

Construction and Implementation of Games Information System in Aid Program for the 27th SEA Games Myanmar

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Keywords: Multi-sport Games, Games Information System, Timing & Scoring System, on-Venue Result System.

Abstract: Multi-sport Games is one of the important social and cultural activities all over the world. It is a necessity to establish the information system for the multi-sport Games, along with the increase in the social concern and participation, and the development of computer and information technology. Games Information System provides complex, accurate and prompt on-site services of all kinds of Games information and results during the competition, and provides more detailed and convenient information services for athletes, coaches, competition officials, OC staff, audiences, media & the public. In this way, the Games Information System ensures the efficient running of the on-site game management and game organization. The 27th SEA Games were held in Myanmar in 2013. As an important part of Aid Program which China gave to Myanmar for supporting the SEA Games, the Games Information System was constructed and implemented by China Sport Information Center. This paper studied and discussed the construction and implementation of Games Information System for the SEA Games. The system went well during the Games, and was highly praised by Myanmar side and different fields related to the Games.

1 INTRODUCTION

Multi-sport Games is one of the important social and cultural activities all over the world. It is a necessity to establish the information system for the multi-sport Games, along with the increase in the social concern and participation, and the development of computer and information technology (Liu et al., 2012). Information technologies were widely applied in Olympic Games, Continental Games, National Games, and various sport events with the rapid development of modern science and technology (Han et al., 2013). The construction and implementation of information system was a substantial part during the performance of Games. Compared with “higher, faster and stronger” in competition, information systems were expected to be “more accurate, more rapid and more stable”. Games Information System provides complex, accurate and prompt on-site services of all kinds of Games information and results during the competition, and provides more detailed and convenient information services for athletes, coaches, competition officials, OC staff, audiences, media & the public. Through all kinds of information distribution methods, Games

Information system could display the eye-catching competitions and their results, which would make the possibility to interact between athletes and media & the public, to display the athletic elegance, to exert the media’s power in publicity, and to let the public enjoy the competitions, and thus make more people participate in the Games. Under the support of information service system, the Games create enormous commercial opportunities, which attract more enterprises, and promote the development of the sports industry. There is no doubt that the modern Games will not thrive and develop without the comprehensive Games information systems. It is hard to imagine that successful multi-sport Games will be held without the support of information system.

China sport information center is responsible for Games Information System. This paper was completed during the construction and implementation of the system, and discussed about the top-level design of the system. The system focused both on the environment in Myanmar and modern trends of development of information system. The system offered services in various aspects, including competition support for 33 events, integrated result process, TV graphics display, result

and information distribution, accreditation, arrival and departure management, etc. The system went well during the Games, and was highly praised by Myanmar side and different fields related to the Games.

2 REQUIREMENTS AND ORIENTATION OF SYSTEM

The 27th SEA Games was held from December 11th to 22th, 2013 in Myanmar. 33 sport events, 406 disciplines were set in the Games. Competition venues were distributed mainly at Nay Pyi Taw and Yangon, besides one football venue at Mandalay and sailing venue at Ngwe Saung beach (People.cn, 2013). All 11 countries and regions took part in the Games. Around 5000 athletes and delegate officials participated in the Games, and 40,000 staff served for the Games.

It was the third time that Myanmar held SEA Games, after 44 years since last time. According to the agreement between China and Myanmar government, China would offer help to Myanmar for holding the SEA Games. The aid program included the training of Myanmar athletes, the show of opening and closing ceremonies, and the construction and implementation of Games Information system. It was the first time that software systems were included in aid program of China. The aid program would enhance the level of cooperation with China and Myanmar, expand new areas of cooperation, and increase the friendship between China and Myanmar (Liu, 2013).

In 2012, Myanmar government asked China for help including Games Information system. China working group investigated Myanmar twice in May and August 2012, and determine the aid program for the SEA Games. And the agreement was signed in September 2012.

Myanmar raised requirements for Games Information system as follows:

In accreditation, the system was expected to manage the information for all participators, including athletes, officials, VIPs, volunteers and working staffs. Moreover, the system was expected to make ID cards and car passing cards.

The arrival and departure management module was expected to manage information of arrival and departure of athletes and officials, so the relative department could pick up and send them conveniently.

In competition support, timing & scoring system and on-venue result system for 33 events, result display on public scoreboard, TV graphics display were expected.

In information distribution, result website was expected to publish individual event results, integrated result, gold medals ranking, medals ranking, etc.

