TIM Lecture Series
The Laboratory for Analytic Sciences:
Developing the Art and Science of Analysis

J. David Harris

> " *Our goal is to combine tradecraft and technology.* "
> *We are examining not only the methodologies and
> the tools – the systems and the machinery – that we
> can create in hardware and software, but also the
> critical-thinking skills and structured analytic
> techniques that we can bring to bear when thinking
> about what the key questions are, what the data
> means to us, and how to make sense of it.*

J. David Harris
Director, Laboratory for Analytic Sciences (LAS)

Overview

The TIM Lecture Series is hosted by the Technology
Innovation Management program (TIM; carleton.ca/tim)
at Carleton University in Ottawa, Canada. The lectures
provide a forum to promote the transfer of knowledge
between university research to technology company ex-
ecutives and entrepreneurs as well as research and de-
velopment personnel. Readers are encouraged to share
related insights or provide feedback on the presentation
or the TIM Lecture Series, including recommendations
of future speakers.

The fifth TIM lecture of 2014 was held at Carleton Uni-
versity on July 8th and was presented by David Harris,
Director of the Laboratory for Analytic Sciences (LAS;
ncsu-las.org), a government, academic, and industry col-
laboration whose mission is to imagine, investigate, and
implement innovative classified and unclassified solu-
tions for a variety of tactical and strategic analytic chal-
lenges, including those related to cybersecurity.

Summary

The goal of the lecture was to share the early experi-
ences and lessons learned in the Laboratory for Analytic
Sciences and gather feedback from those who may have
similar experiences or have faced analogous challenges.
In the first part of the lecture, Harris provided a brief in-
troduction to the laboratory and its analysis framework.

In the second part of the lecture, he discussed the lab's
current work and demonstrated a collaboration tool
they are using to both help improve the lab's efficiency
and enhance its analytic approach.

About the laboratory
The activities of the laboratory are centred on the devel-
opment of a science of analysis to address both near-
term problems and long-term strategic challenges of
critical importance. Thus, the lab's work includes a
strong research dimension, but it is also tasked with
solving real-world problems that are affecting the com-
munity today. Cybersecurity is an area of focus, but the
research and methodologies are applicable to a wide
range of analogous domains, including healthcare, fin-
ancial services, energy, agriculture, and retail, among
many others.

Although the laboratory is based on a campus of North
Carolina State University (Figure 1), it is the physical
working space for a consortium of members from gov-
ernment, academia, and industry who bring a diversity
of educational backgrounds, work roles, and experi-
ences. Only about half of the people have backgrounds
in science, technology, engineering, or math (STEM) in
recognition of the broad dimensions of the challenges
that need to be addressed, which extend well beyond
the STEM fields and which will require non-technical
innovation and input. Co-locating diverse staff from the
various consortium members encourages interaction

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Figure 1. The Laboratory for Analytic Science on the campus of North Carolina State University

and collaboration between individuals who may bring their own unique and innovative approaches to problems. Working groups can be easily assembled and disassembled as work on particular challenges progresses.

Having completed its "ideation" phase, the laboratory is approximately one year through its initial three-year timeline and is currently in its "commit" phase. The laboratory currently houses 17 staff, with plans to expand to around 100 once it reaches its "validation" and "scale" phases.

The LAS analysis framework
The analysis framework under development at the LAS is based on the simultaneous need to look backwards with global awareness (i.e., making sense off a massive amount of "big data" from many sources) and to look forwards with strategic foresight (i.e., trying to anticipate where the currents within the stream of data will be going next). The framework depends on three ongoing activities:

1. **Reflecting on the past:** taking into account what we know about the data based on hindsight; saving and structuring past events

2. **Observing the present:** identifying events of interest, deciding which are more or less important, focusing efforts on specific areas within the sea of data

3. **Imagining the future:** making predictions, prioritizing where to look for future events that may form part of a potential narrative of events, developing "devil's advocate" predictions interpretations or assumptions are flawed

These activities are not only performed with past-to-future direction in mind; later events can inform our interpretations and activities about past events. For example, looking back at what actually happened can highlight missing pieces of the story about which we failed to collect data or about which we need to refine our interpretation. And ongoing back-and-forth between our interpretations of past, present, and future is the only way to fill in the picture and improve our capabilities for predicting events based on massive amounts of unstructured data. The overall goal is to improve both narrative processing (i.e., the telling of the story in a compelling and meaningful way) and analytic workflow (i.e., improving our ability to take meaningful actions in response to the data).

Demonstration: Collaboration tools in the laboratory
Finally, Harris demonstrated an online collaboration tool that is currently in use within the laboratory. Based in part on Yammer (yammer.com), a "private enterprise social network", the collaboration tool helps lab members interact, build relationships, and take advantage of the multidisciplinary approach. All of the entries about the activities of individuals are tagged so the data can be mined later, and the overall platform integrates various other tools (e.g., 4square, OSX, Google Glass), including automated event recording and interpretation, and other inputs. Thus, the tool not only contributes to the efficiency of the lab, but through its use, the lab is assembling a large and structured dataset with which it can test and refine its analytic framework and approach. The goal is to collect and mine data, then build stories (both imagined and observed), that can enable meaningful actions.

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About the Speaker

J. David Harris is the inaugural Director of the Laboratory for Analytic Sciences in Raleigh, North Carolina, where the aim is to develop a science of analysis and analytic methodology. During nearly 25 years service with the U. S. Department of Defense, David has worked in a variety of technical and leadership positions in areas of research and development, technology transfer, and operations.

This report was written by Chris McPhee.