Algorithm Development for Security Applications (ADSA)
Workshop 6:

Development of Fused Explosive Detection Equipment with Specific Application to Advanced Imaging Technology

Next Steps

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Improving AIT

- Existing systems
  - Vendors and TSL present classified briefs
  - Predictive study of performance
  - Develop simulation capability
- Fused systems
  - Spec systems to fuse with existing technologies
  - Predict performance of fused systems
  - Develop simulation capability
  - Prototype

MMW Investigations

- Optimize frequency
- Investigate polarization
- Advanced reconstruction
- Depth info to ATR
- Increase solid angle
- New/more sensors for specific threats and locations
- Fuse with other technologies

XBS Investigations

- Range finder
- Fractionate dose for more views
- Anatomical subtractions
- Use transmission information
- Fuse with other methods

DHS Recommendations

- Studies of performance
- Simulation capability including standard mathematical phantoms
- Review other DHS and DoD positive and negative examples of fusion
- Understand DOD model of funding and adapt what applies to DHS, educate as needed
- Adapt language for fusion

Testing Recommendations

- Allow testing of systems that will not pass complete tests
- Allow virtual combinations for said systems
- Assess impact of present tests on ability to predict fused performance

TSA Recommendations

- Change procedures to allow procurement, deployment, operation and maintenance of fused systems
  - In separate boxes
  - From separate vendors
- Test and deploy DICOS
  - Modify as necessary to support fusion
  - Be adaptive in the field

Overall Recommendations

- Vendors ID the go to person(s)
- Address the IP issues up front and not one off to enable technical people to deal with the technical problem
- Need more students to attend and participate in the workshops
  - Students need to present and interact

REVIEW OF QUESTIONS

Question 1

- What should the definitions be for *fusion*, *orthogonal* and *technology*?
  - Are *layered* systems (humans plus technology) the same as *fused* systems?
  - Are PET and CT systems *orthogonal*? Are they *fused* in current medical applications for cancer detection?
  - Do systems have to "talk with/guide each other" to be fused?

Question 2

- Are there existing technologies that have sufficient evidence for their potential as a fused system with improved detection performance?
  - What is the *evidence* (e.g., literature, internet, reports) that fusing existing technologies would lead to improved detection performance?
  - What would be *attributes* of technologies which would best fuse with each of these systems? Do such technologies exist today?
  - What is the evidence to support that AIT and x-ray back scatter technologies are attractive fusion candidates?
  - What other technologies could be fused to improve the detection performance of AIT systems?

Question 3

- How is detection performance improved with adaptive screening?
  - What is the definition of adaptive screening?
  - How should risk be assessed?
  - How should risk be fused to explosive detection equipment?
  - Should adaptive screening be used?

Question 4

- Which investment is likely to have the highest rate of return?
  - Fused system identification and performance evaluation
  - Algorithm development (segmentation, reconstruction, artifact reduction)
  - Sensor simulations
  - Integrating systems and then fusing their results

Question 5

- What changes need to be made by the TSA to allow fused systems to be deployed?
  - What are the developmental steps between identification of attractive fused detection systems and acquisition of such systems by TSA? (Describe the research, DT&E, OT&E, and acceptance testing required, necessary resource levels and the timeframe to accomplish it.)
  - What are the implications of fused technologies on the DICOS developmental effort and emphasis?
  - What is needed by traditional vendors to gain their enthusiasm for fused system development? (e.g., IP and patent protections, data on real threats, etc.)

Questions 6, 7 & 8

- What changes need to be made by DHS S&T to fund the research and development of fused systems?
- How can third parties better be marshaled to accelerate development of optimally fused detection systems?
  - How can projects be given to third-parties who cannot access classified information?
  - Which projects are suitable for third-parties?
- What did you like about this workshop?

Questions 9-12

- What would you like to see changed for future workshops?
- Do you have recommendations for future workshop formats? (e.g., smaller with more focused working groups, larger with speakers and breaks to mingle, etc.)
- What topics would you like to see addressed in future workshops?
- What other comments do you have?