Stratovan's Perspective and Recent Involvement as a 3rd Party

David F. Wiley, PhD

Founder, President, and CTO

Summary

- ADSA facilitated our involvement.
- We have obtained funding from TSA.
- We are continuing the pursuit of airport security opportunities.
- We have contributed to the airport security field and are continuing to do so.
  - DICOS
  - Guinea Pig
  - Validation
  - ATRs
  - Infrastructure
- It has been confusing, a lot of lucky guesses, painful at times, but generally good.

TSA to Work With Stratovan

- Act(s) of Congress needed (not kidding).
- We didn't already have clearance.
- We had never worked with the gov. before.
- Tiny business ("small" is < 500 people).
- Initial hires were critical.
- Timeline, delays, cash flow, payment mechanism - all challenges.
- Fail early and fail fast.

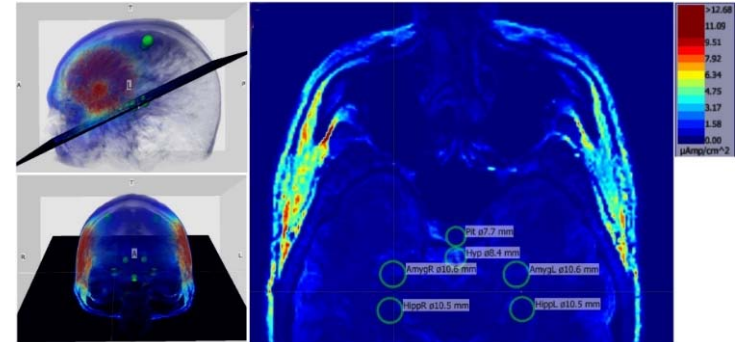## -- TSA has been incredibly supportive --

Stratovan Pre-Airport Security
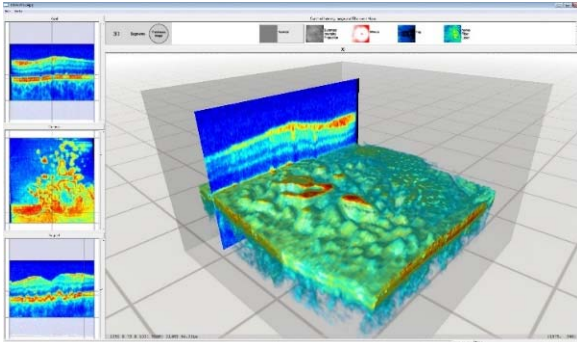
Retinal Imaging
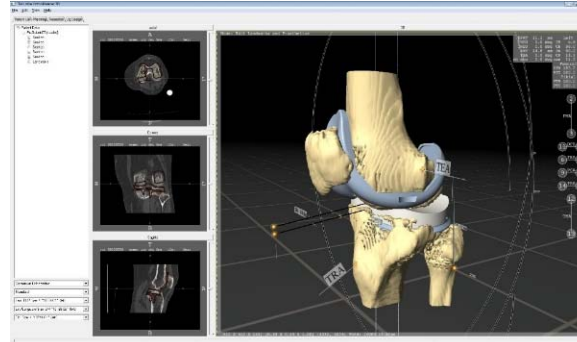
Total Knee Replacement

Transcranial Current Simulation

- Stratovan Encircle™ integrates a high-performance 3D imaging toolkit with a user interface widget library.
  (Similar to combining Kitware's VTK and QT.)

- This saves time, money, and makes our software developers more efficient at solving difficult real-world problems.

- Stratovan Maxillo™ segments the orbital volume from CT scans.

- Used for planning orbital fracture repairs.

- Originated our Tumbler segmentation technology.

How We Transitioned

- ALERT ADSA meetings acted as introduction to industry. Facilitated networking.

- ADSA Task Order 2: CT Segmentation Initiative (as a researcher).

- ADSA Task Order 3: CT Reconstruction Initiative (as a reviewer).

- **Funding for these Task Orders was critical to keep us involved – since we're a small business.**

- 2013 Obtained two TSA contracts through BAA process:
  - DICOS SDK   – ATR for CT

Why would TSA work with Stratovan?

