National Digital Forensic Center

National Digital Forensic Center
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검찰
PROSECUTION SERVICE

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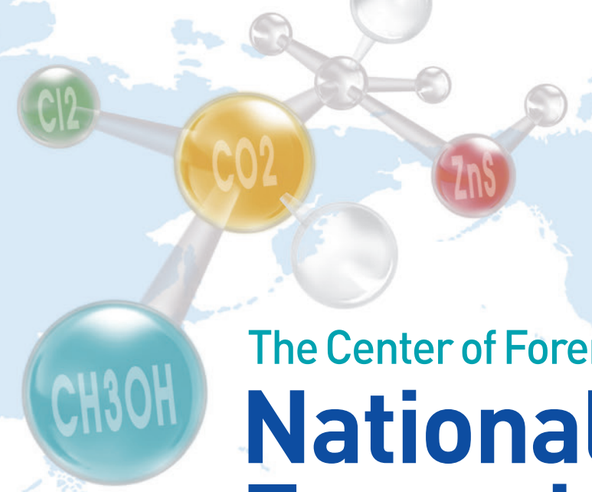
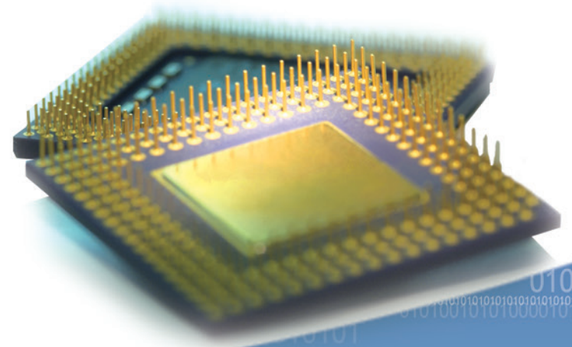


The Center of Forensic Science

National Digital Forensic Center



검찰
PROSECUTION SERVICE

Contents

We discover the substantial truth and protect the human rights through advanced forensic science

National Digital Forensic Center

We aim for the scientific investigation

Vision

- Strengthening future-oriented forensic services
- Specialization of forensic investigators
- Establishment of forensic infrastructure exceeding international level

The Korean Prosecution Service is becoming smarter

Crime is getting more subtle and intelligent as time passes. We are leading the way for protecting human right by prompt and precise examination of evidence in an objective and impartial fighting against rapidly changing crimes.

We discover the truth with advanced forensic science

We are stepping toward the truth by research and development of scientific inspection and examination method. We have established our position as a mecca of forensic science by strengthening our investigation capacities through the introduction of advanced equipment, exchange and cooperation with relevant organizations, and the training of forensic experts.

We lead advanced scientific investigation

The National Digital Forensic Center (NDFC) has established itself as a global leader on international standards of criminal investigation by publishing reports on advanced analysis techniques in internationally recognized IAI and IAFS journals, while promoting exchange and cooperation by signing MOUs with twenty-four related agencies at home and abroad, including the Netherlands Forensic Institute (NFI).

Organization of NDFC

History of NDFC

1960~1980

1968 Foundation of the Forensic Research Department of the Supreme Prosecutor's Office(SPO)
1979.08 First use of the polygraph test
1984.07 Establishment of Forensic Investigation Operation Division at the SP
1986.04 Opening of Document Examination Office
1989.09 Establishment of Criminal Photography/ Voice Analysis Section

1990

1991.05 Opening of DNA and Narcotics Analysis Laboratory
1991.08 Establishment of Forensic Investigation Guidance Division
1992.03 Development of DNA analysis techniques
1998.02 Establishment of Forensic Investigation Division(Integration of Forensic Investigation Guidance Division and Forensic Investigation Operation Division)

2000

2003.03 Operation of Drug Signature Analysis Center(DSAC)
2005.04 Foundation of the Forensic Science Planning Office, Forensic Investigation Action Office 1 & 2
2007.03 Renaming of Action Offices :
Forensic Investigation Action Office 1 → Forensic Science Action Office
Forensic Investigation Action Office 2 → Digital Forensic Action Office
Establishment of Digital Forensics team in Seoul Central District Prosecutor's Office(DPO)
2007.10 Acquisition of international laboratory accreditation on DNA and drug analysis
2008.06 Establishment of Digital Forensics team in Pusan High Prosecutor's Office(HPO)
2008.10 Completion of Digital Forensics Center(DFC) building
2009.02 Acquisition of international laboratory accreditation on Document Examination (1st in Korea)
2009.09 Establishment of Digital Forensics team in Daegu HPO

