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This material is based upon work funded and supported by the Department of Defense under Contract No. FA8721-05-C-0003 with Carnegie Mellon University for the operation of the Software Engineering Institute, a federally funded research and development center.

DM-0002537

Generalized Automated Cyber-Readiness Evaluator (ACE)

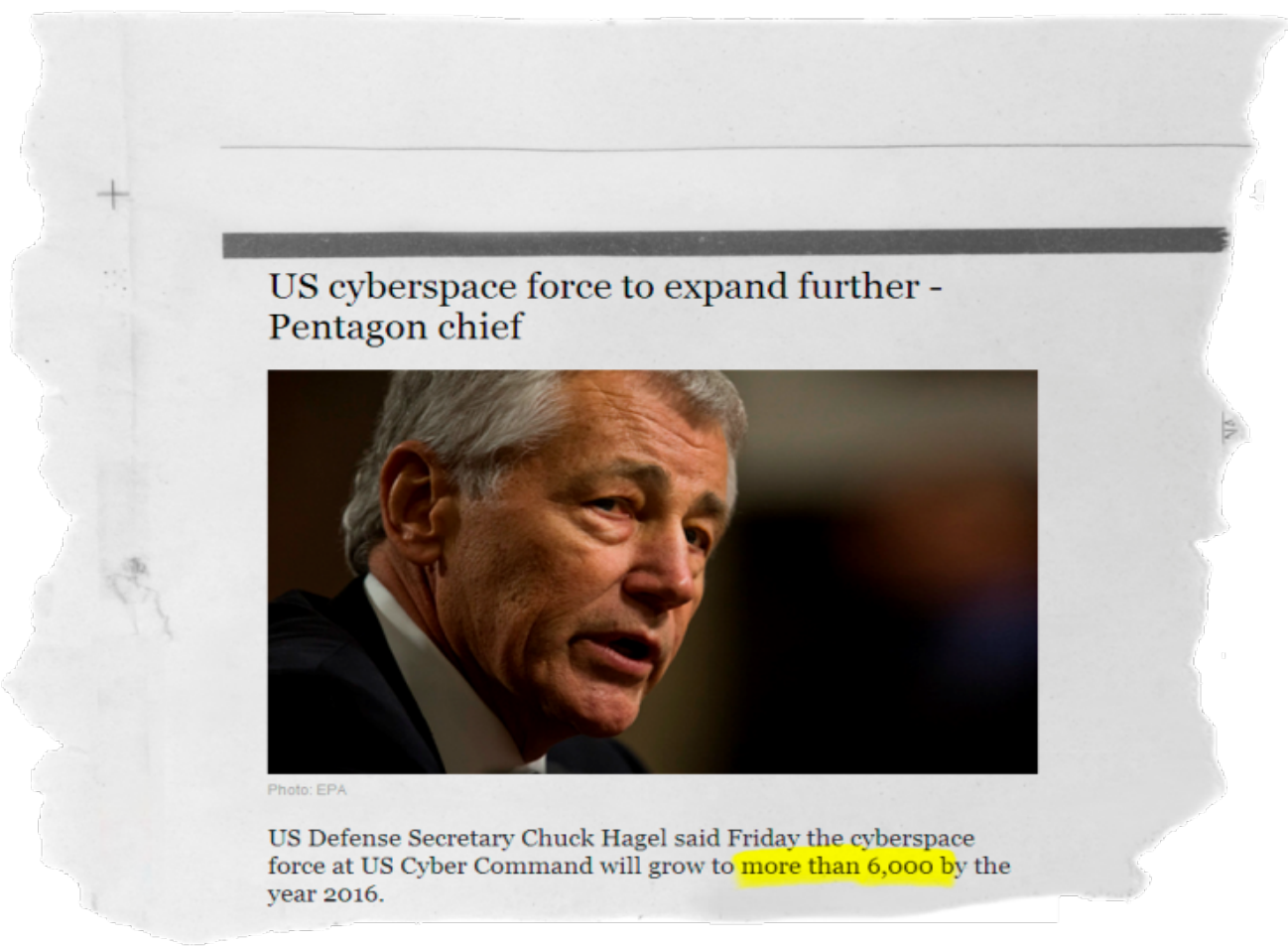
Software Engineering Institute
Carnegie Mellon University
Pittsburgh, PA 15213

Rotem Guttman

Core DoD Challenge Problem

Evaluating Mission Readiness For Cyber Operators

- Scalable
- Objective
- Reliable
- Valid



US cyberspace force to expand further - Pentagon chief

Photo: EPA

US Defense Secretary Chuck Hagel said Friday the cyberspace force at US Cyber Command will grow to more than 6,000 by the year 2016.

