people have more time to follow sport by going to sporting events, following it through the media, or joining fan clubs.

Apart from the increase in leisure time there is a second, related reason for the high profile sport has in modern society. The boom in information and communication technology, especially television, gave birth to the information society as a subsequent stage in societal development as described above. One of the characteristics of this era is the growth in multi-nationally owned mass media and its associated global reach and richness in content. For example, the first televised 'sport spectacle' is claimed to have been the 1946 Joe Louis-Bill Conn heavyweight title fight, which was watched by 150,000 people. By comparison the 2004 Olympic Games attracted an estimated television audience of four billion viewers.[16]

Sport makes up a significant part of this content. Many international media conglomerates, such as News Corporation and Time Warner, not only own television networks, newspapers, and other mass media outlets, but also the broadcast content. This is most often in the form of sport broadcasting rights that give them exclusive privilege to televise sporting events that generate considerable income in the form of advertising and distribution fees.

In South Africa, seven of the two-dozen or so digital satellite television channels exclusively carry sport content, which shows the importance of sport as media content. DSTV

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[14] Rifkin, 2000
[15] Sport Canada, 1998
[16] Meridian Management SA, 2004

owns most of these channels through the SuperSport brand, while SuperSport is also a major sponsor of several types of sport, and has a business interest in the SuperSport United soccer club.

In addition, sporting events and their participants are turned into tradeable commodities that sometimes hold huge value. For instance, these 'properties' take the form of endorsements by world-renowned star personalities, fashion design and branding, and world-class events. The English football club Manchester United is even traded on the British stock exchange.

In summary, two factors – less working hours, and the rapid development and convergence of information technologies hungry for exciting content – are the prime movers behind the growth of sport and it becoming a major part of everyday life in industrialised societies. In the broadest sense, these are also what gave rise to the mega-game, as we know it today.

1.2 Mega-games in the present network society

On closer inspection, mega-games also mirror other more subtle features and characteristics of today's globalised world. It is particularly the meaning of space and time that has been radically altered by information technology. Using sociologist Manuel Castells' work on the network society and changes in the nature of space and time, we now apply some of the principles he formulated to see how mega-games are in fact reflections of major trends in the informational world.[17]

Before introducing these principles it is worthwhile to examine the borderless world of high-level international mega-games. These events take place against the backdrop of a global complex of international sports controlling organisations, national representative bodies, multinational sponsoring companies, media conglomerates, and merchandising license holders. These stakeholders are not based in one location, but spread out around the world, connected by electronic lines of communication and logistics that are characteristic of the network society.

Returning to the example of the Olympic Games, the controlling body for the Olympic movement is the Lausanne-based International Olympic Committee (IOC), whose members and partners are the national Olympic committees of 201 countries around the world, for example the National Olympic Committee for South Africa (NOCSA) locally. The Olympic committees work with the national sports federations, who control the individual sport codes

[17] Castells, 2000

that form part of the Olympic family of sports such as swimming and athletics, as well as other stakeholders, including financiers and drug control authorities. These in turn deal with athletes, coaches, administrators, and other local stakeholders in their particular spheres of interest.

The IOC also has contracts with leading multinational sponsors, including Volkswagen, Nike, and VISA, all of whom have paid millions of dollars for the rights to exclusive exposure of their products during the event. The Olympics is broadcast via a network of international and local television networks – a total of eleven, at the 2004 Olympics[18] – who all pay fees for the right to broadcast the Games in different countries.

The culmination of the above is a two-week-long event held in a major city, in a different country every four years, but which many of the role players who have an interest in its success will probably not attend.

Sometimes it is hard to believe that the physical experience of a few thousand athletes performing their sport for ten days can have an economic and informational impact of such magnitude, most of it manifesting in a non-physical, virtual world. For the majority of people who know about and have seen scenes from the Olympics, the experience has been virtual, mostly through television images, a branded T-shirt, or product endorsement by a gold medal-winning athlete. This disconnected reality is an example of what Manuel Castells calls *"real virtuality"* –

> *It is a system in which reality itself (that is, people's material/symbolic existence) is entirely captured, fully immersed in a virtual image setting, in the world of make believe, in which appearances are not just on the screen through which experience is communicated, but they become the experience.*[19]

The truly successful international level sporting events are the ones that leverage real virtuality most extensively, in order to reach the biggest global audience and show the largest return on investment for its stakeholders, many of whom have nothing to do with sport in their day-to-day business.

Host cities – sometimes a space, sometimes a place

Expanding on the idea of the network society, Castells describes physical location as a *space of flows* rather than a space made up of geographical realities. The global importance of a place – in particular an urban complex – is determined more by its position in the flow of

[18] Meridian Management SA, 2004
[19] Castells, 2000

information internationally, rather than its geographic location. The more peripheral a city or country is in the information network, the lower its ranking as a place of note will be.

Cities in countries that host major international sporting events fit well into this space of flows, as Castells describes it. The city where a particular event is held – and these locations are determined many years in advance – is less determined by its physical location than its place in the information network.

Firstly, the candidate city should have the necessary network connectivity to communicate with hundreds of stakeholders spread across the globe. It must have the skills and know-how to build the necessary infrastructure, plan and execute logistics, and demonstrate that it has an adequate telecommunications infrastructure to ensure that the event is broadcast flawlessly to billions of television viewers worldwide. And above all it must show that it can generate the funding to pay for it all, even if it means – as in the case of Greece – increasing the national deficit.[20]

What this also means is that to be excluded from the network is to be denied access, to a large degree, from the benefits of hosting an international tournament with its accompanying spin-offs of increased tourism, prestige, and international exposure. That's why the cities where the Commonwealth Games have been held previously include Kuala Lumpur, Auckland, and Edinburgh, but will, for the foreseeable future, not be taking place in Zambia, Bermuda, or Cyprus (all participating countries). Of particular interest is the awarding of the 2008 Olympics to Beijing, probably an indication that the Chinese capital is firmly en route to joining the global network society.

It is also important for the participating countries in the event to be effectively plugged into the global sporting network, the hub of which is the event located in the host city. This means that each participating team should have access to first-class training facilities and know-how, and be backed up by a near-perfect management team able to provide optimum support, so they can perform at their peak when the big moment arrives. Ironically, the resources for these are located outside the participating country; for instance, promising athletes often train at universities located outside their home country because that's where the best facilities are available.[21]

[20] Lunsche, 2004
[21] Heyns, 2004

Sport sociologist Joseph Maguire refers to this process of globalisation of sport as "*sportisation*" within a network of global flows.[22] His critical appraisal of the way sport fits in with the global order is evident in his reference to global sport as a "*sports-industrial complex*", an allegory of the military-industrial complex, referred to in a famous speech by USA president Dwight Eisenhower in 1961, in which he warned against the cold war military-industrial build-up of the time. Maguire mentions the dominance and growth of achievement in sport in contrast to sport as a communal activity, which can also be interpreted as an impetus for the growth of large, competitive sports events.

Part of the contribution of this thesis to the world of information management is to refine a system that will hopefully enable a participating team, and the organisations behind them, to effectively and constructively plug into this network in order to contribute to on-field performance in a definable way.

Of course the host city still has to deal with bricks and mortar issues, such as transportation, infrastructure and facilities, and accommodation. Without these an event of this scale can obviously not be a success. Events that are one hundred percent virtual are not quite with us yet! However, it is the impact of the event, both on and off the field, which has become primarily informational, just as the global macro-community has. The thread that ties it all together and ensures its success and impact is virtual, and has no physical centre.

Timeless time

Castells devotes a chapter in his book, *The Network Society*, to describing a new meaning of the concept of time, and particularly how the relationship between space and time has changed in the informational age.

In everyday language time normally depicts a series of events that happen sequentially. Everyday occurrences such as appointments, deadlines, and birthdays are socially programmed or biological sequences that give order and structure to our lives. They presuppose that either there is a time lapse between events, or that a certain amount of space separates two events from taking place, therefore inducing a time difference.

While the above is still valid in the physical world, the information age has also introduced the notion of *timeless time*. The introduction of electronic networks and the twenty-four-seven availability of information in a multitude of channels and formats – the heart of the space of flows – has induced, in Castells' words, a "*…systemic perturbation in*

[22] Maguire, 2004

the sequential order of phenomena..."[23] This means that it is no longer a given that we will experience things as they happen. Events are recorded, stored, and played back at any time, and in any sequence, rendering the time and place that they occurred inconsequential.

Reality television shows such as Big Brother are good example of timeless time. You can watch it live anywhere, twenty-four hours a day. Switch on anytime, and you can see it happening. But you can record and watch the best scenes at your leisure, over and over if you wish. Or you can choose to watch the highlights later; at any one of a number of times the network schedules it to be screened. You can vote anytime online or by phone for the next person to be evicted, but only once a week, at a certain time, does the eviction 'ceremony' take place.

It should be clear that while some events are scheduled, others are not bound by time or space at all—they can happen anytime, anywhere, as long as the user/consumer is hooked into the network. Again an example from sport: the electronic umpire. A human umpire in a major rugby or cricket match can request that a sequence be played back over a large screen format before making a decision. In some cases electronic umpires have even overturned the decisions of human umpires.[24] Time, as a factor in decision-making when the activity takes place, is therefore removed.

On one hand the whole process of staging an event such as the Commonwealth Games is one of synchronising project timelines—everything from the delivery of T-shirts to the start of the 100m hurdles for men is run according to clock time. On the other hand, to be truly successful, a mega-game IMS must be able to deliver the correct facts and figures to people that need it, wherever they are, at any particular time. In other words the real trick is to separate information from conventional space and time.

Such fluidity makes for an extremely complex operating environment, in which no information management system is ever perfect, nor is it static. There are simply too many variables that play a role in it to guarantee a system that will work one hundred percent of the time, for everyone. Instead rapid changes in technology and developments in the subject matter itself ensure that it is a continuous learning process rather than a goal in itself. The objective here is to focus, through the development of a model, on the key areas and factors that make a substantial positive difference in the operation of such a system—an eighty-twenty principle—and to point to areas that are critical for its proper functioning.

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[23] Castells, 2000
[24] Tester, 2004

1.3 Mega-games and the teams that participate in them

In the previous section we described the nature of sport in modern society; now we begin focusing on the characteristics and challenges of mega-games that have an impact on information management.

1.3.1 Characteristics of mega-games

A brief picture of the biggest mega-game in the world – the Olympic Games – was given earlier on, showing how societal changes are reflected in sport. From those discussions we can now distil certain characteristics that make mega-games unique, play a role in the development of the IMS model we'll be tackling later, and are also precursors to the case studies presented after that.

Geographically dispersed

Because mega-games take place in major cities worldwide, there are in each case a number of geographical factors that impact their organisation, such as travelling distances, time zones, and so on.

Let's look at the influence of differing time zones, which may have a major effect on the operation of a team, directly and indirectly.

Time differences also play havoc with television scheduling. Should the time difference be substantial, it means live television coverage is either very late at night or early in the morning, as was the case with the 2002 Soccer World Cup held in Korea and Japan. Since the Games took place in a region where soccer is not a major sport, it also impacted on the fans that had to make special arrangements to watch live matches.[25] This means that sponsors don't get a return on investment due to smaller television audiences.

Even in the case of preparing a national team, geographical location plays a role when it comes to first-class competitions. Often the potential star athletes that form part of the team are resident in countries outside their country of origin. Many of the team athletes are international in stature, meaning that they live overseas while studying, or spend most of their time living in Europe or elsewhere where they compete during seasons. Yet their movements and requirements have to be coordinated from the home country base in order for them to be in the event city on time to participate. In addition, the locally based team members come from different provinces and cities—a situation that poses its own logistical challenges.

[25] This had a major impact on the television watching habits of soccer-mad Brazil (Vickery, 2000).

The team from the host country inevitably has a distinct competitive advantage in a mega-event—this was evident in the success of the South Korean team in the 2002 Soccer World Cup.[26] Apart from playing in front of their home support base, they also have the benefit of being in close, 'in the flesh' contact with the central organising office.

Geographical dispersion also implies cultural diversity. Sometimes the home language – and therefore the one most commonly used – is not spoken by most of the visiting teams, causing potential communication problems. Issues such as food preference, religion, and everyday social rituals also come into play.

In addition, because mega-games are multi-sport events, the venues are almost never together; each sport needs a special field, court, or facility with certain features and amenities.[27] This means there has to be a means to distribute and collect information from venues that may be many kilometers apart.

The implications for information management should be clear. Apart from technical infrastructure challenges in terms of telecommunications, information gathering, and distribution, is a diverse task that requires careful planning and integration.

Organisationally complex

It is widely held that the increasingly turbulent and fast changing environment in which we live makes for organisations that have to deal with constant change and shortened decision-making processes.[28] The increased complexity organisations have to deal with is also reflected in mega-game projects.

Their complexity stems both from the many levels of organisations concerned (local, provincial, national, and international), as well as the range of organisational types and functions involved. Event management in general has a particularly wide range of supplier organisations, from security to marketing, catering, medical, and infrastructure. While national team preparation is not as extensive in scope as organising a complete, high-level event, it also has a broad supplier base, and what's more, it is deadline driven. For instance, the Team SA project for the 2002 Manchester Commonwealth Games consisted of 535 tasks, divided into twelve key performance areas (of which only one dealt explicitly with

[26] South Korea beat Italy, one of the strongest soccer-playing nations in the world, in the second round, and then continued to the semi-finals where they were beaten by Germany. It was the first time ever that an Asian nation has featured among the top four winners.

[27] The 2004 Olympic Games had 35 venues in an approximately 20km radius, according to www.athens2004.com.

[28] Malhotra, 2000

information management, although it was implicit in many more).[29] Imagine how long the task list for the Games itself must have been!

Mega-games also have to deal with organisations on different levels, ranging from local neighbourhood clubs to high-level governmental institutions, from athletes who may have never travelled outside their hometowns to political figures that demand exact protocol and procedure. This requires extra skill and effort in realizing the type of communication and relationship handling appropriate to each of them.

Organisations that manage mega-games and teams not only have a limited life span, but also change dramatically in size as the project is convened, grows in anticipation of the event, and reaches its peak at the event. In both the cases of the 2002 Commonwealth Games and the 2000 Sydney Olympic Games the technology and information teams grew from less than half a dozen people to a few hundred, only to be dissolved completely after the Games.[30]

Organisational complexity has a definite effect on an information system. The more diverse pieces of data there are, the more involved the cross-referencing and analytical processes become. Creating common denominators and standards are a greater challenge. More care has to be taken in the design of such system to ensure that what it produces is meaningful and coherent in the face of organisational diversity.

The role of time

While in a global sense a mega-game may be timeless, the importance of deadlines in *staging* a mega-game means that information vital for its success is closely linked to fixed timelines. The event has a start day and a planned ending, and within those dates many individual items are scheduled. There are expectations that certain things will happen at certain times. The progress of the event, from the time that it is first announced in what city it will take place through to the closing ceremony, is dependent on these expectations being fulfilled punctually. In the project plan this is referred to as the 'point of no return'—the moment when, if an event does not take place or a task is not fulfilled, that action is no longer effective or useful.[31]

Synchronising the many interdependent tasks and actions that have to take place in the organising of a mega-game means that different timelines have to be 'connected' and adhered to. In doing this different pieces of information have to be available at specific times to ensure continuity.

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29 Interview, Van Oerle
30 2002 Commonwealth Games Final Report; Toohey & Halbwirth, 2002
31 Interview, Van Oerle

For example, the domicile information of each team member has to be recorded, in order to book his or her airplane tickets to Johannesburg in time. From there the arrival times need to be synchronised so that they arrive on time in the host city to acclimatise and prepare. In between there are many factors that have an impact on timing, from the traffic conditions to and from an airport, to check-in and border control delays. There is an order of events in which timeous contribution and processing of information is essential if this order is to be maintained and meaningful reports made available.

Then there is the 'timeless' aspect of time, as described earlier. In an environment of global audiences and operations that stretch across time zones, information should be available twenty-four hours a day, seven days a week. Searching unnecessarily for information that should be at hand costs time. Here the 'fingertip availability' of data that electronic information systems enable, goes a long way to making deadlines easier to meet and helps to avoid bottlenecks.

Technologically sophisticated

As was seen before, technological progress is perhaps the most important reason for the growth of mega-games. Technological advances are continuously integrated into mega events; in this sense they are mirrors and applications of the spiral of innovation characteristic of the informational society.

On the sports field, technological advances mean fiercer competition and the ever-present possibility that a record will almost inevitably be broken in a sometimes-spectacular fashion. Electronic measuring equipment is making split-second photo finishes possible to within a hundredth of a second. Specially designed wheelchairs and other supplementary devices are turning disabled athletes into super-athletes. Decision-making is also influenced by electronic umpires in many major sports, now allowed to override a human umpire.[32]

The rules of sport are continuously tweaked to make it more exciting to follow on electronic media, to the point where 'sporting activities,' such as Gladiators and the Eco-Challenge, are now being developed specifically for broadcasting, with virtually no audience present.[33] Off the field, fast and efficient mass travel, telecommunications, and many other technologies keep fans in touch with their sports heroes and ensure that they can – relatively effortlessly and reliably – be part of a major sporting event, no matter where they are.

[32] Tipping, 2002
[33] Donaldson, 1998

Information management technology can be seen as the oil that lubricates the gears of mega-games, helping to ensure timeous delivery and control, rather than having a particular effect on either the players or the audiences, or the interaction between the two. Yet the scale and complexity of mega-games would not be imaginable if electronic means of collecting, analysing, and distributing information within mega-game projects were not available.

Mega-games have cycles

Very few mega-games are one-off affairs. Almost all of them have a cycle of between one and four years in which they take place, mostly at a different venue each time.

The fact that they repeat in a uniform cycle has tremendous implications for information management at these events. Repetition means that the experiences and lessons learnt at one event can easily be transferred to the next, without having to reinvent the wheel. It gives tremendous power to teams and organisations using information management as learning experiences and to create knowledge bases. In reality, however, this has to date seldom happened with mega-games, as will be seen later.

1.3.2 Information management challenges at mega-games

There are many information-related issues that can cause problems before and during mega-games, even in events that have huge budgets for highly sophisticated systems. As will be seen, these issues are less often human rather than technical, which gives further impetus to the multi-dimensional approach which will be taken in the model, giving equal attention to the human, content, and technical aspects of the IMS.

Managing information diversity

One of the most challenging tasks is managing the diversity of mega-game information in source and in content type. In particular:

- Information supplied to mega-game and team organisers comes from a wide range of sources that are geographically spread out. Stakeholders have access to different means of communication – some have access to email, others prefer fax, some are easily reachable by cell phone and some not – and these all have to be catered for in the communication process. There are layers of responsibility and filters that information passes through before it gets to the people who will be compiling it. The more of these there are, the greater the chance of error and miscommunication.
- Information changes often. For instance, athletes fall ill or get injured, which means that replacements must be chosen and integrated into the system.

- Each aspect of the event or team has a unique and discreet set of information. From clothing to travel arrangement, accommodation, and results, each has a uniqueness that has to be accommodated in a meaningful way. Each sport comes with its own set of rules, scoring, judging, and other criteria. Athletes from each have different requirements and sometimes-unexpected requests that have to be recorded in the system.[34] The information that will be handled is therefore dissimilar, and there are often no obvious standards.

Ensuring integration of role players

Following from the wide range of information that has to be accommodated, it stands to reason that standards are vital in order to keep the structure of the system manageable, while still ensuring that the essence of the information it stores, and the context thereof, is not lost. This requires a fair amount of knowledge of each component and an analytical approach that can identify commonalities and linkages that can be used to create a system that will achieve this.

If all technologies and role players in the event do not have a common language and frame of reference to guarantee trouble-free communication and information exchange, integration cannot take place.

As far as the selection of technology is concerned, mega-games are run on time-critical systems where failure can have unthinkable repercussions. Much of the information management success of the 2002 Manchester Commonwealth Games is apportioned to them deciding at a very early stage in the planning process to use standardised technology that meant stability, scalability, and hassle-free exchange of data between spreadsheets, scoring systems, online distribution, and more. This is in vast contrast to the 2000 Sydney Olympics, which used a number of different operating systems, thereby adding to the complexity of managing information.[35]

A human resources problem regarding integration that tends to crop up is lack of communication between the staff responsible for the information content, and those that do technical maintenance.[36] Technical people – those responsible for the programming and preparation of information systems – are notorious for having poor communication skills and providing inadequate systems documentation for the software they construct. This can lead to

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[34] For instance, special airplane seating and extra-long sleeping beds have to be arranged for basketball players. The equipment from some sports such as shooting also requires special transport arrangements, Interview, Van Oerle

[35] Microsoft case studies, 2000

[36] Leather, 2002

unnecessary time delays when errors occur, and also means that new staff members take longer to become skilled at using the software.