2010

2010.01 Establishment of Fire Investigation Team
2010.04 Establishment of Digital Forensics team in Gwangju HPO
2010.07 Launching criminal offender DNA database
2010.08 Foundation of the DNA Forensic Action Office
2010.12 Establishment of Digital Forensics team in Daejeon HPO
2011.04 Establishment of the Pusan Drug Analysis Team
2011.05 Establishment of Digital Forensics team in Incheon DPO
2011.11 Establishment of the Cybercrime Investigation Department
2012.06 Establishment of Digital Forensics team in Suwon DPO
2012.11 Renaming of the DFC to the National Digital Forensics Center(NDFC)
2013.08 Opening of the Digital Forensic Lab
2014.05 Establishment of Multimedia Restoration Team
2014.12 Establishment of Digital Forensics team in Seoul HPO · Seoul Southern DPO · Changwon DPO
2015. 02 Foundation of Forensic Science Investigation Department
Establishment of Cybercrime Investigation Division and opening of the Forensic Research Institute
Forensic Science Action Office → Forensic Science Division 1
DNA Forensic Action Office → Forensic Science Division 2
Digital Forensic Action Office → Digital Forensic Division
Cybercrime Investigation Department → Cybercrime Investigation Division
2015. 02 Establishment of Digital Forensics team in Seoul Northern DPO, Chuncheon DPO
2018. 02 Renaming of Action Offices :
Forensic Science Division 1 → Forensic Science Division
Forensic Science Division 2 → Forensic Genetics & Chemistry Division
2019.03 Establishment of Digital Forensics team in Suwon HPO
2020.01 Established the Secretariat of APC-HUB

The Status of internal and external exchange

MOU with related organizations at home and abroad

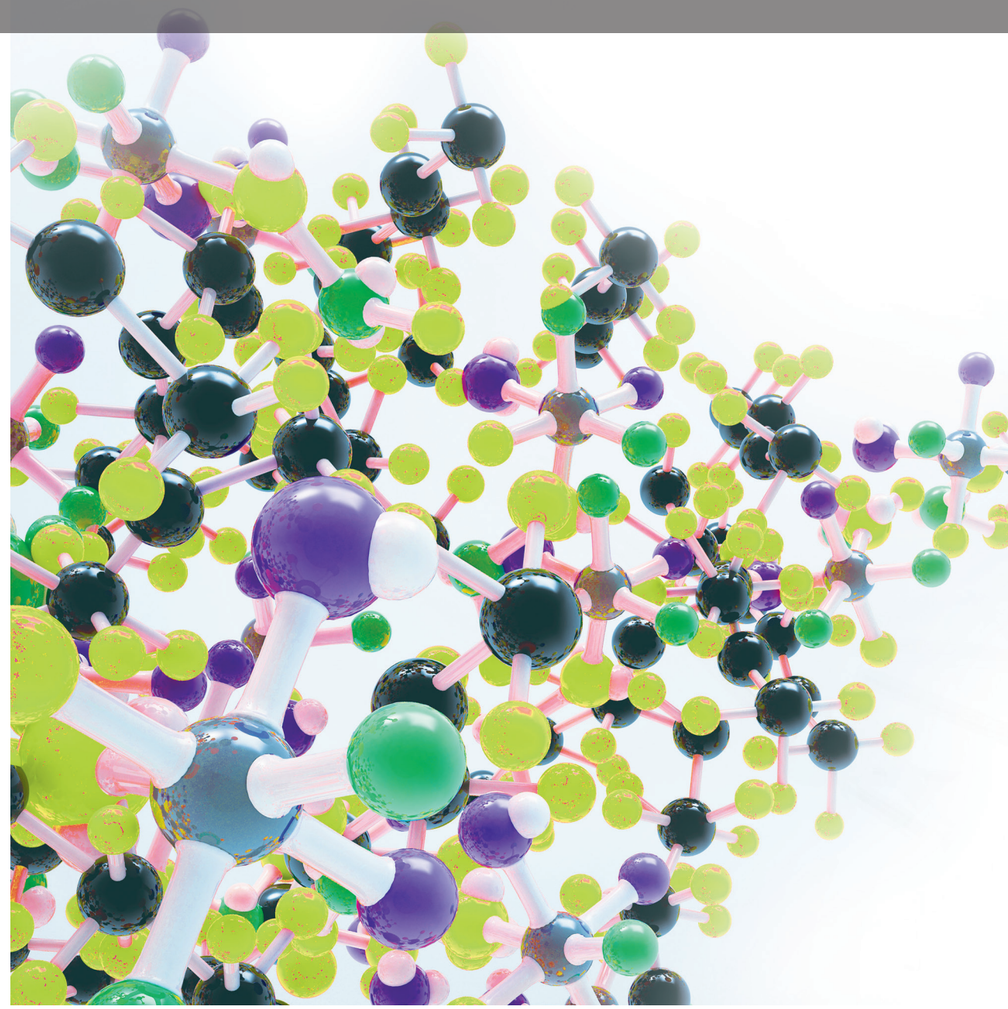
	1	2	3	4	5	6	7	8	9	10	11	12
Signed Organizations	KIST	NFSA	KIOST	KAERI	KRICT	KARI	KRISS	ETRI	KISA	KCC	SPC	KISPI
	13	14	15	16	17	18	19	20	21	22	23	24
	FSI	NFI	NFS	KFI	IMS, SNU	AhnLab, Inc.	NICE Information Service	Microsoft	CRIFS	KASCI	NSR	WB -GFCE

