Forensic Laboratory Financial Management/Return on Investment: Project FORESIGHT Revelations

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Project FO RESIG HT

- West Virginia University Forensic Science Initiative
- NIJ funded project FY09 and FY10
- Connect casework, financials, and personnel data
- Create business metrics to understand the “industry” of forensic science laboratories
- Share what works; improve what does not
Project FORESIG HT Areas of Investigation

- Blood Alcohol
- Crime Scene Investigation
- Digital evidence - Computer, Audio & Video
- DNA Casework
- DNA Database
- Document Examination (including handwriting)
- Drugs - Controlled Substances
- Evidence Screening & Processing
- Explosives
- Fingerprint Identification
- Fire analysis
- Firearms and Ballistics
- Forensic Pathology
- Gun Shot Residue (GSR)
- Marks and Impressions
- Serology/Biology
- Toxicology ante mortem (excluding BAC)
- Toxicology post mortem (excluding BAC)
- Trace Evidence (includes Hairs & Fibers, Paint & Glass)
FORESIG HT Participation

- Annual submissions from FY2005 - FY2016
- 136 laboratories in FY2016; 116 U.S.
- Six continents represented
- Dramatic increase expected with FORESIG HT 2020
Project FORESIGHT Metrics

FO RESIG HT 2020

- ASCLD Project
- Funded by the Laura and John Arnold Foundation
- Cooperative effort with major LIMS providers
- Automatically generate reports for Project FO RESIG HT, NIJ, etc.
- Dashboard for real time operational and business metrics
### Foresight cases

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### Last TAT

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Current Research Underway

- The Return on Investment (ROI) from investment in the DNA Database
- U.S. Forensic Science laboratories v. International laboratories and performance over time
- The Queuing Elasticity of Demand for Forensic Science Services
The Return on Investment from investment in the DNA Database

- “In 2010, 761,609 offender profiles were uploaded to CODIS... this cost the state and federal governments approximately $30.5 million, but saved at least $1.2 billion annually by preventing new crimes.”


- Applies the Doleac societal returns to individual contributions from FORESIGHT laboratories.

- Policy implications on distribution of funds and jurisdictional versus regional cooperative efforts.
The Return on Investment from investment in the DNA Database

- Operational improvements can offer dramatic increases in productivity and efficiency
- Right-sizing operations to take advantage of economies of scale
- TAT reduction will be met with increased demands for services
- Plan for the moving target
- Data driven decision-making
- Societal ROI: 890% to 3,800%, depending upon jurisdictional scale of operations

- Decomposition Redux
- Econometric estimation of the efficient frontier for each investigative area
- Offers advance metrics on potential gains from operational changes (such as lean six sigma programs)
- Policy implications
Lean Six Sigma and Potential Gains

DNA Cases/ $K

Caseload

Cases/Thousand Dollars Expended
Lean Six Sigma and Potential Gains

Case/$K

Cases/Thousand Dollars Expended

Caseload

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000
Lean Six Sigma and Potential Gains
Lean Six Sigma and Potential Gains

Lean Six Sigma and Potential Gains

Scale Economies

Lean Six Sigma
Economies of Scale
Economies of Scale—Size Matters

Scale Economies
Economies of Scale—Productivity & Size

Productivity: Case/FTE

Caseload

Cases/FTE
U.S. Forensic Science laboratories v. International laboratories and performance over time

- Do differences exist in the efficient frontier?
- Does knowledge of the performance metrics promote improvement?
Backlog, Turnaround Time, & Queuing Elasticity

- SAK Backlog Reduction Efforts
- TAT reduction
- Queuing elasticity less than -1
- Interpretation: for a 1% reduction in TAT, demand for services increases by more than 1%
- The metrics should accompany planning and resource allocation
- Resource needs are a moving target
The Queuing Elasticity of Demand for Forensic Science Services

- Efforts to reduce backlog have an unintended consequence; such programs reduce TAT which actually increases backlog.

- Cases: $\eta_{TAT} = \frac{\text{percentage change in cases}}{\text{percentage change in TAT}} = -1.290$
The Queuing Elasticity of Demand for Forensic Science Services

- Items: $\eta_{\text{TAT}} = \frac{\text{percentage change in items}}{\text{percentage change in TAT}} = -3.906$

- This suggests that not only do more cases get submitted, more evidence is requested for review in existing cases.
The Queuing Elasticity of Demand for Forensic Science Services

- Samples: \( \eta_{TAT} = \frac{\text{percentage change in samples}}{\text{percentage change in TAT}} = -2.916 \)

- And from the additional cases and additional items of evidence more samples are being tested as TAT falls.

- The demand for laboratory services is growing, the faster casework is processed.
The Queuing Elasticity of Demand for Forensic Science Services

- Permits anticipation of funding awards to systemic demands
- Permits measurement of program effectiveness towards capacity enhancement
- Policy implications on funding, return on investment, operational change, etc.
- FORESIGHT 2020 contribution offers the opportunity to even better track the market demand for lab services
Moving Forward

- Additional topics under research are either suggested by participating laboratories or uncovered in the data.
- ASCLD 2017 will highlight several operational success stories from use of the FORESIGHT output.
- FORESIGHT 2020 support continues through February 2018.
- Future funding will be critical to continued analysis.
  - Gains are forensic laboratory industry-wide.
  - Societal returns suggest public funding.
FORESIGHT Published Research Output


FORESIGHT Published Research Output


FORESIGHT Published Research Output


