The History of the International Symposium on Ballistics and the International Ballistics Committee

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The Silver Jubilee of the International Symposium on Ballistics marks two important events: the selection of Beijing as the symposium venue and the founding of the new International Ballistics Society. This paper presents a brief history that describes the origins of international co-operation in the science of ballistics and the creation of the International Symposium on Ballistics. The paper reviews, in the light of an expanding scientific scope and nations submitting papers, the need for the creation of the International Ballistics Committee to manage the symposia. The paper concludes with a description of the drivers that have led to the formation of the Ballistics Society.

INTRODUCTION

The 25th International Symposium on Ballistics (ISB), its Silver Jubilee, marks two significant points for the study of the Science of Ballistics at the international level. In the first instance the holding of the symposium in Beijing, China, represents a significant milestone in terms of expanding the world-wide accessibility of the symposium to ballisticians. In the second instance the 25th ISB marks the founding of a new International Ballistics Society with its objective of taking the science of ballistics into the 21st century and allowing for a wider scope of involvement with the running of the society, the development of ballistics science and the organization of the ISB. It is therefore opportune to set down a brief history of the origins of and drivers for the ISB, the key people behind it and the evolution of its development and management through the International Ballistics Committee.

THE INTERNATIONAL SYMPOSIUM ON BALLISTICS

The ISB owes its origins to the American Ordnance Association (AOA), which in turn evolved via the American Defense Preparedness Association (ADPA) into the National Defense Industrial association (NDIA). NDIA's Bomb & Warhead Division's long-held and still continuing annual meetings were concerned with ballistics but were classified, since they also included programme overviews and weapons performance. The US forerunner to the ISB was therefore created to provide an opportunity for US scientists and engineers from universities, industry and government laboratories to

meet together in an open forum to present their current research work, discuss the implications of their work and identify future lines of research.

The papers and presentations at the ISB meetings were un-refereed and distributed at the meeting to encourage collaborative research and equally important encourage new entrants into the field of ballistics. This high level aspiration was later to form a core tenet of the ISB to provide the broadest possible basis for dialogue and the presentation of work in progress in an international forum.

In parallel to both of these meetings the US also established a classified Vulnerability & Survivability Symposium within the newly formed Ballistics Division of the AOA. Dr. Louis Zernow led the V&S Section sponsoring this meeting until 1989 while participating as the Ballistics Section's Secretary.

Dr. Robert (Bob) Eichelberger, later Director of the US Army Ballistics Research Laboratory (BRL), and others recognized that the various NATO country bi-lateral exchanges at government level provided an opportunity to establish an unclassified international forum along similar lines to the Bombs & Warheads meetings.

The ISB was therefore founded during the first decade of the seventies with the objective of fostering all aspects of the science of ballistics. Its founding fathers represented a team of scientific pioneers in ballistics and were composed of US and European experts. The US side included Dr. Robert Eichelberger, Dr. Louis Zernow, Dr Pei Chi Chou (Drexel University), Dick Dowd (Martin Marietta Corp.) and Martin Summerfeld of Princeton University. The European side included Dr Gustav-Adolf Schröder (EMI - Germany), Prof R.E. Kutterer (ISL Director, France/Germany), Neil Griffiths OBE, (RARDE – UK), Prof. Rudolf Thomanek (MBB/Germany) and Dr. Hans Pasman (TNO – Netherlands). A primary objective of the symposium was to compare and contrast the state of the art in ballistics in North America and Europe and foster collaboration.

Once again university and industry attendance at the symposium was highly encouraged so that scientists and engineers in universities and industry might participate in creating, developing, and studying the sciences and technologies that were previously restricted to limited venues of NATO and bi-lateral exchange agreements. Only NATO member states and other select friendly state attendance was encouraged in light of the "Cold War" within which the world was at that time enveloped. This remained the case until 1989.