Polling Question

Do you know how evaluations are currently being conducted?

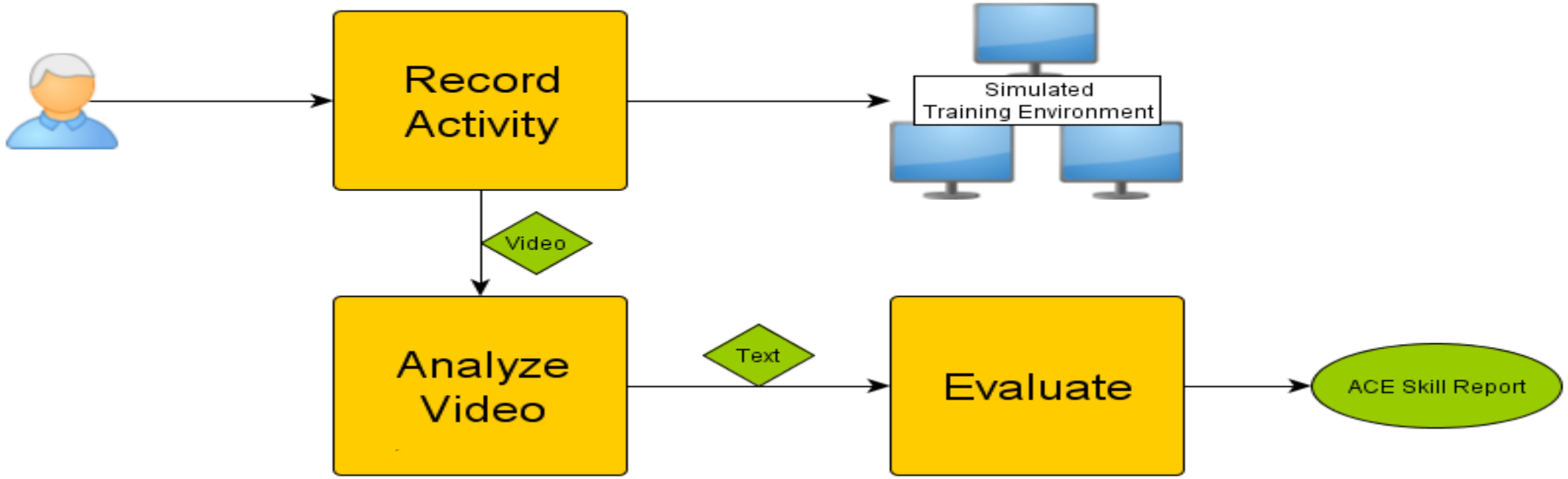
ACE

- Develop Automated Cyber-Readiness Evaluator.
- System will:
  - Place users in a cyber operator scenario similar to their normal work environment.
  - Allow users to perform cyber operator tasks in that scenario.
  - Understand the actions of the user within the scenario.
  - Verifiably determine a user's mission readiness based on their actions within the scenario.
- Benefits:
  - Automated analysis
  - Specific deficiencies isolated
  - Automated remediation plans
  - Recording available for future review

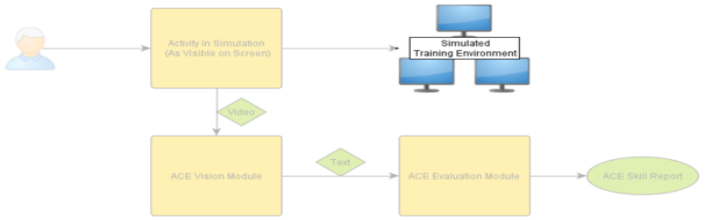
Technical Approach

Automated Cyber-Readiness Evaluator (ACE)

- Evaluate mission readiness by tracking actual performance



Technical Approach



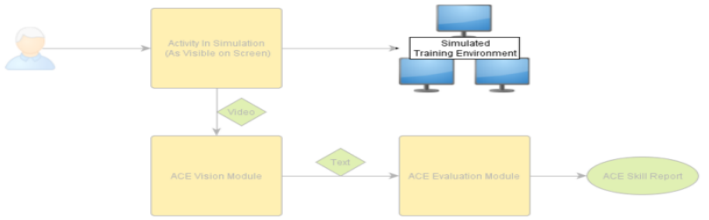
Role Choice

- Forensic Analyst
- 2 Hours
- Matching DoD Standards

Joint Cyberspace Training &

Certification Standards (JCT&CS)