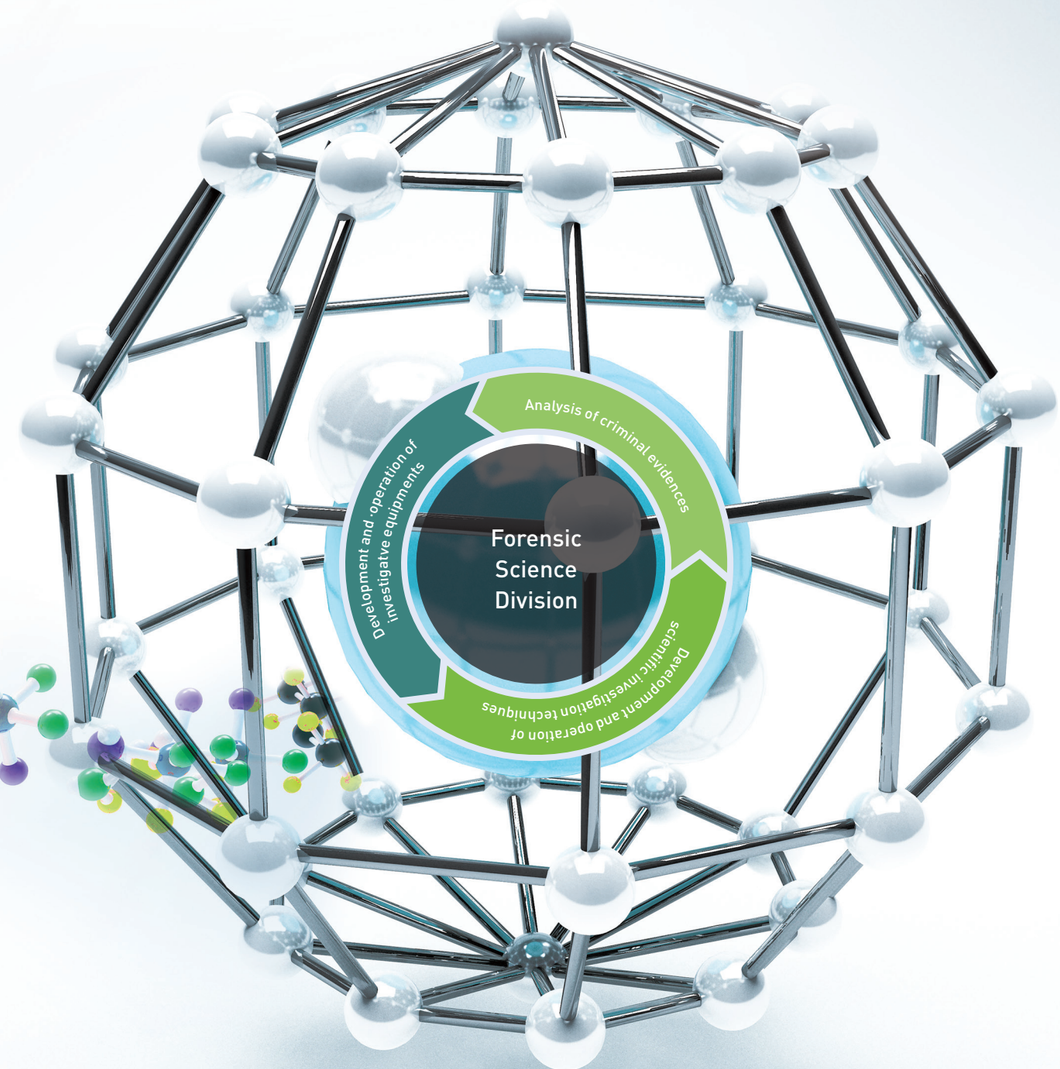
International Exchange and Cooperation

- Ghana
- Guatemala
- Nigeria
- Netherlands
- Nepal
- Nicaragua
- Dominican Republic
- Laos
- Russia
- Malaysia
- Morocco
- Moldova
- Mongolia
- United States of America
- Republic of the Union of Myanmar
- Bangladesh
- Bolivia
- Brazil
- Vietnam
- Brunei
- Saudi Arabia
- Sri Lanka
- Singapore
- Haiti
- Azerbaijan
- Afghanistan
- Ecuador
- El Salvador
- Oman
- Honduras
- Jordan
- Uganda
- Uzbekistan
- Ukraine
- Egypt
- Indonesia
- Japan
- Jamaica
- Georgia
- China
- Kazakhstan
- Cambodia
- Kenya
- Costa Rica
- Colombia
- Kirgizstan
- Tajikistan
- Tanzania
- Thailand
- Panama
- Paraguay
- France
- Philippines
- Peru

Forensic Science Division

We have consolidated our position as a mecca of forensic science by strengthening our authentication and analysis capabilities via research on scientific investigation and analysis techniques, the introduction of advanced equipment, and the training of forensic experts.





1. Document Examination 2. Psychological Analysis 3. Multimedia Analysis
4. Fire Investigation 5. Video Recording System Planning&Management

1. Document Examination

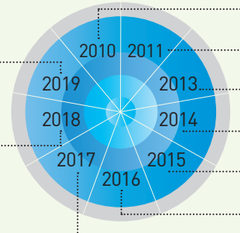
Starting off in April 1986 as Examination of fingerprints, document examination has expanded its scope and enhanced its probative power through introduction of advanced equipment and continuous research and development of examination methods. Based on this high reliability of Examination results, it supports prompt and precise scientific investigation.

Document examination analyzes the text, symbols, seal, ink, or paper used in documenting to identify forgery or date of documentation, or in cases where part or all of the content is illegible by human eye, detect and decipher its content. The Document Examination Section was certified by KOLAS, an internationally accredited testing agency in Korea, as a forensic document examination laboratory for the first time in Korea.

