

METROLOGY FOR THE NEXT GENERATION: INTRODUCING THE “*FIND A COOL CAREER IN METROLOGY*” DVD

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Abstract - The National Conference of Standards Laboratories International (NCSLI) 164 Education Liaison and Outreach Committee recently developed a Metrology Career Multimedia DVD, titled “Find a Cool Career in Metrology.” The DVD is designed for use as an outreach tool to reach teachers, students, and high school counselors. The project was a joint venture between the American Society for Quality, Measurement Quality Division (ASQ-MQD), Measurement Science Conference (MSC), and NCSLI.

The DVD helps explain “What is Metrology?” and provides an opportunity to explore Metrology careers. DVD users learn about the high school courses needed for Metrology, educational pathways leading toward a Measurement Science career, and typical salaries. One of the primary interactive features highlights current Metrologists describing their career experiences, sharing how they got started in metrology, and what they like most about metrology. A collection of measurement science educational resources are provided on the DVD, including many of the Metrology Ambassador tools that have been developed by the 164 Education Liaison and Outreach Committee and other Metrology organizations to make conducting outreach events simple, fun, and rewarding. The Phase II expansion of the project to an interactive website (www.metrologycareers.com) has begun and sponsorship opportunities exist to help metrology career opportunities reach digital natives on their terms, 24 hours a day 7 days a week.

INTRODUCTION

In 2005, members of the National Conference of Standards Laboratories International (NCSLI) meeting at the annual Conference in Washington, DC began a grassroots movement to develop increased awareness of measurement science and strategies to increase new Metrologists entering the workforce. The 164 Education Liaison and Outreach Committee was formed shortly thereafter and volunteers have created outreach tools to be used by Metrology Ambassadors. One of the first projects on the “wish list” was an interactive tool that would appeal to technology-savvy students who have been raised on video games and surfing the internet. The purpose of the DVD is to provide a resource to students, parents, and academic counselors that explained metrology, described the wide variety of opportunities offered in this Science, Technology, Engineering, and Mathematics (STEM) career field, and explore how to become a measurement scientist.

Collaboration Helps Students Explore Metrology

Where there is a will, there is a way! Realizing the potential impact and benefit that an interactive tool could have on recruiting future Metrologists, a partnership was formed between the American Society for Quality, Measurement Quality Division (ASQ-MQD), Measurement Science Conference (MSC), and NCSLI. In less than a year’s time, funds were raised and volunteers

embarked on making this dream a reality. Now, students everywhere can *Find a Cool Career in Metrology!* (Figure 1). A very sincere “Thank You” goes out to all the organizations that supported this project (Appendix A).

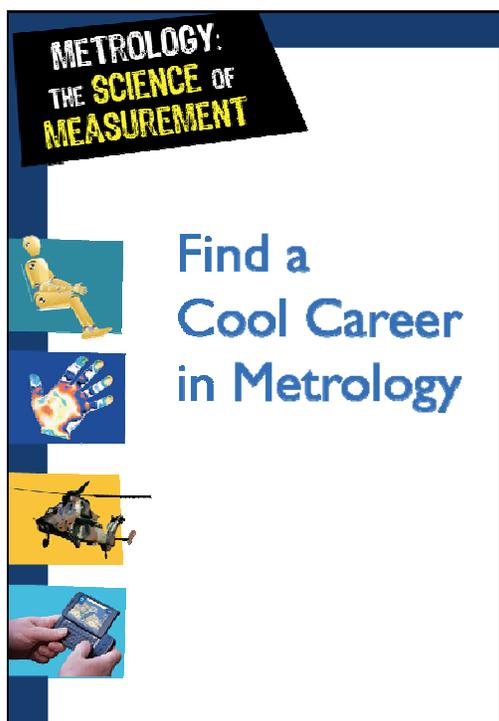


Figure 1. Interactive DVD helps students, parents, and counselors explore metrology careers.

But wait...the fun has just begun! The interactive DVD is considered the first step in providing an interactive interface to for students to explore Metrology careers. Plans for Phase II include converting the *Find a Cool Career in Metrology* DVD into an interactive website. The website www.MetrologyCareers.com has been acquired for this project.