Lack of integration can also cause duplication of data. It may happen that two departments end up running two systems for the same data, because they don't know what each other are doing. This is costly both in terms of time and accuracy of data.

From the above explanation of the process of information gathering and sharing, it should be clear that if there is not proper co-ordination between the role players, much can go wrong. If it is unclear who is responsible for each part of the process, the information on the database will probably be incomplete, or out of date.

Data security and integrity

Compromising of data through technological failures or human error can obviously be disastrous for an event. Following are the major areas that can cause problems:

- Loss of data through hardware failure: Computer failures, while not necessarily damaging data itself, may mean that the data is not accessible to people who require it. It includes actual computer failure (hard drives, fans, processors) or cabling problems (bad connections, damage or disruptions to cables). It happens mostly in poorly maintained environments or where conditions are present that are not conducive to computers, such as excessive dust or humidity. It can be further exacerbated by poor or unavailable technical support, and instances where computer equipment is outdated and therefore spare parts are unavailable.

These would particularly be problems encountered where events are held in developing countries that do not have sophisticated ICT infrastructures.

- Loss of data through software or data failure: This occurs when a software program becomes corrupted, or the files containing data are damaged. This can be caused by physical factors such as unexpected power outages or hard drive failures. By its very nature, however, electronic data is prone to corruption.

  A major danger that has appeared with the growth in data distribution and exchange through electronic means is computer viruses. Viruses are small software programmes that travel through channels such as the Internet, email, and computer disks, and once reaching a new host computer, self-actuate and destroy 'healthy' data. They are an ever-present problem and there is no cure-all or lasting solution other than constant vigilance.

While data is sometimes retrievable by experts, the loss in production time alone makes safeguards absolutely necessary.

- Unreliable data and human error: For data to have maximum value it should adhere to pre-determined contextual and syntax rules. Sometimes data sets (for example, biographical details of a person, consisting of 15 different fields, such as first name, date of birth, street address, etc) are left incomplete if the database doesn't force the user to fill in everything that needs to be completed. Common data capturing errors, such as spelling mistakes and fields filled with incorrect information, can cause incomplete search results. Sometimes databases don't have mechanisms that prevent users from inadvertently changing or deleting data. Lack of co-ordination can also mean that users may not be aware of the changes and additions that others make, leading to incorrect information or duplication.
- Data security: Data security, especially on public networks such as the Internet, is a highly contentious issue in the information-driven age, particularly after the 9/11 attacks and the common presence of computer virus threads. Often systems do not have mechanisms in place that prevent unauthorised persons from maliciously entering and obtaining or changing its contents. On the other hand, mechanisms should be in place through which public domain information from the system is easily accessible—an opaque system is just as ineffective as an insecure one.
- An issue that is becoming increasingly important in the aftermath of the controversial failure of American corporations such as Enron – due to mismanagement – are regulatory and governance issues. The availability and transparency of data is important for auditing purposes, and may also be required through regulation. For instance, the IOC has written a requirement into the 2008 Beijing Olympics agreement requiring the organisers to keep records and archives of all documentation.[37] These prescriptions therefore indirectly place certain responsibilities on the hosts of a mega-event or team IMS.

Issues of complexity and access

Mention was made previously of the increased pace of environmental change and the effect it has on organisations. A challenge for information management is to keep track of changes happening in the environment and not fall behind or become redundant—to become

[37] Toohey and Halbwirth, 2002

'effective anticipators'.[38] It requires innovative processes and managerial agility, aside from the concomitant higher expectations of technology.

In this regard the first challenge to deal with is changes in technology. Technological advancement is best described by what is colloquially knows as *Moore's Law*, a notion first raised by Gordon Moore in 1965.[39] In his paper Moore stated that the "*cost per (electronic) component is nearly inversely proportional to the number of components,*" meaning that computing power becomes cheaper as it grows in strength.

The inevitable result of *Moore's Law* has been the software upgrade spiral, which sees a new, improved version of popular software such as Microsoft Office, which included the popular MS Word word processing package[40] becoming available at regular intervals, making the older versions and associated out-of-date hardware redundant. These have cost implications, as organisations have to invest in equipment and training of personnel. For a mega-games organisation such as the South African 2010 FIFA World Cup Bid Committee this scenario has major implications as it begins planning for an event which is still a number of years away, making it very difficult to do technology infrastructure planning.

Not only do organisations have to deal with technical complexities, but its people must also deal with issues concerning information content and the effective use and access thereof. One of the major problems of the information era is that of information overload, or what David Shenk refers to as "*data smog*".[41] Having too much data at our fingertips can cloud up matters rather than clarify it.

Secondly, having ever-increasing data and processing power at hand doesn't mean that the intended result – better decision-making – actually happens. It more often than not leads to what Richard Saul Wurman calls "*information anxiety*",[42] the feeling we get when having too much information leads to confusion and inaction. Users may also develop techno-phobia and a resistance to learning anything more than just the bare minimum. In other cases they will simply revert to a paper-based system because it is perceived to be easier to use and produces results faster than an electronic one.

Therefore attention needs to be given to issues such as access of content and the tools that exist to retrieve information. It could happen that there is simply too much information on offer within the system, and that the tools to analyse it – reports, search mechanisms, and so

[38] Malhotra, 2000
[39] Moore, 1965
[40] Version one of the popular MS Word text processing software first appeared as a DOS program in the late 80s, and has since had at least six major revisions, or roughly one every two to three years (Pratley, 2004).
[41] Shenk, 1997
[42] Wurman, 1991

on – are inadequate. The inevitable result is that it is simply easier to shout out a question to the room, hoping that someone else will know the answer, than look it up on a computer.

Thomas Stewart refers to this danger as "*over-investing in knowledge*"—using sledgehammer techniques in information management that ensure we drown in information, rather than having a definition of what we require to solve a particular problem or deal with a certain process.[43]

The bottom line is that in an information-intensive society people are easily confused by giving too much choice or feeding them too much information, especially if they don't have the corresponding decision-making skills and tools to decipher complex data.

Expecting the unexpected

The increase in dynamism and rate of change in organisations, and the role that information plays in those processes is increasingly being addressed through a move from techno-centric information processing systems to an approach that acknowledges the importance of the role humans play in this.

The core of this shift lies in the realisation that while machines are efficient at processing data and producing linear information, humans work best at creating knowledge.[44] In particular, it stresses the important role of knowledge generation and sharing in information management—an approach broadly known as 'knowledge management.[45] This new approach developed because the former copes best in areas of work with formal rules and predictable processes and activities, while knowledge management takes into account the knowledge generated and contributed by people. However, factoring humanness into traditional systems in order to help overcome uncertainties in information management systems is a challenge not easily met.[46]

One of the most awkward problems is capturing tacit knowledge in a system that is essentially suited for explicit knowledge. Thomas Stewart described the difference between the two types of knowledge as follows: Explicit knowledge is that which belongs and resides within a company (for instance, that which sits inside its reports and other documentation);

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[43] Stewart, 1999

[44] At this point the differences between *data, information*, and *knowledge* in the context it is used here should be made clear. Data consists of single facts, while information is formed once a relationship between one or more facts is established. Knowledge is information plus human experience. For example, the temperature is 28 degrees—a fact, or piece of data. It is 28 degrees, the sun is shining, and there's a cool breeze blowing, which makes for a perfect day at the beach—that's information. Remember to pack the suntan lotion to avoid getting burnt—that's knowledge.

[45] Malhotra, 2000

[46] Davenport, 1997

tacit knowledge is based in the individual, is intuitive, and made up of experience and observation.[47] The former is easily centralised and distributed through a system, while the latter is difficult to capture and distribute without the originator. Some authors even contend that anything representing emotion and experience is *impossible* to systematically represent, as is necessary in a structured information system, so alternative methods of representation must be found.[48]

Since knowledge management depends heavily on human resources management and 'social arrangements,' as Steven Denning[49] points out, this added dimension brings its own problems in issues of human relationships, such as leadership, hierarchies, and role definition.

Data continuity and value adding

Data continuity refers to issues concerning the transfer of information assets from one event to the next. In a study on information and documentation in the Olympic Games[50] it was found that seven out of sixteen Winter Olympics' archives were missing, while those of several summer Olympic Games were also nowhere to be found. While we touch later on efforts by the Olympic movement to overcome this, it was also found that only in the past two Olympic Games were there any attempts to transfer information resources from one Games to the next, and then even with mixed results. In the case of the 1999 All Africa Games all (paper-based) records are still locked away in a basement room at the CSIR in Pretoria, virtually untouched since the event ended five years ago.[51]

Ways have to be found of not only archiving mega-games information in an efficient way to preserve it for the future, but also for applying it at forthcoming versions of the event. This requires a mix of technologies for backing up data onto suitable media, as well as having the necessary skills to perform this task.

As will be seen later on, the main purpose of a mega-event IMS is the collection, storage, analysis, and distribution of information. These systems are typically not designed for strategic decision-making and knowledge generation, which limits their value.

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[47] Stewart, 1999
[48] McKinlay, 2003
[49] Denning, 2002
[50] Toohey & Halbwirth, 2002. An influencing factor in the Olympics is the technology sponsorship, held by the company who normally provides the computer infrastructure. At the 2000 Olympics it was IBM, but Atos Origin took over from them for the 2004 Olympics, causing a discontinuity in standards. However Atos Origin also did the infrastructure for the 2002 Winter Olympics, and transferred much of the infrastructure from there to the 2004 Athens Olympics (BBC News, 2004; Church, 2004).
[51] Personal observation.

Having built a picture of the world of mega-games, we're now ready to move on to the conceptualisation of a model of a mega-games IMS.

Chapter Two

A model for a mega-game information management system

To perform a scientific analysis of a real-world experience or phenomenon, a method has to be found that is appropriate for the type of phenomenon being examined and which, ideally, also takes into account the environment in which it exists. The scientific method utilised for studying mega-game IMS systems is model building, which for a number of reasons is appropriate here.

2.1 Why a model?

While models were historically first applied in natural sciences, the use of models in social science is well established and debated. In an epistemological sense, models are vehicles for learning about the world.[52] They provide this function, as is stated in various definitions of models,[53] through representation and simplified abstraction of phenomena in the real world.

While models are widely used to represent physical phenomena (for instance cars), its application here is semantic—studying phenomena through the use of linguistic symbols.[54] Although an important part of an IMS is tangible things like computer hardware, the model and its analysis is conceptual rather than physical.

There are a number of advantages to using a model for studying mega-games systems. In the complex world of mega-games one needs to narrow down and focus on the essentials in order to make sense. Models, as simplifications of reality, are ideal for this. Furthermore, because models are seldom end products in themselves, but rather evolve with the study material, they are particularly suited to dynamic phenomena, such as mega-games.

[52] Hartmann, 2004
[53] Muller, 2004; Stockburger, 1996
[54] Muller, 2004

Information systems used in preparation for and during mega-games are an ill-defined area of study compared to, say, project management or financial systems where there are clear benchmarks and design guidelines. This makes model-building an ideal method for examining them.

This is obviously not the first time a model of what is essentially a human communication process will be constructed. Many such models exist, of which the earliest and most well known is Claude Shannon's mechanical model of communication, which will be referred to later on. Models build on each other's insights and discoveries, adding additional angles and perspectives to a particular subject. There is no right or wrong in model-building, neither can models, because of their simplified or idealised form, be seen as a perfect representation of the world.

Model building takes place through a process of establishing the essential questions to be answered, finding resources and frameworks with which to build the model, and then validating it through testing data.[55] What we are doing here, therefore, is building a representation of the real world – a model – which contains the essential parameters which we believe are essential for an effective mega-games IMS, thus making the process of analysis manageable.

A graphic illustration of the process of model building – process of learning – that takes place during the course of this thesis was shown earlier on in Figure 1.

The four stages of model building used here are as follows:

In the first stage the phenomenon that the model represents must be described. In this case the characteristics and challenges of the world of mega-events are discussed in order to uncover the central issues that need to be covered in a model. This is done later on by looking at the characteristics and issues of mega-games.

In the second stage a model is built using a relevant theoretical framework. In this case the two frameworks applied to the model are that of intellectual capital—the systemic part of the model, and the information management cycle—the process part of the model. Using the information from the first stage and the theoretical framework of the model, a number of parameters are distilled and built into the model. These parameters are measurements against which a mega-games IMS can be tested to see how well an existing system performs.

[55] Frantz, 1995

The more one learns about a subject such as mega-games and IMS systems, the more parameters one would find to build in. However at some stage, as Stockburger states[56], one has to 'build the boat' on which the model is based, to see how it sails. Subsequent refinements can then be made.

In the third stage a number of case studies of implementations of mega-games IMS systems are taken, and the real-world performance results from each interpreted in terms of the model parameters. Forthwith shortcomings in the case study systems can be determined and perhaps rectified in future editions of the event, or in different implementations of the system.

In the fourth stage the model is refined by examining and applying feedback from the results of the case studies. Since the model is a simplification that does not cover all factors influencing the implementation conditions of an IMS, there may be important issues pointed out by the case studies which are not covered by the model, and which need to be incorporated into it as modifications or additions.

We have already covered the first of the four stages, which focuses on getting to know mega-games and the IMS systems that accompany them. The next stage is to build the actual model using the conceptual frameworks of intellectual capital and information management, which is discussed forthwith.

2.2 Building the model

As mentioned, the model proposed here is constructed using two conceptual frameworks, the one systemic and the other process-based. In the systemic framework mega-games systems are measured in terms of intellectual capital, using in particular the work of Thomas Stewart[57] as a reference. In a nutshell, Stewart describes intellectual capital as "*...knowledge, information, intellectual property, and experience*". Mega-games information management therefore fits quite neatly into the framework of intellectual capital, especially since the system totality implies more than a database of names and addresses on a computer.

2.2.1 Mega-games information systems as intellectual capital

Stewart identifies three types of intellectual capital. The first is human capital, and refers to the intellectual value brought to the table by individuals through their experience and know-how. Structural capital refers to things like computers and other infrastructure that have

[56] Stockburger, 1998
[57] Stewart, 1999

informational value. Lastly, customer capital looks at customers as assets, embodying value that can be unlocked through relationship building, and leveraging the information the organisation has about them.

At least two of these – human and structural capital – are of use for analytical purposes here. Mega-events don't have 'customers' as in the case of a commercial venture, but they do have information suppliers that have value. These types of intellectual capital are translated into three dimensions of a mega-games IMS, and form the basis for the model.

The three dimensions are:

- **People dimension:** Covers aspects of the system that relate to the people that will create and utilise it in any one of a number of ways. These include all stakeholders – even those who don't physically work with the system – but make use of its products and information downstream.
- **Content dimension:** Covers aspects related to the actual data that will be gathered and stored in the system, the processes it will undergo, and the formats in which it will appear.
- **Design dimension:** Includes the various software applications and hardware components that make up the system.

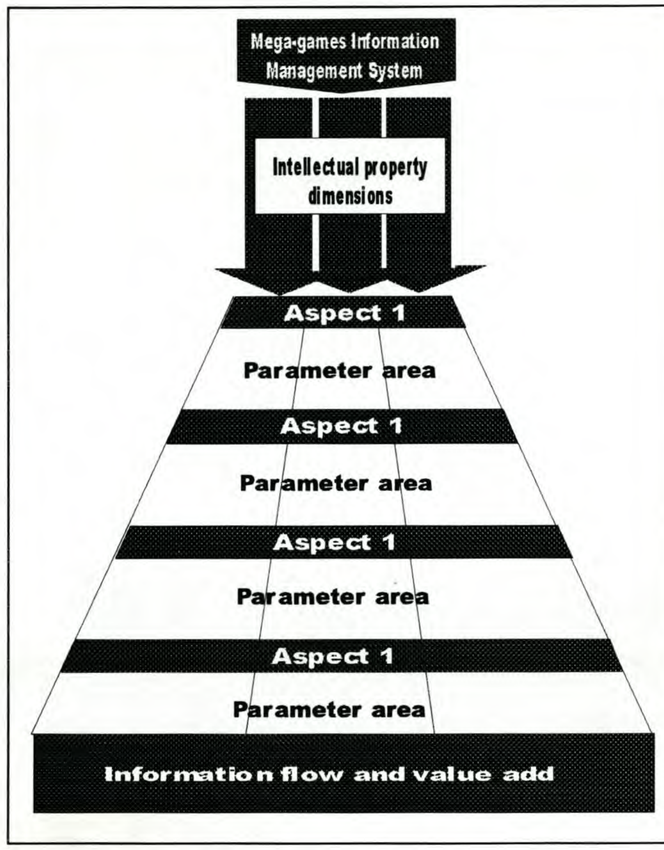

Figure 2: Schematic of the model.

An outline schematic of the model showing the three intellectual capital dimensions and its related elements are shown in Figure 2.

The dimensions are interactive and have an influence and impact upon each other. A limitation in one will cause a weakness in the other, while their strong characteristics will strengthen the whole system. The areas where the dimensions interact and influence each other are referred to here as *aspects*, of which there are four—comprehensiveness, sustainability, flexibility, and impact. Within each, research questions can be framed that tell us what we can expect to know at the end of the case study.

Each aspect has a *parameter area* that is shared by the three dimensions. In this area a parameter is formulated for each dimension as a statement relevant to a particular dimension. These parameters are used to measure real life IMS systems, such as the case studies here. Obviously if the model is constructed well it should be able to evaluate any mega-games system.

To make intellectual capital practical and applicable, the conceptual framework of each type of intellectual capital is discussed together with each dimension of the model. In that way the concepts are made practical and applicable, and it also leads to a better understanding once the case studies come under the spotlight.

Figure 3 is an illustration of the model with all the dimensions, aspects, and parameters in place, as well as indicating the information management cycle to be discussed later.

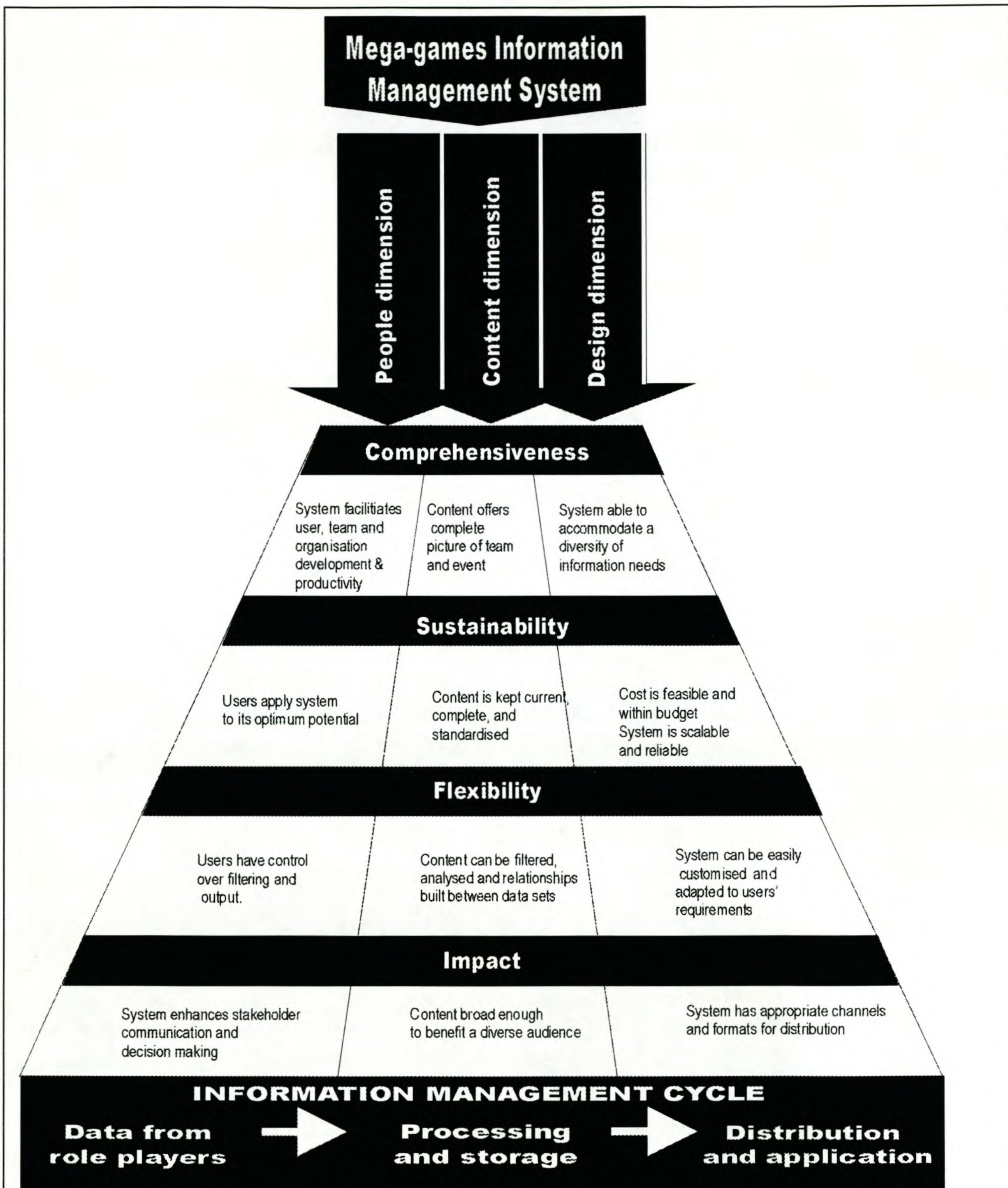

Figure 3: The mega-games IMS model.