SEA Games was a regional multi-sport, in which only 11 countries and regions took part. The competitive level was limited, and the international attention was not very high. The economic level of Myanmar was limited and basic environment such as electric power, network, transportation, accommodation was not good. Myanmar government put more money and resource to improve basic environment for holding the SEA Games, however those were not enough. It was a big challenge to implement Games Information system under such basic environment.

According to the requirements of Myanmar, and compared with information systems applied in similar level multi-sport Games, the service level of Games Information system was oriented to be medium, slightly better than which was applied in SEA Games 2011 in Indonesia. The system would focus the service on field of play in venue. The construction and implementation of the system would meet the requirements of Myanmar side under the consideration of actual local environment.

3 DESIGN OF GAMES INFORMATION SYSTEM

3.1 Overview

According to the requirements, Games Information System was designed as a high-efficient, complete, open and advanced competition information processing system, which integrates all kinds of resources such as hardware platform, net communication platform, tools platform and application software platform etc. The system is applied to provide services for the Games to guarantee its high-efficient and faultless operation, which include athlete entry by name and by event, competition organization and management, timing and scoring, results processing, information distribution and results inquiry and so on.

Games Information System is mainly responsible for processing competition results information, including sports entry, defining the scale of the

Games, defining competition events, arranging competition schedule and program, getting and processing results, generating and printing various competition reports.

The construction and implementation of Games Information System involves not only its own construction but also basic environment such as venue, electric power, network, communications, volunteer which would guarantee smooth operation of the whole system.

The architecture of the system is shown as follow:

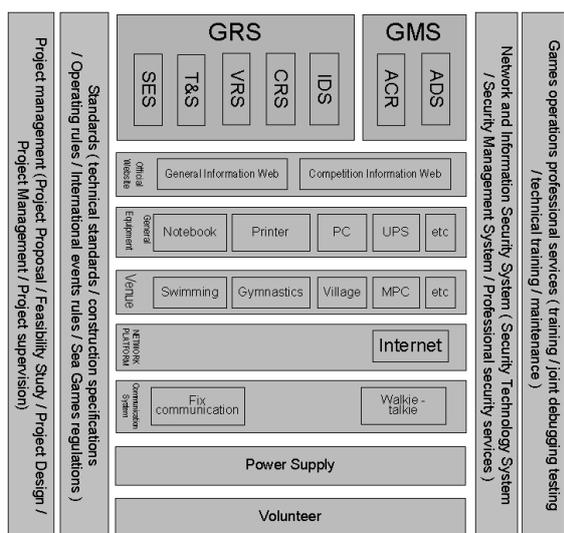


Figure 1: Architecture of Games Information System.

There are 2 main parts of Games Information System: Games Result System (GRS) and Games Management System (GMS). GRS offer direct service for competition which contains 5 parts: Sport Entries System (SES), Timing & Scoring System (T&S), Venue Result System (VRS), Central Result System (CRS) and Information Diffusion System (IDS). GMS offer service for Games management which contains 2 parts: Accreditation System (ACR) and Arrive and Departure System (ADS).

3.2 Games Result System (GRS)

3.2.1 Sport Entries System (SES)

SES operates before competition and is the only entrance system for athlete competition entry. Registration via SES involves two parts: Entry by name and Entry by Event. Entry by name indicates athlete registration information by ACR; Entry by Event refers to the information of the specific events which athletes participate in.

The function of SES is:

- Delegation Management: Delegation Management refers to the management of delegation roster including delegation code, name of delegation in both abbreviated and full form, and the management of whether delegations participate in the competition.
- Athletes Management: every country / region submits athlete information to OC via internet. Athlete Roster information refers to the registration of athlete’s personal information.
- Event Management: Athlete’s entry by event is very complicated. Event management refers to the management of information of what event will every athlete participate.

3.2.2 Timing & Scoring System (T&S)

A data acquisition system is needed for a high-level competition to provide a high-demanding live operating service under a series of technical work such as data capturing, processing and distributing and so on.

Timing & Scoring System is an aggregated system customized according to rules and regulations of each discipline, which involves various equipments or devices operating simultaneously with diverse technology aggregates at different operating places. The combined system operates flexibly in a variety of complex working conditions. T&S is applied to the core part of competitions, namely, generating competition results and records as the only criteria for athlete results. Besides, Timing and Scoring System, as a front basic system of Games Result System, is responsible for providing the raw competition data for the other sub-systems of Venue Results System (VRS) and its operation decides the success or failure of competitions and, sequentially, decides whether the whole system can operate faultlessly.

The main functions of T&S can be defined as the following:

- Provide equipment and service for operation
- Provide service for the special display equipment in competition
- Exchange real time data.
- Offer analysis report to referees.