Technical Approach



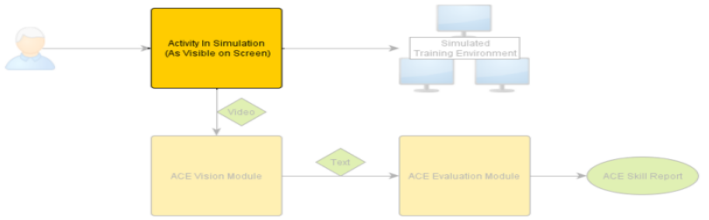
Scenario I & II Details

- Missing Person
  - Foul Play Suspected

- Classified* Documents Exfiltrated
  - Computer Drive Image
  - Multiple Layers of Story
    - APT1
    - USB
    - Personal Email

* Fabricated documents (Not actual classified data)

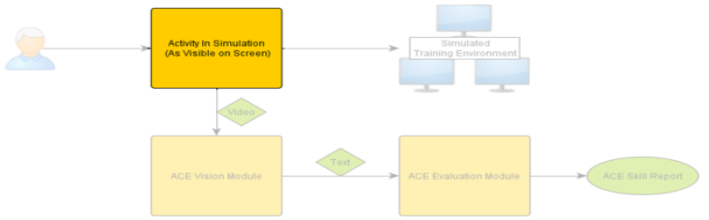
Technical Approach



Data Capture Capability

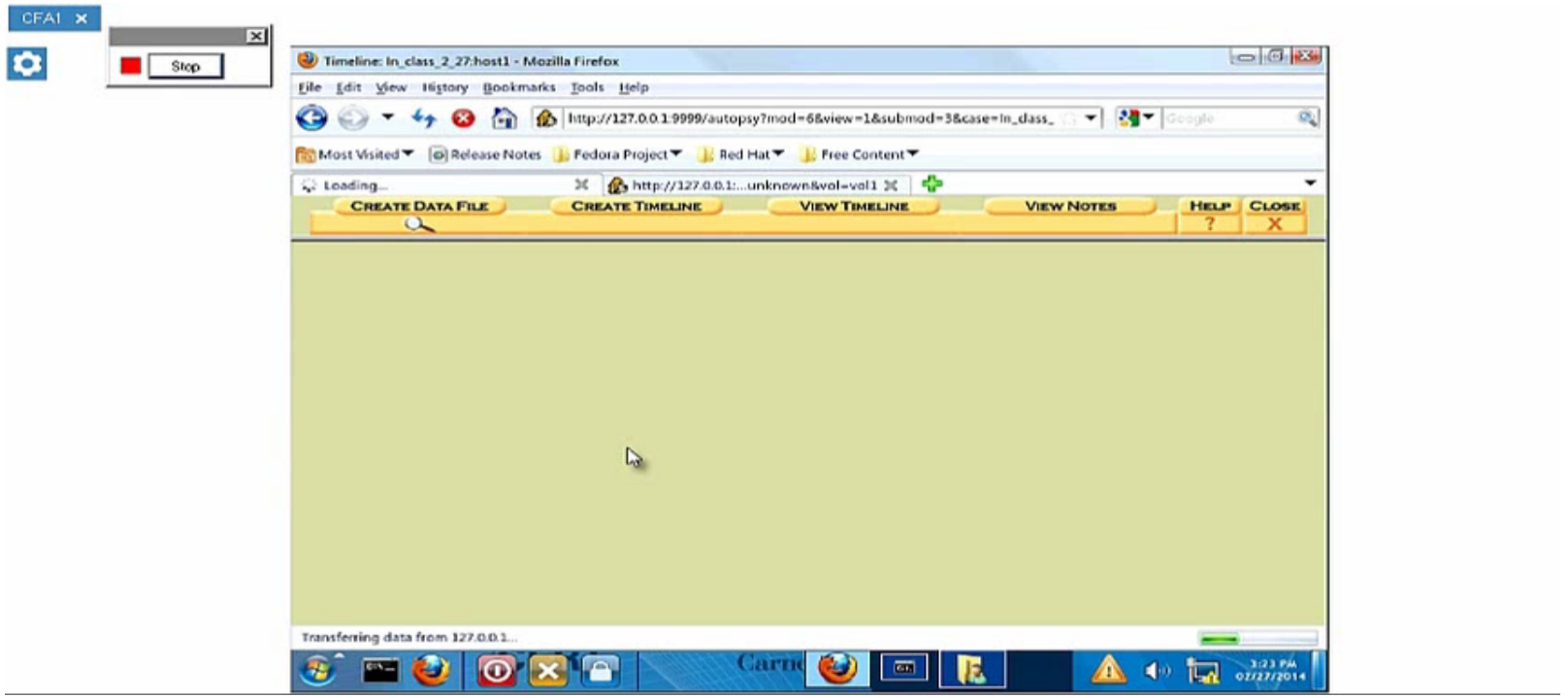
- Background Data Collection
- Restricted to Environment
- Scalable

