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Background

- 90% of our casework is "touch" evidence from firearms, explosive devices and incendiary devices.
- Many of these samples result in mixtures, some more complex than others
- Most of these samples suffer from limited quantities of DNA and / or various levels of degradation

Evidence Types

- Swab various parts of the firearm
  - Grips
  - Slide grooves
  - Front and rear sights
  - Ridge detail/smudges on smooth areas
- Post-Blast device components
  - Pipe fragments
  - Twisted wires
  - Adhesive and non-adhesive surface of tape
  - Timer knob or remote buttons
- Molotov cocktails
  - Mouth area of the bottle
  - Ridge detail/smudges from bottle
  - Wick material
- Documents from threat letters
  - Adhesive seals
  - Stamps
  - Ridge detail/smudging post-ninhydrin treatment
- Random objects
  - Rocks
  - Etc.

Success Rate

- Fingerprint success rate off a firearm approximately 5%
- DNA profile suitable for comparison purposes off of a firearm approximately 25 – 30%
- Many of the profiles not suitable for comparison purposes are due to complex mixtures
- Lots of room for improvement

Options when there is limited data

- Use enhanced detection methods
- Make better use of the loci successfully detected
- Learn to live with disappointment

Make better use of loci successfully detected

- Obtain higher discrimination by increasing the power of discrimination for the loci detected (all 15 alleles are not created equal)
- Use sequencing data to aid in the deconvolution of a mixture
  - Separate shared alleles
  - Better estimate of the number of contributors
  - Obtain a better estimate of the number of alleles at a locus to aid in statistical calculation (e.g. 3 alleles turns into 4 for an assumed 2 person mixture)
- Discriminate between stutter and true alleles when examining a minor contributor to a mixture at the level of the stutter alleles

Your **programmatic plans** for developing and implementing this technology including **past and current investments** as well as timelines for making future investments

- No $$ - no plans