



Bulletin

IN THIS ISSUE



PM's Perspective 1

IEMRM Workshop Completed 2

AFRL Senior Scientist Visits 4

Accident Reporting 4

MSIAC is Lucky to have Liekens 5

Country Visits: Korea & Belgium 6

Strong ARM Release 7

In Memoriam: Brad Forch 7

AASTP Training:
- 2018 Wrap-up 7
- 2019 Schedule 8

MOVEMBER effort Raises Cancer Awareness 8

Student Projects 8

Dec. - 2018

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PM'S PERSPECTIVE

At this time of year, I always hope for a bit of time to reflect and start preparing for the next year. However, we seem to be busy right up to the end of the year with country visits to Korea and Belgium, as well as support to the NATO AVT and AC326 meetings.

I want to take the opportunity to make a couple of announcements, the first of which is to confirm that **Poland has officially joined MSIAC**. We completed the amendment to our MOU and can now formally announce them as our newest member. Welcoming a new member is an exciting time for us and offers the opportunity to work more closely with Polish safety specialists and to learn from their and our collective experiences.



You will also have seen in the e-mail announcing this newsletter that we are looking for **a new MSIAC project manager**. In October next year, my six years as project manager will be up, which seems to have passed very quickly. If you are thinking of applying I would encourage you to do so. It's been a great experience for me and I have very much enjoyed working with a great team, in supporting our nations to help them stay safe.

Major events since the last newsletter include the **workshop in Grenada** on improved explosives and munitions risk management, described elsewhere in the newsletter. I personally really enjoyed this, learnt a lot, and was encouraged by the good discussion between the IM and storage safety communities (perhaps the first time there has been such an opportunity). I think we took some good steps forward which we will follow up on in the years to come.

We also had the pleasure of **going to Republic of Korea (ROK)** for a country visit (their first as a participating member of MSIAC). We still have to complete an amendment to our MOU for ROK but I am expecting that this will be completed in 2019. In the meantime, we are able to work closely with ROK with the agreement of our member nations.

Oh and we also had **Movember**, so check out the article further on in this newsletter!

We held our autumn **MSIAC steering committee meeting**, which provided the opportunity for our member nations to get together and to give direction to the team. This was the first one held in our new NATO building and we took the opportunity to take a photograph in front of the new headquarters. MSIAC staff presented progress against our work plan and we obtained valuable input.



We discussed and agreed the **2019 program of work** which includes new additional work elements, briefly described below. You are welcome to request more information

(Continued on page 2)



on any of these topics and I would encourage you to get in touch and become involved.

⊕ **Next Generation Polymers and Plasticisers.**

The introduction of new processing technologies has driven renewed interest in formulations. To assist the community in its efforts to develop improved EM, MSIAC will prepare a review of polymers and plasticisers identifying new polymer technologies and materials, and their readiness level.

⊕ **Ageing Algorithms.**

This effort will review what mathematic models (ageing algorithms) are used to predict degradation process and or critical failure modes and how they have been developed and used.

⊕ **Defect Criteria, Acceptability, Testing, and Assessment.**

Guidance and understanding on how to deal with defects is often limited and this work program offers an opportunity to share knowledge and experience on how to approach such situations. (Supports a workshop on this topic in 2020.)

⊕ **Guidance on Instrumentation for IM and HC Tests.**

This work aims at supporting HC and IM tests and evaluations by reviewing use of existing instrumentation and agreeing and detailing best practice. (This could be an ideal project for a student - don't forget about opportunities to spend time working in MSIAC! Student and fellowship opportunities exist <https://www.msiac.nato.int/products-services/msiac-interns-trainees>; plus we are always open to new suggested topics.)

⊕ **Supporting Development of RAM Activities.**

This work element will allow the continuation of discussions by holding further technical meetings and maintaining a forum for RAM-related discussions within the MSIAC member nations. It was proposed that this be prolonged for a further 2 years leading up to a workshop in this area.

⊕ **Review of Risk and Tolerability.**

The intent is to review international and national risk policies and their application to better understand differences between MSIAC Member Nations. Best practice with respect to quantitative risk assessment (QRA) will be reviewed as a means to inform risk decisions. Finally, understanding how we should apply safety targets for design and how this relates to tolerability will be assessed and defined.