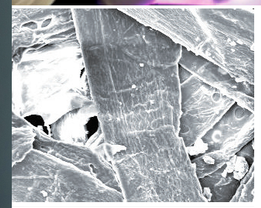
● Main Case Analyses

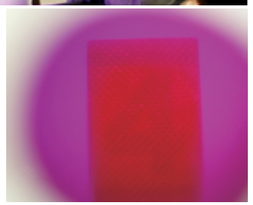
Handwriting analysis at Daegu District Prosecutors' Office to directly(without a referral from the police) imprison a criminal who habitually commits false accusations

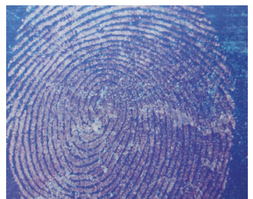
Fingerprint analysis regarding maintaining an indictment for a rape case occurred in Busan in 2009



- Examination of the certificate of graduation regarding the so-called 'Tajinyo' incident
- Examination of documents on the stem cell research government aid embezzlement case
- Examination of documents on the rebellion conspiracy of an incumbent Assemblyman
- Examination of documents on the spy case of a Seoul civil servant
- Appraisal and examination of documents related to violations of the Political Funds Act by the late Wan-jong Seong, Kyeongnam Enterprise
- Appraisal and examination of handwritten medical records related to a 2016 political scandal
- Appraisal and examination of documents related to the bribery case involving the chief of the Gwangyang police station, Jeonnam







Main duties

● Document Examination

Analysis of handwriting, fingerprint and stamp image	Identify and analyze authenticity of handwriting, fingerprint and stamp image on documents
Unclear characters	Revealing hidden or forged characters
Typewritten characters	Identifying original typewriter or word-processor characters
Indented writing	Revealing indented writing
Paper Properties	Identifying paper types, manufacturers and other characteristics
Order of handwriting	Identifying the first writing on the cross section of writings
Other documents	Identifying super note, forged stamps or passports

● Fingerprint Identification and Latent Fingerprints

Identification of whether the fingerprints on document are identical, and development of latent fingerprints remaining on documents or crime tools

● Research on Analysis Techniques

- 2009 Exploration of properties of document paper used in different eras
- 2010 Development of techniques for measuring the age of paper when analyzing old documents
  Building a database for optimizing the representation of latent fingerprints
- 2011 Patent filed for techniques for analyzing the written orders of documents using a spectroscopic technique
  Creating a system for analyzing Word documents and accumulating their production year
  Exploration of properties of old documents prepared before or after Japanese Colonial Period
- 2012 Research of yellow dots properties detected on color laser printouts
  Techniques for analyzing word characters and identifying printer types
- 2013 Study on identifying the Order of Documentation Ⅰ
- 2014 Study on identifying the Order of Documentation Ⅱ
- 2017 Development of an intelligent font classification system for the appraisal and examination of Word characters
- 2018 Cutting edge technology to prevent crimes related to document forgery Ⅰ
- 2019 Cutting edge technology to prevent crimes related to document forgery Ⅱ

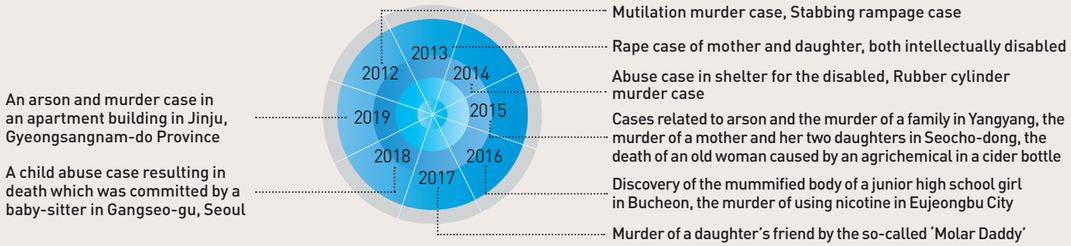
2. Psychological Analysis

Starting with the introduction of polygraphs in 1979, psychological analysis has been divided into PDD(Psychophysiological Detection of Deception), behavioral analysis, and statement validity assessment. Furthermore, integrated psychological analysis is also performed for enhancing their reliability.

PDD have been actively utilized in investigations since the introduction of the computerized polygraph in 2000, followed by the employment of the electroencephalograph in 2004 in Korea. Behavioral analysis and statement validity assessment techniques that detect changes in the behavior or the reliability of a statement by the person undergoing testing are utilized for investigations of violent crimes, including rape or murder.

To improve the reliability of the polygraph results, the Psychological Analysis Section has conducted real-time monitoring under a nationwide quality control system for polygraph test since 2004 to proactively prevent errors in the analysis procedures of field offices. According to the research on its reliability that was jointly conducted with academia in 2007, the results of polygraph tests performed by the Prosecution Service display a high degree of accuracy. These results were presented in the Japanese Psychology Forum in 2008.

● Main Case Analyses



Main duties

● Psychophysiological Detection of Deception

❶ Polygraph Test

A technique that measures physiological responses that are caused from lying, such as respiration, blood pressure and skin conductance to infer whether the tested person's statement is truthful.

