



# Looking to the Future Phase II of the NEST Project

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**NIJ**

**FRN**  
Forensic Resource Network  
A program of NIJ



# NDIS Approved Expert Systems

- i-Cubed™ v.4.0.2 using GeneMapper/ID v.3.2; ABI 3700 (data collection v.3.1.1); Identifiler™
- i-Cubed™ v.4.1.3 using GeneMapper/ID v.3.2; ABI 3130xI (Data Collection v.3.0); Identifiler™
- i-Cubed™ v.4.2.2 using GeneMapper/ID v.3.2.1; ABI 3130xI (Data Collection v.3.0); Identifiler™
- TrueAllele™ v.2.7.348; ABI 3100 (data collection v.1.1); Profiler Plus™ and COFiler™
- TrueAllele™ v.2.9; ABI 3100 (Data Collection v.1.1); Profiler Plus™ and COFiler™
- TrueAllele v2.9; ABI 3130xI (data collection v3.0); Identifiler
- TrueAllele v2.9; ABI 3130xI (data collection v3.0); Profiler Plus and COFiler
- GeneMapper ID-X v1.0; ABI 3100 (data collection v2.0); Profiler Plus and COFiler



# Attendance at Demonstration

- 24 laboratories from demonstrations sessions answered survey
  - 18 have identified an expert system
  - 10 have purchased an expert system

