



Performance from Experience

Telecommunications Aspects of the Olympic Games: Challenges for the Athens 2004 Olympic Games



**Prepared for:
Third Aegean
International
Conference
May 19-21, 2001
Tinos Island
Greece**

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Telecommunications and Olympic Games

- The Olympic Games, regardless which is the host city, become the **largest telecommunications project** ever undertaken for a single event
- The role of telecommunications becomes one of the **critical differentiators** for winning a bid or host the Olympic Games
- A **highly complex, yet extremely reliable and robust**, telecommunications network is needed to deliver the broadcast images to the world
 - **EXAMPLE:** In the Sydney 2000 Olympic Games:
 - **3.7 billion viewers watched the Games on TV**
 - **36.1 billion was the cumulative audience over the 17 days**
 - **3,400 hours of live coverage**

Summer Olympic Games Statistics

	Seoul 1988	Barcelona 1992	Atlanta 1996	Sydney 2000
National Olympic Committees present	159	169	197	199
Number of sports	23	25	26	28
Events on the program	237	257	271	300
Athletes	9,627	9,905	10,630	11,116
Journalists-photographers	4,930	4,880	5,954	5,300
Radio-television staff	10,360	11,433	13,954	14,292
Countries broadcasting	160	193	214	220
Tickets sold	3,306,000	3,812,000	8,384,290	7,000,000

Official Olympic Games Web Sites

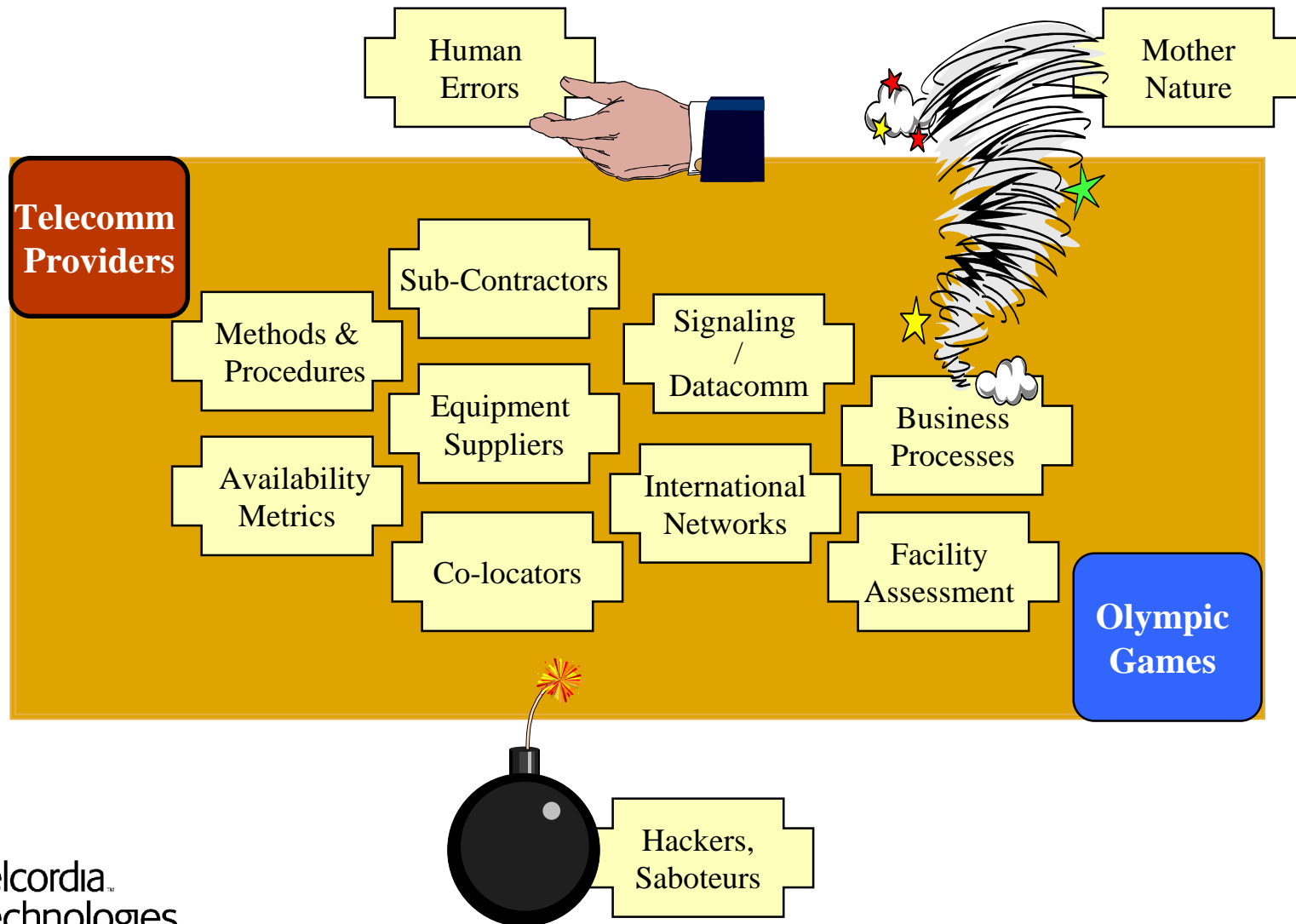
**Internet Traffic during the Games (17 days)
has increased exponentially!**