First International Symposium on Ballistics

The first ISB was finally organized in 1974 in Orlando (Fl., USA) and was considered a great success with between 100 and 120 attendees. Dr. Eichelberger provided BRL support to the organization of this first meeting by providing Eddie Bryant to do all the organizational "leg work". Dick Dowd of Martin Marietta, head of the Ballistics Division and Section of ADPA, and his staff handled the local arrangements in Florida. The selection of abstracts was achieved via a series of visits by members of the ADPA Ballistics Section to the European partner's organizations. This initial ad hoc arrangement has since evolved into the current two or three day paper selection meeting held approximately six months before a symposium.

The first symposium with its relatively small number of attendees fitted into a small motel conference room. The proceedings were a simply bound set of photocopies of the presented papers.

Second and Subsequent Symposia

The second symposium was also organized by ADPA in 1976 at Daytona Beach (Fl., USA). The third ISB, held in 1977, was organized by EMI and held in Karlsruhe (Germany). This established the alternation of successive symposia between North America and Europe with a period of 18 months between symposia.

With the end of the cold war and the expansion of participating countries outside of NATO other countries have requested the opportunity to host and organize a symposium. Of the 24 symposia held to date the USA has hosted 11, Canada 2, Europe 8 (Belgium, France, Germany, Netherlands, Spain, Sweden, Switzerland, and United Kingdom), and Australia, Israel, South Africa one each. Very appropriately China will host the 25th ISB.

The international character of the Symposium, in its broadest sense, rapidly evolved after the end of the Cold War and has become one of its defining characteristics. Today between 300 and 450 ballisticians, from 26 countries, regularly attend and actively participate in the ISB and in the process help secure its world class reputation. The largest attendance, of over 600, occurred at the ISB in Stockholm Sweden in 1992, where the meeting was locally hosted by the FOA – National Defence Research Establishment. In the first symposium in 1974 there were 34 papers, which can be compared to the 223 papers accepted for the last symposium in New Orleans (2008).

The technical content of the ISB has also evolved and widened to reflect changes in research priorities of national research programmes and the interests of the scientific community outside of government research laboratories. It now includes sessions on Interior and Exterior Ballistics, Warhead Mechanisms, Terminal Effects, Armor & Personal Protection and Wound Ballistics & Vulnerability.

Many of the symposia, starting with the third, have witnessed the first presentation in the public domain of papers on Explosively Formed Projectiles (EFPs), active and passive amour and other 'sensitive' technologies. Symposia have also reflected the rapid development and application of numerical modeling techniques as well as the ever increasingly sophisticated experimental diagnostic techniques that have followed on the back of the revolution in electronic chip fabrication technology. Their complementary combination has led to an increased understanding of the detailed mechanisms that drive ballistics technologies and the importance of material properties in their realization. The continued evolution of ballistic technologies is clearly reflected in the proceedings of the symposia, which shows how old technologies have been re-invented and developed for other applications.

The initial ad-hoc organization committee, based on two representatives from each representative country worked well during the period when attendees were restricted to NATO and invited countries. However with the end of the Cold War a new governance model had to be adopted.

THE INTERNATIONAL BALLISTICS COMMITTEE

The recognition that a more efficient set of rules to govern the organization of the ISB was required led to the founding of International Ballistics Committee (IBC) on 23 April 1993 at a meeting held at the French-German Research Institute – Saint-Louis (ISL) in France. The meeting was chaired by Prof. Eduard Celens (Belgium) and

co-chaired by Dr. Gustav-Adolf Schröder (Germany), with Dr. Rob Ijsselstein (Netherlands) as secretary. The founding members of the IBC are listed in Table I, below. Dr. Gustav-Adölf Shröder, Germany, became the first IBC chairman in 1993. He was followed by Dr. Michael Murphy, Dr. Marc Giraud, Dr. Pieter Nel, Dr. Bo Janzon, with Jack Riegel, the current chairman completing the list, see Figure 1.