The people dimension

Obviously the mega-game IMS exists to serve the needs of the people and organisations it is designed to benefit. Recall that mega-games have a wide range of role players involved in team preparation and presentation in some way or other. These people all have expectations as to what value they will gain from the system, as well as contributing something of their own that will add value to it. Among the role players are information suppliers, data capturers, the project management team, and the event participants themselves. Collectively they make up the human capital of the project.

On an operational level, the benefits for the stakeholders in the system lie in the typical features an information system offers: centralising of data, processing speed, and easy extraction and reporting—advantages computerised systems have brought to industry, which we can hardly imagine being without. But to avoid being caught up in the so-called 'productivity paradox'[58], these perceived advantages have to translate into tangible benefits for the users and role players, and inter alia, the organisation itself. To ascertain these benefits one would look at the relationship between the organisation, the users, and the system and pinpoint certain key parameters that would tell whether they all found it to be advantageous, regardless of how well the electronics worked, or how accurate and complete the content it hosts is.

One way of ascertaining this is to look for the formation of *communities of practice*. The nature of the groups of people doing mega-games information management is ideal for the formation and nurturing of communities of practice. The term, coined by Etienne Wenger from the Harvard Business School and widely commented and written on[59], refers to the way that people who are otherwise in hierarchical positions and diverse teams in organisations get together to share information and learn about a particular topic. Communities of practice are the "*shop floor of human capital*" as Stewart puts it. Through their working together they become a collective resource of knowledge and therefore adept at problem solving. In short, they can be a powerful contribution to the wellbeing of an organisation.

What sets communities of practice apart from other types of human groups in particular is the fact that they are self-organising, grow by learning, and are, in the words of

[58] The productivity paradox is a controversial phrase implying that investment and expenditure on computers is not justified by commensurate growth in economic productivity, a statement yet to be scientifically vindicated, but has nevertheless partly led to the growth in knowledge management as an alternative method of measuring return on investment in technology. See Brynjolfsson, 2003 and Brynjolfsson & Hitt, 1998 for a discussion on this issue.

[59] Stewart, 1999; Van Winkelen, 2003

Richard McDermott, "*driven by value, defined by knowledge*".[60] The latter means they provide value to members through the knowledge and know-how they possess and share, which has a knock-on effect for the organisation in which it takes place. They thrive in environments driven by change and innovation, such as the world of sport and technology described before. As with mega-games, their lifespan is also short, and they are often only formed for specific projects or tasks. The formation of such groups therefore can add a great deal of value to the system, through a combination of the system content and their experiences and insights.

Referring to Figure 3, the parameters relevant to the human dimension are as follows:

Comprehensiveness – *System facilitates user, team and organisation development & productivity*

Obviously users of the system should all have optimum access to it, or in other words have 'information at their fingertips', which will contribute to productivity and task completion. However, it should also contribute tangibly to the cohesiveness of the team and the ability of members to collaborate. It should add value to the team in ways such as increasing productivity by improving and speeding up decision-making, communication, and production processes.

The true value of an information management system lies in its contribution to the organisational knowledge base and the formation of a community of practice. The greater the pool of skills, knowledge, and experience in pulling off mega-game information management projects are, the greater the chances of successful future projects. To ascertain this, one would look at the qualities and deliverables of communities of practice, and the extent to which they are present in the human capital of a system. A number of these mentioned by authors such as Van Winkelen, Lelic, and McDermott include the formation of standardized best practices, the presence of effective leadership in the relevant managements, and practical factors that enhance or deter the free flow of information among members of the communities of practice.[61]

Sustainability – *Users apply system to its optimum potential*

For the system to be used optimally, all users should have adequate skills both in operating it as well as in managing its content. A training program should be in place that teaches prospective users how to utilise the system, but also makes them aware of the

[60] McDermott, 1999
[61] Lelic, 2001; Van Winkelen, 2003; McDermott, 1999

importance of accuracy of information, and other attributes essential for the system to deliver results.

Communities of practice can play an important part in facilitating learning. However, for this to take place the factors that play a role in the formation and sustenance of communities of practice should be present, such as a sense of community, adequate resources, leadership or co-ordination, and management support.[62]

The 2002 Manchester Commonwealth Games report mentions the importance of transfer of knowledge from one occurrence of the event to the next as one of the lessons learnt during the event.[63] The ultimate sustainability is therefore the continuity the project team creates by sharing their learning experiences with the team that will take over from them during the next event. Once again, a community of practice or knowledge base similar to the Olympic Games Knowledge Service mentioned by the Commonwealth Games report can help achieve this.

It is also important that the system be integrated properly into the event project plan in order to ensure that it has adequate support, both financially and materially. Project planning issues that need to be addressed include deadlines, dependencies, contingency plans, and understanding causal relationships between different parts of the information management. For instance, it means realising that certain data has to be in the system before others, by a certain date, in order for a particular goal to be reached.

Flexibility – *Users have control over filtering and output*

Users should be able to accurately extract from the system *precisely* the information they require, and control the output through methods such as filtering and selection of media. They should also be able to draw relationships between different data groups in the system, and create reports of it, if necessary. This doesn't refer to the abilities of the system, but rather to the users' ability to analyse their needs and conceptualise different permutations of data sets requirements. In common language: 'A computer is only as clever as the person using it'.

It may sound silly, but often project people don't know the system exists, or if they do, they only use a fraction of its full capabilities. Therefore awareness needs to be created among potential beneficiaries of what the system is capable of, and how it can make their work easier. Again, training and learning support groups play a major role in this process.

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[62] Lelic, 2003; McDermott, 1999
[63] Leather, 2002

Impact – *System enhances stakeholder communication and decision-making*

The system should include a careful analysis of who its stakeholders are, and how it can assist by keeping them in touch with each other through system functionality. This is not only dependent on technical features, but more importantly on stakeholder planning and ensuring that all of them interact with and gain value from the system.

These stakeholders consist of two broad groups of people. There are those who have direct access to, or interaction with the system itself, who are in most instances members of the project team. Then there are secondary audiences who benefit indirectly from the system, such as the mega-game organisers, media, and top decision makers, who can use the data for strategic purposes. For the system to work properly these two need to be in touch via channels that form part of the system, since much of the success of a mega-game or team participating in it is dependent on this co-operation. For instance, while athletes don't have anything to do with hands-on information management, they do need to be in touch in order to find out about logistical arrangements – managed by means of the IMS – that affect them.

Content dimension

The second dimension in the model – content – refers to the actual data and information contained in the system. This dimension is closely related to customer capital since content is mostly supplied by outside agencies. However, it can also be interpreted as structural capital, representing stock that, were it physical goods, would sit on shelves and in warehouses.

Data and information – the content of the system – is a critical factor in customer capital here. No one will care too much about the nuts and bolts of the infrastructure used to host the management system, nor will they be interested in who was involved in the project behind the scenes. But the accurate and timeous flow of information during critical stages of the project, such as flawless accreditation of participants, a steady flow of item results, and the availability of historical data and other analyses are the kinds of things that will be of value to them. To a large degree the information contained in the system plays a role in making all that possible.

The processes inherent in the mega-game IMS stockpiles data obtained from various sources. Before the information is put into the system, it resides within many different organisations and individuals, and the system-hosting organisation cannot lay claim to it. But once it has been collected and put into the system the resultant *information stock* is the property of the organisation, and is therefore an asset with value forming part of the overall structural capital of the organisation. Once there, it is up to the system design to enable mechanisms of storage, analysis, and distribution to ensure that the stock is put to work by the people who require it.

Comprehensiveness – *Content offers complete picture of team and event*

Comprehensive, complete data is essential as it is the only way an accurate representation of the teams and events can be obtained. To begin with, an accurate picture of all the information requirements needs to exist. Once it has been obtained, issues that need to be given attention include factual accuracy including spelling; correct formatting, for instance in the case of dates; and incomplete data such as first names without surnames. It is important that someone be responsible for taking care of these content issues.[64]

'Comprehensiveness' implies not only the *amount* of data contained in the system, but also the *kinds* of data the system can accommodate. Good information sets will include all types of data, not only text or numeric, but also multimedia if required.

Sustainability – *Content is kept current, complete, and standardised*

Information within a database system resides on two planes—horizontal and vertical. Vertically, the system can accommodate any number of records, for instance, ten thousand athletes names. Horizontally, a certain amount of information about each athlete, for instance, his or her demographics, travel arrangements, and participation can be kept in the system.

Estimates of the amount of data that will be hosted in the system should be made to enable meaningful statistical analysis of the system content, and to assist with the technical planning of the system.

For the system to be truly useful over a long period of time, data should be standardised so that the data available from one mega-game to the next is comparable. For instance, the measurement of time should be consistently reported in hours, minutes, seconds, and parts of a second. Therefore data standards should be set before the system is implemented. A clear picture of the types of data that will be used should exist to ensure that the system can cope with it from the outset.

Flexibility – *Content can be filtered, analysed and relationships built between data sets*

In this context flexibility refers to the extent to which data sets in the system can be manipulated and cross-referenced to form meaningful information. Data should be organised in such a way that relationships between data sets can be easily formed, and that a resultant

[64] Choo, 1995

query can be filtered to provide only the essential information required. Again, pre-planning is essential in ensuring that the results required can indeed be achieved.

Impact – *Content broad enough to benefit a diverse audience*

At the outset the question is whether the system will make a difference in the lives of the people who should benefit from it. The impact of the content will go a certain way to answering that question.

The data should be relevant to the intended audiences; too often large amounts of data is captured that in the end nothing is done with because it does not fit the intended purpose, or the output formats make it difficult to work with. The data available should answer the needs of the users, which should all be clearly identified, for instance, as media, operational personnel, participants, or the sporting public at large. Therefore the question of impact is largely an issue of relevance and appropriateness.

Sometimes the content is also relative to the channels, which are all used by a particular audience looking for certain types of information. For instance online websites lend themselves well to a rich mix of different types of content that need to be presented in an informative and interesting way to retain visitors' attention. On the other hand, printed reports intended for someone in charge of managing results may have a different rationale—such a person is looking for essentials that are easy to understand and interpret.

Design dimension

The design dimension refers to the computer system's software and hardware, items that have become ubiquitous in everyday work life. In most cases it is transparent to the user—we'd like to switch on the computer, call up the word processor or other software we use daily, and proceed with the work at hand. Yet the general mindset change that society is undergoing – the formation of an 'information consciousness' – would not have been possible without the technological revolution that has brought about the advent of omnipresent computing.

Thomas Stewart begins the chapter on structural capital – in this context, the computer and its peripherals – in his book *Intellectual Capital* with a section describing how everyone in a company is always searching for information that is somewhere in the building, but no-one knows quite where, and therefore spends days or hours locating it, or in the end, sourcing it from outside.[65]

Much the same happens behind the scenes at major sporting events. The technical mega-game IMS is an effort to create a central information depository with a major benefit—critical project information that gets generated at the run-up and during the actual event is available to everyone, anywhere, at any time. These two elements – the depository and the making available of vital intelligence – are the two purposes of structural capital identified in Stewart's book. If they can be implemented successfully, the chaotic scenario painted by Stewart will be avoided.

Structural capital simply connects the experts with knowledge. In itself it does not represent a direct benefit; it merely enables users to make more effective decisions during the project. It is most effective when operating in the background and does not interfere with actual operations. Thus a perfect system is one where the technical aspects are transparent to the user.

There are a number of criteria to keep in mind when designing an information system as structural capital. Some are mentioned by Stewart and are discussed below.[66] These factors are taken into account when designing the model upon which this case study is based.

Push vs. pull

This refers to two ways that an audience can receive information through a medium, particularly electronic media. In the push scenario information is fed to users whether they want it or not. This method of information distribution is most prominent in advertising—traditionally receivers of advertising messages have very little control over what they receive and what they don't. The growth of electronic information has made the indiscriminate distribution of information even more prevalent—think of the growth of junk email (spam) that has taken on endemic proportions, simply because messages can be sent to millions of users at the press of a button, at virtually no cost, since it is so easy to 'harvest' email addresses. The result is that a glut develops that makes it difficult to filter and apply information and turn it into knowledge.

The ideal solution is building a system that allows the user to 'pull' the information when they need it, and in the format best suited for that need. The push side of the equation would allow users to opt into mechanisms that allow them to get the kind of information they

[65] Stewart, 1999
[66] Stewart, 1999

require on a regular basis. So for instance, a website would have an option whereby visitors can join a mailing list and automatically receive an email each morning of the previous day's results.

The information under discussion here changes often and has to be updated frequently, and using a pull methodology means that users can access the latest changes at any time, minimising the chances of them getting confused between different versions of a report or document.

Much of this is dependent on the design of the human computer interface. This area of study is well covered with many research institutions[67] providing guidelines in this regard. For instance, the trend in larger, more information intensive screens (like the plasma screens now common in airports) mean that the scope for 'pushing' information to users becomes much more prevalent.

Put the user in charge

Linked to the principle of pushing customised information to users, or allowing them to pull what they require, are the ways one can give the user control over the format and content of the information they want. They should therefore be able to decide not only when they want the information, but also exactly what they receive, in the process untying the user from the time sensitivity of information, putting the user in the realm of 'timeless time'.

For example, out of twenty interrelated pieces of information, such as first name, surname, phone number, email address, birth date, province, and so on, a user may only require four to assist in completing a particular task. Secondly, their task is also made easier if they can filter not only in terms of the spread they require, but also in terms of its depth. For instance, following from the above example, they may only require the first names and surnames of male hockey players for Gauteng, drawn from a list of all participants.

However, putting the user in charge only pays off if the system offering them the choices is user-friendly, and the choices are not overwhelming and 'dense', meaning they don't make logical sense.

Is the system market-related?

The bottom line for an information system is that it must do what the users, or 'market' as Stewart calls it, wants it to do. Technology should not be used for the sake of technology, but rather to make the job easier.

[67] An example is the Human-Computer Interaction Lab at the University of Maryland, http://www.cs.umd.edu/hcil/

The answer is to use methods such as pilot studies and prototyping to test a system before it is committed to market. Any system should not only be tested beforehand, but also be assessed after an event to determine ways of improving it.

Following are the parameters in the model, as applied to the design dimension:

Comprehensiveness – *System able to accommodate a diversity of information needs*

Technically the system should be able to accommodate a diversity of information, as required by the mega-game project team. The fields in the database should be what the users require, and the formats should be such that meaningful reports can be extracted from them. For instance, distance fields should be in kilometers, meters, and centimetres, and time in hours, minutes, seconds, and parts of a second, as required by each event, in order to be able to make calculations and numeric comparisons.

Another important issue is that of hardware and software compatibility. There are a number of factors that play a role when deciding what software and hardware to use for this 'heart' of the system. The first is compatibility between the computers and software used by people involved in the mega-game projects, who have to exchange information in a common format. Fortunately, today computers based on Intel microprocessor chips using a common base language are by far the most common hardware platform used by small applications. So while compatibility was a problem in the formative years of personal computing in the early 80s, one can, in most cases, assume that desktop computers have the same hardware infrastructure, for the purposes of this study.

Software compatibility means that the desktop computers all run similar operating systems, and have the necessary auxiliary software – such as email readers – to perform the task at hand. While Microsoft currently has a virtual monopoly on desktop operating systems through the Windows platform, it is still a factor that should be accounted for in the system design and analysis.

Sustainability – *Cost is feasible and within budget; system is scalable and reliable*

Computer hardware and software have a particular life cycle that has an impact on compatibility, as discussed above. The development cycle of hardware according to *Moore's Law* has been highlighted before. There is a race between computer processor chip manufacturers, such as Intel and AMD, to constantly produce faster chips to run more complex software, while software functionality expands as computer power and memory increase.

This means that software and hardware have built in obsolescence, as different models of computers and versions of software constantly supersede older ones. On the hardware side, new technologies are constantly being introduced that have to be evaluated to ascertain their appropriateness in the circumstances they will be used. Matching peripherals such as printers, network systems, and online modems must also be taken into account.

Regarding software, each subsequent version of a software package requires a minimum hardware configuration, or it may not run satisfactorily. A software application designed for an older operating environment or slower computer configuration may or may not work with a more modern version, while an application designed for the latest computer configuration will most likely not work on a redundant or superseded computer.

Therefore it is imperative to ensure that the software application used for the mega-game information system and the available computer hardware are compatible. It is even more important, since the management application will most probably be run on a network with a variety of computer models with different configurations and operating platforms.

There are three other secondary factors at play here: what the system costs, whether or not it is expandable, and its ease of use.

- It is important that the budget for information management is sufficient to finance a system that will do the intended job. This should be established early on during the needs analyses to ensure that the budget, needs, and intended system are aligned.

- One can imagine that, as is common with information systems, the mega-game system will eventually outgrow its intended purpose. The database of team members may grow larger after it has been used during a number of events, or additional uses may be found for it. How easy would it be to reprogram or update the system's software to achieve this? Another issue is the aging of technology. The lifecycle of software is typically two to three years for a particular edition or version. What role will that play? Will it mean that the system has to be totally rewritten after three or four uses, or is there a 'succession' plan?

- The interfaces between the user and the data – input screens and other communication points between user and computer – should be as easy as possible to understand and operate. It should be as foolproof as possible, and not intimidating, since often system users have only a basic understanding of computers and software. A system that is difficult to understand and operate will probably be ignored by its users, who will simply invent their own systems of coping with their information needs.

An important part of technical sustainability is keeping a record of changes made to the system by the designer, as well as documentation of its initial construction. It often happens that when another supplier or member of staff takes over the job of looking after the system technically, they have to start from scratch, programming the system, because there is no record of how it was designed and built.

Flexibility – *System can be easily customised and adapted to users' requirements*

The system should be customisable in a number of ways to benefit users. Firstly, they should be able to set their own parameters and variable settings. For instance, they should be able to set the types of sports, names of participating countries or provinces, and so on with which they will be working.

Secondly, they should be able to specify the types of reports they would want to draw from the system, and what they would like to include in those reports; being able to cross-reference and filter different sections, for instance, the results of a certain event with their towns of origin.

Also, the system should give users the ability to make changes to date quickly and easily, including being able to make mass changes to a group of records in order to save time.

Impact – *System has appropriate channels and formats for distribution*

The system's technical ability to reach, and be reached, by everyone depends mostly on its ability to be networked and produce formatted data output.

Looking at its output ability, the systems should programmatically be able to provide output in print and electronic formats that suit all its users and beneficiaries, no matter what their level of sophistication may be. This ranges from obvious formats—simple printed reports for less sophisticated users—to being able to export data to spreadsheets and online web-based applications where the data can be manipulated further.

This completes the intellectual capital part of the model. What has been outlined is a suitable framework within which to evaluate mega-games IMS systems according to the essentials needed to produce systems that are effective and have the potential to contribute to the success of mega-games.

The second conceptual framework discussed forthwith is the information management cycle—the process that begins with gathering data through to provision and usage, and the ultimate impact it has on an organisation.[68]

2.2.2 The information management cycle

Conceptual frameworks of information management have their roots in the early history of electronic communication systems, specifically telephones. One of the first to emerge after World War II was the information theory of Shannon and Weaver, which proposed a simple sender, channel, and receiver process of information flow.[69] The impediments and bottlenecks alluded to in previous sections can be equated to what Shannon and Weaver referred to as 'noise'—factors that prevent the output from being equal to the input. This noise or interference can be in the form of either physical factors (for instance, problems with transmission lines or computer downtime) as well as semantic or message issues, such as language differences or mistakes occurring during data capturing.

Since then this rather simplistic information flow model has been added to and refined by many theories and models including those on mass media,[70] social psychology, and with the advent of computers, the ones exploring how organisations manage organisational information, particularly the digital type.[71] Among the latter is the model of information management cycles, used here as a conceptual framework to model a mega-games IMS.