- **Atlanta 1996: 190 million hits**
- **Nagano 1998: 650 million hits**
- **Sydney 2000: 11 billion hits (peak 1.2 million/min)**

Olympic Telecom Network Challenges: Quotes

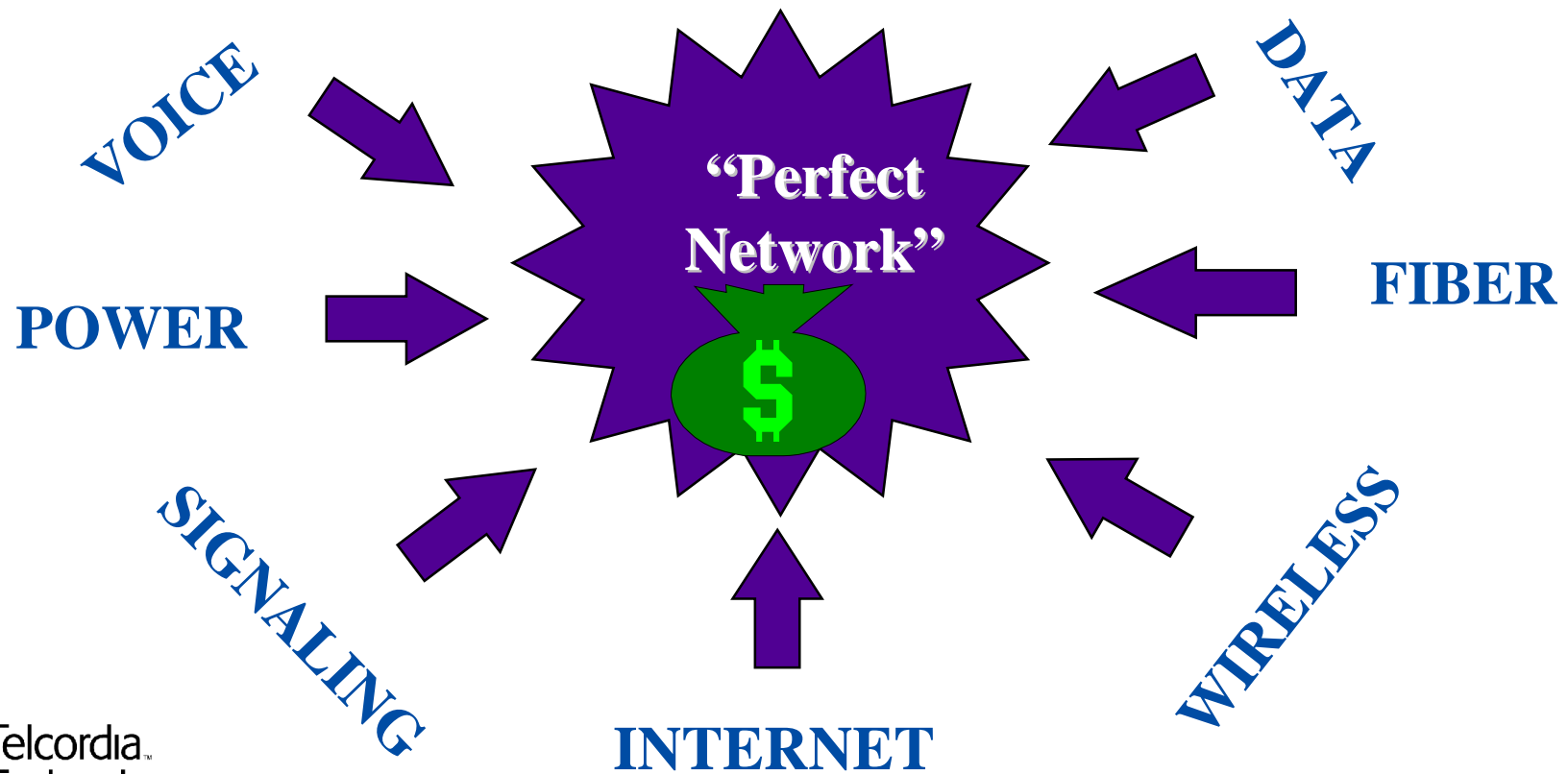
- “Continue full network reliability support for existing customers, while absolutely fulfilling the telecommunications needs of the mega-event (i.e., Olympic Games)”
- “Full network redundancy ensuring a **constant feed** from the **venue to the broadcast center**”
- “Massive upgrades of hardware and software”
 - several 100k miles of fiber cable
 - several 100% increase in wireless capacity
- “Everything we build has to have a planned re-use”
- “100s people-years of effort to find the right balance of reliable and gee-whiz technologies to insure the success of a 17-day event”
- **“Volume isn’t the key issue --Strategic Network Reliability is”**