Technical Approach



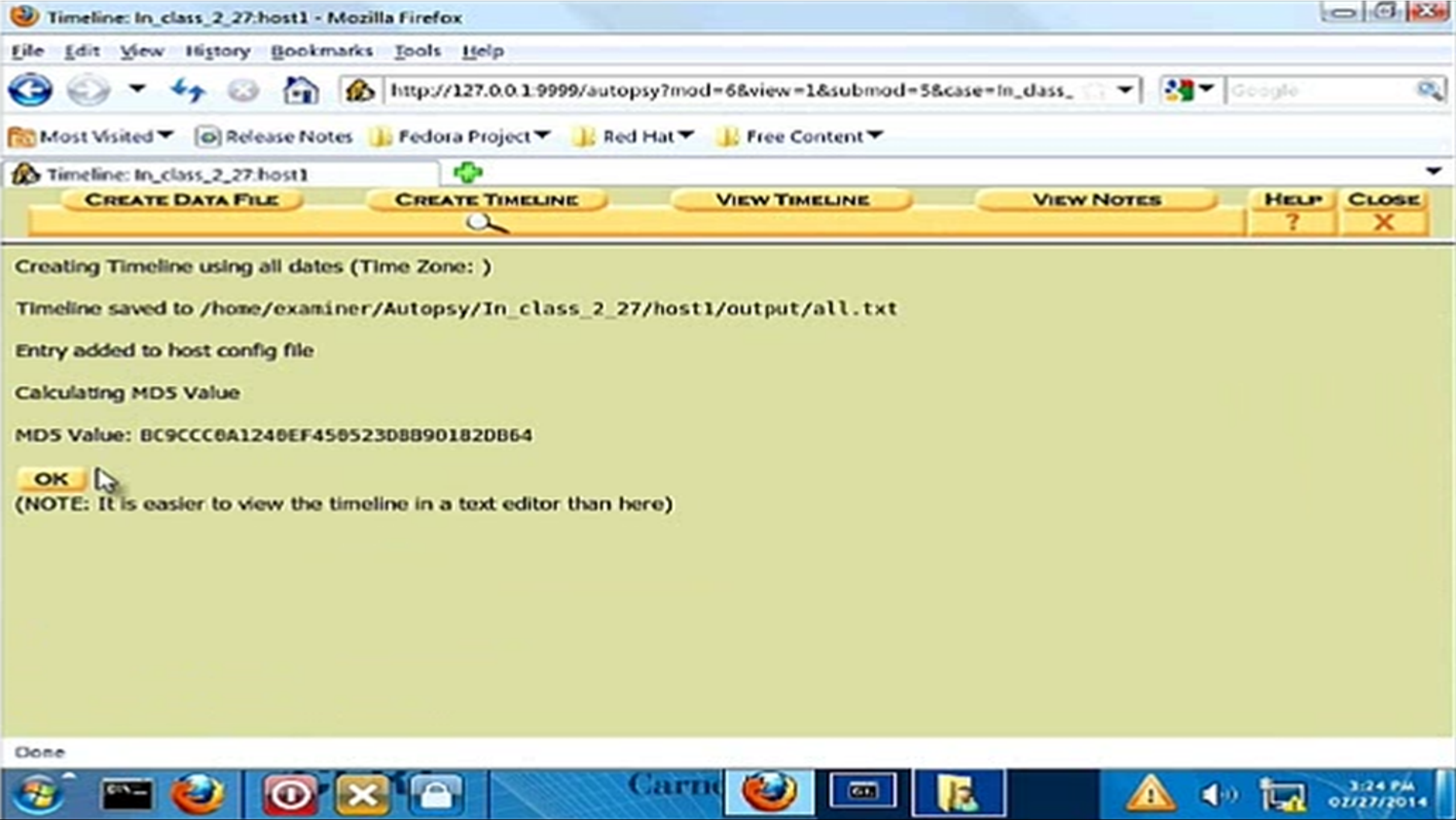
Data Collection

- CERT Staff
- CMU Graduate Students
- GCD Participant Groups
- DoD Personnel
- NCFTA Volunteers
- Pending: CMU Information Security Office



Polling Question

What Makes Computer Vision Difficult?


