Key Concepts of Chapter 17:

- **Questioned Document Analysis**
  - Any object with handwriting, print or typewritten markings whose source or authenticity is in doubt may be referred to as a *questioned document*
  - Comparative analysis
  - Document examiners (QDE) gather documents of known authorship or origin and **compare** them to individual characteristics of questioned documents

The QD Examiner

- First questioned document examiners were photographers
- Forensic document examination did not begin in the United States until 1913
  - Congress ruled that document standards could be allowed as evidence in court

Training and Education of QDEs

- No formal college-based programs in questioned document analysis in the U.S.
- Essentially a classical apprenticeship field
  - Several years of study with an accomplished professional in the field
  - After passing tests and exercises, the trainee may then become a *journeyman* questioned document examiner
  - Certification program in the U.S. administered by the American Society of Questioned Document Examiners (ASQDE)
- Training program consisted of formal coursework, reading and studying the relevant basic and advanced books and journals, as well as study and examination of actual questioned documents under the supervision of the trainer
- Quality assurance and control materials including blind tests and mock trial exercises
- Learn relevant statutes and legal considerations that govern the examination, reporting, and expert testimony of questioned documents

Ink Analysis

- Chemical analyses are becoming routine work for questioned document examiners
  - Easier methods to characterize and compare inks
  - Understand changes ink undergoes as it dries
  - Determine if writings were added after document was originally written
  - Determine if additions were made and document was backdated
- Not possible to individualize an ink sample to a particular writing instrument

Analyzing/Comparing Ink Samples

- Inks are found in ballpoint pens, roller ball pens, fiber or porous tip pens, gel pens, India ink pens, fountain pens, ink-jet printers, etc.
- Inks are complex materials
- Determination of ink composition can help determine what type of writing instrument it came from
- **Thin Layer Chromatography**
– About 10 sections are dissolved in a minimum amount of solvent and then spotted on the plate
– After development, there will be several spots from the dyes in the ink
– Visualization techniques may be used to see peaks from the non-dye components of the ink

• **Other Types of Chromatography**
  – GC and LC have been used for the analysis and comparison of inks
  – Yields quantitative and qualitative data
  – More sensitive than TLC
  – GC-MS allows identification of each of the components in the ink
  – CE has also been used for ink analysis; limited research

• **Infrared Spectrophotometry**
  – IR shows absorption peaks for all of the components of the ink at one time
  – Useful for comparing two ink samples to see if they could have originated from the same source
  – Requires more sample than chromatographic methods

• **Microspectrophotometry**
  – Used to determine color of ink and compare the colors of two ink samples

• **Mass Spectrometry**
  – Used with or without GC
  – Laser desorption uses a laser to remove ink from the surface of the paper and then analyze it
    • Also useful to track ink dyes as they age and chemically degrade
    • Essentially non-destructive

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**Computers in Forensics**

• CER (computer evidence recovery)
• Involves acquiring or retrieving data for investigators
• Search warrants are needed for machines and data
• Must check for encryption and virus issues
• All items must be collected
• ALWAYS make a copy before beginning analysis

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**Forensic Databases**

• Firearms:
  – DRUGFIRE (cartridge cases)
    • FBI
  – IBIS
    • ATF
  – NIBIN
• Fingerprints:
  – AFIS
    • Looks at all prints
      – Local open cases
      – State
      – National
– Confirmed by latent examiner, supervisor

- DNA:
  - CODIS
    - All states, US Army, FBI – October 2007
  - Main Databases:
    - Forensic Casework
    - Convicted Offender
    - Missing Persons

- Evidence Tracking
  - LIMS

- Spectral Libraries
  - IR, GC/MS, Trace Evidence

Key Concepts of Chapter 18:
- Computer forensics involves the preservation, acquisition, extraction, and interpretation of computer data
- The types of computer evidence can be grouped under two major subheadings: visible and latent data
- Temporary files, created by programs as a “backup” can prove valuable as evidence
- When a user deletes files, the data typically remains behind, so deleted files are another source of latent data

Key Concepts of Chapter 19:
- The use of mobile devices (such as cell phones) provides another avenue of forensic evidence that can be interpreted
- Cellular systems are basically networks of transponders and receivers allowing users to move between cells without losing calls or power
- While we may call our cell phones “smart phones” and they have many capabilities that a computer or laptop might have, they don’t always have an OS (operating system) and that can prevent a forensic examiner from obtaining or retrieving certain information on the device
- Timelines obtained from reviewing information such as events on the calendar, contacts, deleted text messages, call log, and other applications, are the backbone and foundation of digital forensic investigations

REFERENCE