INTEGRATED FORENSIC DNA DATAT ANALYSIS AND MANAGEMENT – A SCALABLE ENTERPRISE SOLUTION FOR FORENSIC DNA LABORATORIES

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Management and analysis of DNA workflow data in forensic labs is a daunting task. One of the most challenging aspects is the ability to easily and efficiently extract useful intelligence out of related, but currently disjointed sets of data stored across a variety of systems within the laboratory. This is complicated by the fact that as the scale and size of the lab increases, so with it does the complexity and sheer amount of case and sample level data needing storage, management and analysis. With the technological advancements, additional information gathered from different regions of the human genome, such as Single Nucleotide Polymorphisms (SNPs), Y chromosome Short Tandem Repeat (Y-STR), and mitochondrial DNA (mtDNA), also would become factors to be considered simultaneously to further enhance this intelligence.

Thermo Fisher Scientific is developing a new enterprise software solution suite that seamlessly integrates volumes of raw, processed and meta data generated throughout the DNA processing workflow, from sample accessioning, extraction, quantification, amplification to CE or NGS. The software solution will be highly configurable to fit specific laboratory workflows, SOP, chemistries and analytical and reporting requirement. The system will allow for automated data transfer and integration with various forensic DNA laboratory instrumentation and systems including Thermo Fisher Scientific's real-time PCR and CE instrumentation, GeneMapper® ID-X software, as well as the Ion Torrent PGM and accompanying software solutions. The software will support the generation of scalable local DNA profile databases with the capability to store autosomal STR, Y-STR, mtDNA, and SNP profiles. These profiles can be searched for single source profiles for both complete and partial matches. This data management capability will be extended to further build Y-STR Haplotype Frequency databases intrinsic to particular region for case work. Based on the data management module, kinship analysis, ancestry inference, and mixture analysis will be built to meet the DNA laboratories' needs. In addition, the system will allow for configuration of both the user interface and output reports, as well as many features to insure data security and integrity. The characteristics, configurability, and analytical search capabilities of the software will be presented.