Timeline: In_class_2_27:host1 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://127.0.0.1:9999/autopsy?mod=6&view=1&submod=5&case=In_dass_
Most Visited
Release Notes
Fedora Project
Red Hat
Free Content
Timeline: In_class_2_27:host1
CREATE DATA FILE
CREATE TIMELINE
VIEW TIMELINE
VIEW NOTES
HELP
CLOSE
Creating Timeline using all dates (Time Zone:)
Timeline saved to /home/examiner/Autopsy/In_class_2_27/host1/output/all.txt
Entry added to host config file
Calculating MD5 Value
MD5 Value: BC9CCC0A1240EF450523D8B901820B64
OK
(NOTE: It is easier to view the timeline in a text editor than here)
Done
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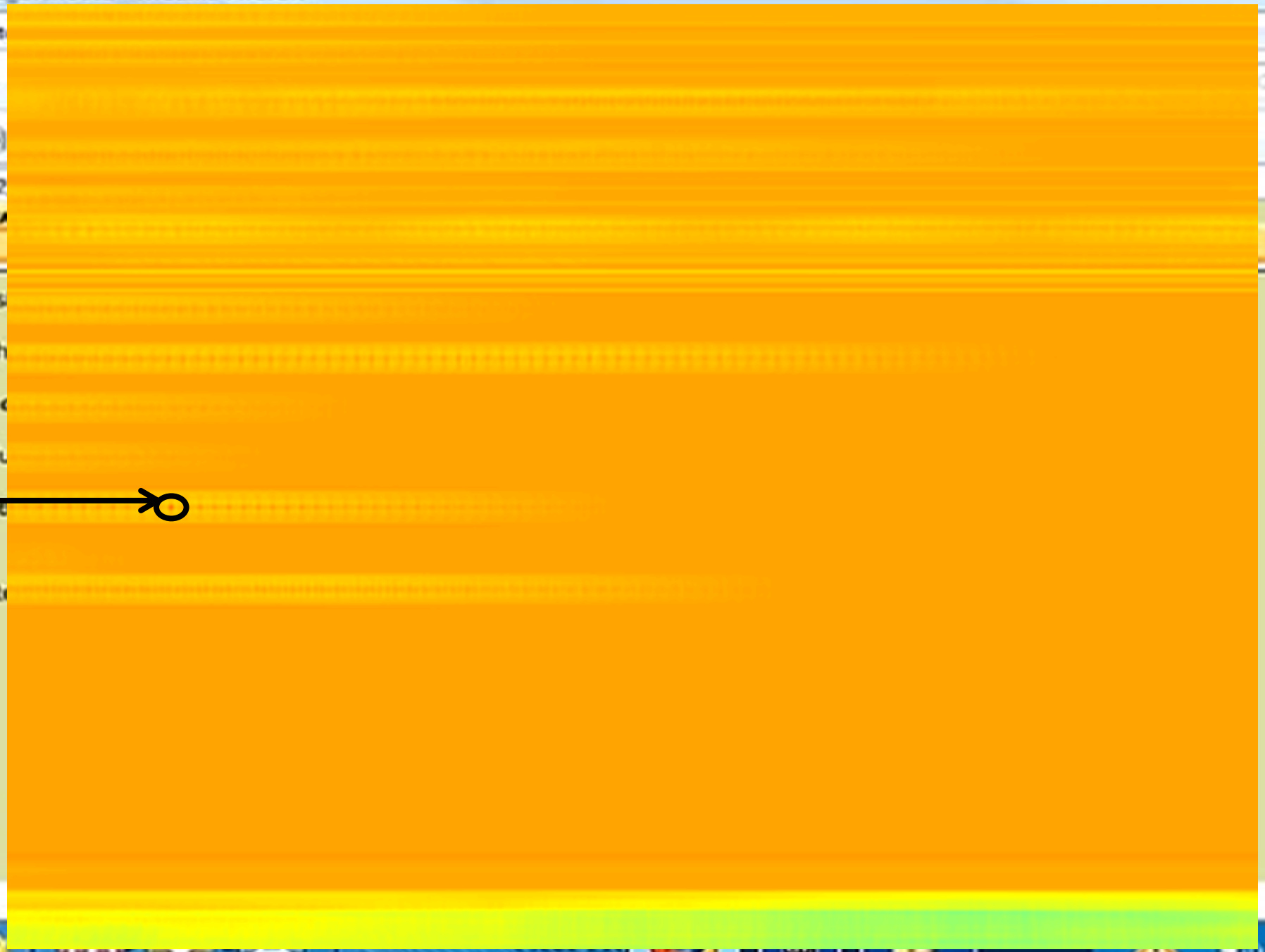
02/27/2014