⊕ **Online Hazard Classification Database.**

This project intends to develop an online, searchable, common HC database, allowing contributing nations' access.

Finally, we said farewell to Martin Pope in November and will also lose Wade Babcock in this month (more on Wade in the next newsletter). Martin spent four and half years at MSIAC as the technical specialist in Munition Systems. I have known Martin over the years on and off since 1998 and during that time it was clear that Martin is an advocate for munitions safety. His experience in the British Army as a user, knowledge of EOD, and experience in the safety and suitability for service assessment of munitions was a valuable asset for the team. Martin's knowledge of munitions safety standards was put to good use in helping identify best practice (reviewing nations process and procedures) and in supporting the development of tools such as SASO and MSAS. As a team we relied on Martin's knowledge and experience and will miss his support. I want to wish him all the best on behalf of the MSIAC team and myself. But I am sure this will not be the last time we come across Martin in the munitions safety world.



IMPROVED EXPLOSIVES AND MUNITIONS RISK MANAGEMENT (IEMRM) WORKSHOP

The IEMRM workshop was held from 10 to 14 September 2018, at the PCGR Congress Center in Granada, Spain. Many thanks to MSIAC Steering Committee member Col. Emilio Larriba De La Rubia for supporting this workshop. There was an excellent participation of 73 researchers, policy makers, and practitioners from 12 MSIAC nations.

The aim of the workshop was to exploit an improved understanding of munitions vulnerability and consequences to deliver improvements in munitions risk management. It brought together three communities related to Hazard Classification (HC), Insensitive Munitions (IM), and Explosive Storage Safety. Also there were a number of key-representatives from the AC/326 Sub Groups (A, B and C).

The workshop was intensively prepared by MSIAC staff with advertisements in newsletters, presentations at various meetings and symposia, a webinar, and a site survey. Most work went into the production of 15 MSIAC limited and open reports, papers and presentations. TSO Storage and Transport Martijn van der Voort was responsible for the organization, but the workshop was a great team effort with contributions by Christelle Collet, Matt Andrews, Martin Pope, Ernie Baker, and Michael Sharp.

A lot of work was also conducted by the participants who prepared 34 excellent papers and presentations. We would like to thank everybody once more for these contributions and the intensive discussions during the week. A repository

(Continued on page 3)





Group picture on the steps outside the Granada conference center.



The main meeting room.

with all workshop documents was created in MSIAC Sharefile, and can be made available upon request.

Besides the hard work conducted, there was also some time left to explore the culture of Granada. Many took the opportunity to visit the Alhambra and the old city center in the evenings. The workshop reception and dinner were organized in the Alameda restaurant and Jardín de Gómez, and gave people the opportunity to experience the excellent Spanish cuisine. An excursion to General



Group picture in front of General Dynamics European Land Systems (GDELS).

Dynamics European Land Systems (GDELS) was organized as well. We were amazed by the history of this site which dates back to the 14th century, making this one of the oldest industrial facilities of Europe. We would like to thank the Granada factory manager Dr. Antonio Caro Chena and colleagues for their hospitality.

Early 2019 we expect to complete a series of limited reports detailing the discussions and conclusions reached during this inspiring week in Granada. Findings will be presented at various technical symposia in the coming months. Special thanks go to the session chairs, who received the official IEMRM tie or scarf after completion of their important task!

Positive feedback was gathered after the workshop. Some participants were however concerned how the recommendations

would be followed up in the future. A good start was made with briefing the preliminary results at the AC/326 Sub Groups which took place right after the workshop. Also three new work elements were defined at MSIAC for the 2019-2020 period:

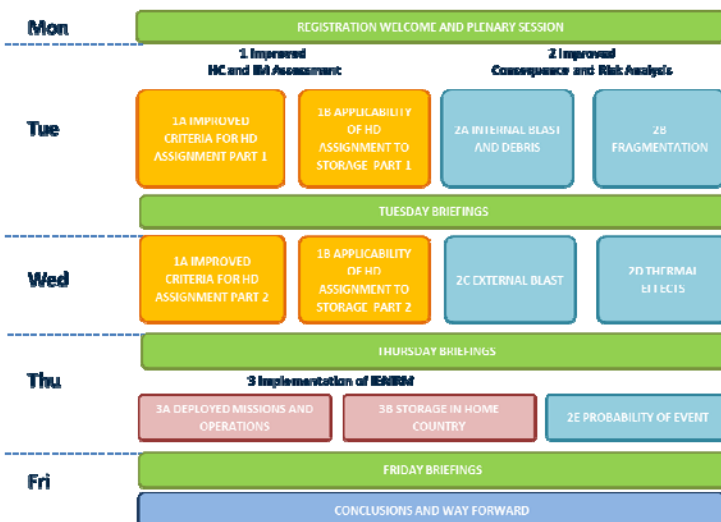


Belgian delegation during the dinner at the Jardín de Gómez.