❷ EEG(Electroencephalogram) Analysis

This technique is used to judge a subject's connection with a criminal case, the truthfulness or falsehood of a statement uttered by analyzing the electroencephalogram displayed by observing the stimulus related to a crime scene.

● Behavioral Analysis

Behavioral analysis is used to determine the truthfulness or falsehood of a statement made by suspects or victims of a crime by comparing and analyzing behavioral symptoms, including the individual's non-verbal cues, verbal, para-verbal characteristics, and the adequacy of his/her emotional expressions. It is adequate for criminal cases like homicide or rape cases in which fluctuations in the subject's emotions are greatest.

● Statement Validity Assessment

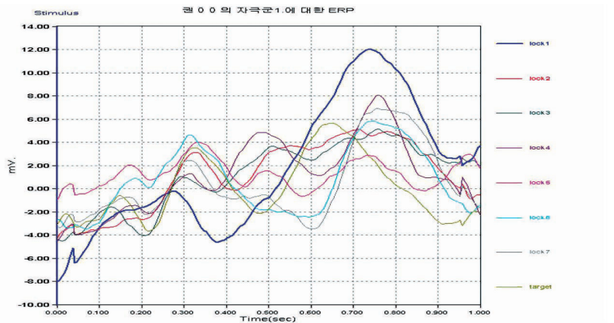
This technique is used to determine the truthfulness or falsehood of a statement by scientifically analyzing statements related to controversial points using interviewing techniques. It is highly useful for sexual abuse incidents in which the party's statement constitutes essential evidence.

● Full Psychometry

Full Psychometry is a procedure that involves understanding the subject's personality, cognitive capacities, and mental pathology through various psychological tests, interview, and behavioral observation. It provides comprehensive information necessary for investigation, such as whether the crime was elaborately planned or was incidental and impulsive.

● Research on Analysis Techniques

- 2009 Feasibility of detecting false statements by measuring facial temperature with infrared rays
- 2012 Joint Research with Hallym Univ. on 'Verification effectiveness and the development of questions for behavioral analysis'
  Joint Research with Chung-ang Univ. on 'Psychophysiological analysis techniques using micro bio-signals'
- 2013 Development of Investigative Interview Manuals Effective for Psychological Change of the Subject
- 2014 Study on the Characteristics of Testimony by Minors and the Disabled and Methods of Testimony Analysis
- 2015 Study of Detecting Deception on Pupil Response
- 2016 Development and patent registration of 'Sound recording certification system and sound recording certification method'
  Internal research conducted on image indexing and arrangement techniques using machine learning
- 2017 Registered a patent on "Method and Equipment of EEG(Electroencephalogram) to Verify the Truthfulness or Falsehood of a Subject's Statement"

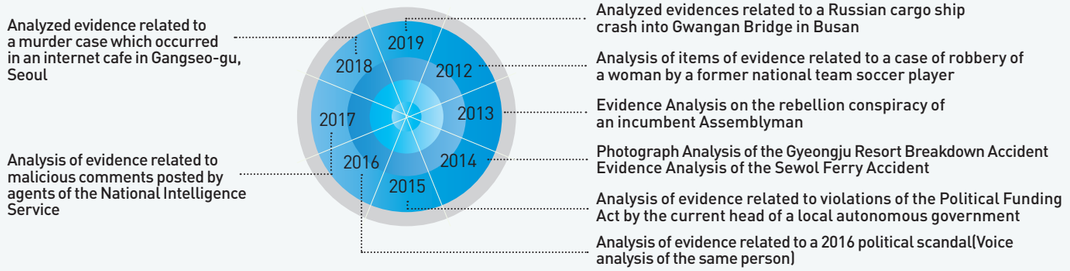


3. Multimedia Analysis

Multimedia Analysis is the scientific analysis and recovery of multimedia files such as photographs, videos, and voice recordings related to crime investigation, and has a significant role in today's forensic science.

In response to more sophisticated crimes, we are leading the way towards better authentication methods and advanced scientific investigation techniques in response to more sophisticated crimes by improving analysis techniques and enhancing reliabilities through securing investigative equipment that abide by international standards.
In 2014, we have taken a step forward from simply analyzing photographs, videos, and voice recordings to recovering multimedia files that have been damaged of deleted, establishing a One-Stop investigation support system in regards to multimedia.

● Main Case Analyses



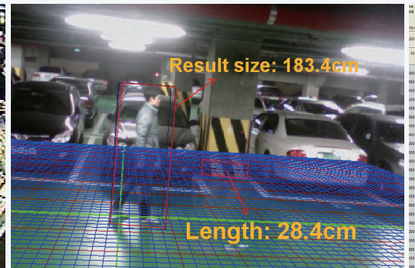
Main duties

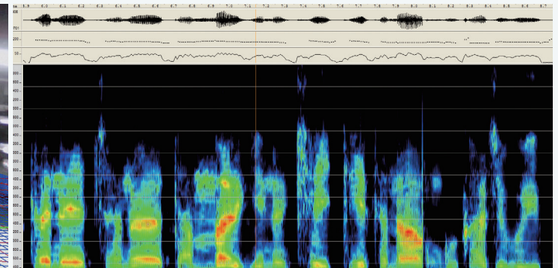
● Identification of Whether It was Edited