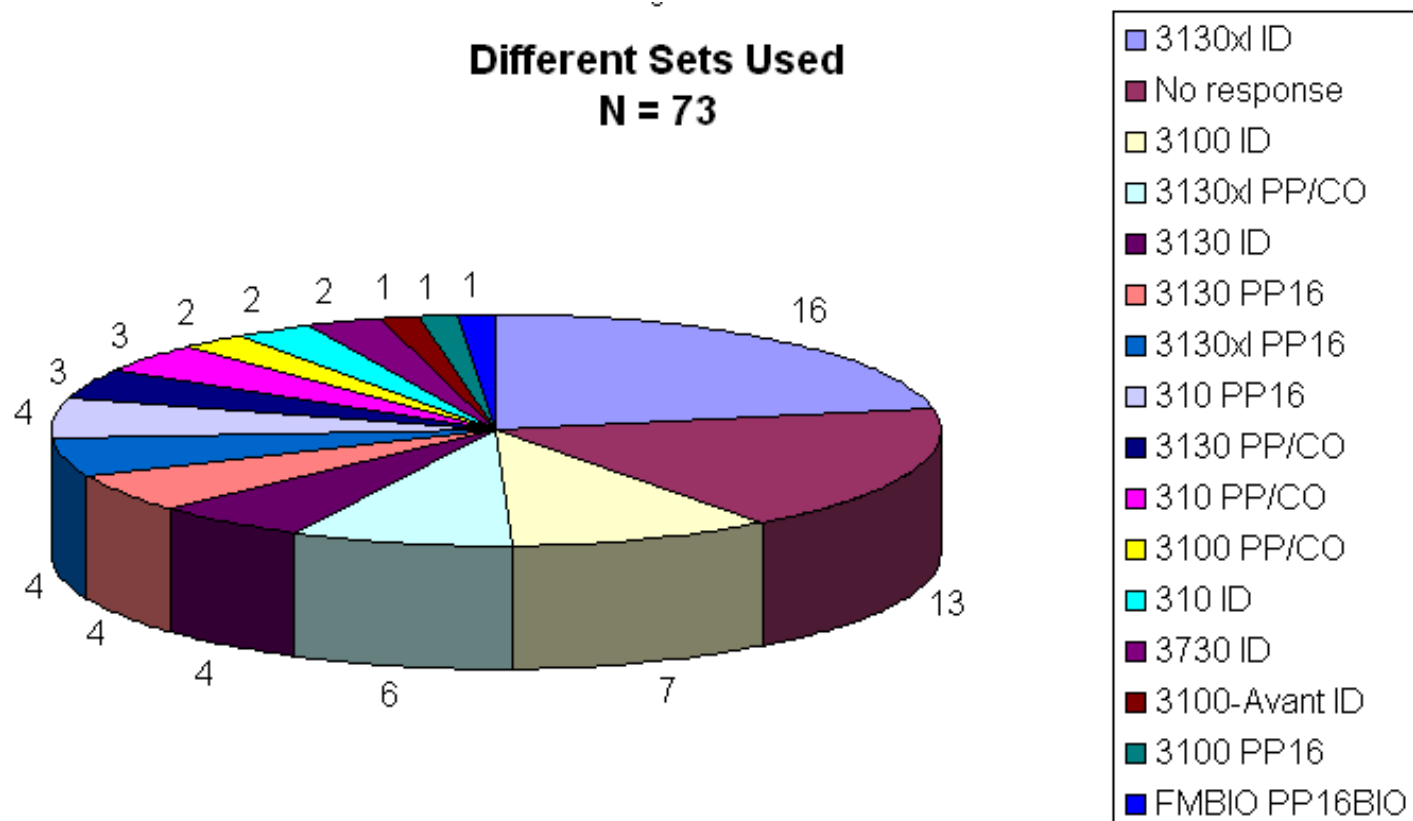


## Total Number of Sets Requiring Developmental Validation

- Definition of “Set”
  - Instrument platform
  - DNA typing kit
- Definition of “Complete Set”
  - Instrument platform
  - DNA typing kit
  - Expert system



# 53 responses; 15 different sets



**Note: Some laboratories plan on validating more than one set.**



## **39 responses to validating the complete set**

- 25 laboratories to validate one complete set
- 11 laboratories to validate two complete sets
- 1 laboratory = 3 complete sets
- 1 laboratory = 4 complete sets
- 1 laboratory = 6 complete sets



# Conclusion

- Do not wait for your complete set to be developmentally validated
- Developmental validation of an expert system is an excellent exercise



# Expert Systems for Mixture Deconvolution

- Do they exist?
- What is the definition?



# An Expert System...

- A software program or set of software programs
- Performs all of these functions without human intervention
  - Identifies peaks/bands
  - Assigns alleles
  - Ensures data meet laboratory-defined criteria
  - Describes rationale behind decisions
  - No incorrect calls



Does a software program exist that can take the place of one or both independent reviews of mixture data?



# Deconvolution Tools

- FSS-i<sup>3</sup>
- TrueAllele Casework
- DNA\_Data Analysis
- STRESP
- GeneMapper ID-X