- ⊕ Guidance on instrumentation for IM test data (PoC: Christelle Collet)
- ⊕ Collation and analysis of IM test results (PoC: Martijn van der Voort)
- ⊕ IEMRM follow on work (PoC: Martijn van der Voort)

We are looking back at a successful workshop with promising results and recommendations!

Martijn van der Voort
TSO Safety of Storage and Transport



The workshop schedule and the official IEMRM tie and scarf.



U.S. AIR FORCE SENIOR SCIENTIST VISITS MSIAC



Dr. Suhithi M. Peiris, Senior Scientist from the U.S. Air Force Research Laboratory (AFRL) Munitions Directorate, Eglin Air Force Base visited MSIAC on 12 November 2018. She is the principal scientific authority and independent researcher in the field of Enhanced Energy Effects.

Dr. Suhithi M. Peiris The visit was part of an effort by Dr. Peiris to better coordinate with MSIAC and NATO, and to foster international technical cooperation. MSIAC is recognized as a highly productive model for international technical cooperation, data sharing and coordination for the area of munitions safety. Dr. Baker presented an overview of the MSIAC organization, mission and work elements. Dr. Peiris discussed the AFRL-Munitions organization, mission and work areas. Dr. Peiris works in the same organization as Mr. Stephen Struck, who is the U.S. Air Force Service Representative to MSIAC and custodian of STANAG 4382 - Slow Heating, Munitions Test Procedures. MSIAC and AFRL-Munitions will continue to coordinate, communicate and work together as required in order to foster productive cooperation and avoid duplication.

Dr Ernie Baker
TSO Warheads Technology

BENJAMIN B. STOKES FELLOWSHIP ELIZABETH FRANCOIS

Elizabeth Francois began a Stokes Fellowship at MSIAC in November. Elizabeth has worked at Los Alamos National Laboratory (LANL) in the field of energetics research since 2005.



Elizabeth Francois

Elizabeth attended the University of California, Berkeley earning a BS in Nuclear Engineering and a BS in Chemical Engineering.

After undergrad, disillusioned with the world, she devoted her life to rock climbing and lived in Yosemite for three summers, working on the Search and Rescue team.

At some point, a 'real' job was sought in Boulder CO: working on the development of and manufacture of thin films for the semiconductor and laser industries. This was not a delightful job and she made her way to LANL, earning a master's degree in Mechanical Engineering somewhere along the way. Elizabeth has a somewhat unique cradle-to-grave knowledge of explosives. She can perform synthesis, formulation, pressing, test design, execution, and analysis on a variety of explosives. In her career, the concept of an insensitive booster has occupied much of her attention, and it is this sort of project she is pursuing at MSIAC.

BOOSTER RELIABILITY MATRIX

Reliability, with respect to boosters, is a measure of the ability to light the main charge in the given size and shape at the given temperature. Some materials are notoriously temperature sensitive. The cold temperature performance of TATB and its formulations is legendary for its challenges. Because of this, the reliability of explosives at low temperatures (-54°C) is critical to ascertain. This project proposes a suite of tests that examine the parameters relevant for symmetric, reliable initiation, performance and whether the booster is capable at all temperatures. A variety of explosives will be chosen; running the gamut from conventional high explosive (CHE) to insensitive high explosive (IHE). These tests will be conducted at LANL during 2019. A return to MSIAC in one year to write up and close out the project is planned for early 2020.

ACCIDENT REPORTING

MSIAC is organizing an accident reporting / MADx community meeting, in cooperation with Canada. The meeting will be held at NATO HQ, on Tuesday 5 February and Wednesday 6 February 2019. The meeting is aimed at personnel from MSIAC member nations responsible for accident reporting, risk analysis, safety assessment, and procurement of munitions. Personnel from other nations with a representation in AC/326 Subgroups are also welcome. If you or your colleagues are interested please confirm your attendance by the end of 2018!