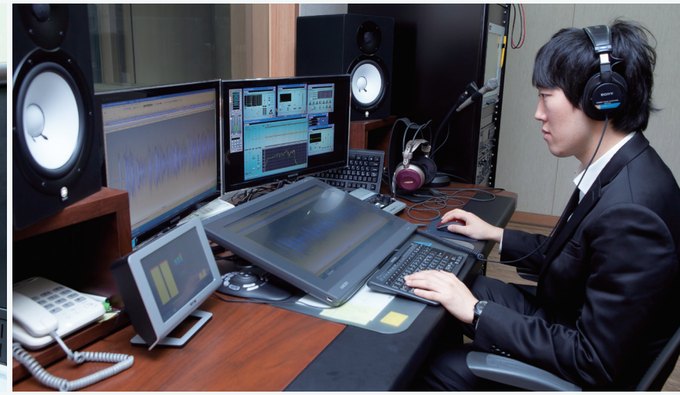
We analyze evidence to decide whether the voice recording, photograph or video is original or it has been manipulated and mixed.

● Enhancement of Image or Sound Quality

It is a procedure that uses various methods of image processing to enhance image quality and delete unnecessary noise from the background to raise the clarity of voice recordings. Requests for such cases are rapidly increasing as secret voice or video recording through cell phones or voice pens are common nowadays.







● Multimedia Analysis

We decipher the car plate, text, object, the movement of subject, voice, etc. and analyze the development of the case per time period.

● Distinguishing Identities

With the development of multimedia, crimes have diversified in to kidnapping or voice phishing cases. As such, requests for distinguishing identities and verifying if the criminal and the suspect are identical persons have increased. We affirm the identity of the criminal through the characteristics of the person, relative facial measurement, and voice prints.

● Multimedia Data Restoration

Multimedia Data Restoration: The NDFC restores deleted or damaged multimedia data(images, videos and recorded voices) stored in CCTVs, car dash cams, digital recorders, etc., and converts non-playable multimedia files to accessible ones, and also recovers scratched or damaged optical disc drives (CDs, DVDs).

● Research on Analysis Techniques

- 2007 Joint Research on 'Emotional Speech and Speaker Identification' with Speech Research Lab, Northwestern University, USA
- 2011 Patent Registration of developing 'Vocalization Inducement Methods and Tools for Identity Confirmation'
- 2012 Research on Digital Video Counterfeit Analysis Methods
- 2013 Research on Facial Recognition Methods in Low-quality Videos
- 2014 Patent Registration on developing 'Counterfeit Detection Tool of Audio Files'
  Patent Registration on developing 'Recovery Tools and Methods for Damaged Voice Files'
- 2015 Development and patent registration of 'Detecting Method of Suspicious Points of Editing through Analysis of Frequency Distribution'
- 2016 Development of a database of standard Korean voices for the identification of suspect voices
  Patent registration of image arrangement devices using time stamp and the related methods
- 2017 Patent registration of Method and Apparatus for Speaker Recognition Using Voice Quality Feature
- 2018 A Study on the Advancement of an Automatic Speaker Profiling Technique
- 2019 A Study of Intra-speaker Speech Variation across Recording Conditions

4. Fire Investigation

The Fire Investigation section, created in January 2010, has made efforts for the research and development of advanced fire investigation methods through exchange with the National Emergency Management Administration and the National Association of Fire Investigators(NAFI), USA.

Main duties

- **On-site Identification**

  Determining the starting point and cause of fire as well as exploring the causality by analyzing physical and chemical changes by flame and the behavior of persons related to the accident.

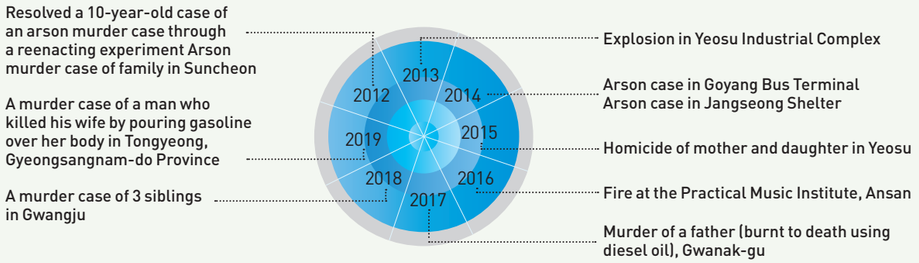
- **Re-enactment Experiment and Computerized Simulation**

  Analyzing the reliability of statements given by persons in conditions similar to fire scenes as well as reconstructing simulated cases using a computer-assisted Fire Dynamics Simulator (FDS) when real-scale reproduction is unavailable.

- **Analysis of Evidences and Investigative Consulting**

  Utilizing the MOU with the National Emergency Management Agency, we explore the cause of fire using advanced analysis equipment as well as suggest scientific information and recommendation based on the fire dynamics to investigation teams.

- **Main Case Analyses**



5. Video Recording System Planning &management

Since November 2004, the Prosecution Service has used a video recording system to enhance interview efficiency while protecting the public rights by enhancing the transparency of the interviewing process.