# Other Evaluations

- Time Study
- Degradation Study
- Security Features



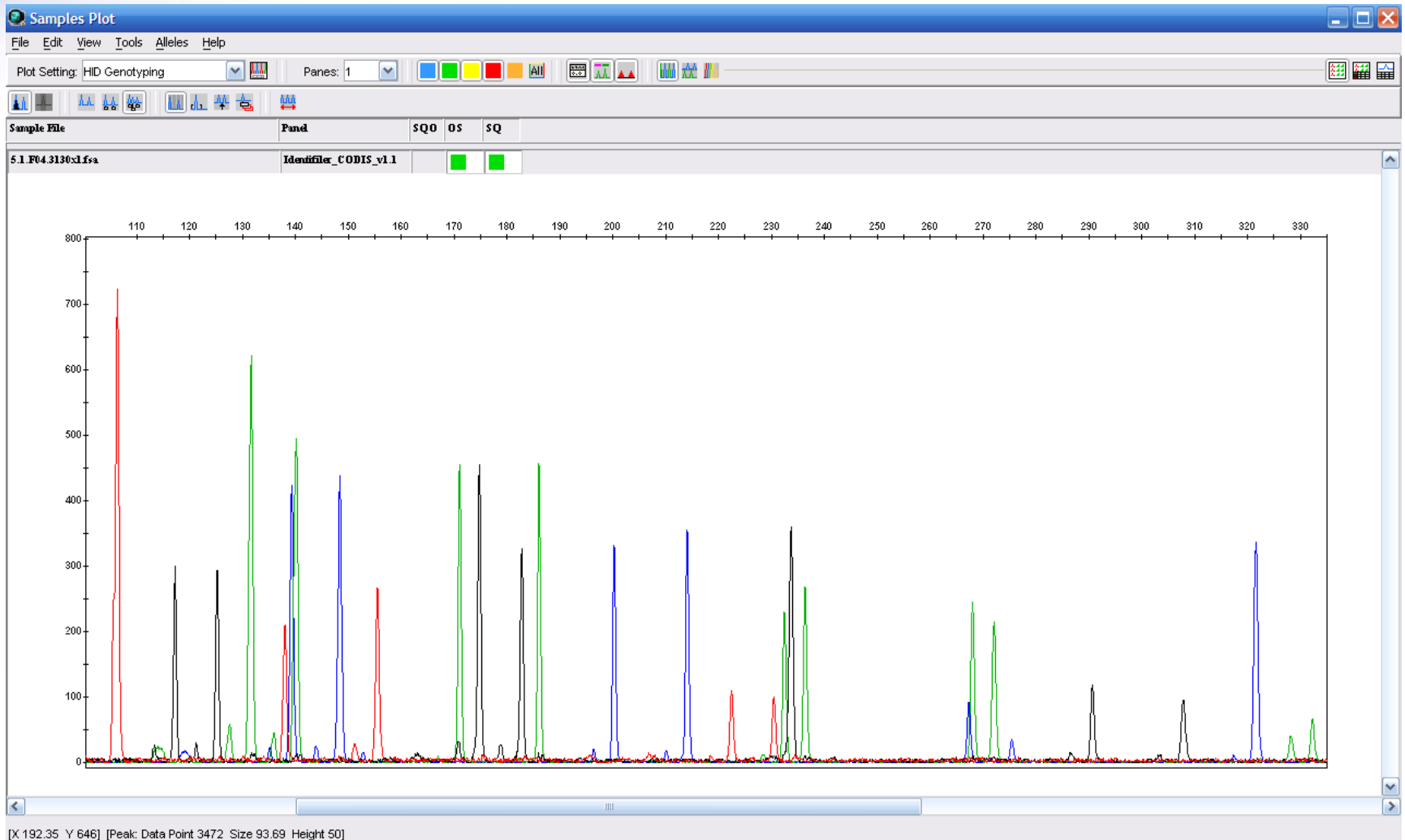
# Time Study

- GeneMapper *ID*
  - 0:11:55
- FSS-*i*<sup>3</sup>
  - 0:06:52
- TrueAllele Databank
  - 0:10:06

**Manual Review  
GeneMapper ID  
1:08:31**



# Degradation Study





# Security Features

Software System	Does the Software Ask for a User ID?	Does the Software Ask for a Password?	As a user, do you have access to change ALL settings?	As an administrator, do you have access to change ALL settings?	Will the software "time out" if the computer remains on or in sleep mode?	When a change is made to an allele call, is an annotation required and/or available?	Can the output files be edited?	Do the output files track who made the changes?
GeneMapper® ID	✓	✓	✓	✓		✓	✓	
GeneMapper® ID-X	✓	✓		✓		✓	✓	
FSS-i <sup>3</sup> ™				✓		✓	✓	✓
DNA_Data Analysis			✓	✓			✓	
TrueAllele® Databank	✓			✓		✓	✓	✓



# **NEST Project Generation of Data**



# Single Source Background

- Produced single source samples for optimization of expert systems
- Amplified using various kits
  - Identifiler
  - ProfilerPlus/COfiler
  - PowerPlex16
  - SGM+



# Development of Mixture Samples

- Chose 4 specific profiles
  - 2 Male
  - 2 Female
- End product
  - 2 Sets of two-person mixtures



# Profiles Used In Mixture Samples

	NEST A	NEST X	NEST B	NEST Y
D8S1179	8,13	13,14	13,15	12,12
D21S11	28,29	30,31.2	29,30	28,30
D7S820	10,12	9,10	10,12	8,10
CSF1PO	11,12	11,12	11,12	10,11
D3S1358	14,18	14,18	18,18	15,16
TH01	6,9	9.3,9.3	7,9	8,9.3
D13S317	11,11	12,13	11,11	11,13
D16S539	11,12	9,12	9,12	9,12
D2S1338	20,24	21,23	23,24	19,25
D19S433	14,15	13,13	14,15	14,15
vWA	16,16	17,17	14,18	15,17
TPOX	8,8	8,9	8,8	8,8
D18S51	12,12	14,14	15,16	16,17
AMEL	X,X	X,Y	X,X	X,Y
D5S818	11,12	11,13	12,12	11,11
FGA	23,23	23,23	20,25	20,23



# Combinations Of Alleles in Mixture Samples

One Peak	Two Peaks	Three Peaks	Four Peaks
<b>2 Homozygous (Shared Allele)</b>	<b>1 Homozygous &amp; 1 Heterozygous (One Shared Allele)</b>	<b>1 Homozygous &amp; 1 Heterozygous (No Shared Alleles)</b>	<b>2 Heterozygous (No Shared Alleles)</b>
	<b>2 Heterozygous (Two Shared Alleles)</b>	<b>2 Heterozygous (One Shared Allele)</b>	
	<b>2 Homozygous (No Shared Allele)</b>		



# Defined Mixture Experiments

Female DNA:Male DNA
30:1
10:1
3:1
1:1
1:3
1:10
1:30

Total Input DNA
1.5 ng
1.0 ng
0.5 ng
0.25 ng

Kits Used
PowerPlex 16
Identifiler
Profiler Plus/COfiler
SGM Plus



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