The meeting has the following objectives:

- ⊕ Exchange lessons learned from accidents
- ⊕ Develop a common terminology and harmonization in relation to accident reporting
- ⊕ Discuss MADx user feedback and identify possibilities for improvement and further development

Please let us know if you or colleagues are interested to attend!

The number of nations participating in MADx is increasing. Besides Australia, Canada, France, Germany, United Kingdom, and the United States, now also the Netherlands has joined. Furthermore MADx has been extended with a new data field in relation to the NATO Stock Number (NSN) involved in the accident.

With the issuing of this newsletter we also include a new batch of accident reports that were available from the media (May 2018 – November 2019).

Martijn van der Voort
TSO Safety of Storage and Transport



Check out all new reported **ACCIDENTS** via this [hyperlink](#).



ANGELINE LIEKENS CELEBRATES 25 YEARS ... AT MSIAC !!

At the October MSIAC Steering Committee meeting, Angeline Liekens received from Camille Grand, Assistant Secretary General, a NATO certificate in recognition of her contributions over 25 years whilst working for NATO. Indeed, she first started to work as a contractor for NIMIC in 1992, and was hired as a permanent staff member shortly after, in 1993. The History of NIMIC/MSIAC is intrinsically linked to its database of information and Angeline was here from the very beginning of this story. As a result, it is our honor to discuss her contributions in building, maintaining and managing this fantastic MSIAC resource over all these years.

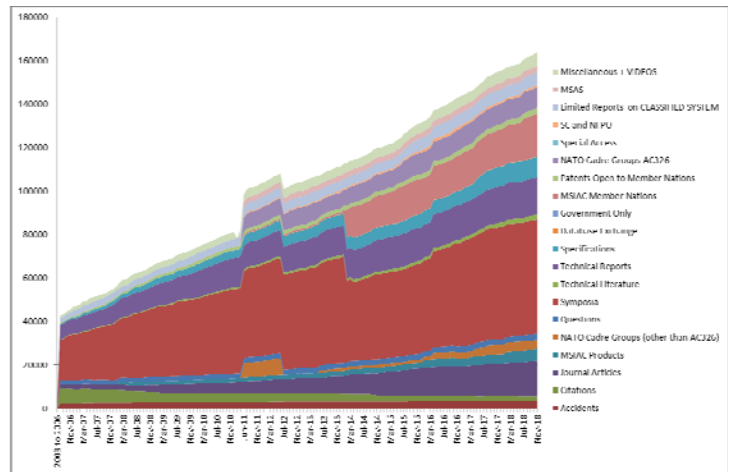


Camille Grand (NATO Assistant Secretary General, center) thanks Angy on behalf of NATO and the Secretary General, for her valuable contributions.

At the beginning of NIMIC and MSIAC's journey, one of the first priorities was to gather and store information relevant to Insensitive Munitions, and this is exactly the reason why Angeline (or Angy to her colleagues) was hired. A database system called Bibliographic Retrieval Services (BRS), implemented on UNIX, was used to allow searching of document keywords and abstracts. At this time Angy's work consisted of entering the title, authors, key words, and abstracts for each document into the database. An unofficial role was to badger Technical Specialists to complete the key wording and abstract writing which was required for every single document — a time consuming and laborious process!

In 1992, the database contained around 2000 documents. In 2000, a new system called ARCHEA was implemented but it proved unsatisfactory and was replaced in 2005-2006 with Laserfiche. The Laserfiche tool has stood the test of time, evolving into a much more capable product as technology has advanced, and is still in use in the MSIAC offices today. The advance in computer technology has also brought changes to how we gather information. As a consequence, Angy's role has grown from feeding and maintaining the database to one which includes data mining.

So where has 25 years taken us? Angy's diligent efforts feeding and data mining information have resulted in a full text search database containing more than 163,000 documents, representing 374 GBytes of data, and 4,2 million digital pages. The following chart demonstrates Angy's steadfast determination to build this valuable resource, contributing to the success of MSIAC in supporting our nations.



MSIAC's database has grown dramatically, largely due to the diligent efforts of Angy.