Timeline: In_class_2_27:host1 - Mozilla Firefox
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MD5 Value:
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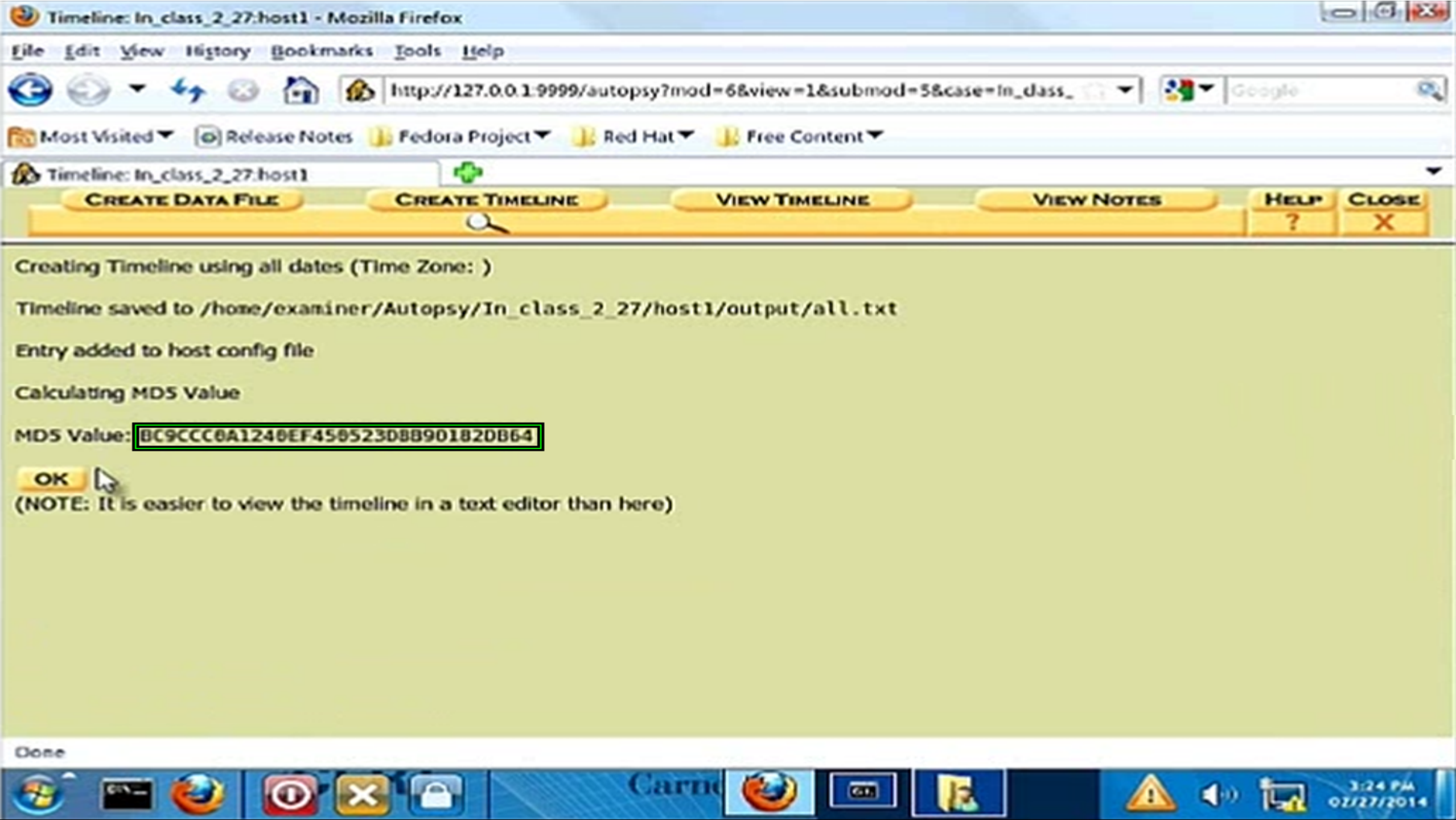
Timeline: In_class_2_27:host1 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://127.0.0.1:9999/autopsy?mod=6&view=1&submod=5&case=In_dass_
Most Visited
Release Notes
Fedora Project
Red Hat
Free Content
Timeline: In_class_2_27:host1
CREATE DATA FILE
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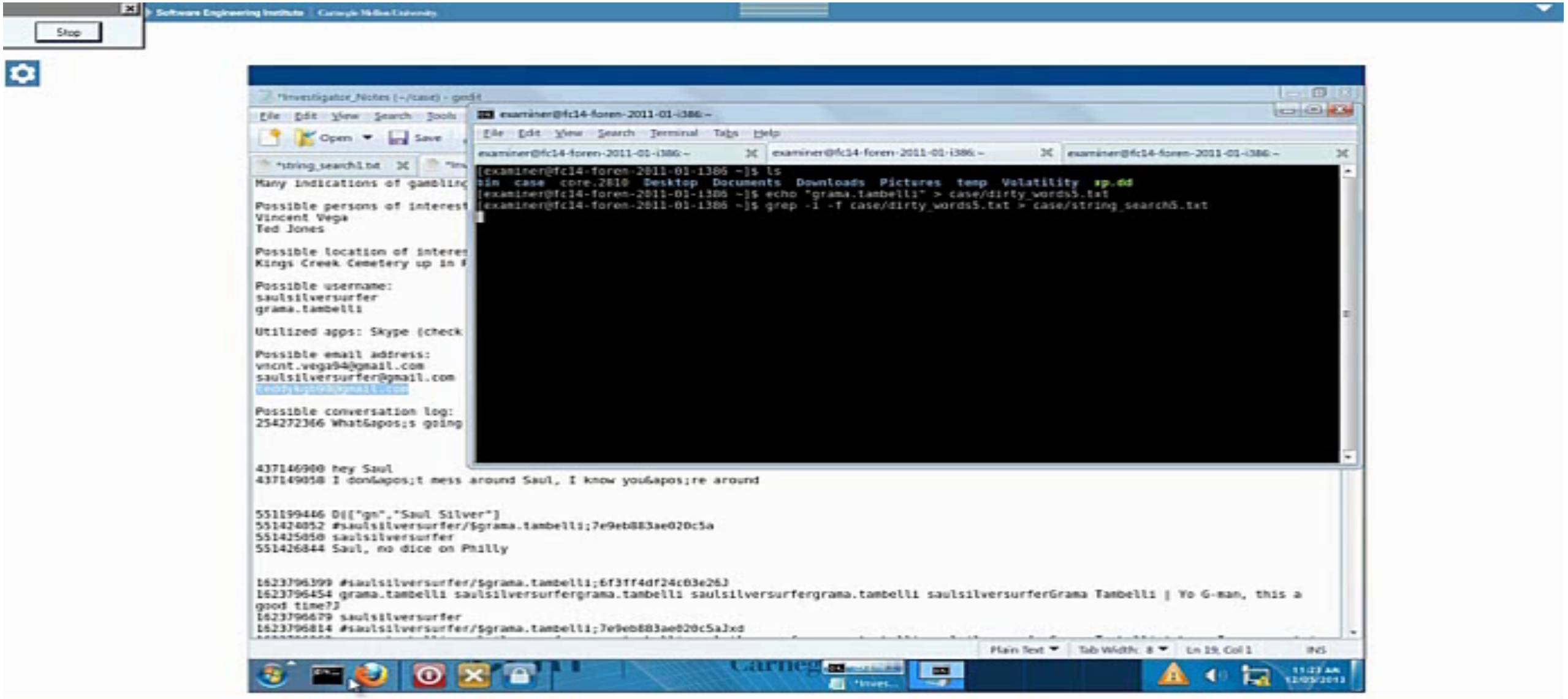
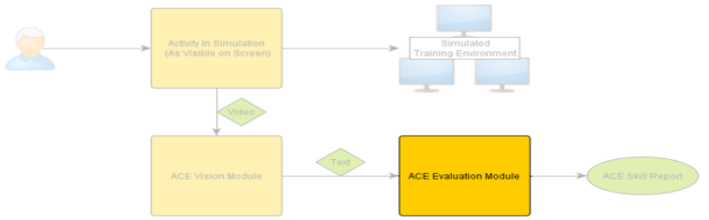
Calculating MD5 Value
MD5 Value: BC9CCC0A1240EF450523D8B90182DB64
OK
(NOTE: It is easier to view the timeline in a text editor than here)
Done
3:24 PM
07/27/2014