The term 'information system' or IMS has been used fairly generally up to now. At mega-games a variety of different information and communication systems are used, from ones used to display scores on television sets to ticketing systems and highly sophisticated stadium advertising and scoring systems.[72] All use different technologies that perform various functions and have unique characteristics, yet they are all collectively the engine room that keeps the processes and flows of information going. To make sense of these seemingly random collections of technologies and systems we use a conceptual framework inside the model as an analytical road map, rather than examining the nuts and bolts.

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[68] This framework is based on the work of Choo, 1995.

[69] Shannon, 1948

[70] Perhaps the most well-known information flow model in mass media is the two-step flow of communication model, which describes the role opinion leaders and gatekeepers play in decisions individuals make based on media information. (Lazarsfeld, Berelson, & Gaudent, 1944)

[71] Fulk & Boyd, 1991

[72] The Manchester Commonwealth Games Post Games Report, Volume 3, Section B5 lists four technology clientele: Sport division (timekeeping, scoring, etc); Broadcast; Media; and Accreditation. It also provides a list of the areas of application and the outcomes that were achieved.

Information systems can be classified in a number of different ways. Note is taken here of three methods:[73]

- The types of information they contain. Since mega-game systems are not limited to a particular type of content, this is not an appropriate distinguishing factor;
- The types of technology or processing methods of the system. Any technology that does the job can be used, so this is also not relevant;
- The system objectives, which is the method used here, since the objective is unique within this context.

Based on system objectives authors most often distinguish the following information system sub-types:[74]

- Management information systems: Systems that have as their prime functionality the recording, storage, and distribution of information. Typically database management systems (DBMS) fall into this category, characterised by features such as means of data navigation and search-ability and relational linkages between disparate sets of data. The prime examples of DBMS based on specific programming languages include Microsoft SQL and Oracle.
- Transactions processing systems: These are systems that process transactions, for example, financial transactions, including accounting and financial control systems.
- Decision support systems: Systems that use modelling or other means to help decision makers solve unstructured and semi-structured problems. They tend to encompass a number of subsystems that can incorporate document management, simulation systems, or work group collaboration tools.[75]
- Expert systems: Systems that help managers diagnose and solve problems by means of a set of algorithms or rules about a very specific subject. The user is therefore a relatively passive participant in the process, as it is the purpose of the expert system to come up with solutions.[76]
- Office automation systems: These include word processors, spreadsheets, and related software through to specialised, custom-built software running common office equipment, such as fax machines and photocopiers.

[73] Gangolly, 2000
[74] Kelly, 2003, Mentzas 1994
[75] Finlay, 1994
[76] Yang, 1995

Although mega-games information systems have an element of decision-making support by nature of the types of information and reporting they have, their central function is that of a management information system, because its primary purpose is data storage, manipulation, and distribution.

Apart from this classification it is also important to note the scope of the system as a characteristic of a mega-game IMS. Based on the number of event participants contained in them, databases used at mega-games and for team preparation are generally comparatively small; they seldom host more than five thousand records consisting of one or two hundred fields, which in the general world of information systems used for instance at financial institutions is tiny.

The most obvious benefit of an information management system, therefore, is that it acts as a central repository for information that would otherwise be scattered around the organisation. It also acts as a communication gateway between different groups, allowing them to share and exchange information in a way that would not be possible without the electronic systems we have today. Through serving as an 'intellectual latticework' it also plays a part in the organisational and team learning processes, helping them adapt to changing environments.[77] All these benefits are very closely tied in to the information management cycle, which exists within the IMS.

Chun Wei Choo proposed a process-based approach to information management that would include linear steps through which information is gathered, transformed, and distributed, and that would form an information value chain.[78] Given that mega-games are chronologically process-driven activities with an advent, preparation, staging, and winding up, it would make sense to view its information management process in this way.

Other authors have also conceptually developed information management cycles. Dias[79] quotes the '7Rs of information management' of Butcher & Rowley, a cycle consisting of seven stages. However, this interpretation of the cycle is mainly applicable to information already existing in the organisation, particularly in electronic format, and is therefore not applicable here, where information gathering also includes data from a host of outside agencies.

Choo proposes six stages in the cycle: identifying information needs; acquiring information; organising and storing information; developing information products and

[77] Choo, 1995
[78] Choo, 1995
[79] Dias, 2001

services; distributing information; and using information. All six stages are present in the information management cycle developed here, although two stages – developing information products and services and distribution of information – are combined. This is because products and services are necessary for information use and distribution, and it is assumed that they would have been pre-programmed into the system at the outset, and therefore don't form part of the information cycle.

Lastly, a stage Choo doesn't mention is added to the cycle, namely archiving of information. This stage is added after the last stage to ensure that information gathered over time is not lost, but kept in a safe depository for use in subsequent events.

Information needs

The information management cycle begins with the determining of the project's information requirements. For effective information management to take place, the exact types of information required should be made clear by all role players who will be making use of it. The needs should be established jointly between the persons who will be actively doing the information system design and management, and the people who will be using the system and benefiting from it. Information needs peripheral to the system, such as training material and other documentation, should also be considered.

The format and media through which specific information will be acquired should also be decided at this stage. For instance, if information is being collected through application forms and questionnaires, these should be designed before the acquisition process begins, giving special attention to the details of system requirements to make data capturing as easy and effective as possible. Where information is time-sensitive, entry deadlines and other timelines must also be set in line with the overall project plan.

While Choo doesn't mention it in his description of this stage, it is also here where the design of the computer system that will host the information should be conceptualised, based on the information needs. This includes choices such as the type of computer platform to be used, as well as details of software choices and construction of custom-built applications. Without a clear understanding of the project's information needs this cannot be done well. Once a system is constructed, if its use and the information hosting requirements subsequently change, it is difficult to adapt the hardware and software.

Information acquisition

Once the data required has been identified, it must be fetched from where it is located outside the mega-games organisation, and brought to a central place for capturing on the system. The diversity of sources in this process has been highlighted before.

Typically, data exists in many formats and media. The channels used to make the acquisitions include everything from conversations and phone calls to e-mails, printed documents, and online resources. The design of the gathering system should take this into consideration, for instance in the design of filing, system-tracking procedures, and so on.

According to Choo, one should involve as many people as possible in the process of collecting data. However, it is important that specific persons be appointed as editors or gatekeepers in this regard. Davenport mentions that one of the problems in organisations is that "*knowledge is regarded as everyone's job*", which results in no one doing it.[80]

Organising and storing information

This stage consists of the capturing of data onto the system, after which the database software organises it in logical groups that can be cross-linked and referenced, thus transforming it into information.

Capturing is normally done by keyboard, although auxiliary systems such as scanners are also used. Often large quantities of data must be captured in a short period of time, thus the inputting interface should be optimally designed for that purpose.

Training of personnel plays a major role during this stage. Not only do capturers have to learn computer skills, but attention should also be given to information accuracy and other 'soft' skills often neglected during this stage. While the capturing interface can be designed to help capturers avoid spelling errors and detect common inputting problems, it is still necessary for capturers to be made aware of the importance of this stage, and the problems wrong data can cause. Too often training is an informal process where skills get handed down from one user to the next, for instance when personnel changes, often with a resultant drop in the standard of work.

The validation stage takes place both after the data has been captured – often through validation rules built into the system – as well as prior to capturing.

Validation includes a number of processes:

- Error-checking spelling and numeric inputs

[80] Davenport, 1997

- Checking that data is reasonable and fits the range, for example a birth date that is out of range, or a male participant in a female event.
- Checking that all compulsory information exists and has been captured.
- Checking data before it is captured eliminates problems later on in the process. The old adage, 'Garbage in, garbage out' is true in this regard.
- Once information has been captured it is stored in an electronic form within the computing system. Issues that arise during this stage include the following:
- Compatibility of media: It often happens that data has to be shared between different computers, which can only be done if the storage media is compatible, for instance in terms of operating system and hardware.
- Backing up of data: To avoid loss of data it should be backed up regularly, and backups should be readily available at all times.
- Storage space: Ensure that the hard drives on which the information is stored is large enough, or has enough free space to accommodate everything. Few things are as frustrating as a hard drive running out of space at a critical moment.

Distribution of information through system products and services

Once the data has been captured, users should have access to it using a variety of products and services that provide them with the information they require. Retrieval of data takes place either so the user can share it with others, or merely as a lookup or reference. Examples of products and services include printed reports, data exports, and search facilities.

Using information

Once a user has obtained the information they want from the system using one of its products or services, they then put it to work in a number of ways. Most of the time it will be for problem solving or decision-making in operational and task-oriented matters. Choo makes the point that the time needed to obtain information from the system, and the time available for decisions to be made should be the same. For instance, a slow system or cumbersome process of getting information when the need for it is immediate will cause problems. Similarly, as stated before, the information obtained should be in the format required, else that would also delay matters.

When using information gleaned from the system, users will combine it with their own experience and other related information they may possess. Together this forms knowledge, or what Choo calls "*representations that provide meaning and context for purposive action*".[81] At this point the value added process of converting data to information, to knowledge has been completed in the information management cycle.

Disposal/Archiving

While not that relevant at the initial stages of the development of the mega-game information system, archiving of redundant information would be necessary toward the end of the lifecycle of the system. Therefore it is important to ensure that the necessary facilities for archiving are created, and can be used when required.

Archiving is necessary for the accurate build-up of historical data that will form the record, as the system is used from one event to the next. Building up an accurate historical database is one of the prime values of the system. In the case of mega-games teams it will create a continuous flow of information as the system is used in subsequent projects. That will allow users to, for instance, track the performance histories of team members, making it easier to spot the development curves of athletes, enhance talent identification, and plan interventions.

Not all the stages in the information management cycle mentioned above necessarily happen chronologically; neither do they follow on from one other without variance. When a system is in use during an event, they may all be taking place simultaneously, since more than one user is accessing the system. Inputting of data, processing, and retrieval may overlap, creating a feedback loop of capturing, checking, and distribution.

Since it is a cyclical process, a feedback loop exists whereby information is fed back from end users to the beginning of the cycle, which impacts the following cycle. This is part of the learning process that results from the cycle, as well as enriching the content that resides within it.

This concludes the section on the construction of the mega-game information system model. Case studies as a methodological strategy are discussed next, where it will be shown that case studies have a number of methodological advantages that make it ideal in this environment.

This is followed by an overview of the backgrounds of the case studies, necessary in order to provide the context and environment in which they took place, which is important for

[81] Choo, 1995

understanding the bearing they have on the model. Once that has been done the model is revisited in terms of the case study evidence.

Chapter Three

The case studies

Now that we have a model in place, we can test it for validity and to see whether it is comprehensive enough from which to draw meaningful conclusions. This is done using recent experiences from case studies at the South African Sports Commission.

3.1 Case studies as a research strategy

The purpose of this study is to create a framework that can be used to measure the effectiveness of information systems used at mega-games. The framework has now been established in the form of a model, described in the previous section, built on principles of intellectual capital and information flow, against a background of a networked, informational society where time and space has new meaning.

The question arises as to how one would test such a model in order to ascertain its validity. Any testing method used should allow for adequate analysis, as well as add practical value by providing ways of improving the model.

An appropriate way would be to take examples from real life and apply them to the model. This would show both how accurate the model is, as well as how to improve on the real-life processes and make them work better. The analogy is one of a car designed by testing a model of it in a wind tunnel. The results are used to both refine the model as well as the end product. This is in essence the route taken here, through the use of case studies.

Yin[82] mentions a number of circumstances and conditions under which case studies are a good choice as a research method. Each can be translated into the study undertaken here:

- **Case studies work well in explorative research surroundings**

Information management systems at mega-games are a relatively new phenomenon. Its development shadows the introduction and spread of computer systems in general that has

[82] Yin, 1994

only been in everyday use for the past twenty or so years. Furthermore, the world of mega-games is, from a technological and informational point of view, fluid and prone to change. In such cases an explorative study is best suited, rather than one whose purpose is to find an ultimate—a final outcome or a perfect system. Since exploration – seeking answers to 'how' and 'why' questions – is probably the most outstanding feature of case study research, it makes it well suited in this case.

- **The exploration follows a historical path**

The path of exploration is also well suited here because the case studies take place over a period of about two years, thus showing how the system developed over time. One can see how the system – common to all the case studies – developed, thereby allowing for more accurate forecasting and greater depth of critical analysis. What is presented here is not an end goal, but rather a contribution to an ongoing process.

- **Case studies work where context is important**

Since the case studies take place in various locations and obviously in different circumstances and environments, their contexts are important in coming to a full understanding of them. An experimental type of study seeking to eliminate the influence of the environment in order to obtain meaningful results is not possible.

Furthermore, best practices develop as more data is drawn into the process of analysis, increasing the usefulness of the study and making it a learning process rather than just an academic one.

- **Ample data allows triangulation**

The fact that five case studies are used provides an abundance of data from a variety of sources that can be triangulated and cross-referenced, providing ample corroboration of the findings. It also means potentially greater accuracy in the research process.

The purpose here is not to try and obtain as accurate information as possible through statistical or other methods, but rather to provide a pool of data with a significant scope and reach that will make good analytical material. A snapshot, once-off study would not be able to provide those insights. In addition, measuring the impact that technology systems have on human traits such as quality and effectiveness is still unclear, thus quantative research would probably not provide accurate results.[83] Even in a broader sense, which is important in the

[83] Brynjolfsson, 1998

light of what we set out with, "*The more the economy becomes an information economy, the less you can measure it*", according to Brynjolfsson.[84]

The caveat of case study methods is that subjectivity may be present because there are few controls. This could make the results less reliable. For instance, the author of this thesis actively participated in all of the case studies rather than being an objective observer, which means that selection and interpretation of data may be subject to his own orientations, belief systems, and expectations.

Collecting data in this way – participative observation – is a well-established methodology that has been applied in a number of classic sociological studies, such as the Street Corner Society, in which researcher William Foot Whyte participated in the activities of a street gang in order to observe the group's social dynamics firsthand.[85]

However, the debate surrounding objectivity and subjectivity is less relevant here if one takes into account our central interest, namely trends, general directions, and the *what happens,* rather than *what is*, or an outcome or end result that can be confirmed or rejected. There is no hypothesis in this study to prove correct or disprove, neither will there be a need to replicate the study in the future. A framework of analysis for a work in progress – the model – is what guides the study, rather than a right/wrong agenda. The challenge is to ensure that the correct spread and depth of data exists to ensure proper checking of the model.

Case study data collection

The collection of data is very much guided by the model proposed earlier, since it presents parameters that have to be interrogated and corroborated by the data. As the exploration continues and unfolds, data is presented to do that.

To ensure reliability of findings and conclusions, cross-referencing of different sources of data are used, a process that Yin refers to as "*convergence of multiple sources of evidence*".[86] This means, as can be seen in Figure 4, that many pieces of evidence are used to support a particular finding.

[84] Pescovitz, 1998
[85] Van der Zanden, 1979
[86] Yin, 1994

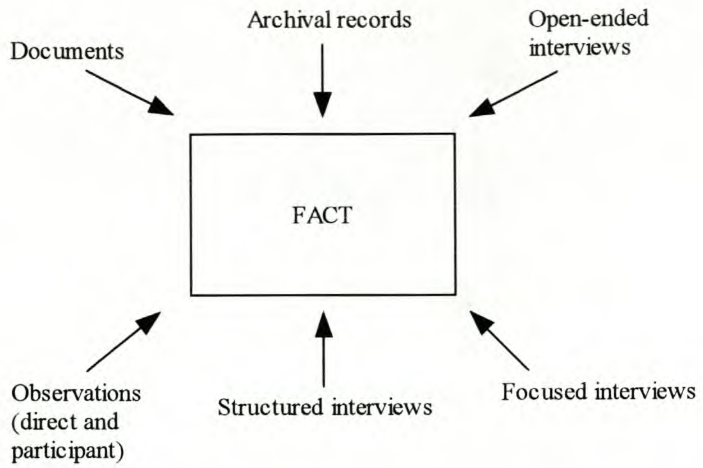

Figure 4: Convergence of multiple sources (Yin, 1994).

In the case studies described here, use is made of the following types of data:

- The researcher conducted a number of unstructured interviews with individuals intimately involved in each case study, who used the information management system in place for that particular case study. The interviews were based on the model developed earlier, and contained questions pertinent to its parameters and dimensions.

  The interviews were particularly useful because they dealt not only with the facts of the case studies, but also conveyed insights into the role the experience, know-how, and similar types of information not easily articulated and communicated by a person – tacit knowledge – played in the information management process, which is difficult to document.

- The author's own experience as a contributor to each case study. He was involved in the technical development of the system, as well as the running of it during two of the case studies. However, he was never directly involved in working with the data itself.

- A library database of case study documentation was established, including official team booklets, post-event reports, and media clippings.

- The official website of the mega-games of which the case studies formed part, and the Team SA website which was established during one of the case studies.

- Copies of different versions of the software used during the case studies.

- Various individuals involved in similar mega-game projects were contacted and asked for their views and relevant insights.

As mentioned at the outset, the idea for developing the model discussed in the first half of this thesis came through work done at the South African Sports Commission, tasked at its founding to manage certain events and teams. We now look at some of the SASC projects that made developing the information management system being studied here necessary.

3.2 The situation prior to the case studies

Prior to the case studies, there had been no coherent system for recording and managing team information.[87] Information was captured in a variety of formats, mostly in MS Word and MS Excel, or by hand on paper. This resulted in numerous duplicated records and co-ordination difficulties, and updating data was an arduous task. Sharing data was obviously a task that could only be done manually, and mass distribution was cumbersome as well.

Consequently there are no complete, unified records of the teams that participated in events prior to the 2002 Manchester Commonwealth Games project, apart from a certain number of printed records and post-event reports that contain overviews and summaries. While useful, these do not provide a standardised, searchable database format for comparison of data between successive events in which a national team participates. It leaves very little scope for easy data analysis, drawing up of reports, and other data manipulation mechanisms for which databases are used. While the documentation is of documentary and historical value, the absence of a coherent information system to organise and collate it means that it is very difficult to add value to the information contained therein.

3.3 Introducing the case studies

The case studies used here were selected because each has unique attributes that highlight a particular part of the mega-game information management process. They also took place in very different environments, providing a range of testing milieus. Thus, as a whole, the case studies present a varied and diverse picture of all aspects of the model under discussion, making testing of the model much more robust.

At the same time, they share many commonalities that show patterns of development as each successive case study unfolds. It is therefore possible to see progress through the lessons that were learnt with each successive project.

The case study projects follow a fairly similar pattern of operation. In the case of Team SA projects, information management was a specific task within the overall project

[87] In the 1998 Kuala Lumpur Commonwealth Games post-event report (Olivier, 1998) mention is made in passing of the *intention* to create a database for team information management, but there is no evidence of a system ever having been used. This was confirmed in interviews with Olivier.

management teams, established about six months prior to the Games taking place. The project team members are all highly skilled in their fields—primarily project management and sports science. Once appointed they begin work on various tasks, such as compiling lists of qualifying athletes, ordering the official kit everyone will be wearing during the event, and arranging accommodation and travel arrangements, as well as other logistical matters. During the course of this, information on all these topics is collected and captured onto *SportOrganiser*.

Most of the project team members then travel to the Games event a few days prior to it starting. They stay on until the event is finished, providing support services to the athletes and their technical teams.

In the case of the SA Games, information management is handled by a special project sub-team, dealing only with that topic. Its appointment varies; in some cases they were appointed a few months before, but in the case of the Zone VI Games accreditation project the lead time was a mere three weeks. In these cases the information to be managed is considerably more than in the prior case, because the scope of the project includes *all* participants in the Games. The type of information the project team works with is also different from that of a team project. Here results information and accreditation are the central issues dealt with, rather than logistics. These teams are constituted mainly of volunteers who are based at the 'nerve centre' of the event itself, rather than working from the SASC offices, as is the case with the team projects. The skills level in these project teams is therefore much more varied, since few of the volunteers work in the field of sports, being either students or unemployed.

During the months before the event, the team consists of two or three persons doing training and co-ordination tasks. Two to three weeks before the event the team expands considerably as the processing of information and readying for the Games begins. The busiest time is the two-day accreditation before the event, as well as the time spent capturing results during it. As in the case of the Team SA projects, the project team winds up its activities after the event and disbands.