- TSA is under significant pressure from multiple directions.
- Airport security industry is going through a transition towards interoperability to alleviate pressure.
- This has happened for many industries:
  - Personal computers
  - Operating systems
  - Satellite broadcasting
  - Factory floor automation
  - Networking equipment
  - Etc.
- This has resulted every time in increased growth, profitability, and a flourishing industry for customers *and* vendors.
- This change also allows best-of-breed to percolate upwards providing the customer with higher value.

DICOS SDK

Goal	Rationale
Provide an SDK to the Industry	A step in the direction of interoperability
Provide SDK for free via download	Encourage adoption
Provide tools for compatibility, compliance, and testing.	Improve multi-vendor compatibility
DICOS Viewer	Debugging of spatial data
Support multiple operating systems	Meet your development needs
Help the software developer in your org: documentation, examples, and support.	Don't have to become a DICOS expert
High-performance	Can be included in production
Target one or two week dev investment	To reduce the burden of becoming DICOS compliant

DICOS SDK - Current Status

- No cost and unrestricted access and use once approved.

As of last week:

- **89** users have signed up and downloaded our SDK.

- From **44** different airport security companies around the world.

**https://www.stratovan.com/products/dicos-toolkit**

ATR Effort

- Goal is to improve PD and reduce PFA.
- Cover more material classes and smaller sizes.
- Build upon technologies developed for our medical imaging applications and also CT Segmentation Initiative success.
- Project challenges are numerous:
  - Obtaining training data
  - Large data
  - Borderline research
  - Data dependent problem
  - Limited time budget
  - Complex algorithms
- Involves complex computer science technologies:
  - GPGPU
  - Image processing
  - Large data
  - High-performance computing
  - 3D data
  - Image segmentation
  - Machine learning

ATR Fragment Tree Abstraction
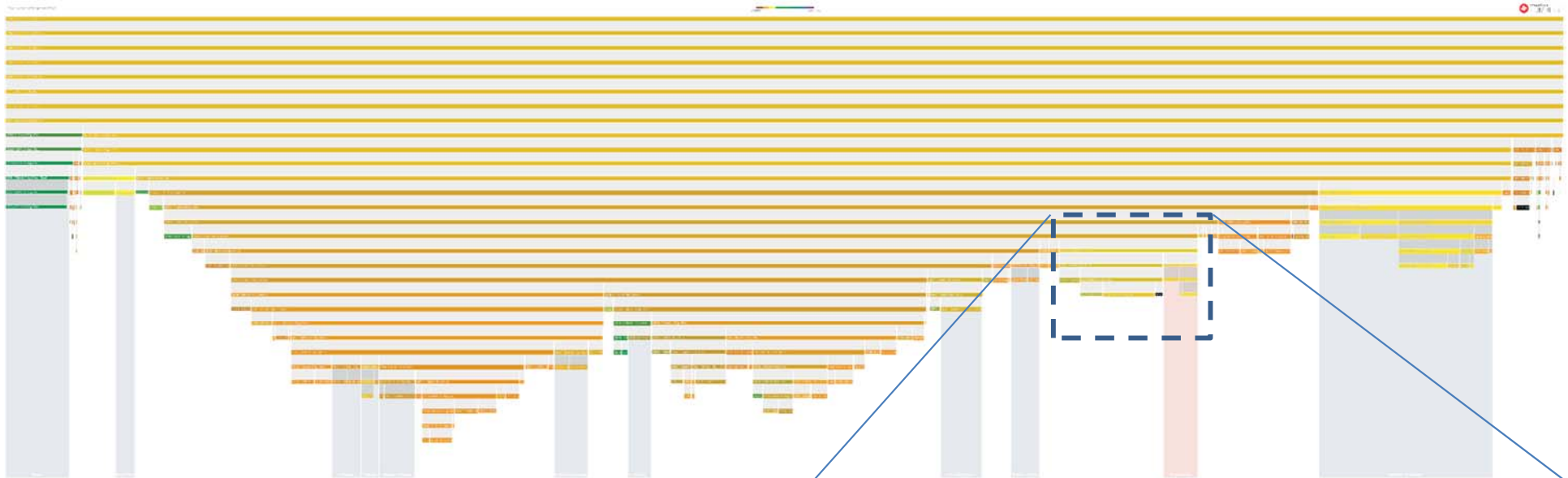
- Multi-stage segmentation.
- Decompose into tree of fragments.
- Similar to Russian nesting dolls.
- Run detection on each node.
- Issued patent.
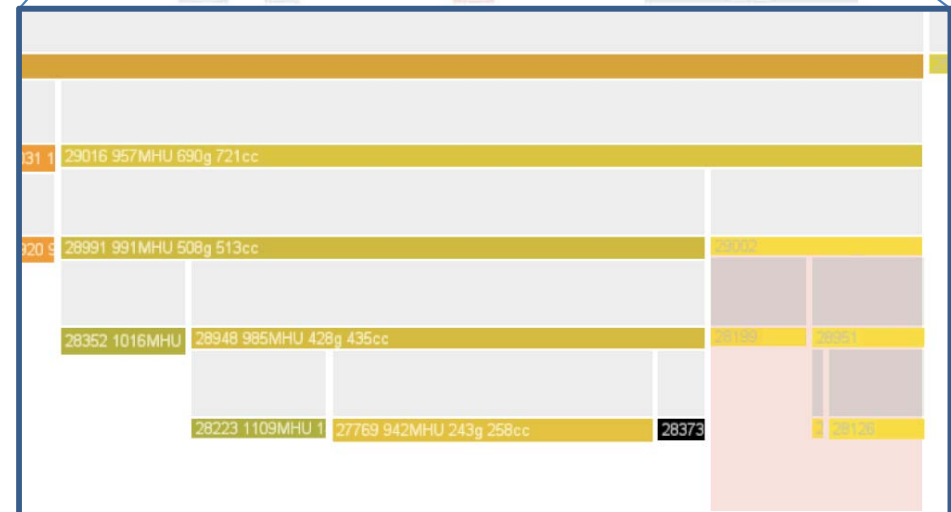
3rd Party Deployment Barriers