The 164 Committee is seeking additional partners to fund **Phase II**, which is estimated between \$15,000 and \$20,000. Anyone (individuals and corporations) can make a tax deductible contribution to the **Education Development Fund (EDF)**, through the NCSLI Store (www.ncsli.org) or by sending a check to NCSLI. U.S. Federal employees can contribute through the Combined Federal Campaign (**CFC Code 26683**). Additional information about Phase II sponsorship can be requested by contacting Mark Lapinskes, 160 Education and Development VP

(407-551-3775, mark.lapinskes@sypris.com) or Elizabeth Gentry, 164 Committee Chair (301-975-3690, elizabeth.gentry@nist.gov). Phase II projects include adding a Blog *Metrology in the News*, expanding the interactivity of the Modern Marvels section, and other website enhancements that take advantage of Web 2.0 technologies and leverage sharing capabilities.

The 164 Committee is encouraging metrology organizations to add the www.MetrologyCareers.com URL to their website to promote and leverage student exposure to measurement science career opportunities. Since October 2010, 172 users from 26 countries around the world have accessed the site, including U.S. (26 states), China, Canada, Brazil, Chile, United Kingdom, Germany, India, Italy, and Nigeria.

EXPLORE COOL METROLOGY CAREERS

PC users may open the DVD by double clicking the “**Windows**” operating system folder. Then, double click the “**Launch.exe**” file to open the application. The DVD is also Mac compatible. The DVD home page was designed to welcome and introduce the audience to Metrology, the science of measurement (Figure 2).

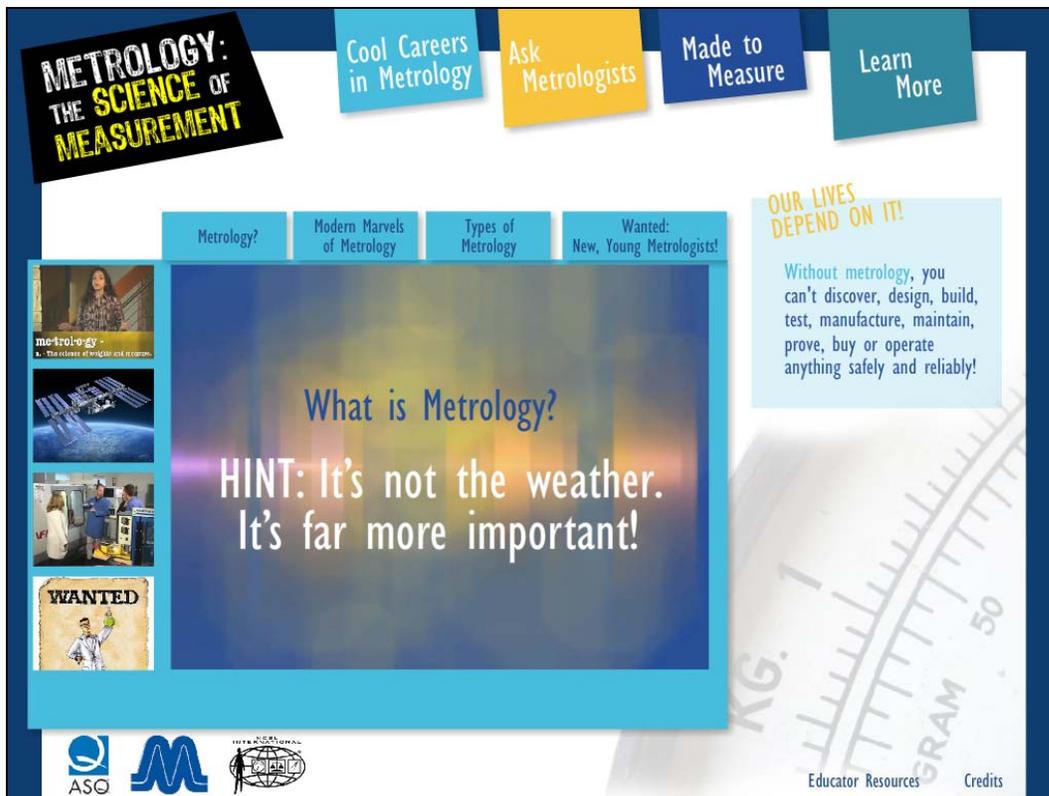


Figure 2. Users begin exploring the science of measurement on the home page screen.