The case studies all took place during 2002 to 2004, each separated by a few months. Following is a timeline of their succession:

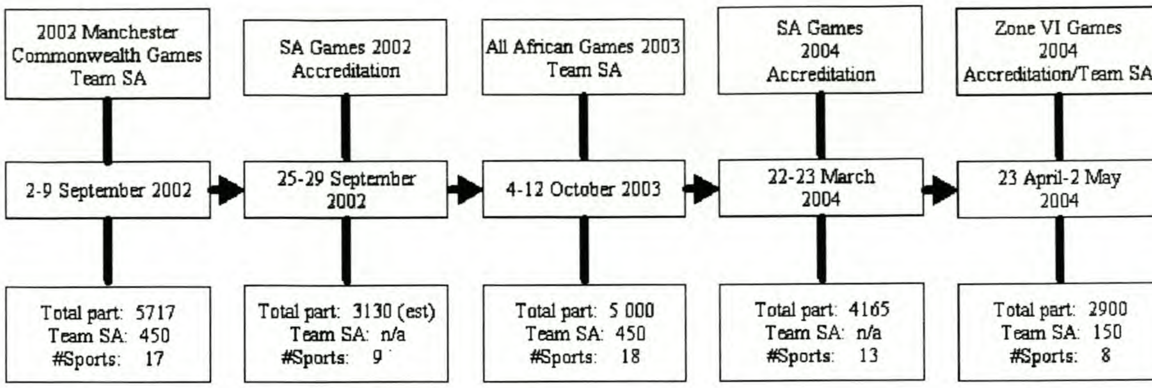

Figure 5: Timeline of the case studies.

Case study #1: The Team SA 2002 Manchester Commonwealth Games project (M2002)[88]

The 2002 Commonwealth Games took place in Manchester, England in late July and early August. More than 5,700 athletes and officials from 72 countries participated in the event,[89] with the SA team consisting of 450 individuals, of which 257 were athletes. The Games were characterized by superb planning, supported by a modern, well-equipped telecommunications infrastructure.

South Africa ended in fifth place with a total of 46 medals, well behind Australia (207 medals), England (165 medals), and Canada (116 medals) but not too far behind India (69 medals). However, New Zealand trailed South Africa by one medal. The top three countries are all well known for their superb sports infrastructure.

Case study #2: The Team SA 2003 All Africa Games, Nigeria project[90]

The 2003 All Africa Games took place in Abuja, the Nigerian capital, in October 2003. The South African team consisted of just over 400 individuals in eighteen sporting disciplines, while more than 6,000 athletes from 53 countries participated in the event. The most unique feature of this case study is that it was held in a country without reliable telecommunications and data infrastructure. Although the team preparation was done in South Africa with its first world ICT infrastructure, the adverse conditions of the event itself nevertheless had a substantial effect on the preparation and execution of the project.

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[88] A very comprehensive legacy website filled with statistics and useful reports, some of which are quoted here, can be seen at www.gameslegacy.com.
[89] Leather, 2002
[90] A website for the event was established by the Nigerian government, but unfortunately it no longer exists.

The Games was marred by disputes regarding the final medal counts. Officially South Africa ended third with 174 medals, but disputed Nigeria's winning position of 231 medals, claiming that Nigeria had contravened several rules and protocols of the event.[91]

Case study #3: The 2004 Zone VI Games projects—Team SA, and Games accreditation

The Zone VI Games[92] is a Southern African (sub-continental) event that had been mooted for several years, but was held again in Mozambique in 2004. South Africa sent a team of 179 athletes and 89 managers and officials. Being held for the first time in years, and then in one of the poorest countries in the world means it didn't have access to the huge budgets typical of events like the Commonwealth and Olympic Games. It also had an almost total lack of technological infrastructure, to the point where South Africa was approached by the Mozambican government at a very late stage to assist with running the accreditation centre and providing technical support.

Thus South Africa's participation in the Zone VI Games became two projects. The first dealt with the preparation of Team SA, and was therefore similar in nature to the M2002 and All Africa Games projects. The second project was management of the actual Zone VI Games accreditation process, which involved providing all 2,500 participants from eleven countries participating in the Games with accreditation at very short notice.

Case studies #4 & 5: The 2002 and 2004 SA Games projects

Touched upon briefly before, the SA Games is a junior event (in other words, only school-going children participate) meant to be a feeder event at which up-and-coming talent is identified and plans set in motion to nurture and develop it for senior events. It takes place on the provincial level, i.e. provincial teams compete against each other in a number of sport codes. Each province gets a turn to host—in 2002 it was Gauteng, and in 2004 the Eastern Cape, the event being held in East London.

While it is not an international event and has a relatively limited budget, it shares many of the characteristics of international mega-games. For instance, it is a multi-code event in that a number of sport codes are represented; the event items are spread across a wide area, and it has a large, diverse number of athletes and staff attending. Furthermore, the SASC is not only responsible for the affairs of one team, but manages the whole event, in conjunction

[91] Jonckheere, 2003

[92] Sports wise, Africa is divided into eight zones, the southern region being Zone VI, which consists of Namibia, South Africa, Swaziland, Lesotho, Mozambique, Zimbabwe, Zambia, Botswana, Mauritius, Angola, Malawi, and Tanzania.

with the host province, in much the same way a major event such as the Olympics is managed. Thus it is substantially different to the Team SA projects.

3.4 Mega-games IMS projects in other countries

It would be impossible to easily get from other countries the same depth of data from similar projects as we are getting from the information-rich case studies here, however, an idea of how they perform their mega-games and national team management would be useful.

As part of the analysis of the case studies, a brief survey of other existing mega-games IMS systems used elsewhere in the world was conducted. To try and gauge the level of information management in other Commonwealth countries, the Commonwealth Games associations of a number of countries were contacted via email, and questions were put to them about the types of systems they used for managing the information of teams that attended the 2002 Manchester Commonwealth Games.

Scotland, England, and New Zealand replied to the email, and some of their comments are used during the case study discussions. Countries that didn't reply include Malaysia, India, and Nigeria. While one can't draw any firm conclusions from this, it is telling that the countries most central in the global information network replied, all confirming that they used relatively advanced technologies and systems with which to manage their teams.

Probably the first mega-games to run a comprehensive, event-wide IMS *and* document its successes and shortcomings were the 2000 Sydney Olympic Games. The commentaries on the system – written by among others Kristine Toohey and Sue Halbwirth – which have already been quoted before, are particularly informative in understanding the factors that play a role in the successful running of such systems. [93]

As a result of the efforts made during this event, the Olympic Games Knowledge Service was launched—a programme specifically aimed at helping bidding and hosting countries better prepare for the event through knowledge transfer in the form of workshops, simulations, and other services.[94]

The 2000 Olympic Games infrastructure was provided by IBM, who had a sponsorship with the IOC. This sponsorship was taken over by SchlumbergerSema, part of the European based Atos Origin information services conglomerate, after the 2000 Games. They

[93] Toohey & Halbwirth, 2002
[94] Olympic Games Knowledge Service website—www.ogks.com

are under contract to produce both winter and summer Olympics until 2008, providing continuity for the Games during that period.[95]

Communities of practice, in the model used as part of one of the people dimensions, is reported to have been a prominent feature at this Games. In particular they were formed inter-organisationally, between stakeholders such as sponsors and the organising committee.[96]

The 2002 Manchester Commonwealth Games also has a very extensive post-event report detailing some of the information management arrangements there, though not in great depth. Their infrastructure was primarily handled by the bid committee themselves, in close co-operation with Microsoft.[97] Apart from the cases of the two or three largest mega-games, there generally seems to be a dearth of documentation evaluating mega-games information management in a systematic way, no doubt due to many of the issues raised previously and in the case studies.

[95] McDougall, 2003
[96] Personal communication, Halbwirth
[97] Microsoft case studies, 2002

Chapter Four

Outcomes of the case studies

From the above description of the case studies at hand it should be obvious that they form an unfolding process.[98] In each success, implementation of the mega-game information management system was developed and transformed as the users and developers became more skilled in understanding its potential, increasing the breadth and depth of its use.

To show this development, the evidence from the case studies is presented in narrative form rather than as particular outcomes or results taken case by case. A narrative is a way of illustrating the development and maturation of the information system, as it 'travelled' from one case study to another. It allows integration of the case studies in such a way that the unfolding history tells the story of the learning experiences that culminate in the evaluation of the model.

At the same time the three dimensions of the model – people, content, and design – guide the narrative, with the relevant parts of the case studies discussed under each dimension and its parameters.

We first take a look at the design dimension, since the technical system is central to the process.

4.1 Design dimension

Mention has been made of *SportOrganiser*, the database system at the heart of all the case studies here. To place it into context it is useful to first look at the development of *SportOrganiser*.

At the outset of the first case study – the 2002 Manchester Commonwealth Games – the project team responsible for managing Team SA due to compete in it, requested that the Information and Research sub-unit of the SASC design and implement a database that could

[98] The results of the case studies are summarised in Appendix A.

be used to manage the team's information. Their data needs were primarily for logistical housekeeping, while a secondary need was to have a flexible reporting system with which they could print out data in particular formats, for instance, producing a list of athletes by sport, surname, or province of origin.[99]

In response to their request a small database was developed in MS Access—a well-known database development product for small and medium sized databases, which forms part of the Microsoft Office suite of software packages.[100] Its first implementation proved reasonably successful, and so it was used, with modifications and additions, in all subsequent case studies. In the process it expanded considerably and acquired the title *SportOrganiser*, which is how it is referred to here. *SportOrganiser* forms the heart of the technology infrastructure side of the information management equation, representing to a large extent the design dimension of the model. For a schematic of *SportOrganiser*'s content structure see Appendix C.

The fact that the software was built and maintained in-house, rather than by an outside agency, has several significant advantages. Most importantly it meant that changes and improvement to the software could be made on demand without involving an outside contractor. This made the software development cycle considerably shorter and less troublesome than if off-site consultants had performed the technical construction and maintenance. This co-operation between users and designers is sometimes lacking in information management, an issue that Choo, among others, highlights in his writing on the matter, saying that greater co-operation could lead to better quality information generation, since more people are involved in the process.[101]

Another reason why the prototyping option was chosen is that very little software development has been done for this type of purpose. While there are many event management software packages commercially available, few cater to the unique needs of mega-games and the functionalities of its management teams, and there are only one or two off-the-shelf software solutions available for this application.[102] Alternatively, had the software been developed according to a blueprint, it would not have been possible to do the valuable *in situ* fine-tuning that was possible with the prototyping model.

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[99] Personal observation; Interview, van Oerle.

[100] Both the English and Scottish Commonwealth Games associations confirmed via email correspondence that their databases were also programmed in MS Access.

[101] Choo, 1995

[102] SportzWare, a package used extensively in Australia, was tested at the SASC. While it is a very comprehensive product, it was felt that there were specific requirements, for instance in terms of health records of athletes, for which it did not cater.

It also means that software developers and users were in the same building, so they could communicate both regularly and as the need arose, thus speeding up the development and ensuring that any problems that arose were quickly ironed out. The system was mainly used in-house at the SASC headquarters, which meant that technical assistance from the developers was close by, situated on another floor. Much development and additions to the system was done while it was being used, and this was generally perceived to be a distinct advantage by most users.[103] Where the system was implemented outside the SASC offices, technical staff was generally present to assist in case of problems.

The distance between the content managers and the software developers is also a problem highlighted in the post-event report of the 2002 Manchester Commonwealth Games.[104] Particular mention is made of the lack of communication between systems developers and content managers, which created delays in the updating of information.

Developing the initial design of *SportOrganiser* in-house also meant that the financial outlay for the development of the software was close to nil, since the expense for the development was indirect—the SASC employee's work hours obviously has a cost, but it does not show up on a balance sheet. However, should one put a price on the development of *SportOrganiser* it would probably cost between R50,000 and R100,000.[105]

Comprehensiveness – *System able to accommodate a diversity of information needs*

As mentioned, the first to use *SportOrganiser* was the M2002 project team. Once the system was up and running, they utilised it for tracking biographical information of athletes, managers, and officials, including contact details, passport numbers, and so on. It was also used to gather travel arrangements, and the issuing of kits – the official clothing, shoes, and so on – to each person. The team using the system was small—at any one time there were no more than four people who had access to it, while only two contributed material to it.[106] The database was housed on the local area network of the SASC; therefore everyone on the team had access to it on his or her desktop.

During this phase there was a great deal of interaction between the developers and the project team, as the data capturing features were fine-tuned and new reports were added.[107]

After the M2002 project was completed, a different team used the system during the SA Games 2002 project. A new functionality was added during this project, namely the

[103] Interviews with Van Oerle and Joubert
[104] Leather, 2002
[105] Interview, Parent
[106] Personal observation
[107] See Appendix C for information on the system development

ability to produce accreditation cards for all participants. Many of the existing sections were expanded and streamlined.

The system evolved further as the requirements of the management team members expanded. The team managing the All Africa Games project worked very hands-on with the medical and performance testing processes of athletes.[108] Therefore the health section of *SportOrganiser* was expanded to include a facility to track the cost of medical services to athletes. More fields were also added to the biographical area.

The kit section was also overhauled at this stage. In the beginning it had consisted of a number of pre-programmed items, such as T-shirts and caps. Users could attach a unique size to the item and the number of items per person to order, thus enabling them to draw up a list of the types of kit required by the team, and how many of each size and item. This worked well during M2002, but during the All Africa Games project users felt that they needed flexibility, enabling them to input any number of different kit items, not only a pre-programmed few.

But during the actual running of the project it was found that the kit section was still under-utilised. This was due to the large number of clothing each team member received (a total of 56 different items). Inputting sizes and selections of different items for more than 400 team members meant that a total of almost 25,000 clothing items and sizes had to be captured, which proved impossible. The system also didn't have the facility to change groups of people at a time (for instance, to set all hockey players to "red T-shirts" in the kit section), which would have shortened the process considerably. With too few data capturers on hand, the system got bogged down in the sheer magnitude of the data to be processed, pointing to a problem with the scoping of the system at the outset. Even with enough data capturers to do the job, the process would still have been cumbersome and prone to error. While this shortcoming was difficult to foresee, more flexibility in data processing procedures would have alleviated the problem.

At first implementation of *SportOrganiser*, the number of fields in the health section consisted of nine fields; by the time it was used for the Zone VI Games project it had been expanded to more than 28. The total number of database fields grew from 60 to 300. Yet some of the data sections, such as travel, remained largely unused. Instead a mixture of information drawn from the system and handwritten notes were used, for instance, by writing the room

[108] Interview, Nolte

numbers of team members on a printed report of names.[109] It seems that users thought that was easier than using the system.

One interviewee[110] made mention of the fact that the information required by mega-games managers from participating countries will become more sophisticated in the future. This is because of the growing importance of issues such as security, drug use, and high profile, sport specific issues such as hooliganism in football. The first issue is already evident —at the 2004 Athens Olympics each participant was issued with a badge with which their movements could be traced through a centralised system.[111] The trend therefore is toward increased sophistication in information management.

Sustainability – *Cost is feasible and within budget; system is scalable and reliable*

SportOrganiser proved to be both reliable and stable in all case study environments, with few system crashes experienced by users, and no hardware failures reported. Only once, during pre-event testing at the 2004 SA Games, did *SportOrganiser* experience network problems. However, these were ironed out before the event commenced.

As mentioned, *SportOrganiser* was programmed using MS Access. The size of databases programmed in Access and the number of simultaneous users are limited by Access' specifications,[112] which in lay terms means that *SportOrganiser* can in its present state of development probably be used for 10-15 events and teams, judging by the sizes of the respective case study databases.

To enable *SportOrganiser* to accommodate more data it has to be redeveloped – scaled up – in another computer language environment more suitable for large databases. Technological advances ensure that there are a number of options available to do this, with the scope being more limited by budget than technology constraints.[113]

While Access provides a number of means of exporting and transporting data in electronic formats recognizable by other applications, none of these features were readily available in *SportOrganiser*. Connectivity and the ability to easily exchange data with other technologies, including email applications and web-based systems, remain limited.

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[109] Interview, Joubert
[110] Interview, Parent
[111] McDougall, 2003
[112] According to the MS Access specification sheet available at www.microsoft.com, the maximum size of an Access 2000 database is 1 Gigabyte, with a maximum of 255 simultaneous users. Experience has shown that these figures are actually considerably less, for a database to run reliably.
[113] Interview, Parent

Some users thought it a serious drawback that they couldn't move the system from one location to another, for instance, from using it in an office to taking it with them to an event venue. This problem appeared during the M2002 and All Africa Games projects, when members of the management teams took notebook computers loaded with *SportOrganiser*, containing all team data to the event venues in Nigeria and the United Kingdom. While one person with a notebook had access to the information, others did not, because networks for linking the computers were absent. Therefore networked additions, corrections, and data access was not possible.

The problem of portability was overcome during the Zone VI Games accreditation centre project, when a small wireless network was established by the SASC at the accreditation centre in Maputo.[114] *SportOrganiser* was placed on this network, and SASC staff, as well as a volunteer team from the Eduardo Mondlane University, did data capturing and processing during the event, without any technical trouble. It is likely that as wireless technologies such as Wi-Fi and cellular become increasingly ubiquitous, portability will become less of a problem.[115]

A hardware problem that popped up during the 2004 SA Games project concerned the appropriateness of the peripherals chosen. It was decided at a very late stage to print the event accreditation cards on a high-end colour laser printer. However, due to the high throughput required—more than 4,000 accreditation cards had to be printed, as well as hardware compatibility problems that surfaced at a very late stage, this did not work out, causing severe bottlenecks with the production of cards. This lesson was well taken to heart, and during the Zone VI accreditation project cards were printed in black and white using laser printers that were much faster and more reliable—essential in a place like Maputo where technical support for computer equipment is not as accessible compared to major South African centres.[116]

The mega-games system used during the M2002 project was intended to be utilised for the event, and team projects that followed it as well. However, because there was no feature in *SportOrganiser* that allowed users to distinguish between different projects within the same system, users felt that it would be better to use a separate copy of *SportOrganiser* for each event to avoid having to wade through the many thousands of entries in the database.[117] Therefore there was no unified database for all projects—a serious programming shortcoming that still existed after the last case study.

[114] The network was based on 802.11b wireless technology and included six notebooks and three laser printers.
[115] Personal observation
[116] Personal observation
[117] Interview, Joubert

Flexibility – *System can be easily customised and adapted to users' requirements*

As mentioned before, implementation of *SportOrganiser* during the first case study was done on a needs basis, with features and capabilities added programmatically as users requested it. There was no way that users could customise the software's features themselves —all features were hardwired; pre-programmed into the software by the developers.

At the start of the SA Games 2002 project – the second case study – users requested more data fields in addition to those used in the M2002 project, as well as changes to some existing fields, and additional types of reports. These were duly added, but the developers began to realise that another approach was necessary to prevent the software from becoming too unwieldy. This rethink was also necessary to prevent the software development team from becoming bogged down in the costly spiral of having to constantly change existing features to suit successive project teams.

This customisation and automation process began with the All Africa Games implementation of *SportOrganiser*. Firstly, a maintenance section was developed that allowed users to pre-set various parameters within *SportOrganiser* themselves. Examples of this automation feature included the following:

- Before, all sport codes in which athletes participated were hardwired into the program. But since each event had a different list of sports in which athletes were participating, changes to the software had to be made by the developer to adapt it for each individual case. The changes allowed users to specify the sports with which they were working, thereby eliminating the need to call the developer to make software modifications.
- The same was done for the types of individuals on the team (athlete, coach, team manager, and so on), athlete grading, types of kit, and many other parameters.

However, the success of the added versatility and customisability of the database has major caveats, as will be explained later in the content and user dimension sections.

Furthermore, each successive case study saw the reporting section developed to give users more options from which to select when printing data reports. During the M2002 case study, users were limited to a total of seventeen preset reports, while by the most recent case study – the Zone VI Games – they were able to mix and match data in a choice of more than eighty reports, while the filtering options on all had also improved dramatically. Examples of filtered reports possible with the new system included:

- A report of all coaches, listed alphabetically, including their kit sizes.
- A report of hockey athletes, listed by province, including performance records.

- A report of volunteers, listed by area of responsibility.
- A list of accommodation venues with the names of participants staying at each.

Putting users in charge of customisation obviously contributed greatly to operational efficiency. However, the added capabilities did not include output formats that would be of value to decision makers who didn't need detailed information, such as trend analysis summaries and problem identification reports. Neither are there user-friendly methods to link the data to spreadsheets that would provide analysis of data, for instance one that gave a breakdown of medals by province, race, and gender. *SportOrganiser* therefore has no way of adding value to the data contained therein, or at least facilitating that process by providing the tools with which to do it. Any such reports – although never requested during the course of the case studies – would have to be done by manually analysing data—a very time-consuming effort.

Impact – *System has appropriate channels and formats for distribution*

In all of the team case studies *SportOrganiser* was housed on the SASC's in-house local area network, giving all personnel working on the project access to the data and enabling them to share in a single, distributed resource.

By far the most popular form of distribution of data drawn from the system was by means of printed reports, which was described before.[118] This was the most flexible and easily accessible means of getting data to stakeholders who did not have direct access to the system.