Third party looking into marketplace:
- How do we get our "stuff" into airports?
- What opportunities are there for innovation?
- What performance requirements must we meet?
- How can we add value?
- What is the certification process?
- How do we know our "stuff" will work with others?
- **How is passenger risk determined?**

These questions can be answered with software!
-- Interoperability is a software problem --

Invest in SDKs
(Software Development Kits)

- Software problems are solved with SDKs.
- Provides a common ground for everyone.
- Clearly defines (in software) what is possible and what is not.
- Reduces barrier for becoming compliant.

Apple iPhone SDK example:
- Provides clear interfaces/standards for developing cell phone applications.
- Handles credit card processing, interaction with App Store, user interfaces, access to hardware resources, etc.
- Apple has a process for "approving" apps prior to inclusion in App Store – akin to certification.
- Ecosystem supports millions of vendors and billions of users.

Challenge is that not everyone understands software…

Sandia OTAP Collaboration

- Data collection effort (PBOD)
- Hardware sensor exploration
- Reconstruction exploration
- ATR exploration
- OPSL (Open Platform Software Library)
  - An SDK for screening workflow operation.
  - Supports Risk Based Screening (RBS).
  - Works with: DICOS, STIP, Secure Flight, BHS, etc.
  - Meant to interconnect *all* security devices via Ethernet.
  - Orchestrates data flow by facilitating communication between devices.

Questions?

Thank you!

OPSL

- Why not use existing platforms?
  - No other environment has the same requirements.
  - 1,000 times the data volume than in hospitals.
  - Scalability, automation, cyber security, reliability, and management are key.
- Use IBM PC model to decompose security components into **OPSL Roles** and define interfaces between them.
  - PC Roles: Mouse, Keyboard, Monitor, Printer, CPU, RAM, Hard drive, etc.
  - PC Interfaces: PCIe, USB, Bluetooth, Ethernet, TCP/IP, etc.
  - Roles compartmentalize requirements and provide foundation for certification.
- An OPSL Role plays a part in the passenger screening process.
- Provides mechanism for transporting passenger risk score to OPSL Roles to enable RBS.
- Allows dynamic and heterogeneous configuration of Roles within airports. No longer need the same everywhere.

OPSL

- Define architecture around OPSL Roles:
  - What does it do?
  - What are the input/output formats? Data, passengers, baggage, cargo, etc.?
  - How fast does it need to process?
- Treats each Role as black box.
- Supports innovation within Roles.
- Provides foundation for Automated testing via Role interfaces:
  - Compatibility testing against a gold standard.
  - What happens when…?
  - How is the Role tested and certified?
  - Self testing prior to certification testing.