The meeting finalized the "Terms of reference" for the IBC. These Terms of Reference were endorsed at the first formal IBC meeting held during the 14th ISB held in Quebec in September 1993.

Table I: LIST OF FOUNDING MEMEBRS OF THE IBC

IBC FOUNDER MEMBERS
-23 April 1993-

Dr. Bruce Burns	ARL	USA
Prof. Eduard Celens	ERM	Belgium
Dr. Claude Fauquignon	ISL	France/Germany
Dr. Marc Giraud	ISL	France/Germany
Mr. Neil Griffiths OBE	DRA	UK
Dr. Rob Ijsselstein	TNO	Netherlands
Dr. Bo Janzon	FOA	Sweden
Dr. Meir Mayseless	RBC	Israel
Dr. Michael Murphy	LLNL	USA
Dr. Gustav-Adolf Schröder	EMI	Germany
Dr. Alois Stilp	EMI	Germany

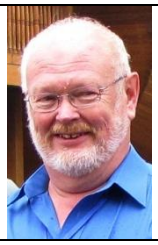
Gus Schroeder Germany 1993 - 1996	Michael Murphy USA 1996 - 1999	Marc Giraud France 1999 - 2002
		
Pieter Nel South Africa 2002-2005	Bo Janzon Sweden 2005-2008	Jack Riegel USA 2008-2010
		

Figure 1: Chairmen of the International Ballistics Committee 1993 - 2010

The IBC is concerned with 'promoting the science of ballistics internationally in the broadest sense, and has as further objectives: to provide at the highest level a means of interchange and experience in this field by ensuring that at least an ISB takes place approximately every 18 months and that the organization thereof is of a high standard; to organize and conduct additional activities that further the development and advancement of the field of ballistics'.

Dr Marc Giraud, the third IBC chairman, recognized that to better fulfill the main objectives of the IBC it was necessary to adapt the initial Terms of reference of the IBC, especially those concerning membership, the composition of the executive board and the creation of advisory committees. Therefore a charter replacing the initial Terms of reference of the IBC was submitted to the IBC members for discussion at the 19th ISB held at Interlaken, Switzerland, in May 2001.

The Charter was finally approved and adopted at the 20th ISB in Orlando, in October 2002. The Charter defines the responsibilities and membership requirements of every IBC member. The rules of governance vest the running of the IBC in an Executive Board of 8 members, supported by 5 advisory committees. The responsibilities of every IBC member were therefore clearly defined.

Technical Programme Development

The IBC has expended considerable effort to improve the scope of the ISB and maximizing the opportunities for those attending a symposium to present their work and network with colleagues. Whilst the oral presentations remain a core element of the ISB, the poster paper sessions now represent the main presentation medium for delegates. The use of the General Sessions in the oral presentations have been developed as a vehicle to let delegates gain a fuller understanding of the current research activities in ballistics that may be outside of their immediate area of expertise.

The scope of the ISB has also been widened to include personal protection, which together with vulnerability and wound ballistics are topical areas given current conflicts.

The IBC has continued to encourage high quality papers by supporting prizes and awards. Currently there are three: The Edith and Louis Zernow Award for outstanding advancement in ballistics; The Rosalind and Pei Chi Chou Award for young authors; The Neil Griffiths Award for outstanding contribution in warheads and shaped charges. There are plans to introduce an award for the best poster paper at the Beijing symposium.

When it comes to the ISB Proceedings the IBC has been keen to embrace developments in reproduction technology. As a result the proceedings are now available in a two volume hard back book printed to high quality and an electronic CD. For ISB organized in North America a copy each of the proceedings is lodged with the Library of Congress to ensure they are always readily accessible to researchers. A copy is also available from the NDIA. Given the weight and cost of printing these hardback volumes there is significant pressure to move towards only an all electronic version of the proceedings.

