

# Review of High-Rate Imaging Panel Discussion

SEM Annual Conference  
Uncasville, CT  
Wednesday June 15<sup>th</sup>, 2011  
4:20pm – 5:50pm

# Details

- **Organizers:**

K.T. Ramesh- Johns Hopkins University, Richard Rhorer – NIST

- **Session Description:**

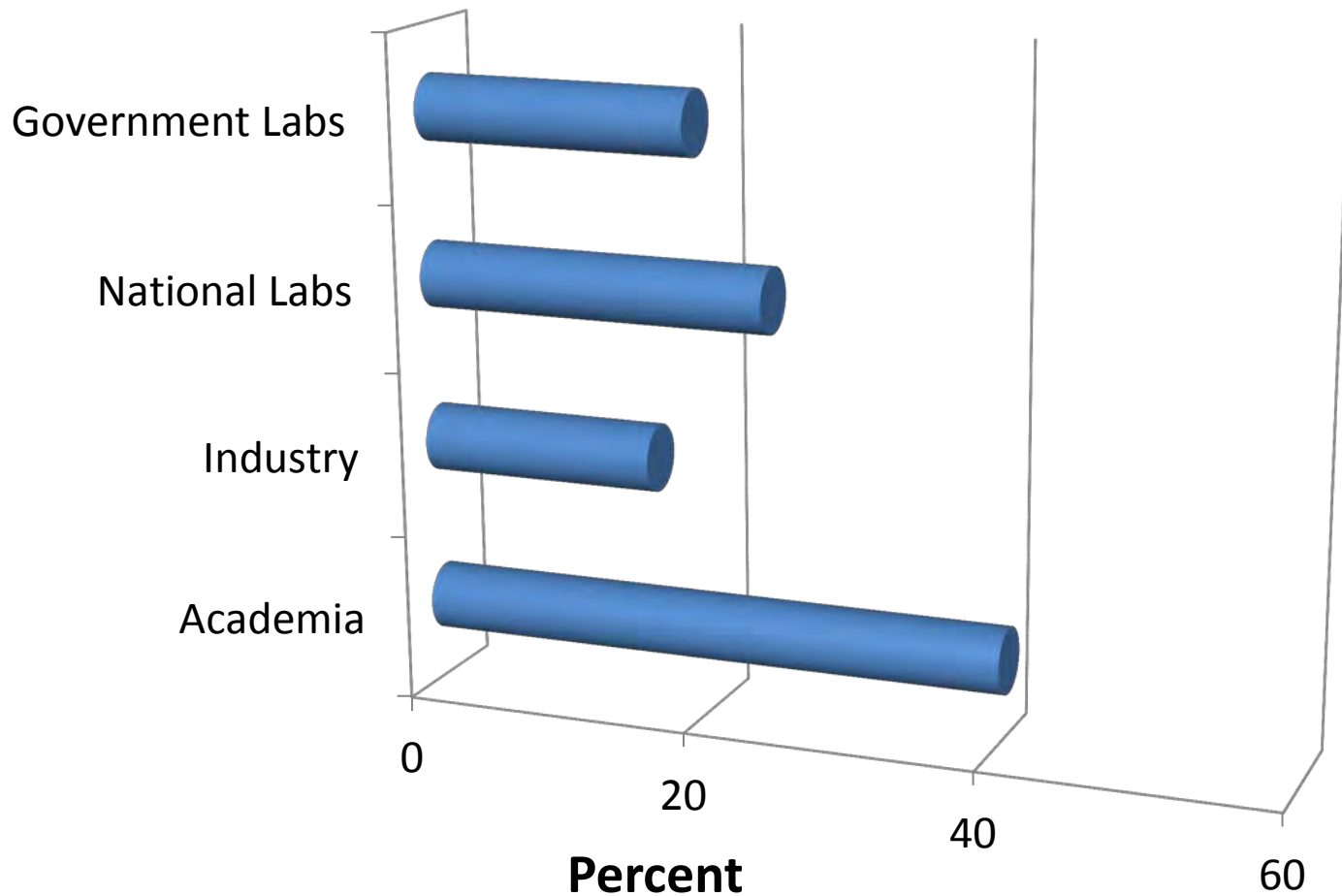
Professor K.T. Ramesh and Dr. Leslie Lamberson, Johns Hopkins University, will moderate a panel discussion exploring the future needs of high rate imaging in the field of experimental mechanics. The panel includes representatives from companies exhibiting at 2011 SEM who provide high rate imaging systems. The goal of the session is to address potential applications and improvements in high rate imaging technology by bringing the community of scientists using the systems in open dialogue with the producers of such systems. Please give some thought as to how additions and enhancements to high-speed cameras, digital image correlation and the like could assist you in your research and join us during this session.