Angy's job is in continuous evolution and her daily work has changed much from the 90's with today's tasks including:

- ⊕ Searching for new technical documents in open websites (this is what she loves most!): on specific request or on a regular basis from specialised journals and open conference proceedings. Her impressive language skills are a real bonus for this activity. Indeed, Angy speaks fluent Dutch, French, English and German and also knows some Arabic, Greek, Italian, Spanish and Norwegian!
- ⊕ Archiving NATO AC/326 main and sub-group work and standards related to munition safety (this includes all discussion related materials as well as current and superseded standards);
- ⊕ Entering new documents in the Laserfiche database: "OCRing" them (Optical Character Recognition) if not already done, optimising the size, logically position documents in the database structure, completing database fields to facilitate searching and sorting, adding key words (meaning that she browses ALL the documents she enters!), and assigning security tags to enable access rights.

And of course, she is also your preferred point of contact for MSIAC secure website password retrieval — anyone who has contacted her will, I am sure, vouch for her ultra prompt and helpful manner.

In Summary: Angy is the longest serving member of the MSIAC team, and has provided excellent support to colleagues and to the member nations in building a valuable knowledge repository. She has seen the project grow from 5 nations to the 15 members today, and the success of the project is due to the diligent efforts of individuals like Angy.

For an information analysis centre her contribution to the overall objectives of the MSIAC project are clear. Angy's diligence, perseverance and dedication to MSIAC and the munition safety cause have helped nations develop safer munitions, protecting the lives of those who handle and use munitions in our nations.

Angy's favourite saying is "the database is not up to date" so she is continuously working to try to reach this goal! So this means the figures given above are already incorrect as Angy continues to work while this article is being written.

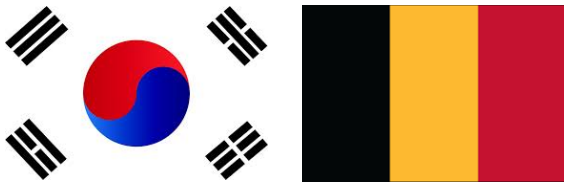
Christelle Collet
TSO Propulsion

&

Dr Michael Sharp
Project Manager



MSIAC COUNTRY VISITS IN SOUTH KOREA AND AT MECAR IN BELGIUM



Noodle soup the first day in Seoul



Korean dining



Fried chicken in Daejeon

November was a busy period for MSIAC, starting with a country visit at the other side of the world, to one of the most recent MSIAC member nations: South Korea.

Michael Sharp, Mathew Andrews and I arrived in Seoul on November, 12th and after a quiet first day to recover from the jet lag (8 hours), we were welcomed in the Ministry of National Defense in Seoul. We provided a full day of presentations about the MSIAC activities and the support available to South Korea on the development of insensitive munitions and munition safety.

The meetings during the rest of the week were hosted at the Agency for Defense Development (ADD), in Daejeon, about 200 km south from Seoul. We provided more in-depth presentations and had discussions on the MSIAC tools and products, the evolution of standard test procedures, new ingredients, as well as energetic materials and their use in insensitive munitions. Finally, on the last day, Dr Jung Su Park led us on a tour in his research laboratory where new explosive materials are developed. Drs Jongwon Lee and Kieun Lee gave presentations about their ongoing activities on a Safety Distance Visualizer and on Shock to Detonation Transition of an HNIW-based explosive formulation.



In the meeting room, during the first day at MND

This trip was highlighted by very nice meals giving us the opportunity to discover the wonderful Korean food as well as to get to know our Korean hosts better. The official meal organized on the Thursday for instance, provided us with the great opportunity to meet Dr Lim Seong Taek, the Vice-President and principal researcher at ADD.

Also Dr Jinkyung Jung invited us in her office for an informal chat and a cup of coffee. We can definitely say that we were warmly received and this visit was a great success, mostly due to the hard work done prior to this week by Dr Kieun Lee, the Korean National Focal Point Officer.

We have already thanked him a thousand times during the week of the visit, but just to be sure: THANK YOU again, Kieun Lee!

After visiting one of the farthest located MSIAC member nations, we visited the closest one: Belgium! The MSIAC delegation (Michael Sharp, Martijn van der Voort, Matt Ferran and I) had the pleasure to be hosted by MECAR on the 20th of November. Different topics were addressed, such as storage and transport of ammunition, new trends for gun propellants, ageing, and disposal of insensitive munitions.