3.2.3 Venue Result System (VRS)

A modern Games makes high requirement of competition organization and management (including arranging competition program and management of athlete entry by name and by event), results capturing and processing (such as acquiring

the results from Timing and Scoring System or the results by manual entry, ranking and qualification processing etc.) and on-venue data exchange and data distribution (including data exchange and real-time data service).

Venue Result System is deployed at each venue to provide the service for competition management and competitions for each event. The system is directly engaged in competition commanding management and referees' work, which is an inseparable part of competition organizing management. As a result, the operating conditions of Venue Result System directly influence whether competition events can go smoothly.

Being unique and special, each event is configured with a specified venue result system compliant with its rules and regulations.

The main modules of VRS are:

- Result Data Entry: Result Data Entry (RDE) is the data inputting system of VRS. RDE stores data into the database of OVR by acquiring data from external systems (e.g. T&S) or generating technical statistics, manual result.
- On-Venue Result system: On-Venue Result system (OVR) is the core module of VRS. Its main function is to assist sport-event departments in organizing, managing and arranging the events and dealing with results. OVR handles the result for an on-going competition. It acquires data through automatic collecting or manual inputting. Meanwhile, it processes ranking & ordering, promotion, record-breaking and penalty.
- Local Result Print: Local Result Print (LRP) runs offers the functions of result report design, management and print. It is allocated to the entire workflow of VRS, capable of printing competition result report.
- Public Scoreboard display: Public Scoreboard display (PSCB) is a monitor system which coordinates with competition control, then display results on venue scoreboard. During the competition, PSCB acquires real-time data from OVR and display the data acquired in prescribed templates on the venue scoreboard.
- TV Graphics system: TV Graphics system (TVG) is a system equipped in each competition venue, capable of transmitting high or standard definition TV signals and running independently. Through network, TVG promptly and accurately transmits real-time information on timing & scoring, competition schedules, and result processing in the form of TV pictures to television viewers.

3.2.4 Central Result System (CRS)

The difference between multi-sport Games and individual event is the capability of processing the integrated results. Multi-sport Games require a capable system to provide integrated competition information service by collecting and processing all venue competition information (mainly results information).

Central Results System is the core of Games Results System (GRS), and also the center of integrated transaction system and data base of GRS. Its function is setting up the parameters of Games such as the scale of Games, competition event, record-breaking, arranging competition schedule, monitoring and collecting the results and reports for each event, dealing with the communication and data exchanges between VRS and IDS.

The main modules of CRS are:

- Data exchange Management system: Data exchange management system (DXM) provides basic-level service to control and manage the data communication. It's mainly responsible for the management of message distribution route and the data exchange taking place between CRS and VRS as well as between CRS and IDS.
- Central Management System: Central Management System (CMS) is mainly responsible for the management and configuration of CRS, including coding management, application safety management and the management of Games configuration.
- Central Process System: Central Process System (CPS) is mainly in charge of set the plans, making the arrangements and handling the concerning work, including the sports plan management, ranking management, broken records management, medals management, and central monitoring console management and so on.

3.2.5 Information Diffusion System (IDS)

The display of competition process and results is an important means to show the unique charm of high-level competitions in international multi-sport Games. Modern multi-sport Games require a variety of channels or means to provide press and media and the public with the competition information.

As an important component of GRS, IDS support the multi-user information generation in various formats and the information distribution to the official website. It is the main channel for the competition participants, media and the public to acquire the competition information. The list of contents to be distributed includes: athletes'

information, game results, competition schedules, reports, competition progress, medals, rankings, etc. The main channel of distributing information is website and APP for smartphone.

3.3 Games Management System (GMS)

3.3.1 Accreditation System (ACR)

The function of Accreditation system is to collect personal information for all participants, including athletes, officials, working staff, volunteers, etc. ACR will design ID cards which contain all necessary information of participants.

The function of ACR is:

- Data interface: Define data interface between ACR and other systems.
- Query and modification: After the participant applies registration, he or she can query on the website, and revise if there are any changes.
- Data input: Input personal information.
- Data audit: OC can audit the participant whether he or she can participate in the Games.
- Access permission management: Define the access permission to determine which venue the participant can enter.
- ID cards design: Design ID cards which contain all necessary information of participants.

3.3.2 Arrive and Departure Management System (ADS)

The function of ADS is to manage information of arrive and departure of athletes and officials, so that the relative department could pick up and send them conveniently.

The function of ADS is:

- Data interface: Define data interface between ADS and other systems (mainly ACR).
- Data input: Input arrival and departure information of participants.
- Data query: Query arrival and departure information on the website.