- **Panel Members:**

- F. Kosel (Specialised Imaging)
- F. Pierron (Arts et Métiers ParisTech)
- P. Reu (Sandia National Laboratories, Albuquerque)
- R. Rhorer (NIST)
- T. Rumbaugh (Hadland Imaging)
- T. Schmidt (Trillion Quality Systems)

# SEM Attendees

- $\approx$  37 People Present



# General Representation

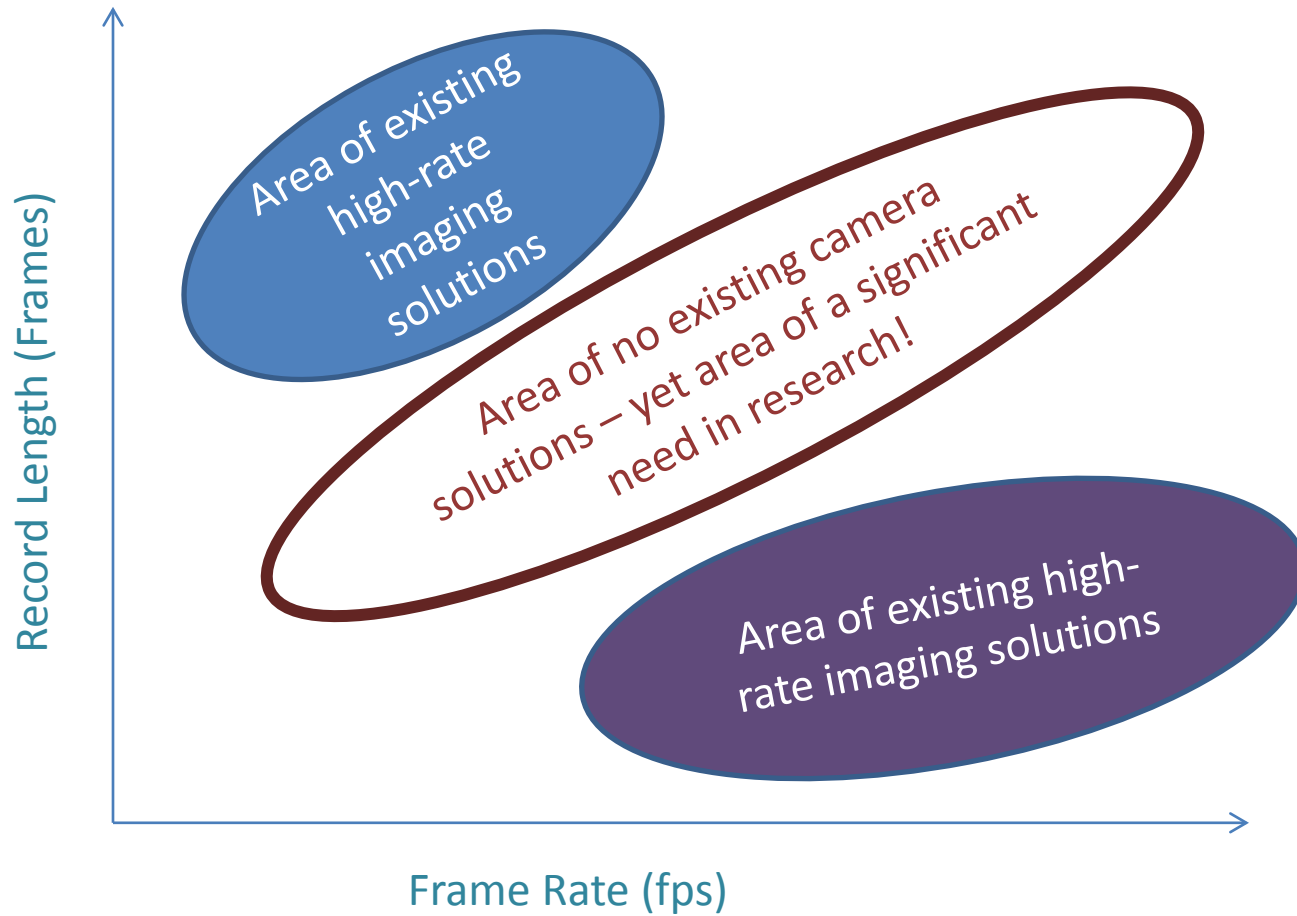
*\*In no particular order (not fully inclusive)*

- Purdue
- Arts et Métiers ParisTech
- Johns Hopkins University
- ARL
- AFRL
- Sandia National Lab (NM, CA)
- NIST
- SWRI
- DuPont
- ATK
- NASA – Langley
- IITK - Kanpur
- University of Dayton Research Institute
- University of Washington- Seattle
- University of Maryland
- University of Rhode Island
- Trillion Quality Systems
- Specialised Imaging
- Hadland Imaging
- Photron Imaging
- Shimadzu Scientific Instruments
- Academics from Finland, Brussels

# Order of Operations

1. Introductions from everyone in room with each providing description of his/her specific interest/application in high-rate imaging (20 min)
2. Frank Kosel presents general talk (with slides) on main ideas of how high-speed imaging systems work (15 min)
3. Floor is opened, Dr. Ramesh leads group in discussion with panelists (remaining time)

# Setup of Discussion



Dr. Reu provided a slide with specific imaging systems and resolution “footprint” listed to help start the discussion