There were no other easily accessible means of transmitting data electronically, except that reports that would have been printed were saved in RTF format (readable in MS Word) and subsequently emailed to recipients. However, this feature wasn't an easy-to-use, standard feature of *SportOrganiser*—users had to be individually trained how to do this, and even then only relatively advanced users made use of it. The absence of these features was largely a result of lack of in-house technical skills, but the necessity of it was not foreseen at the outset.[119]

The Team SA Website

Since websites are primarily a channel of distribution, it is appropriate to discuss its formation here.

[118] For all but one of the interviewees this was the primary method of extracting and communicating information. The exception used mainly RTF reports.

[119] Personal observation

The information management systems used during the case studies were offline systems, i.e. they had no integrated online network such as a web-based central 'nervous system' to plug into, which meant that more generalised distribution of information during the case studies was limited to distributing printed and email reports, as mentioned above. However, during the M2002 project a budget was made available to construct an accompanying Team SA website, which was meant to be a companion to the *SportOrganiser* system, although the two weren't linked electronically. The idea was to use the website for other future Team SA participations at mega-games, but this didn't come to fruition, as will be discussed later.

The technical development of the website took a different route to the database prototyping process described above, with a distinctly different outcome.

Internet hosting and developing company Mweb won the bid to build the website for Team SA, hosted at www.team-sa.co.za. An outside supplier was chosen because of the specialised skills and knowledge required to build and host a website of this magnitude and complexity.

However, an important design decision was to make the website totally maintainable by the people responsible for inputting information on to it. To explain: in most websites the workflow of maintaining a website with fresh information is as follows: The client or information provider contacts the technical developer (in this case Mweb) and sends them new text, photographs, and other elements they want to see on the website, briefs them as to the page layout, and so on. The latter then programs the pages, sends them back to the client for approval, and then makes the changes 'live' for others on the Web to see.

Obviously this is a long and tedious process over which the client has very little control. In the environment of the case studies, where time is of the essence to display, for instance, event results as soon as they became available, this is not a viable option.

The alternative is to build a website which can be maintained by the client. The way to do this is to create a user-friendly interface for the client, whereby they can add their own information onto the website without having to do any programming. This way they can create as many new pages as they wish, and archive the older ones. Thus anyone viewing the site could, theoretically, see the outcome of an event moments after it had taken place.

The budget for the Team SA website was approved at a very late stage, reducing its worth, as it only went online two weeks prior to the Commonwealth Games.[120] However, enough money was made available to implement all of the features required.

During the time that the website was used, there were a number of technical hitches. Because of the pressure to place new results and news stories on the website as soon as they happened, these problems had to be ironed out there and then. Often this could not be done because the technical personnel at Mweb were unreachable, causing delays in the web updates. This was in contrast to the technical development of the database, which happened in-house, so problems could be solved there and then.[121]

Another major problem, which in fact contributed to the website being abandoned after its use in the 2002 Manchester Commonwealth Games project, was the slowness of the system—caused by a mixture of technical issues and telecommunications lines not being fast enough.

4.1.1 Design dimension conclusions

Based on an analysis of the mega-games model, *SportOrganiser* excelled in the following:

- By the end of the most recent case study, the Zone VI Games, *SportOrganiser* had developed into a system that technically catered for all information capturing and storing needs at a mega-game, certainly within the spectrum of the SASC's needs. This is borne out by the fact that virtually no *data capturing* changes (e.g., adding new fields) were made to the software after the Zone VI Games in preparation for its next use at the SA Games 2005. The prototype approach meant that there was ample time to build the system exactly to the users' specifications, resulting in an ability to accommodate all required information.

- Since the system was built in-house, costs were kept low. However, it put a ceiling on the level of skills that could implement advanced features, since programming is not a core business of the SASC.

- The maintenance section means that the system is flexible and adaptable to different mega-games with specific requirements. This puts users in charge, enabling the 'pull' side of the information distribution equation discussed earlier.

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[120] Olivier, 2002

[121] Personal observation, confirmed by interview with Parent.

- Technologically, the system is very adaptable, with ample room for expansion and adaptation of new technologies. This is because it uses a common programming language platform standard.

A shortcoming of *SportOrganiser* is the ability to easily change and update large blocks of data simultaneously, as borne out in experience with the kit section.

A serious programmatic failing of *SportOrganiser*, however, was its inability to maintain the data of all five case studies in one database—a new copy of the system was used for each successive project. This means a certain amount of technical work would have to be done to combine or link the databases and their contents to form a unit housing all historical data.

Both these shortcomings could have been prevented to a large degree by more careful planning beforehand, involving tapping the experience from other similar projects.

Figure 6a and 6b below shows this graphically:

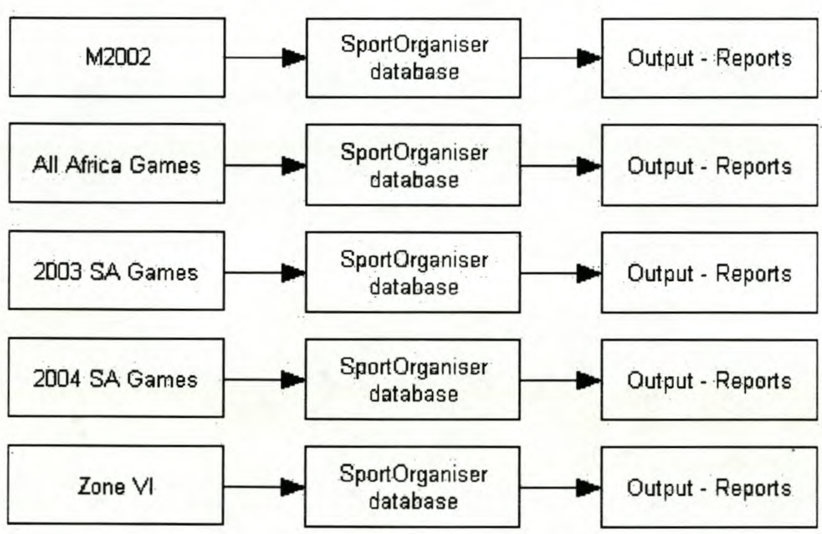

Figure 6a: The case studies, each using their own copy of *SportOrganiser*...

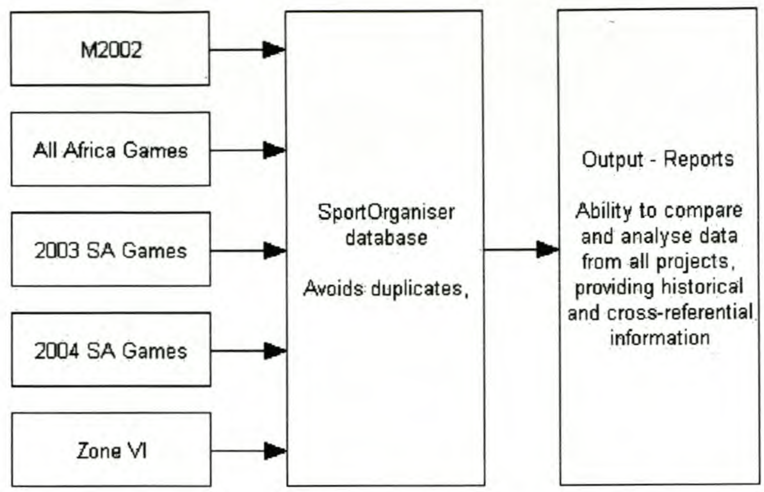

Figure 6b: What should have happened—all project information stored in one database.

Certainly the software could have been designed to incorporate features that would have made the scenario in Figure 6b possible. However, none of the stakeholders foresaw a need for this feature. The focus was on providing an information management tool for the project at hand, with little thought for future data analytical requirements. The implication is that the first step of the information management cycle wasn't adhered to properly. This mirrors the situation at large events such as the Olympics and Commonwealth Games, where successive games don't share a common system either.[122] One reason is that integrated information management is a relatively new discipline; however the competitiveness and political sensitivity of large multi-sport events may also be factors preventing the co-operation necessary to develop such systems. The formation of communities of practice across mega-games – discussed later – can probably go a long way to overcoming these planning problems.

Another shortcoming was the lack of a method for plugging *SportOrganiser* directly into a web-based distribution channel. It meant that there was no way of transporting or exchanging information between the two systems. Since the Internet is such a potent and important channel, this will have to be rectified soon, together with the technical problems affecting system speed.

In broad terms of programming and technical development, the *SportOrganiser* system developed organically, and not as a piecemeal software project. The way it was technically developed contains many elements of the *agile software development approach,*

[122] The 2002 Commonwealth Games report (Leather, 2002), as well as the IBM technical report on the 2000 Sydney Olympic Games clearly indicates that the systems used were built from scratch.

which is seen as an alternative to plan-driven, centralised software development. Williams and Cockburn, in defining this term, quote the Manifesto for Agile Software Development:[123]

- Individuals and interactions over processes and tools
- Working software over comprehensive documentation
- Customer collaboration over contract negotiation
- Responding to change over following a plan

These four comparative values of agile software development stress the importance of the organic nature of software development, taking into account typical aspects of software development, such as last-minute changes and customer-driven development demands. The project 'unfolds' in a close collaboration between developer and customer, as was the case with *SportOrganiser*.

These conditions are often very difficult to achieve, as was illustrated with the Team SA website development.

4.2 Content dimension

In a previous section the information management cycle framework of the model was outlined, and since it involves mostly the flow of content, it fits into the discussion here.

4.2.1 The information management cycle within the case studies

All the case studies here share a common informational flow process, with slight differences in terms of the role players and output mechanisms present.

Figure 7 shows a common flow diagram of the information management cycle that each of the case studies shared to a greater or lesser degree. The arrows at the top indicate the relevant model cycle stages as discussed earlier, indicating the corresponding stages and role players within the case studies.

[123] Williams & Cockburn, 2003

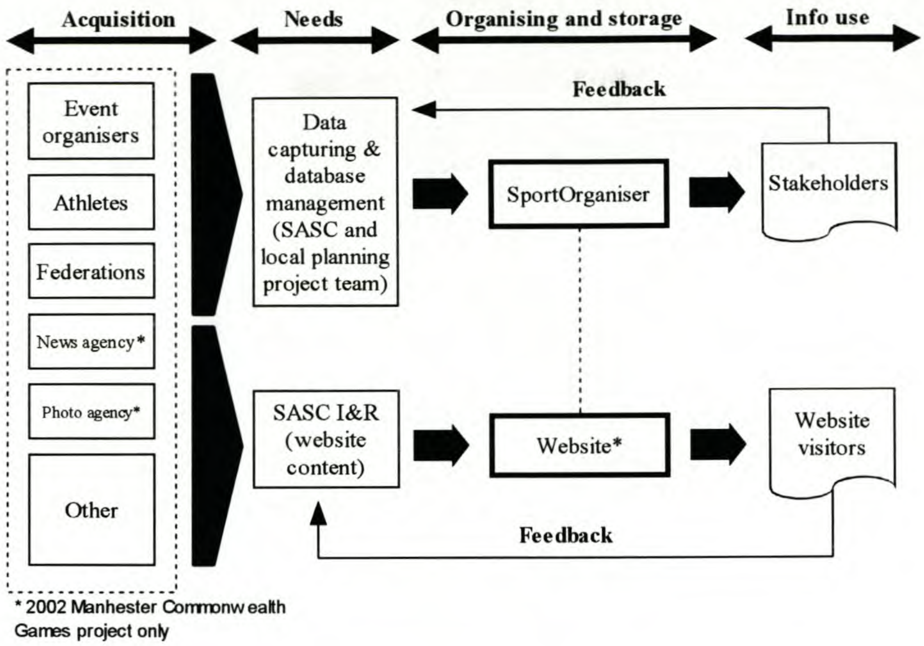

Figure 7: The information management cycle in the case studies.

Not all the cycle stages in the model manifested in every single case study; neither are they chronological. This is shown in the evidence from the case studies related to the information cycle, which is interwoven in the discussions below.

Comprehensiveness – *Content offers complete picture of team and event*

One way to apply this model parameter is to look at how the *Information needs* stage of the information management cycle played out in the case studies.

As shown in Figure 7, the information required was discussed and decided upon in the project teams at the SASC. In the M2002 project needs were largely based on tasks defined in the overall project plan.[124] Also used to a limited extent in prior planning was experience – tacit knowledge – from project team members who had worked on the 1999 All Africa Games and 1998 Commonwealth Games.[125]

In subsequent projects, defining the information needs was a 'learning on the job' process, with new needs arising and being discussed with each successive project, as well as occasionally being covered during the course of projects. This could have been made easier by doing more research prior to the launch of the projects, by examining for instance information systems used at other mega-games. However, many of the needs only developed

[124] Interview, Van Oerle
[125] Interview, Olivier; personal observation

as the project progressed and could hardly have been foreseen, stressing the need for dynamism and flexibility in the hosting environment.[126]

The specific needs of the environment in which the events took place also played a role in the types of information required. For instance, fields were included in *SportOrganiser* that indicate the race and gender of participants, in order to address the issues of transformation and equity in South African sport, which have been spelled out as national priorities.[127]

In all of the case studies, the users interviewed were satisfied that *SportOrganiser* accommodated all types of biographical information required to do their work once their requests had been implemented. At the most recent case study – the Zone VI Games projects – no new biographical information needs were identified.

The website for the M2002 project was a mixed success in terms of providing a one-stop information portal for the project. The event results section of the website was only partially successful, because the online data capturing fell behind due to the slowness of the Internet access.

However, the website also hosted other information, such as news stories about the athletes, general interest articles, photo galleries, and links to related websites. This part of the website worked very well due to the fact that outside public relations, news, and photographic agencies were contracted to supply the website managers with good quality content. The website had a fair number of visitors during the time period of the project, based on the feedback received from visitors.

While there were efforts to use the Team SA website for the All Africa Games project, it failed due to a number of factors. Firstly, there wasn't a clear and explicit agreement as to who was responsible for content, neither was a project plan formulated, so the function was neglected. Secondly, infrastructure and communication problems in Nigeria prevented information from reaching the SASC headquarters where the website maintenance took place. The result was that virtually no information appeared on the website, and it received very few visitors. The website has not been used for any subsequent project, mainly because of the technical reasons mentioned before, but also because of lack of funding.[128]

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[126] During the Zone VI accreditation project, the information management team were only informed that they had to double-check ages of athletes one day prior to commencement of the event, and disqualify those over a certain age limit. This was a political decision that could not have been foreseen as an information requirement beforehand.

[127] Sport and Recreation South Africa, 2002

[128] Personal observation

Sustainability – *Content is kept current, complete, and standardised*

In all of the case studies most problems experienced could be linked to issues surrounding the collection, upkeep, and maintenance of data, mostly during the *information acquisition* and *organising and storage of data* stages of the information management cycle.

In all case studies the main source of biographical data acquired was sports federations. Participation application forms were dispatched to them, which they had to complete with the details of everyone affiliated to the federation who was to compete in the case study event. The procedure was for federations to distribute these forms to athletes and officials to complete and hand back, after which the completed forms were sent back to the SASC and captured in *SportOrganiser*. Application forms were received almost exclusively via fax and post, and in a few instances e-mail.[129]

Other minor sources of data included the event managers, journalists, security agencies, and in the case of the M2002 project, news and photo agencies who supplied material for the website.

In addition to biographical information, *SportOrganiser* was also intended during the 2004 SA Games event management project to be used for capturing event results from the different sports. This did not happen as planned. Communication between the stadia, halls, and fields where event items were taking place and the nerve centre, which was the heart of the information process, wasn't planned well enough, with the result that many of the results did not reach the centre or were seriously delayed, often only arriving the day after the event took place. Incomplete and illegible results, often written on scraps of paper, were also a problem. A combination of inadequate training and control of the data capturers meant that no systematic capturing of results took place.[130]

Different reasons were reported for this. In interviews with staff members[131] who took part in data capture, the reason was given as poor management of the process of gathering and managing the capturing procedures. There was confusion as to who took responsibility for this process, resulting in lack of co-ordination, maintenance, and control of data. However, post-event reports[132] blamed the database network for being slow in printing and producing reports.

[129] Personal observation
[130] Interview, Grobler
[131] Interviews: Van Oerle, Grobler, personal observation
[132] South African Sports Commission, 2002

Specific problems with acquisition of data that impacted negatively on the strict deadlines of the information management process included the following:

- Lateness of data. It is a common problem that data suppliers don't stick to submission deadlines. Data capturing bottlenecks were common, caused by data that came in late from suppliers. At the SA Games and Zone VI accreditation projects substantial numbers of application forms were still being received even after the events had begun.
- Inaccurate and incomplete information. Handwriting on the application forms was often difficult to read, while some fields were left blank.

In some team project case studies communicating with the event organisers located in a different country was also a problem. In the case of the All Africa Games and Zone VI Games, both hosting countries – Mozambique and Nigeria – have inferior telecommunication systems, which mean that the local team administrators had difficulty getting vital logistical information from the organisers. In the case of the Zone VI Games the team had still not received any event schedules by the time they left Johannesburg for Maputo.

Mention was made earlier of the maintenance section of *SportOrganiser* that allowed users to customise certain fields of the database. This facility proved to be a double-edged sword, for while it provided flexibility, it also caused problems with data integrity. There are two major reasons for this:

- In none of the case studies was a standardised set of values for the lookup tables (type of individual, list of sport types, and so on) decided beforehand, and this decision communicated to users and data maintainers. Values were added as they were required without co-ordination or control, resulting in duplication, spelling errors, and faulty designation of values to records.
- Also, all users had access to this section, so they changed and added values at will. Thus there was a lack of access control to certain sections of the database. Only designated personnel should have had access to this area to ensure proper co-ordination thereof.

This non-standardising made extracting reports difficult. For example, there would be three entries in the *individual type* dropdown box, named "Coach", "Coaches", and "Caoch" (sic) entered by three different individuals, where there should in fact only be one category for all three. Obviously a report filtering all entries for "Coach" would thus not produce a truly complete list of all coaches contained on the system.

Since the website and the *SportOrganiser* system had no common interface, the only way to get information on both was to capture it separately on each. This meant a duplication of work, since the same data had to be punched in twice into different systems. This duplication, and the fact that the web-based database was very slow to operate, caused the website, as a means of distributing information, to be abandoned after the All Africa Games project.

However, this leaves a serious gap in the completeness of the informational content, as websites are important depositories of textual and visual project information, which is not hosted in *SportOrganiser*.

Flexibility – *Content can be filtered, analysed and relationships built between data sets*

In almost all interviews, users mentioned the fast filtering and search features of the database as one of its main advantages, because it is simply not possible to quickly and effectively draw specific, filtered information from handwritten lists, or even when using applications such as spreadsheets to keep track of data. Filtering came in useful particularly where customised data extractions had to be distributed quickly to targeted stakeholders such as federations and service suppliers.

A long-term issue regarding data was the fact that information from different projects was housed in separate databases, making data standardisation across projects virtually impossible. Because standards across the board had not been decided and codified beforehand, different rules applied to different data sets. The result was that content categorisation was not the same throughout the different events, making comparison and compilation of the data into one unit very difficult. This diminished the long-term value of the information considerably, because a historic base for future analysis could not be established.

Another sustainability of data issue was the fact that there were no archiving policies in any of the case studies, thus the *archiving* stage in the information management cycle didn't happen. There is no central depository where data from past projects is stored safely. Most of the data from the various projects are kept on individuals' computers, and will probably be lost should they leave the organisation.[133]

Impact – *Content broad enough to benefit a diverse audience*

As mentioned before, all interviewed project team personnel who worked hands-on with *SportOrganiser* in the case study environments felt that it satisfied their information

[133] Personal observation

management needs, and moreover made a positive contribution to their productivity. Furthermore, data was easily cross-referenced and ordered making it easy to communicate, and simple to read and understand. This is confirmed by the positive comments about the performance of the system, particularly in the 2002 Manchester Commonwealth Games and All Africa Games post-event reports.[134] This means that the system fulfilled its requirements as an information management system that stores, processes, and distributes data needed to get a job done efficiently.

However, the lack of consistent integration of the system, particularly into the website, severely limited the reach of the system, particularly as far as the media and sporting public was concerned. For instance, during the 2004 SA Games it was difficult for the media to obtain results, since they were not being captured and distributed in a uniform way, as alluded to earlier. An online distribution system would have made this function much easier. It could also be useful much earlier to communicate with the parents of the participants, who obviously want to have accurate information about the event to which they are sending their children.[135]

Of additional interest, however, is what the stakeholders did with the data *after* a project was over. At that point the project teams had to write post-event reports that among other things summarised and analysed the data with which they had worked during the project, and produce tables and graphs showing medals won, team breakdowns, and other similar information.

Producing this is a laborious process that had to be done by hand.[136] Breakdown reports had to be printed, and calculations made manually. This was because of the inability of *SportOrganiser* to do any automatic data analysis, as explained earlier.

Related to this is *SportOrganiser*'s inability to host historical data over a number of projects, which makes the data largely unsuitable for high-level decision-making, as historical trends cannot be accurately drawn.