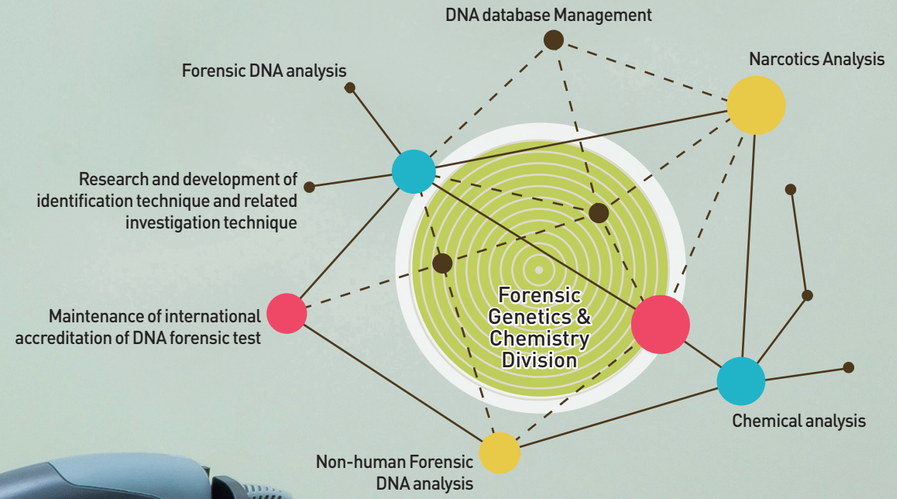
In order to establish the video recording system, the Prosecution Service has so far installed 885 video recording rooms, which represent approximately 90% of the investigative prosecutors since 2004. Video recording was employed to interview 350,000 persons since then. The Prosecution Service has endeavored to enhance investigation efficiency and inspire public trust by developing sophisticated investigation systems including advanced interviewing and interrogation techniques.

- **Progress of Video Recording System**

2006	Enactment and implementation of guidelines on video recording
2007	Full-scale implementation of the Video Recording interviews
2009	28 stenographers assigned to field offices to promote Video Recording sessions
2010	Implementation of customized video recording programs
2013	Video Recording investigation is made mandatory for victims of sexual violence that are under the age of 19 or are disabled 54 stenographers additionally assigned to field offices
2015	Enforcement of facilitation plan for Video Recording such as designation of cases for which video recording is mandatory
2016	Development of standard interview rooms with video recording functions, including one-way mirrors and hearing devices
2017	Replacement/upgrading of functions of obsolete video file management systems
2019	Assigned 24 stenographers additionally to district prosecutors' offices, hold conferences which introduces a video-recording Survey at 28 district prosecutors' offices around the nation

Forensic Genetics & Chemistry Division

We are protecting the rights of our people by providing decisive clues or evidence for the resolution of heinous or other criminal cases, using our outstanding capacity and accuracy in analyzing forensic chemistry, forensic DNA and DNA database.

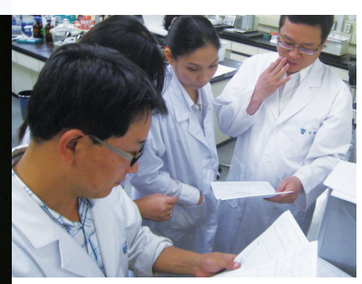


1. Forensic Chemistry Analysis

The Forensic Genetics and Chemistry Division is in charge of analyzing drug component , whether a suspect takes drugs or not and carrying out drug signature analysis which can provide scientific investigation information based on an analysis of seized drug samples . It also analyzes unsanitary and low-quality foods , illegal medicines , harmful chemical substances and heavy metals and identify whether or not a subject takes any therapeutic medicine for mental illness such as sexual impulse control treatment.

As a globally certified testing institution , the Forensic Genetics and Chemistry Division is providing credible testing and analysis results and is enhancing its expertise by collaborating in joint research with academia and other relevant agencies. Also, the Division is giving an expert training about analysis methods and skills to domestic and foreign criminal investigators and appraisers.

Since the Korean prosecution established its first drug analysis division in the Supreme Prosecutors ' Office in July , 1992 under the name of the "Drug Analysis Office ", the Busan Drug Analysis Team has been additionally launched to support Busan High Prosecutors ' Office in Yeongnam area with drug investigation . Along with its high standard drug analysis skills , the Korean prosecution is striving to develop diverse chemical analysis technologies which can be applied to more broadened area. The office was reorganized as the "Forensic Genetics and Chemistry Division" in 2013 and actively providing diverse drug and chemical analysis.



Main duties

- **Analytical service for determination of the type, purity, and amount of illegal drugs**

  This analytical service identifies the type, purity and amount of illegal substances including methamphetamine, marijuana, opium, cocaine, and any scheduled drugs.

- **Analytical service to provide information on illegal drug consumption**

  ❶ Urine Analysis
  This service generally identifies the presence of illegal drugs in circulation within several days to weeks.

  ❷ Hair Analysis
  This service provides information on the presence of illegal drugs in circulation within few months to year.

  ❸ Other Special Analysis
  This analytical service provides information on the presence of illegal drugs in circulation by analyzing body hair (pubic, armpit hair), fingernails and toenails.

- **Drug Fingerprint Analysis**

  This analytical technique have been adopted since 2003 for drug related criminal investigation by analyzing similarities of methamphetamines from massive seizures. This technique provides information on the origins or productions of methamphetamine by investigating physical and chemical properties of methamphetamine as well as impurities generated from its production.