Group picture at MECAR

In the afternoon, after having posed for the nice group picture above, we were very lucky to be able to see the 120mm mortar production line in action (pouring and casting of Comp B and X-Ray control) and 105mm HEP final assembly (crimping and packing), as well as the brand new assembly line for the 25 mm HEI. We finished the tour by visiting the machining and surface treatment facilities.

It was a very enjoyable visit, and we kindly thank all the people we met at MECAR for the interesting discussions we had throughout the day. A special "thank you" is addressed to Isabelle Lebrun for her perfect organisation. As is often the case, a single day was not long enough to fully present and discuss the activities of interest to MECAR, nor learn about all the great work going on there, so we are looking forward to another visit in the future!

**Christelle Collet
TSO Propulsion**



MSIAC's NEW STRONG ARM

The first version of the MSIAC Analytic Response Models (ARM v1.0) has been released.

It is a web based tool now available on the MSIAC Web Portal to replace the Toolbox of Engineering Models to Predict Explosive Reactions (TEMPER), and implements a Jacobs-Roslund impact initiation model.

TEMPER v2.3 will remain available, as it includes significantly more capability than ARM. TEMPER is a unique and powerful software package that utilizes a library

of empirical or semi-empirical models dedicated to insensitive munitions (IM) assessment.

TEMPER was programmed in Microsoft Visual Basic 6.0 (VB6). Unfortunately, the final release of VB6 was in 1998 and it is no longer supported by Microsoft, therefore it is not possible to continue supporting TEMPER into the future. ARM will not fully replicate the capabilities within TEMPER, but rather focus development on current Insensitive Munitions response modeling prioritized by the MSIAC member nations.

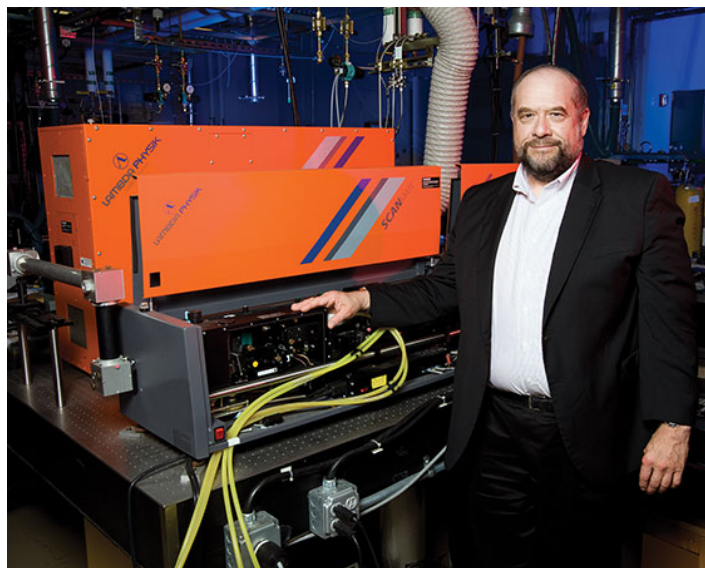
Dr Ernie Baker
TSO Warheads Technology

U.S. ARMY SENIOR SCIENTIST PASSES AWAY

Dr. Brad Forch, the Army's senior research scientist for ballistics, has died. Assigned to the laboratory's U.S. Army Research Laboratory (ARL) Weapons and Materials Research Directorate, Forch had served as a senior research scientist since January 2009. He was nationally recognized for his leadership in formulating strategic research plans, building broad-based coalitions among government, industry, and academic partners and leading ground-breaking change and progress in ballistics and energetics research.

Dr. Forch received numerous awards over the years, including the Silver Medal, Outstanding Supervisor, Federal Executive Board (2007); the Army Research and Development Achievement Awards for Leadership in Energetic Materials Research (2006) and for Laser Ignition for Gun Propulsion (1992); Aberdeen Proving Ground Supervisor of the Year, awarded by the Aberdeen Proving Ground Federal Women's Program supporting outreach, diversity, equal opportunity, promoting women in the workforce (2003); nine Special Act Awards; five Exceptional Performance Awards, four Performance Awards, including one for establishing an Army Strategic Research Objective (SRO) Insensitive High-Energy Materials (1998); an Official Commendation from "Innovations in American Government" from the Ford Foundation and JFK School of Government, Harvard University, for technology transfer (Jaws-of-Life) from SBIR (1996); and an official commendation from PM-Crusader for development of laser ignition technology for the 155-mm self-propelled howitzer (1996).