Network Reliability Depends on Many Players



Things to do Before Hosting the Olympic Games

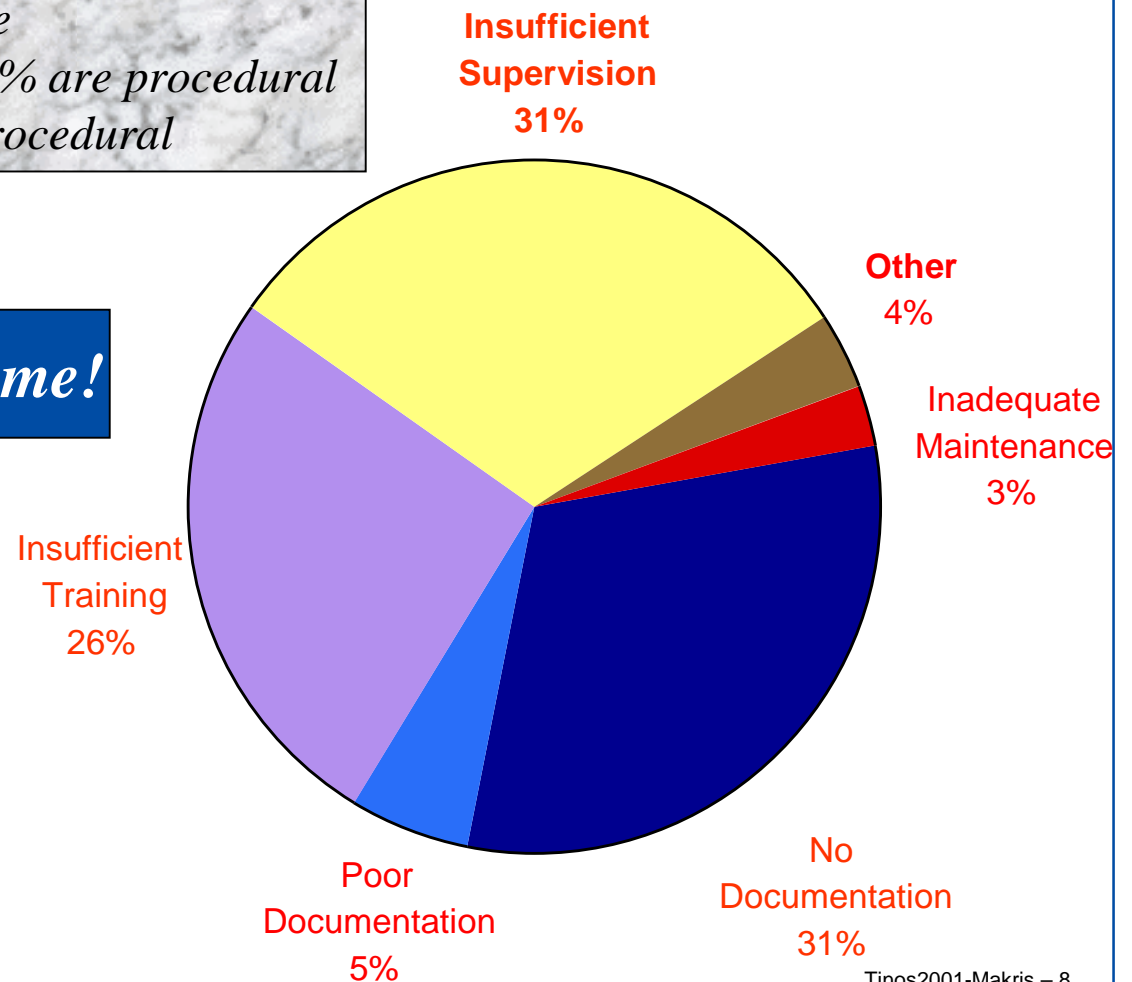
- **Develop detailed network infrastructure plans addressing all reliability, availability, survivability, and security aspects**