# General Interests in Audience

- Thermal Imaging
- Fatigue/crack growth capturing
- Synchronizing imaging with other measurements
- Maintaining speed AND full image resolution
- Specifically large (e.g. 75 ft.) and very small (micro/nano-scale) field of views for various applications
- Developing a set of standards for high-rate imaging
- Main theme that arose:  
**The idea of using high-rate imaging for accurately measuring data, quantitatively as another diagnostic tool in research, rather than just for “seeing” or imaging in the qualitative sense**

# Additional Topics Brought Up in Discussion:

- Lighting critical to DIC success
- Fill factors, aliasing and Moiré effects in high-rate imaging systems
- Uncertainty quantification for imaging
- Benefit of circular mode cameras with pre- and post-triggering options since triggering is challenging in high-rate events
- New chip technology with gain, shutter speed, and sensitivity increase
- Potential to use transients to advantage of researcher
- Importance of experimental techniques in high-rate tests

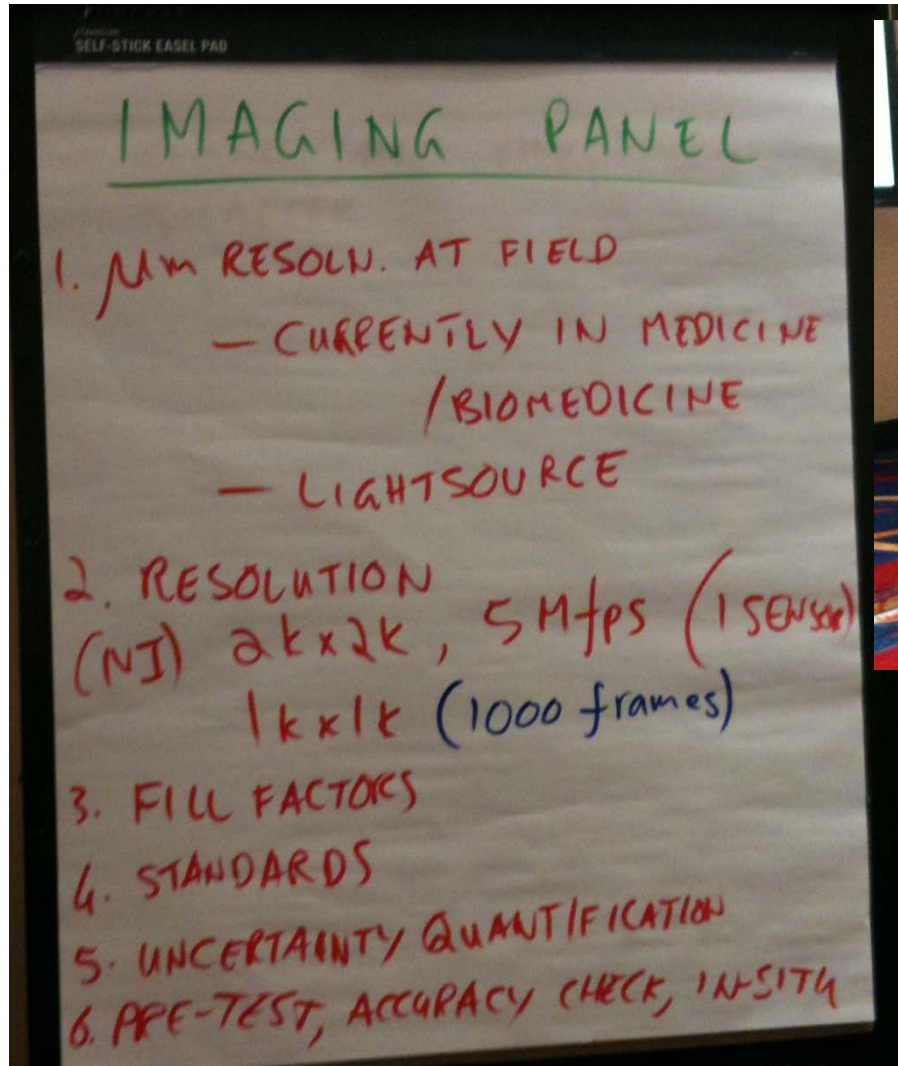
# Proposed “Ideal” camera

- 2k x 2k Resolution
- 1 sensor
- 5 Million fps
- Non-intensified

*Discussed future technologies and the possibility and limitations of getting to this!*

# Images from Event

White board with discussion topics



Panel Members (left to right):

P. Reu, R. Rhorer, F. Kosel, T. Schmidt,  
F. Pierron, T. Rumbaugh

# Suggestions & Feedback

- A suggestion made was to provide introductory talks from panelists first to give necessary background and help focus the following discussion.
  - Then after introductory talks, have attendees introduce themselves and respond to specific questions (i.e. “would you like faster framing rates?”)
- A panelist suggested to place all panelists in a more comfortable setting for seeing each other and the screen – instead of in a row in the front.
- Some suggested the the panel session as a means to have SEM help push for advancing high-speed imaging (e.g. “new 10 million dollar chip”).
- The possibility of a more focused session was suggested for next year? (e.g. application specific such as DIC)

**The consensus seemed to be that the need to discuss the practical aspects of high speed imaging such as camera supports, focusing, lighting, triggering, etc. exists; and that the panel session helped fill that need.**