	A	B	C
148	0:50:52	Focused on Shell2 Window	GUI
149	0:51:00	Focused on Shell4 Window	GUI
150	0:51:13	sudo autopsy	Shell4
151	0:51:17	Shell Link Menu opened	Shell4
152	0:51:18	"Open Link" clicked	Shell4
153	0:51:22	Focused on Mozilla Firefox Window - http://localhost:9999/autopsy	GUI
154	0:51:24	Firefox "File" Menu opened.	Firefox
155	0:51:26	"Work Offline" menu option clicked	Firefox
156	0:51:27	"Try Again" button clicked.	Firefox
157	0:51:30	"New Case" button clicked	Autopsy
158	0:51:34	Case name: "Silver"	Autopsy
159	0:51:41	Case description: "Missing Persons - Saul Silver"	Autopsy
160	0:51:44	Case Investigator A: "Rotem Guttman"	Autopsy
161	0:51:50	Case Investigator B: "Josh Hammerstein"	Autopsy
162	0:51:51	"New Case" button clicked	Autopsy
163	0:51:52	"Add Host" button clicked	Autopsy
164	0:51:59	gedit switched to investigator_notes	Gedit
165	0:52:02	gedit switched to string_search1.txt	Gedit
166	0:52:06	gedit "Find" window opened	Gedit
167	0:52:07	gedit "Find" button clicked - search for: "hostname"	Gedit
168	0:52:09	gedit switched to string_search1.txt	Gedit
169	0:52:18	Focused on Mozilla Firefox Window - http://localhost:9999/autopsy?mod=0&view=7&case=Silver&x=83&y=6	GUI
170	0:52:21	Host Name: "saul-n3eruqnyq5"	Autopsy
171	0:52:39	Host Description: "Saul Silver's Computer"	Autopsy