Dr. Forch was also an ARL fellow, a member of a select group of the laboratory's most eminent scientists,



mathematicians, engineers and analysts. Election to the ARL Fellows is an honor bestowed by the incumbent fellows strictly on the basis of "exceptional technical accomplishment, reputation, the prospect of continued productivity, and a willingness to contribute to the functions of the fellowship." Although Dr. Forch's technical accomplishments were significant, he was well known for helping others realize their true potential, regardless of their job or position. A memorial service was on 14 September at the Aberdeen Proving Ground, Maryland, USA.

Dr Ernie Baker
TSO Warheads Technology

AASTP-1 AND AASTP-5 LECTURE SERIES

We have just completed a busy course year with 6 events. Since the last newsletter we have been to Helsinki and Ottawa to teach students about NATO standards for safe storage and transport of ammunition. We just realized that between 2015 and 2018, more than 400 students from more than 16 nations have successfully completed the course. We hope this will enhance safety around the world, both in home countries and on deployed missions.

Furthermore, we have established the course program for 2019 (See next page). With courses in Australia and New Zealand, we will give some special attention to the Southern Hemisphere. There are just a few remaining seats and until the end of this year it is possible for students from other nations to register. If you are interested please let us know ASAP!



Helsinki, 20-24 August 2018. Instructors: Johnny de Roos, Eric Deschambault and Matt Wingrave. PoC: Kostj Nevala.



2019 SCHEDULE FOR AASTP-1 & 5 LECTURE SERIES

Country	Location	Date	Instructors	Local PoC	Remaining seats
FRA	Versailles	25-29 March	Johnny & Eric	Capt. Sylvain Soudy	5
DEU	Berlin	1-5 April	Johnny & Matt	Lt.Col. Sascha Decker	5
US/CAN	Quantico, VA	23-27 September	Johnny & Eric	Mr. Crane Dauksys Mrs. Kris Bigej	2
AUS	Canberra	11-15 November*	Johnny & Eric	Mr. Bernard Smith Roberts	0
NZ	Wellington	18-22 November*	Johnny & Eric	Mr. Kevin Newell	0
US	Ramstein, DEU	2-6 December	Johnny & Matt	SMSgt. Jason Harre Mrs. Kris Bigej	5

MSIAC MARVELLOUS MOUSTACHES (AND WHISKERS)

What has become a yearly event for MSIAC, November saw its staff support Movember – a cause that raises awareness of men’s health issues through the growth of moustaches or full beards. As in previous years, the gentlemen abandon their razors and beard trimmers and the ladies joined in the fun by creating their own moustaches in order to raise funds that help research the global efforts into cancer research.

As in previous years the intern and Stokes fellow got on board and joined in the fun. Their sticky-tape efforts were more noticeable than those that had a month to grow their moustaches. This year the effects that cancer can have were made more pertinent and poignant to us; making our efforts even more worthwhile. This year we raised a massive total of €830 with kind donations coming from colleagues, ex-colleagues, family and friends. Since 2014 we have raised €2587 for research in these great causes. So a big THANK YOU to you all.



Should you wish to view the team page please follow this link: <http://moteam.co/my-stache-is-against-cancer>

Dr Matthew Andrews □ TSO Energetic Materials

NEW STUDENT PROJECTS AT MSIAC FOR 2019!

Fancy joining the MSIAC team for a short period of time? The new topics for next year’s student projects have been released. If you are a student from a University or an Engineer school specialized in energetics, mechanics, chemistry or any other matter related to MSIAC activities — if you want to join a dynamic and multinational team — if you want to experience Brussels’ wonderful lifestyle — do not hesitate to apply! The proposed projects for 2019 are available via the following link:

<https://www.msiac.nato.int/products-services/msiac-interns-trainees>

Please circulate this message as widely as possible.

Note that you need to apply before 15 January 2019. Also, if you are selected, you need to have an appropriate clearance to be able to have access to the MSIAC offices and database. More information is available on our website at the above link.