It is important to communicate the importance of metrology to every facet of science, because without metrology, we can't discover, design, build, test, manufacture, maintain, prove, buy, or operate anything safely and reliably. Interactive elements were important design features within the DVD, and include videos, audio interviews, and other interactive elements. The DVD provides many opportunities to learn more. URL links provide resources for students, parents, and academic counselors, including learning about the International System of Units (SI), World Metrology Day (May 20th), measurements in sports, and professional metrology organizations. Several documents are included on the DVD, including the European Association of National Metrology Institutes (EURAMET) publication *Metrology – in Short* and National Institute of Standards and Technology (NIST) Metric Program education resources.

Video Elements¹

DVD users can click to activate a video titled *What is Metrology?* Additional sections on *Types of Metrology* includes video on Physical, Chemical, and Electrical metrology, as well as defining Scientific, Industrial, and Legal metrology.

WANTED: New, Young Metrologists!

Measurement science will soon face a hiring crisis: 25 % of today's Metrologists will retire soon, mostly from the Baby Boomer generation, creating a huge demand. DVD users can explore a variety of *Cool Careers in Metrology* and identify jobs that suit their interests and personality traits. There is no single right way to get into Metrology. Career paths vary almost as widely as Metrology career choices. The DVD explores several of these pathways, what high school

¹ All video used in the DVD was provided by Butler County Community College (www.bc3.cc.pa.us).

courses to take, samples of national and international education institutions offering metrology courses, and examples of salaries.

Audio Interviews

This section answers a number of key questions students might ask. What's your work like? What do you like best about your job? How did you get into Metrology? DVD users get answers when they *Ask a Metrologist*. Audio interviews by national and international measurement scientists provide advice and offer insight into this rewarding career (Appendix A).

Getting Your Copies

You can get a copy of the DVD from the NCSLI Business Office by calling (303) 440-3339. You can also get up to 20 copies for each Outreach Event you participate in for no charge. More than 20 copies will cost \$1.35 for each DVD, plus shipping and handling. Keep in mind that you may directly access the DVD content through the internet at www.MetrologyCareers.com.

Using the DVD

The DVD can be used in a multitude of ways. For instance, distribute DVD copies to:

- Invited student guests that attend your NCSLI Region or Section Meetings;
- Your organization, which can be used in a public kiosk or during laboratory tours;
- A local science or math class when you conduct a presentation or hands-on measurement demonstrations;
- Your local community, high school, or university library;
- Your local children's science museum;
- At Parent Teacher Association (PTA) or neighborhood association meetings;
- High school, community college, and university academic counselors in your community;
- Educator and academic counselor professional conferences and training events;
- Participants at Science Fairs, Career Fairs, Girl or Boy Scout Troops, or Science Olympiad competitions; and
- Your children, grandchildren, neighbors, or other students.
- Become a metrology mentor!

BECOMING A METROLOGY AMBASSADOR IS EASY

Metrology Ambassadors encourage students to consider metrology careers in a number of ways, including visiting a classroom or school group with a presentation or hands-on activities, hosting a laboratory tour for students, hosting a school or college group at a NCSLI region or section meeting, summer student work/research programs, and even being a local science fair judge.

In addition to the Metrology Career DVD, the NCSLI 164 Committee has developed several Ambassador Resources to make Metrology career outreach fun and easy:

- ***Intro to Metrology***, a template PowerPoint presentation that provides an overview of measurement science, can be customized by the presenter and tailored to any audience (http://www.ncsli.org/NCSL/learning/Ed_Out.aspx). The presentation is also available in Spanish!
- **Hands-on Measurement Kits** can be checked out by NCSLI member delegates, using the NCSLI website online training library or by contacting the corporate office. The manufacturer, Vernier, publishes free lesson plans and activities for use with the Lab Quest system (<http://www.vernier.com>), including links to how each activity fulfills state education standards (<http://www.vernier.com/standards/>). Metrology Ambassadors Vernon Alt and Dilip Shah will demonstrate the kits at the Learning and Development Zone during the 2011 Measurement Science Conference (MSC).
- ***Careers in Metrology***, a two sided glossy color flier, which can be printed as a handout (Figure 3). The reverse side of the poster promotes the **Simmons Scholarship**, a \$3,000 award to support the study of metrology and metrology-related quality topics. Application forms and information are available on the Joe D. Simmons website (<http://simmons-scholarship.com/index.html>). The flier provides a macro overview of the Metrology profession and relates some of the challenges and opportunities available to those considering a career in Metrology. The **Anthony Ulrich Metrology Scholarship** is now available to students in Canada, offering a \$2,000 award.
- NCSLI sponsored "***Engineering Go For It***" magazine (Figure 4, EGFI, <http://www.egfi-k12.org/read-the-magazine/>), published by the American Society of Engineering Educators (ASEE), can be presented to school teachers and librarians to share with students and inform them about engineering careers.
- Metrology Ambassadors may also request NCSLI branded pens, notepads, and other promotional items as token mementos for teachers and students from the NCSLI Business Office (303-440-3339).