Focused on Shell2 Window
(GUI)

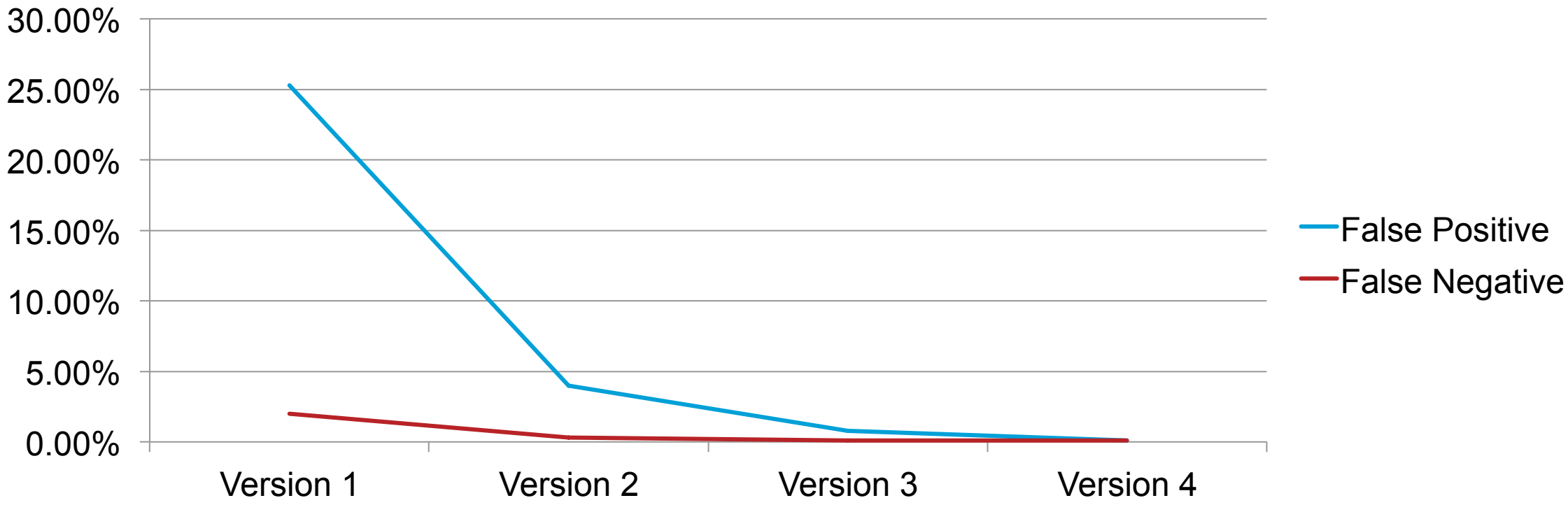
Evaluation Module – Layer 2



- Developing evaluation module that will make final mission-readiness determination
- Status: In-Progress
  - Collaboration with CMU Robotics Institute – Machine Learning department

- Currently exploring multiple methods
  - Hidden Markov Models, Spectral Methods, Path Analysis

Results



Expected Outcomes

- Automated Assessment - Individual
- Extendable Roles
- Time and Money saved for DoD
- Follow On Work
  - Group Evaluation
  - Data-Backed Standards
  - Secondary Uses for Vision System (Research Enabling Tool)