As described above one of the core objectives of the ISB has been to offer a forum for researchers to present their work, including work in progress. Papers were therefore not refereed. Over the past 5 years the argument has developed that the IBC should

begin to publish some of the more technically mature papers as refereed papers in a suitable journal. A major difficulty in meeting this desire was the lack of a journal that covers all of the topics in the ISB. This coupled with the cost of setting up and running a new journal presents two significant obstacles. Nevertheless the IBC decided to proceed with an experiment starting at the 25th ISB in Beijing, which will result in a small number of journal grade papers being refereed and published as a special issue of the Journal of Applied Mechanics (JAM). The first guest editor is Dr. Bo Janzon, the past IBC chairman, who has spent a considerable amount of time in making this possible. If this experiment is considered a success then it will be expanded. However the ISB will continue to adhere to its original objective of providing a forum for work in progress.

Finally a new experiment initiated by the IBC has been the encouragement of technical workshops and courses to be held on the day before the start of the ISB to enable those new to the study of ballistics to learn from those with a lifetime of experience. The feedback from those who have attended the workshops organized in Tarragona and New Orleans has been very positive.

Next Steps

The IBC Charter sets out the process and requirements for ballisticians to become members of the IBC. As a result the IBC has steadily grown in numbers until it now numbers 55, including 14 emeritus members. Whilst the Executive Board has considerable authority its decisions have to be ratified by the whole IBC. As the IBC membership has grown so the decision making process has become increasingly lengthy. As the IBC only meets at the symposia it has become much harder to complete all its necessary business during the 5 days of the symposium, especially as IBC members also wish to attend the various technical sessions. The decision making process therefore needed to be streamlined.

The other challenge facing the IBC is demographics. Many of the founding members of the IBC with a great many years of experience in ballistics have either retired or will retire within the next 5 years. The IBC, therefore, has already lost and will continue to lose a considerable amount of its corporate knowledge.

It has been recognized that for the ISB to continue to thrive we need to empower delegates and encourage them to take a more active participation in organizing the ISB and driving forward the science of ballistics.

After some lengthy discussions within the IBC, Dr. Bo Janzon issued a simple questionnaire to seek the views of the delegates to the 23rd ISB at Tarragona, Spain in 2008. The results showed there was a clear majority interested in the formation of a Ballistics Society, with an elected board of directors. This is very similar to the way in which, for example, the Hypervelocity Impact Society (HVIS) runs its HVIS symposia, where a delegate becomes a member of the Society for the period up to the next symposium. Candidates for the Board of Directors are nominated from the membership of the Society and all members take part in the elections.

Since the Tarragona ISB (May 2007) Jack Riegel, the current IBC Chairman, and the Executive Board have been working out the details of how an International Ballistics Society could be registered and how it would function. After much hard work the International Ballistics Society will be launched in Beijing, marking a new direction for ballisticians and their science.

Consequently, its organization will necessarily take into account the need for a more streamlined Board of Directors and a modernized Constitution reflecting the new objectives of the Society in order to be more reactive and efficient and so further improve the prestige of the ISB. This represents an exciting future for the ISB and all ballisticians.

CONCLUSIONS

This paper has briefly described the origins of the ISB over almost 40 years ago and how its organization and subsequent expansion led to the need to create the IBC. The paper has described the evolution of the ISB and its management and organization through four successive steps: the Pioneering first ISB; an evaluation period; the first management modernization to create the IBC; and finally a second evaluation period. The paper concludes by describing the next development phase which will create an International Ballistics Society where ISB attendees will become members of this new society and so be able to become fully involved with the management and organization of future ISB and ultimately the development of the science of ballistics.

Finally it is interesting to note that the 1st ISB, held in the USA in 1974, the 9th ISB, held in the UK in 1986, the 17th ISB, held in South Africa and now the 25th ISB to be held in China share a common factor of being held in the Chinese year of the Tiger. The Tiger is renowned as being lucky, lively, engaging and incredibly brave in battle. It is therefore not only auspicious to hold the 25th ISB in Beijing but also for the launching of the new International Ballistics Society.

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