Figure 3. NCSLI sponsored *Engineering Go For It* magazine.

After each outreach activity, Metrology Ambassadors complete and return a Metrology Event Tracking form to Elizabeth Gentry, 164 Committee Chair (Appendix B). The data collected helps measure the impact of outreach activities, as well as ensure continued participation of the NCSLI Education Development Fund (EDF) as a charity in the Combined Federal Campaign (**CFC Code 26683**) and other grants/donation programs.

SI EDUCATION RESOURCES

The National Institute of Standards and Technology (NIST) Metric Program (www.nist.gov/metric) is a great source for International System of Units (SI) educational materials for Metrology Ambassadors to supplement outreach activities when they visit with students and teachers in the classroom or invite visitors into their laboratories. NIST has several handouts available in bulk so that each student can receive a copy, such as metric conversion cards and wall charts that explain the history of measurement systems in the United States and SI basics. Numerous educational materials available on the NIST Metric Program website can be downloaded and reproduced freely. The Metric Pyramid (NIST LC 1140) is a great three-dimensional teaching tool that teachers can use in the classroom. Also available are several resources on metric measurements that are used in sports, such as the Olympics and the Tour de France, including the 2008 World Metrology Day *Measurement in Sports* resources developed by The International Bureau of Weights and Measures (BIPM). SI education resources can be requested by contacting the NIST Metric Program (TheSI@nist.gov, 301-975-3690). Please be sure to include the mailing address and approximately how many publications are needed for the outreach event.

Metrology Ambassador Challenge

In 2011, NCSLI will celebrate 50 years of serving the world of measurement. As a special “Happy Birthday” gift, 164 Committee members would like to encourage each and every Metrologist worldwide to participate in at least one outreach event during the year. Collaboration within our professional community to meet the challenge of developing future Metrologists is the key to success. Lights, Camera, Metrology...together we can inspire the next generation!

In just two years, 40 Metrology Ambassadors have reported using NCSLI resources to conduct 84 events, reaching 10,624 students, 332 parents, and 1,870 teachers. Thank you to all the Ambassadors and their organizations for volunteering and supporting this effort (Appendix C).

CONCLUSION

The NCSLI *Find a Cool Career in Metrology* DVD is a new resource available to students, parents, and academic counselors to explain metrology – the science of measurement. The DVD describes how measurement science plays a vital role in every area of science, engineering, manufacturing, and commerce. The variety of opportunities offered in this Science, Technology, Engineering, and Mathematics (STEM) career field can be explored, as well as learning about the multiple pathways available to students interested in becoming a measurement scientist. The DVD is one of several Metrology Ambassadors tools that can be used by volunteers to encourage students to consider metrology careers. Accept the challenge to inspire the next generation of measurement scientists! Visit a local classroom or school group with a presentation or hands-on activities, host a laboratory tour for students, hosting a school or college group at a NCSLI region or section meeting, summer student work/research program, or become a local science fair judge.

A copy of the DVD and other Metrology Ambassador tools can be requested from the NCSLI Business Office by calling (303) 440-3339. Up to 20 copies of the DVD for each Outreach Event can be requested for no charge. More than 20 copies will cost \$1.35 for each DVD, plus shipping and handling. Supplemental NIST SI educational materials can be requested by contacting TheSI@nist.gov. The DVD can be distributed in multiple ways, from individual contact with a student to large group events. The important thing is to get them into the hands of students, parents, and educators so that they can begin to discover the world of metrology and return an Ambassador Event Tracking form (Appendix B) after outreach is conducted.