Example: Distribution of Root Cause Subcategories for Procedural Error- Attributed Major Outages in U.S.

- 14.4 errors / quarter or **1.1 per 2 weeks**
- 34% of all outages are procedural, therefore avoidable
 - **Central Office Power:** 57% are procedural
 - **Local Switch:** 54% are procedural

That's all English to me!



Telecom Network Reliability Approach

- **Prevention and Rapid Recovery through Network Lifecycle**

- **Planning**

- ArchitectureRisk Diversity
- Single Point of Failure Identification
- Network/Service Availability Numbers
- Geographic Assessment
- Facilities, Building Systems Assessment
- System Reliability Requirements (HW+SW)
- Business Continuity Planning
- Disaster Recovery Planning and Readiness

Network

Site / Bldg

Equipment
Processes

- **Deployment**

- Installation Processes
- Physical Risk Assessment

People

- **Operations**

- Heat Release and Power management
- Disaster Recovery Team on Site
- Training / Exercises (“War Games”)



Performance from Experience

Risk Management Activities for the Telecommunications Network

- **Risk Assessment**
 - Identifying and quantifying areas of greatest downtime risk
 - Assessing continuity, recovery, and service interruption plans
- **Risk Reduction and Mitigation**
 - Comparing alternative architectures
 - Prioritizing strategies for economically improving reliability
 - Developing disaster risk estimates and risk-reduction methods
 - Instituting controls that prevent additional damage (e.g., from corrosive smoke, chemicals, water or particulate debris)
- **Risk Contingency Planning**
 - Business Impact Analysis
 - Disaster Recovery Plans Development
 - Disaster Recovery Plans Exercising