All of the above relates mostly to the *using information* stage of the information management cycle.

[134] Olivier, 2002; Mashego & Nolte, 2004
[135] Bro, 2004
[136] Interview, Nolte

4.2.2 Content dimension conclusions

The standardisation and quality control of information during the management cycle is probably one of the most pertinent issues that emanate from the case study material here. Neglect of these led to incomplete information and degradation of information quality, which impaired its usability as planning tools. In the case studies, active management of information was to a large extent not systemically implemented, particularly in the earlier case studies. This is also one of the main reasons information was never archived. It proves that information does not take care of itself; it has to be planned in the form of policies and procedures—something that seldom gets mentioned in literature on the matter.

Most of these problems can be seen as Shannon's transmission line noise, as per his hypodermic needle model of communication mentioned earlier. Yet there is also a different interpretation – made in the context of chaos theory – which postulates noise not as interference but as an integral part of a process that is inherently unstable and unpredictable. Thus they are not so much problems to overcome as features of the system, which must be acknowledged and accounted for in planning and execution of information systems.[137]

As mentioned earlier, mega-games cities need to be plugged into the global information and communication network to be really effective at hosting a mega-game. This was borne out by the problems in Nigeria and Mozambique, where communication problems were experienced, which had detrimental effects on the events. Accordingly, the mega-games information system, and the team behind it, should plan for this reality by researching beforehand the most reliable means of tapping into the global information networks, for instance by relying on cell and satellite networks, which in Africa have become more reliable than fixed line telephones.

While the system did a fine job of providing job-oriented information management, the fact that summary outputs and statistical analyses of information were limited meant that there was little value that could be added to it without having to do much legwork. However, statistics from the system were included in the post-event reports of at least three of the case studies, which, combined with the tacit knowledge contained in these reports in the form of experiences of project workers, made for valuable learning material. Whether it gets utilised and acted upon remains an open question, particularly since there wasn't any evidence of senior management utilising the data for strategic and long-term planning.

In summary, it seems that the timeline of these case studies was spent ironing out issues of task-oriented information management in the system, to the point where it worked

[137] McBride, 1999

fine during the last case study. The task ahead is to improve the value of the information by adding analytical tools and distribution channels. Opportunities for the learning gained through it to be applied to future projects should also be explored and leveraged.

4.3 People dimension

The human capital in the case studies consisted mainly of the project team members (who almost all used *SportOrganiser* to a lesser or greater extent), and in a number of outside stakeholders, such as SASC senior management, and athletes and sports officials that made up the participating teams. In the case of the SA Games and Zone VI Games, the information management teams were complemented by volunteers who played a special role as data capturers. Other benefactors from the system included sports federations, who were in charge of selecting and preparing athletes, and members of the media who published information drawn from the system.

Comprehensiveness – *System facilitates user, team and organisation development & productivity*

In the case of the Team SA projects (M2002, All Africa Games, and Zone VI Games) the project teams responsible for managing them were very loosely constituted. They consisted of personnel from different sections in the SASC, each working on a different part of the project, with sometimes very little interaction between them. There was no status differentiation—all members were equal, and there was no firm, legitimised leadership.[138] While the project teams can be described as social groups per a sociological definition, their only discerning characteristic was their sense of purpose and shared goals. They had to get a good team of athletes to the various Games without a hitch, come hell or high water. But many other obvious attributes of typical small groups were missing, such as shared values, normative censorship, task allocation, and distinguishable patterns of communication.[139]

This had a bearing on their ability to form communities of practice that learn and self-organise. It is doubtful whether learning and self-organising was happening in a group context, because of the lack of consistent interaction in the teams. Learning was limited to personal experience and each person's own approach to getting the job done.

The weakness of the project teams can be largely attributed to poorly defined leadership both within the group and from organisational management, which, as Stewart and others stress, is essential for the success of intellectual capital and knowledge management.[140]

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[138] Interiew, Nolte
[139] Joubert & Steyn, 1980
[140] Stewart 1999, Davenport, 1997

However, the fact that the project teams couldn't work on a networked computer system during the events – as mentioned in the section on system design – also hampered them working together as a team throughout the project.

In the case of the accreditation projects (two SA Games projects and Zone VI Games project) things were different. With each subsequent project the project teams increasingly evolved into clearly constituted groups. During the first 2004 SA Games, management and leadership roles were still unclear, with the result that task allocation and performance suffered. However, much experience was gained and by the Zone VI Games – the most recent case study – things had improved dramatically. Thus it is here that we find the most thought-provoking case study material.[141]

The information management team at the Zone VI Games had a visible and constituted line of command, consisting of a team leader, senior data manager, and a team of volunteer data capturers. Tasks, while clearly allocated, were closely interlinked into a timeline process. There were computer operators who captured data and dealt with the public; accreditation card producers manufacturing cards, and so on, each with a specific job to do and divided into sub-teams. The layout of the accreditation centre reflected this structured approach—see Figure 8a.

These hierarchical task allocations and the work process design worked reasonably well before the start of the Zone VI accreditation process, when there was no work pressure. However, the structure and processes rapidly changed during the (extremely busy) days of actual accreditation. What follows is a fly-on-the-wall account of this transformation:

It is nine o'clock at night in the accreditation centre located in Maputo's derelict international exhibition estate. Apart from the hum of fans dispersing the damp heat of Maputo, it is quiet with only the faint clicking of four notebook keyboards now and then audible. The twelve accreditation officials are idly sitting at their workstations, placed in four orderly rows. In front of each row is a sign displaying the names of the countries for which each sub-team will be responsible. Team A was told that a delegate from South Africa – the first of eleven teams expected to arrive in Maputo – will be bringing a pack of team application forms, arranged in alphabetical order, to the centre for accreditation at around six, which was three hours ago. Rumours are doing the rounds about delays at the border. So they're wondering when they'll be allowed to go home.

[141] Personal observation

Suddenly there's pandemonium as a stream of tracksuit clad, weary-looking individuals burst through the door, quickly filling the room to capacity. Each one is waving a passport in the air and looking expectantly at the stunned accreditation officials. It is the hundred and twenty-strong team from Zimbabwe, who have unexpectedly arrived first. For the next five minutes there's total disorder as the Zimbabweans try to form haphazard queues, while the accreditation teams hastily rearrange themselves to handle the onslaught, calling out to each other in Portuguese, collecting passports, handing out 'Late Accreditation' forms, and feverishly punching data into the notebooks. "We were informed at the last minute that everyone had to personally hand in their passports for accreditation", the Zimbabwean team manager says. By whom? He shakes his head: Don't know, just received a phone call from Maputo telling them to do so. He shakes his head wearily, observing the chaotic scene. "We've been on the road for three days. Will we be getting sleep before daylight?"

To cope with this unexpected turn of events, the workspace quickly transformed itself from a linear to an organic setting—more suited to handling the uneven and unpredictable flow of arrivals. This is clearly shown by patterns of how the work desks were moved around at the end of the first day of accreditation.

The rearrangement, managed by the team manager, came about through watching patterns of interaction between team members, as well as taking note of how the technology (computers and printers) were utilised. It seemed that the team acted more as an amorphous network, sharing work according to the workload at hand, rather than sticking to a rigid, linear pattern of operation similar to a conveyor assembly line. The hub of each of these networks was *SportOrganiser*, which was accessed through a wireless network. This added to its flexibility and mobility, since the computers could be moved around at random without

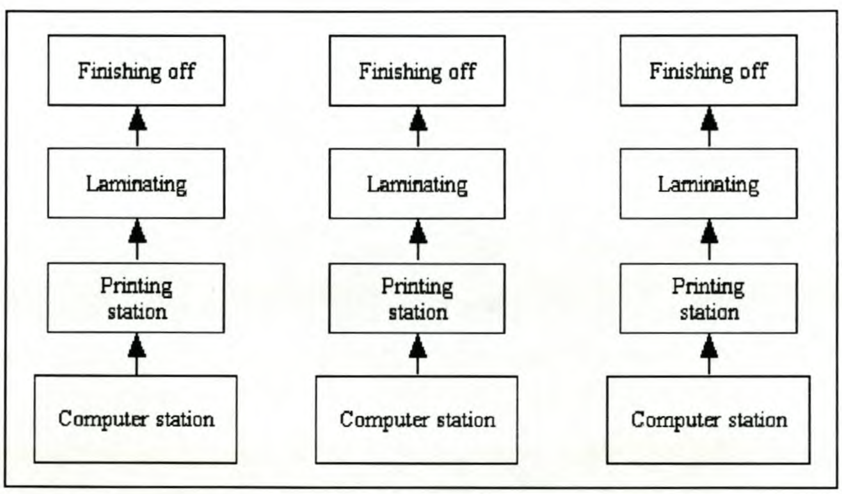

Figure 8a: The layout of the accreditation stations before...

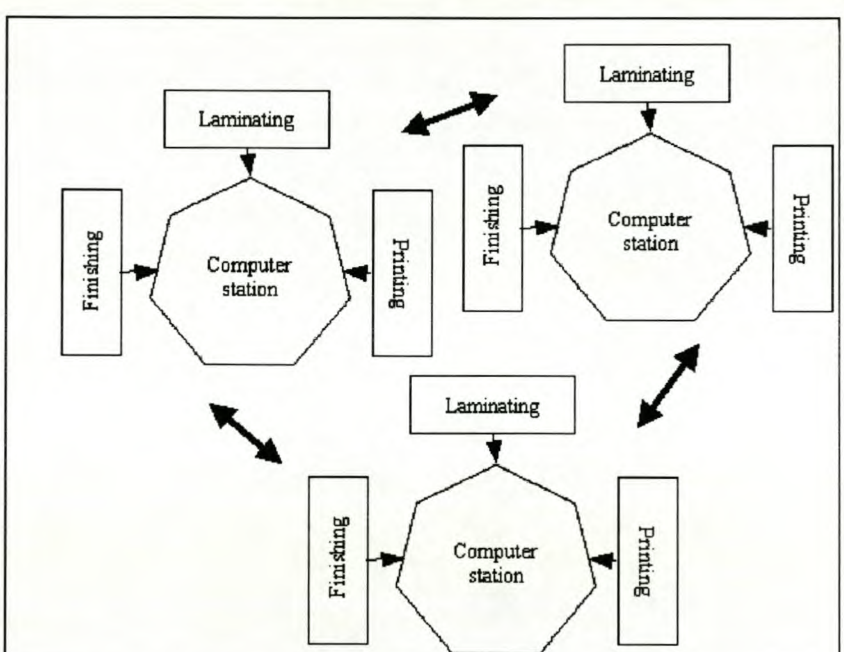

Figure 8b: ...and after it had been re-arranged.

having to worry about cabling problems. The compatibility of printers and other peripherals meant they could be switched around quickly if problems occurred, and they could also be shared amongst everyone, wirelessly. Though guided, the change was largely a self-organising process made necessary by the unpredictable circumstances in which the Games took place.[142]

An important point, however, comes to mind when one compares this to other case studies that didn't progress beyond loose-knit groups. This creative process of reorganisation seemed to only take place once task flow, role allocation, and other fundamental processes were put in place. Therefore it may have happened as a *result* of 'traditional' organisation, rather than as an alternative. Reorganisation is not the opposite of 'no organisation'.

Sustainability – *Users apply system to its optimum potential*

Several of the interviewees mentioned that more adequate training was required to help them use *SportOrganiser* optimally. Most skills for the job were transferred from one person informally, and on a 'need to know' basis. Formal training was not presented, due to factors including shortage of time (meeting deadlines don't allow for training) and the fact that development of the system was ongoing and often took place while the case studies were in progress.

The only case study where users of *SportOrganiser* underwent formal training was the 2004 SA Games. This took place in East London, where a group of fifteen volunteers who were going to assist with data capturing before and during the event underwent a one-day training seminar on how to operate *SportOrganiser*. Most of the trainees had basic computer skills, but none had experience or skills in data capturing.

While the training was successful in teaching them how to operate the program, in other words capture information, and print reports, it didn't address certain inabilities which would be hard to overcome with training, such as lack of spelling skills and accuracy in capturing data, both of which proved to be problems during the case study. These are perhaps more related to experience than knowing how to operate something. Overall, this situation prevented the system from being used optimally.

Flexibility – *Users have control over filtering and output*

As mentioned before, users interviewed found the features allowing them a wide variety of information filtering options quite adequate. During the All Africa Games project

[142] Personal observation

users also began discovering on their own filtering and searching techniques that aren't obvious to newcomers. They learnt these techniques while playing around with the capabilities of Access, and then taught other users how to use them.[143]

One or two interviewees thought that they still had to discover the true potential of the system. They thought perhaps they weren't 'pushing the envelope', partly because they hadn't discovered the potential of the information at hand. This is something that probably couldn't be taught in a workshop or class, as we are talking less about technique or skill and more about analytical thought and experience. Perhaps this is the function that communities of practice could fulfil, where for example tips and tricks that people discover during the course of their work is shared among team members.

Impact – *System enhances stakeholder communication and decision-making*

Operationally, the system – through its availability on a network of computers – enhances a project team's ability to share information, thereby improving communication lines. Interviewees confirmed that most of their operational decision-making was guided by the information drawn from the systems. Therefore the biggest impact was on the operational abilities of the project teams, who worked hands-on with them.

At least one interviewee[144] was of the opinion that the system needed an output format more useful to senior management, who don't need to wade through very specific data, but rather require summary and analytical reports that analyse patterns and trends identifiable through data manipulation. In none of the case studies did senior management have any hands-on interaction with the system, though in at least one case – the M2002 study – the senior manager did request data reports for decision-making purposes.

Members of the public and families of athletes were 'remote' audiences who could have benefited much more from the system if the public channel – the team website – had been better designed and run in all projects. In the M2002 project, the website had several powerful features that added value for these audiences. For instance, each athlete was given an email address as part of the project. The public were able to send emails to the athletes from the website, thus putting them directly in touch with each other. As mentioned before the website was not successfully implemented in subsequent projects, thus losing a powerful medium with which to reach the broader sporting community.

[143] Personal observation
[144] Interview, Nolte

4.3.1 People dimension conclusion

Analysing this dimension is a much more complex task than the previous two dimensions, specifically due to the many social and human resources factors that impact upon it, which lie outside the realm of this thesis, therefore perhaps requiring a study of their own. The evidence presented here provides only clues to them.

While there is much being written on communities of practice as a phenomenon, few give *detailed* attention to the relationship between the formal aspects of organisations, such as managerial quality, and the effectiveness organisational structures have on the formation of communities of practice. Much of the evidence here points toward a symbiotic relationship between organisational *existing* well-being and the formation of such communities. A health organisation and the support it should provide seem to be a prerequisite for communities of practice to be formed.

This leads to the question of leadership, which needs to be insightful enough to understand the organisational processes related to change in complex situations. As demonstrated, things can change in the wink of an eye, and there needs to be flexibility and a management preparedness to cope with it.

Operationally, the use of mega-games IMS impacted positively on the teams. It gave them opportunities to work together, which are not possible without the present technology. It confirms that the growth of mega-games as a social activity is a result of the advent of the information age. However, it should be supported by continuous training, which should cut across the dimensions linked to intellectual capital here, and not be limited to, for instance, only computer skills.

Finally, all of the above conclusions are summarised in table format in Appendix A.

Chapter Five

Evaluating the mega-game information model

5.1 How the model benefited the case studies

It should be clear from the above how the model provided direction in the evaluation of the case studies. It helped identify the current strengths of the information system, which lay primarily in its ability to effectively capture data, organise it internally, and distribute it to core users for operational purposes. It also showed the importance of system stability and minimum downtime, which plays a major role in the smooth running of such tightly scheduled projects. It also accurately pointed out content essentials that showed up in case study evidence, such as the importance of filtering, standardisation, and breadth of content to ensure maximum impact.

Were it not for the model the analysis may have ended there, since those are the evaluations that are obvious. Most interviewees, unprompted, gave versions of the above as their analyses of the system's performance. However, the model provided the means to also analyse less obvious aspects of the system, such as the relevant human capital, as represented by the model's people dimension. It pointed out training deficiencies, and more importantly, the lack of impetus for capturing learning experiences and sharing these through things like communities of practice, and the lack of consistency as far as continuity was concerned.

In addition, examining the case studies also showed problem areas worthy of improvement that weren't covered by the model. As was pointed out in the section dealing with model building, this was to be expected, and is a feature of the building process.

5.2 Model improvements

Forthwith we look at additions and tweaks that can be made to the model in light of the case study material.

Delone provides a framework for measuring the success of information systems that is confirmed here by the outcomes above.[145] He lists six categories in which success can be measured—system quality, information quality, user satisfaction, individual impact, and organisational impact.

His analysis serves as confirmation for the model building-case study methodology followed here. Looking back over the case study evidence, all his categories are represented in the case study discussions. The categories are also covered in the model, although the model provides a more in-depth and all-encompassing classification by covering the technical, content, and human aspects of the system.

The duel frameworks of intellectual capital and the information management cycle proved to be well chosen to simplify and systemise both the process and system aspects of handling information at mega-games. Thus the basis on which the model was designed was proven by the case studies to be adequate.

The main shortcoming of the model pointed out by the case studies was a lack of specificity about the role management of both people and the system itself plays. This was evident in each of the dimension conclusions earlier. With the benefit of hindsight, three of the model parameters have been restated to take those findings into account.

5.2.1 People dimension

Parameter: Sustainability

Present parameter statement: Users apply system to its optimum potential

Restated parameter statement: *Leadership ensures system is applied to optimum potential*

The focus is shifted from the users as agents ensuring the successful application of the system, to one where leadership is seen as central to its success, particularly as far as long-term planning is concerned.

5.2.2 Content dimension

Parameter: Sustainability

Present parameter statement: Data is kept current, complete, and standardised

Restated parameter statement: *Proper management ensures data is current and standardised*

[145] Delone, 1992

The statement is no longer self-evident; it now states that there are proper managerial roles and activities needed to ensure data integrity.

5.2.3 Design dimension

Parameter: Comprehensiveness

Present parameter statement: System able to accommodate a diversity of information needs

Restated parameter statement: *System planning accommodates operational and strategic information requirements*

This parameter makes it more explicit that the information requirements should be made clearly at the planning stage. The more this is ensured in the conceptual stage of implementing a system, the better it will perform later, when less updating and additions need to be made.

Regarding the information management cycle, the most important outcome from the case studies was that the cycle is almost never linear, that rather than talking of a cycle one should talk of **aspects of information flow**. While the model was worthy in the sense that it pointed out where stages of the cycle were neglected in the case studies, the cycle seems to be more of a network of flows within the context of an event. Talking of a cycle implies a sequential beginning and end, while most of the cycle stages noticeable in the case studies took place constantly throughout most of the projects, and in any number of different sequences.

Lastly, it may be beneficial to indicate all the stages/aspects on the graphic representation of the model. The revised version of the model indicating the improvements is shown in Appendix B.

5.3 Looking ahead

The mega-games IMS model was never intended to be used for strategic planning, nor is it a knowledge management toolkit. As per the topic of this thesis, and the subsequent placing of it on the information management system landscape, it functions purely as a system for the collection, storing, and manipulation of data for mega-games and teams. What the model and the accompanying case study evidence pointed out, however, was how the value of this process can be greatly enhanced by ensuring that the outputs from the IMS can be redirected into structures and programs of that nature. One can further imagine a scenario

[150] Nonaka & Takeuchi, 1995

where the system becomes an active contributor to organisational growth and well-being, and not merely an operational tool, especially since the model already includes clues to this in the form of, for instance, communities of practice.

With this in mind it is worthwhile placing mega-games information systems on the landscape of new developments and trends in the field of organisational management. In the past few years the trend in information management has been for it to evolve into knowledge management, broadening the techno-centric definition of 'data' and 'information' management into one that defines knowledge as organisational assets including the former, much in the line of what was discussed earlier.

Under this scenario a 'knowledge spiral' develops in an organisation, of which one type of spiral mentioned by Nonaka & Takeuchi is the ontological one.[150] Here knowledge formed in organisational teams – such as the mega-games project teams – is transported higher up the organisation to divisional or sectional level (in the SASC called sub-units), and from there it travels to top management and even industry level. Along the way knowledge from many other sources – including tacit knowledge – is added to the mix, enriching it. Over time each spiral renews itself, benefiting from learning taking place inside each successive spiral.

The lack of an 'information culture' at policy level – the top end of the spiral – is one of the reasons given by Roche for the lacklustre performance of the 1991 World Student Games.[151] A knowledge spiral such as described above would ensure that an information culture, already in place at operational level through the use of an information system, is carried through to senior management and policy-making levels.