Expanding the DVD content into a website www.MetrologyCareers.com (Phase II) has the potential to expand the Metrology Ambassador outreach beyond current grassroots efforts. An interactive website is the logical next step to communicate to technology-savvy students all over the world. The cost of the Phase II website launch is estimated between \$15,000 and \$20,000. Both individuals and corporations can make a tax deductible contribution to the **Education Development Fund (EDF)**, through the NCSLI Store (www.ncsli.org) or by sending a check to NCSLI. U.S. Federal employees can contribute through the Combined Federal Campaign (**CFC Code 26683**) or other workplace giving efforts.

Please feel free to contact Mark Lapinskes, 160 Education and Development VP (407-551-3775, mark.lapinskes@sypris.com) or Elizabeth Gentry, 164 Committee Chair (301-975-3690, elizabeth.gentry@nist.gov) for more information about becoming a Metrology Ambassador, using the *Find a Cool Career in Metrology* DVD, or Phase II sponsorship.

Appendix A

Sincere thanks and appreciation is extended to all the individuals and organizations that supported the development and creation of ***Find a Cool Career in Metrology***.

Funding:

American Society for Quality, Measurement Quality Division (ASQ-MQD)
Education Development Fund (EDF) Donors
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Measurement Science Conference (MSC)
National Conference of Standards Laboratories International (NCSLI)
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Video and Publication Resources:

Butler County Community College
European Association of National Metrology Institutes (EURAMET)
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Appendix B

Ambassador Event Tracking Form

Available for download: http://www.ncsli.org/NCSLI/learning/Ed_Out.aspx

Ambassador Event Tracking

Ambassador Name and Contact Info, NCSLI Section Number:		
Event Contact Info: Name, Organization, Phone, Email, and Mailing Address		
Date of Event:		
Number of Teachers:		
Number of Students:		
Assessment of Diversity (used for outreach reporting and grant proposals). Please describe in your own thoughts the diversity of the group.		
Response/enthusiasm from group (please explain)	Excellent 5 4 3 2 1	Poor
Feedback from attendees (new sign-ups, Q&A, etc.) (please explain)	Excellent 5 4 3 2 1	Poor
Overall, how do you think it went?	Excellent 5 4 3 2 1	Poor
Resources Distributed:	<input type="checkbox"/> Multi-Media Career DVD <input type="checkbox"/> NCSLI Membership Brochures <input type="checkbox"/> NCSLI Call for Papers <input type="checkbox"/> NCSLI Poster(s) <input type="checkbox"/> Metrologycareers.com link	Not available yet: <input type="checkbox"/> Virtual Physical Laboratory <input type="checkbox"/> Other: <hr/> <hr/>
Resources Used: <input type="checkbox"/> NCSLI PowerPoint Presentation – Introduction to Metrology (available: http://www.ncsli.org/training/education.cfm) (English and Spanish versions) <input type="checkbox"/> NCSLI PowerPoint Presentation – Careers in Metrology <input type="checkbox"/> Video/DVD (which one(s)?) <input type="checkbox"/> Laboratory equipment and/or standards (give examples) <input type="checkbox"/> Measurement Kits (from NCSLI training library) <input type="checkbox"/> Self-developed lesson plan (please submit copy) <input type="checkbox"/> NCSLI Outreach or Learning and Development Poster <input type="checkbox"/> Job Descriptions Article ¹ <input type="checkbox"/> Education Projects and Sponsorship Flyers <input type="checkbox"/> CFC ads and magnets		
Follow-up Planned or Requested? Please describe follow up plans.	Yes/No	
Describe the activity/event. Provide feedback on NCSLI Resources, lessons learned, measurement kit tips, other suggestions:		

¹ The Metrology Job Description Initiative: NCSLI and ASQ Partnering for the Future, Christopher L. Grachanen, Measure Journal, June 2007, chris.grachanen@hp.com. Return this form to: elizabeth.gentry@mist.gov (301-975-3690).
NCSLI Committee 164

APPENDIX C

2009 – 2010 Metrology Ambassadors

Sincere thanks and appreciation is extended to the 40 Metrology Ambassadors and their organizations that supported metrology education outreach and completed an Ambassador Event Tracking form (2009-2010). In two years, 10,624 students have learned about metrology and exciting career opportunities.

Vernon Alt, Jr., Northrop Grumman
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