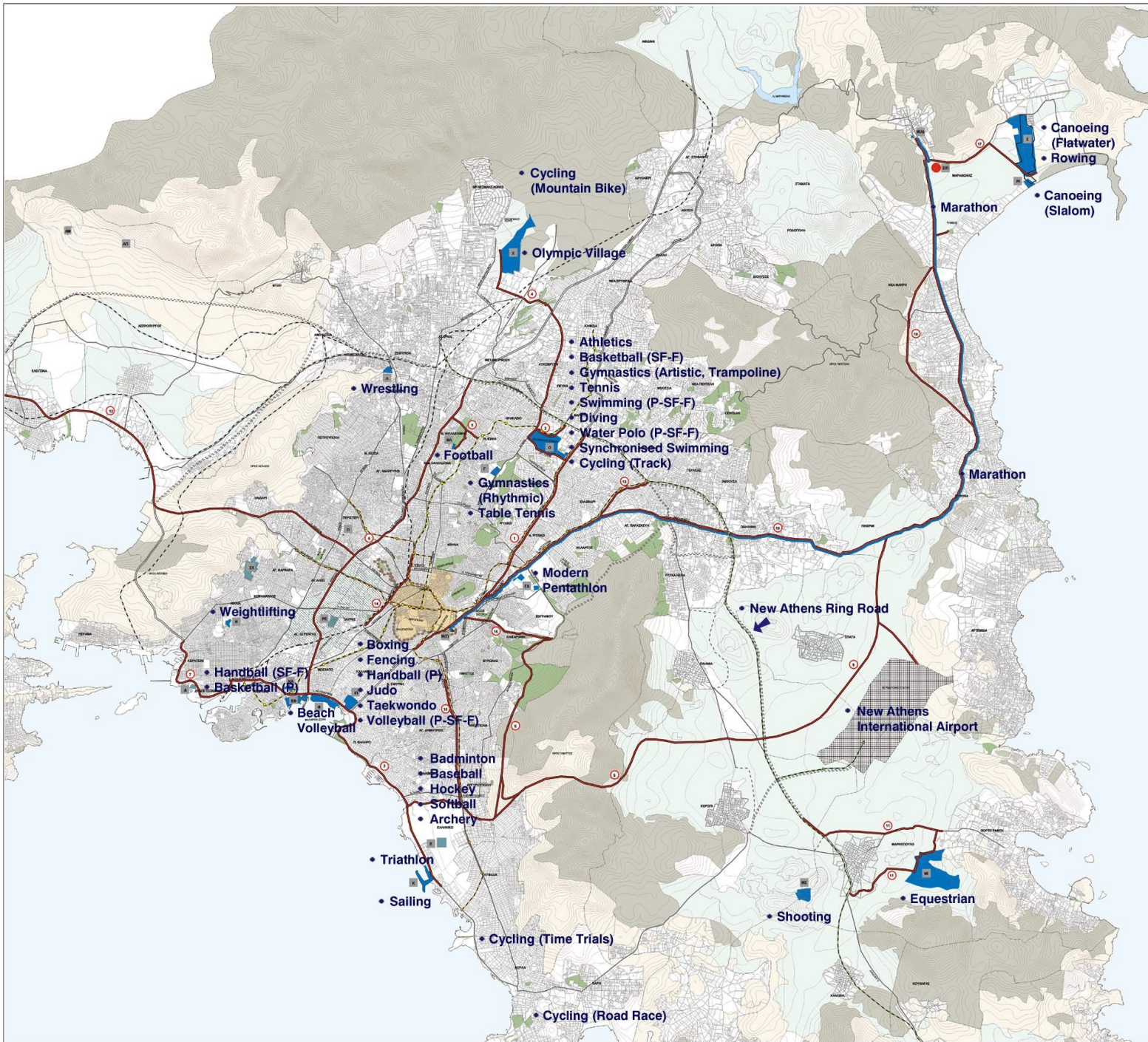
Prevention and Recovery for the Telecom Network

Prevention -- Can Get Hit From Every Angle

- Geographic - Earthquakes, Flooding, Lightning, Fire
- Terrorism, Theft, Strikes
- Contractors, Human Errors, Installation Faults
- Manufacturing Defects, Premature Aging
- Identifying Location
- Planning: Critical Routes, Diversity
- Preparedness: Training,

Recovery -- Requires Experience

- Dispatch Response Team
- Identifying Root Causes
- Update of Disaster Recovery Plans, as needed.



ATHENS 2004



**Venue Locations
November 1999**

2004 Olympic Telecom Network



Telecom Challenges for the Athens 2004 Games

- **Technology related**
 - Convergence to Internet-based telephony
 - Optical networking
 - Wireless technology
 - Broadcasting technology (trend for an all-HDTV coverage)
- **City related**
 - Venue topology was recently finalized
- **Culture related**
 - Government ministries co-operation was an issue
 - No previous experience for such of a magnitude event
 - Language barrier
 - “Things will happen at the end!”

Improving the Quality of Future World-class Events

- **Share information with others**
 - Have frequent forums on world-class events
 - Provide written accounts in articles, publications, etc.
 - (IEEE Communications Magazine, July 2001)
- **Create the Telecommunications Standards and Requirements that insure:**
 - **Reliability**
 - **Availability**
 - **Survivability**
 - **Security**

*“Don’t re-invent
the wheel”*