Ultimately, therefore, knowledge generated by a mega-event IMS could impact on national sport policy level. There is therefore much scope for using this thesis as a building block for analysing the knowledge spiral of mega-games information.

Lastly, an important trend mentioned by Mark McElroy is the converging of knowledge management, organisational learning, and complexity theory.[152] The ability to reorganise in the face of chaos, and out of a situation of apparent disorder, as illustrated in a small way by the Maputo Zone VI games experience, is a prominent feature of complexity,[153] and a feature in the trend toward flatter organisational hierarchies meant to enhance and speed up organisational learning. The deadline-driven, fast-changing environment of mega-games

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[151] Roche, 2001
[152] McElroy, 2000
[153] Complexity is defined as the space between order and chaos (McElroy, 2000).

information management systems could therefore be a hothouse for researching such developments.

It is of course difficult to see in five relatively small case studies reflections of the rather dramatic pictures painted of their mega-games big brothers, such as the Olympic Games. Particularly in the case of the SA Games there are no big sponsors or millions of television viewers, and the system that was used is a fraction the size of that used at the Olympics. Yet one cannot help but notice the similarities in the issues that plague the big events, particularly the problems around continuity and getting people to share information and resources. Unfortunately there wasn't an opportunity to interview anyone who had worked 'on the ground' at these events, but the documentation from large events quoted here hint at the presence of similar problems as those shown through the case study analyses. All that differs is the magnitude of the issues.

In terms of mega-games being an inevitable part of the globalised world in which we live, that certainly rang true. As this thesis was being written, the 2004 Athens Olympics was being broadcast on seven South African satellite television channels and there were tens of thousands of spectators. In Athens, ten thousand computers were crunching data from the 20,000 participating athletes. This was because the Olympics took place in an environment plugged in to the global network of telecommunications that transports those images to billions of viewers. However, experience in the case studies has shown this is simply not possible in locations such as Nigeria or Mozambique; countries stranded on the wrong side of the digital divide. Some writers even question the wisdom of the decision to allow second-tier countries such as India – home of the 2010 Commonwealth Games – to host such events.[154]

There is little doubt that the demand for medals to be won by Team SA will require an increasingly sophisticated information system, catering to the needs of the effort necessary to bring the medal winners home. Every team project needs to run smoother and more efficiently to ensure better delivery, and that is going to be helped along in part by the implementation of learning experiences, and the building of quality historical data on which to base future planning. Like the four-year cycle of mega-events, finding the perfect information management solution is a learning experience that repeats itself, each building on the successes and insights of the previous one.

[154] Cornelissen, 2004

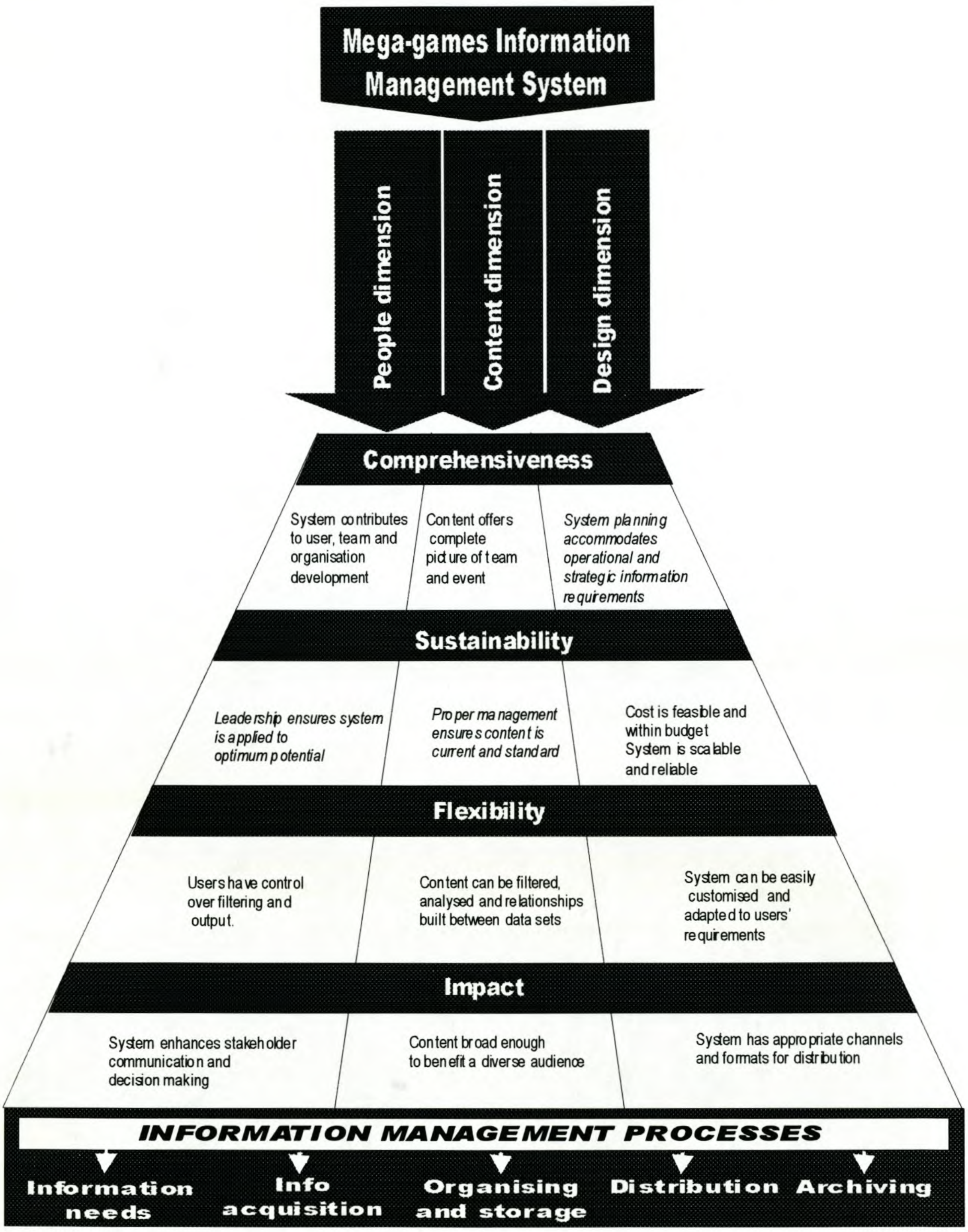
Appendix A

Summary of case study findings

		Dimensions		
		Design Dimension	**Content Dimension**	**People Dimension**
Aspects	**Comprehensiveness**	System generally adequate for requirements with minor adjustments.	Range of data captured was adequate and in line with requirements.	System highlights team weaknesses, provides much opportunity for collaboration/learning.
	Sustainability	System requires ability to be used across any number of events.	Data not standardised; control and management of data needs to be tightened.	Require more specialised training and skills transfer; system could be the basis for creation of communities of practice.
	Flexibility	Needs ability to adjust large sections of data.	Filtering and searching worked well; non-standard data limits flexibility.	Users happy with system, particularly opportunities for collaboration it creates.
	Impact	Needs Internet connectivity to expand system's reach.	Lack of proper website implementation limits reach of content.	Need to increase impact on management decision-making.

Appendix B

The revised model (italicised sections indicate changes)



Appendix C

The contents of *SportOrganiser*

The first working version of *SportOrganiser* implemented during the Commonwealth Games, was Version 0.5, while the version currently being used is 0.80.

The following diagram shows the information that *SportOrganiser* 0.80 hosts. The *italicised* sections existed in the original *SportOrganiser*; the rest were subsequent additions.

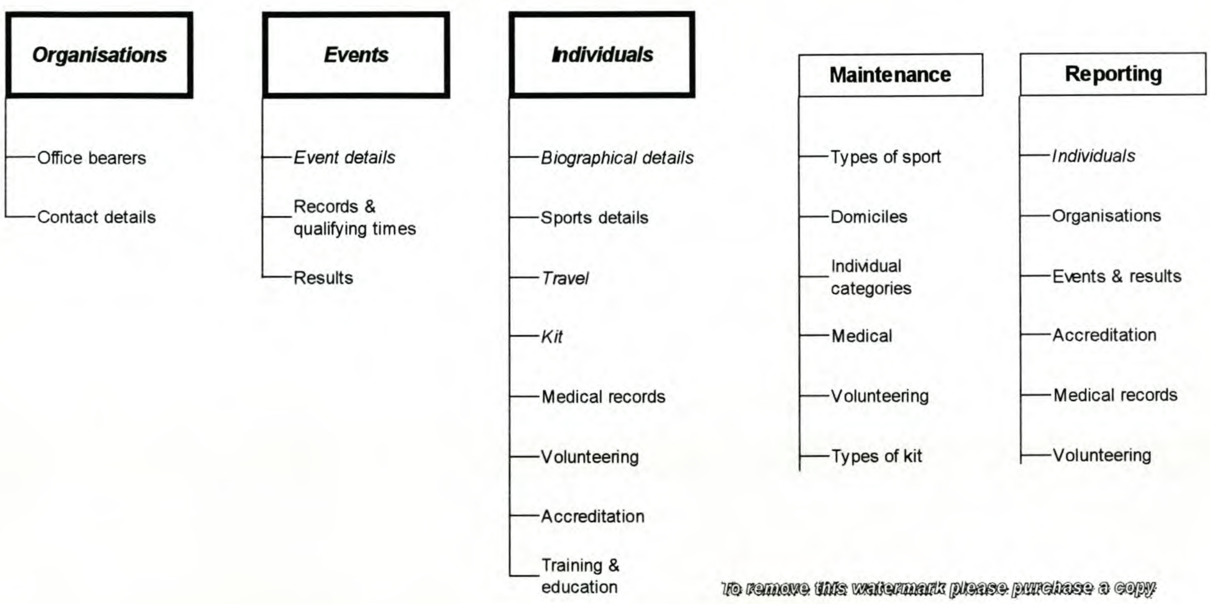


Figure 9: Schematic of *SportOrganiser*.

There are three principal data groups in the database, each with one or more subsets:

Organisations: The names and details of all organisations involved with the team, such as service providers, sport federations, and medical facilities.

Events: This contains the names of mega-games, and the details of all individual items within each, for example *Athletics, 100m men*, or *Swimming, 50m Backstroke ladies*. It also contains the existing records for times and distances in each event, present record holders, as well as the qualifying times and distances where relevant.

Individuals: This is the largest group, and contains details of all individuals who make up the team, such as athletes, coaches, managers, and so on. Its subsets consist of data on team kit (clothing), travel and accommodation arrangements, medical history, volunteerism, and accreditation.

A **maintenance section gives users the ability to** customise certain sections. For instance, a user is able to specify and pre-programme the types of sport with which they will be working in a specific event, types of kit, medical procedures, and so on.

Very importantly, there is a **reporting section**, which allows users to create reports that suit their needs. The reporting section includes filtering options, where a user can narrow the report down to, for instance, a specific type of sport, or even create a report consisting of only one individual or organisation. It also allows the user to create accreditation cards for events, on the fly.

To get a better feel for *SportOrganiser*, screen captures of the database computer interfaces can be seen in Appendix D. The screenshots and images from the database shown are from version 0.73.

Appendix D

Screen shots from *SportOrganiser*

Figure 10: Opening screen

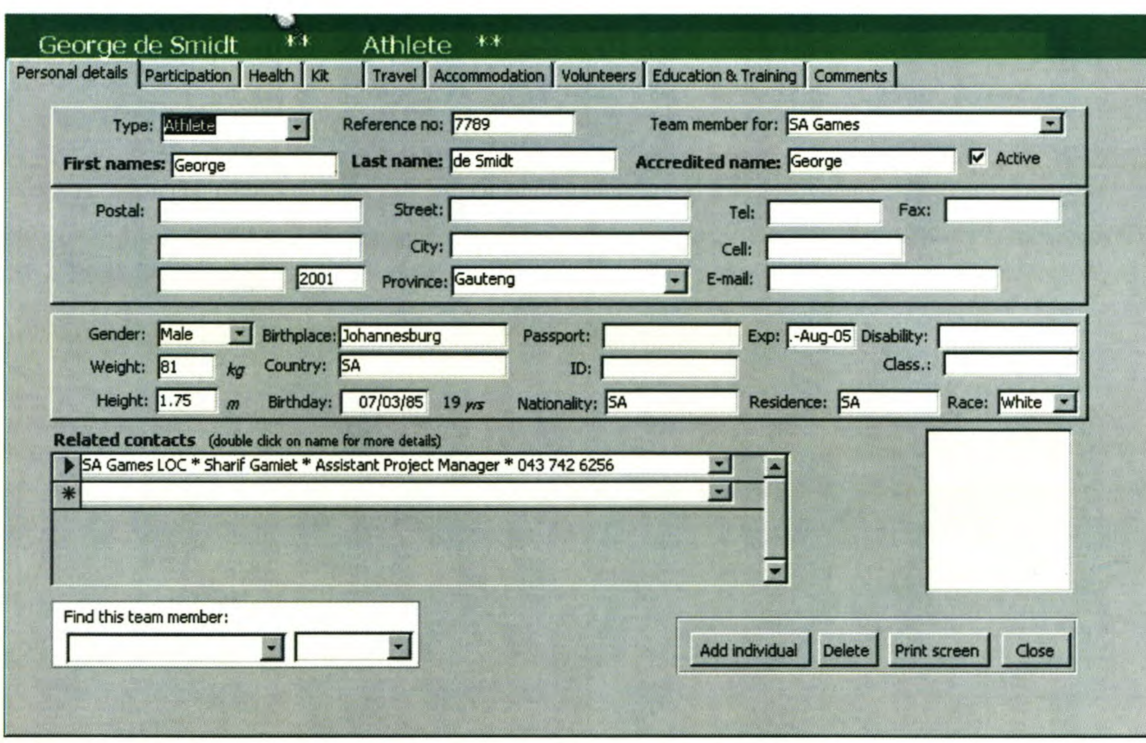


Figure 11: Individual information screen

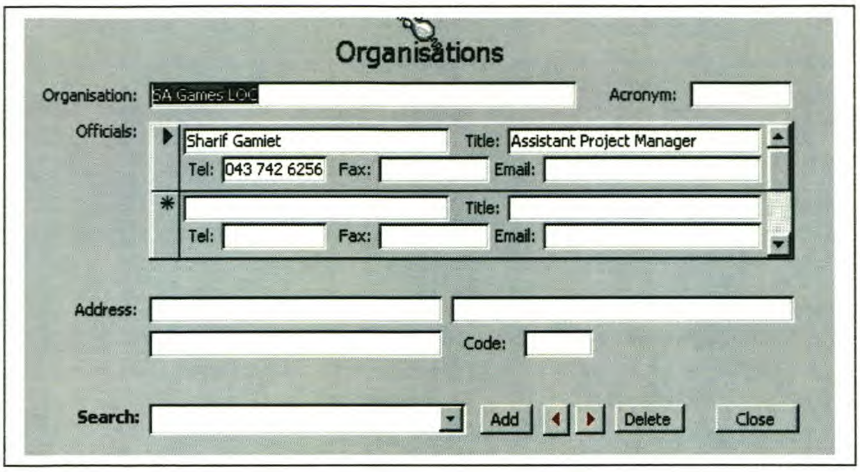


Figure 12: Screen for capturing organisation information

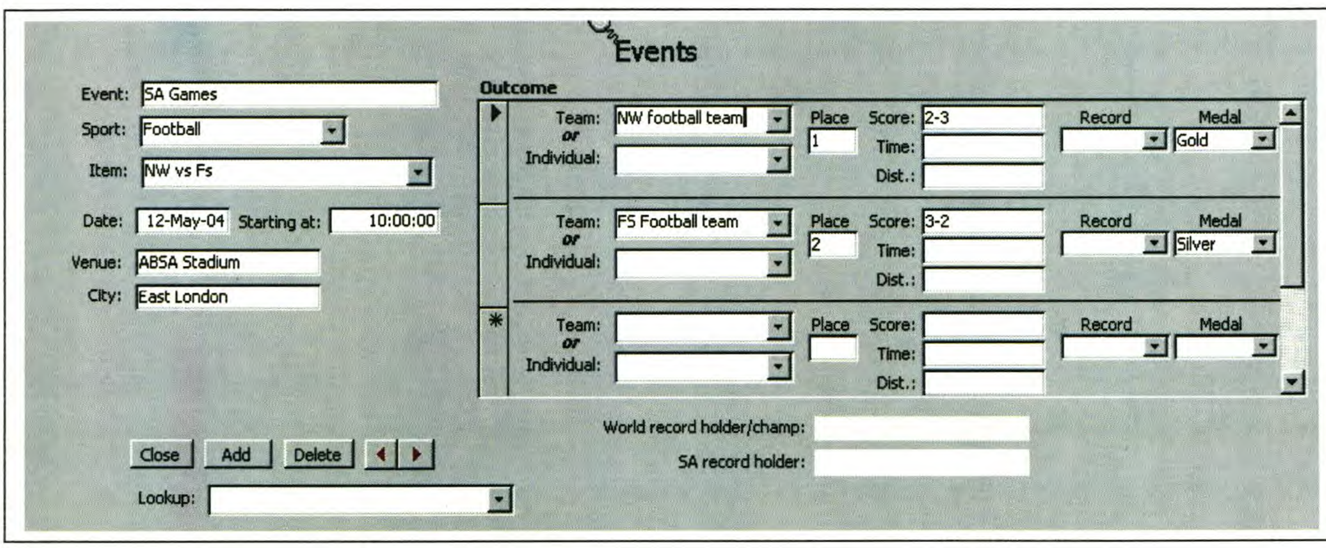


Figure 13: Event and results capturing

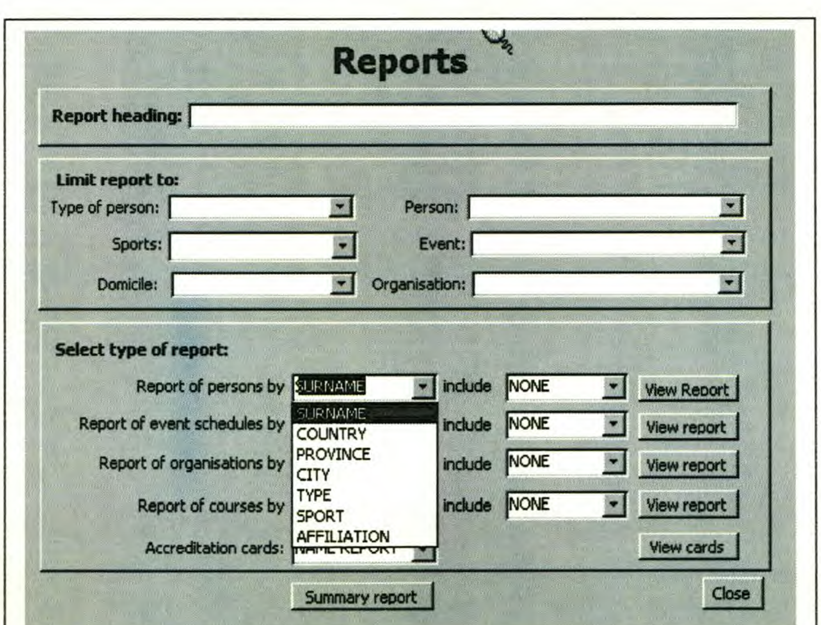


Figure 14: Report selection screen

Appendix E

Table 1: Comparative tables for mega-games

	Olympic Games	Commonwealth Games	All Africa Games	Zone VI Games	SA Games
First time held	1896	1930	1965	2004	2002
# times taken place	26	17	8	1	2
No of competitors at most recent event	20,000 (2004)	5,717 (2002)	5,000 (2004)	1,500 (2004)	2,287 (2004)
Codes represented	28	25	22	5	8

Sources: www.internationalgames.net; www.athens2004.com; www.thecgf.com; www.sasc.org.za.

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Reflecting a general trend in modern society, the world of sport has become information-driven, with effective information management becoming an essential part of all sports organisations and sporting activities.

In particular the sophistication of large, multi-sport events (mega-games) such as the Olympic Games and Commonwealth Games demand a high standard of information management to help ensure their smooth running. This is also true of the managing of national teams participating in them.

In this thesis a model of an information management system (IMS) for managing certain types of information in such events and the national team participating in them is developed. The model is based on two conceptual frameworks—intellectual capital and the information management cycle.

The model is tested against three case studies where a specific information management system was used to manage South Africa's national team participation in certain international events, as well as two additional case studies in which it was used to manage the participation and results data of large multi-sport events that took place in Southern Africa.

The degree to which the information management system was effectively implemented in each case is evaluated, and the results used to measure the correctness and accuracy of the model. Possible improvements to the model that would make it more useful are also discussed.

Lastly, a broader view of information management at mega-games is given in light of the findings and recent developments in relevant fields, and possible future scenarios are outlined.