3.4 Local Environment Requirements

For the smooth performance of the Games Information System, Myanmar should offer local environment such as:

- Venue environment: Functional rooms, desks, chairs, etc.
- Network: A network is necessary to connect all competition venues and main data center. Internet access is required on every spot where the devices

are deployed.

- Communication: Cellphones and walkie-talkies.
- Electric power: To provide electric power and UPS at each venue.
- Volunteers: A number of local volunteers are required to assist the system operation.

4 IMPLEMENTATION OF GAMES INFORMATION SYSTEM

The implementation of Games information system is illustrated briefly as following:

Table 1: Implementation schedule.

Work content	Time
Preparation	September, 2012
Venue inspection	October, 2012
Requirement investigation of GRS	October, 2012
Requirement investigation of GMS	October, 2012
Development of GMS	November, 2012 to July, 2013
Development of GRS	November, 2012 to August, 2013
Delivery of requirements of venue environment	December, 2012
Venue environment construction	June, 2013
Venue inspection (second time)	July, 2013
Training staff for ACR	August, 2013
Trail operation of ACR	8, August, 2013
Operation of ACR	8, September, 2013
Venue inspection (third time)	November, 2013
End of Sport entry	8, November, 2013
Training staff for ADS	November, 2013
Trial operation of ADS	8, November, 2013
Devices and equipment arrival	November, 2013
Training volunteer	18, November to 27, November, 2013
Operation team ready	28, November, 2013
Rehearsal	1, December to 5, December, 2013
System ready	5, December, 2013
Training referee to use the system	Before competition
System operation of SEA Games	4, December to 22, December, 2013
Tail-in work	End of 2013

The SEA Games was started on 4, December 2013 and ended on 22, December 2013. There were 19

match days and thousands of matches. 461 gold medals, 459 silver medals, 611 bronze medals, totally 1531 medals were produced (Wikipedia, 2013).

To complete the Games Information System in aid program, China sport information center have organized a specialized team which have 222 members. The ACR has produced 40763 ID cards. The SES has completed works for 4906 delegation members. Much data have been generated by Games Information System including reports of start list, result, statistics, real-time information, etc. 1090 start list reports, 1388 result reports, 460 medal list reports and 24 record-breaking reports were generated.

Some screenshots and pictures were shown as following:

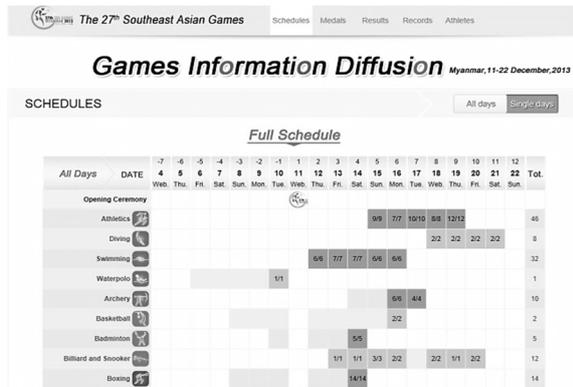


Figure 2: Website of Information Diffusion System.



Figure 3: Competition Report – Athletics.

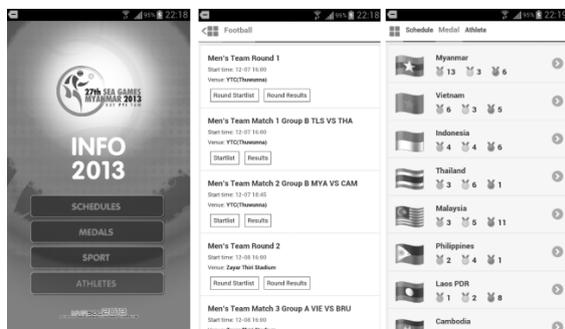


Figure 4: App for smartphone.



Figure 5: System Operation - Swimming.

5 CONCLUSIONS AND FUTURE WORKS

Games Information System provides complex, accurate and prompt on-site services of all kinds of Games information and results during the competition, and provides more detailed and convenient information services for athletes, coaches, competition officials, OC staff, audiences, and for media & the public. In this way, the Games Information System ensures the efficient running of the on-site game management and game organization. With the help of China's aid program, Myanmar has held a successful SEA Games.

This paper was completed during the construction and implementation of the system, and discussed the top-level design of the system. The system focused both on the environment in Myanmar and on the modern trends of development of information system. The system offered services in various aspects, including competition support for 33 events, integrated result process, TV graphics display, result and information distribution, accreditation, arrival and departure management, etc.

The whole system went well during the Games, and was highly praised by Myanmar side and different fields related to the Games.

In the future works, we will make more effort on the expansion and integration of the Games Information System.

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