- **Chemical Analysis**

  ❶ Therapeutic drug examination
  We analyze whether or not a subject takes any therapeutic medicine for mental illness, alcoholism and sexual impulse control treatment.

  ❷ Harmful chemical substance analysis
  We analyze harmful chemical substances such as hallucinogenic compounds, explosive/ignitable substances, oil content and heavy metals.

  ❸ Special and customized analysis
  We conduct diverse and broad-based evidence analysis related with crimes such as unsanitary and low-quality foods, medicines and trace evidence.

- **Research of Analysis Techniques and Patent Filing**

2004	Development of preliminary analysis technique for detecting the presence of marijuana in human hair
2007	Development of techniques for the simultaneous analysis of 13 narcotic ingredients in urine
2008	Patent registration of Simultaneous determination of amphetamine-type stimulants and cannabinoids by gas chromatography
2009	Development of an analysis technique for newly designed drug "DMA" for the first time in Korea
2010	Development of a method of analyzing amphetamine-like narcotics by micro pulverizing hair analysis
	Patent filed and granted for a method of simultaneously analyzing 60 or more narcotic substances in urine using gas chromatography
2011	Research and development for a method of automated analysis of Marijuana-related chemicals in hair
2012	Innovative reduction of time taken to analyze urine containing the new drug propofol by developing 'techniques for directly detecting it from metabolomes
2013	Development of a rapid and higly sensitvie method for identification of psychoactive drugs
2014	Estimation of uncertainties in accuracy of urinary marijuana analysis Development of an urinary analysis for effectiveness of chemical castration agents
2015	Patent registration of Analytical method for the simultaneous measurement of chemical castration agents and testosterone levels in serum
2017	Patent registered for rapid and simultaneous analysis for hydroxyphermine, phentermine and mephentermine
2018	Developed simultaneous hair analysis technology (75 types of drugs at once)
2019	Developed methamphetamine drug signature analysis and identification method

2. Forensic DNA Analysis

The frequency of heinous crimes, including homicide and sexual violence, continues to rise in our rapidly changing society. Forensic DNA Analysis is the most accurate and effective method of addressing such crimes. Why is that?

Forensic DNA Analysis is a highly advanced scientific investigation technique that is used to identify the "owners" of biological evidence collected at crime scenes. The outcome of a DNA analysis provides an outstanding identifying feature as all human beings have a discretely different DNA. This means that the probability or likelihood that a piece of DNA evidence belonging to a suspect belongs to other persons is zero when the evidence and the suspect's DNA match. In addition, it can be applied to all pieces of evidence taken from a human body. Its range of application is very extensive. DNA can be obtained from an infinitesimally small amount of evidence.

The Forensic DNA analysis has led local DNA investigation with its outstanding technologies since it began to develop and apply DNA analysis methods for the first time in Korea. Furthermore, it maintains international-level analytic quality following ISO17025 regulations as internationally certified test institution

• Strengthen field investigation support for DNA identification

• Examples of subjects for which DNA identification is possible

Main duties

● Identify Culprits of Criminal Cases

- After giving critical conviction evidence during Yoo Young-chul trial in 2004, we are giving investigation clues and court evidences in many serious crimes such as homicide and sexual assault
- Assisting the identification of drug users via the analysis of used syringes or urines.
- The NDFC contributes to the identification of criminal facts by securing decisive DNA evidences, which were difficult to be secured and collected during the preliminary analysis process, in the more precise follow-up analysis.

The SPO confirmed a murder suspicion which the police referred to the prosecution because an unidentified tool was used in the crime (Feb. 2019) → The SPO was able to identify the tool and method used in the crime by precisely analyzing the DNA trace of the offender on a fruit knife → The offender was indicted

- From 2013, support on crime scene investigation has been facilitated and personnel are directly participating in collecting evidence so that efficient DNA investigation is possible

[Support on crime scene investigations]

- 2014 Provided DNA analysis for a crime scene and a victim's clothes related to a mutilation murder case which occured in Paldalsan Mountain, Suwon
- 2015 Provided an additional DNA analysis for a crime scene(drain) and a tool(meat cutting machine) used in a murder case which a perpetrator brutally mutilated a victim's body
- 2016 Secured additional evidence and provided a blood-stain analysis for an infanticidal case
- 2017 Detected and analyzed scattered blood-stains on stones and branches which were located at a place where a mob violence occurred
- 2018 Detected and analyzed scattered blood-stains on stones and branches which were located at a place where a mob violence occurred
- 2019 Identified a suspect who illegally disposed of waste by analyzing DNA on a car

● Identification of Victims in Mass Disasters

- Participating in government efforts to identify victims in various disasters, such as the 1995 Sampoong department store breakdown, 1997 KAL and 2002 Chinese airplane accidents, 2003 Daegu metro arson case, 2014 Sewol ferry disaster.

● Support for the MOJ's Works: Foreigner's Citizenship, Refugee, Immigration

- The NDFC provides DNA analysis service with the Ministry of Justice's works in terms of foreigner's application for Korean citizenship, immigration or refugee. It also supports the Ministry to analyze family DNA of independence patriots.

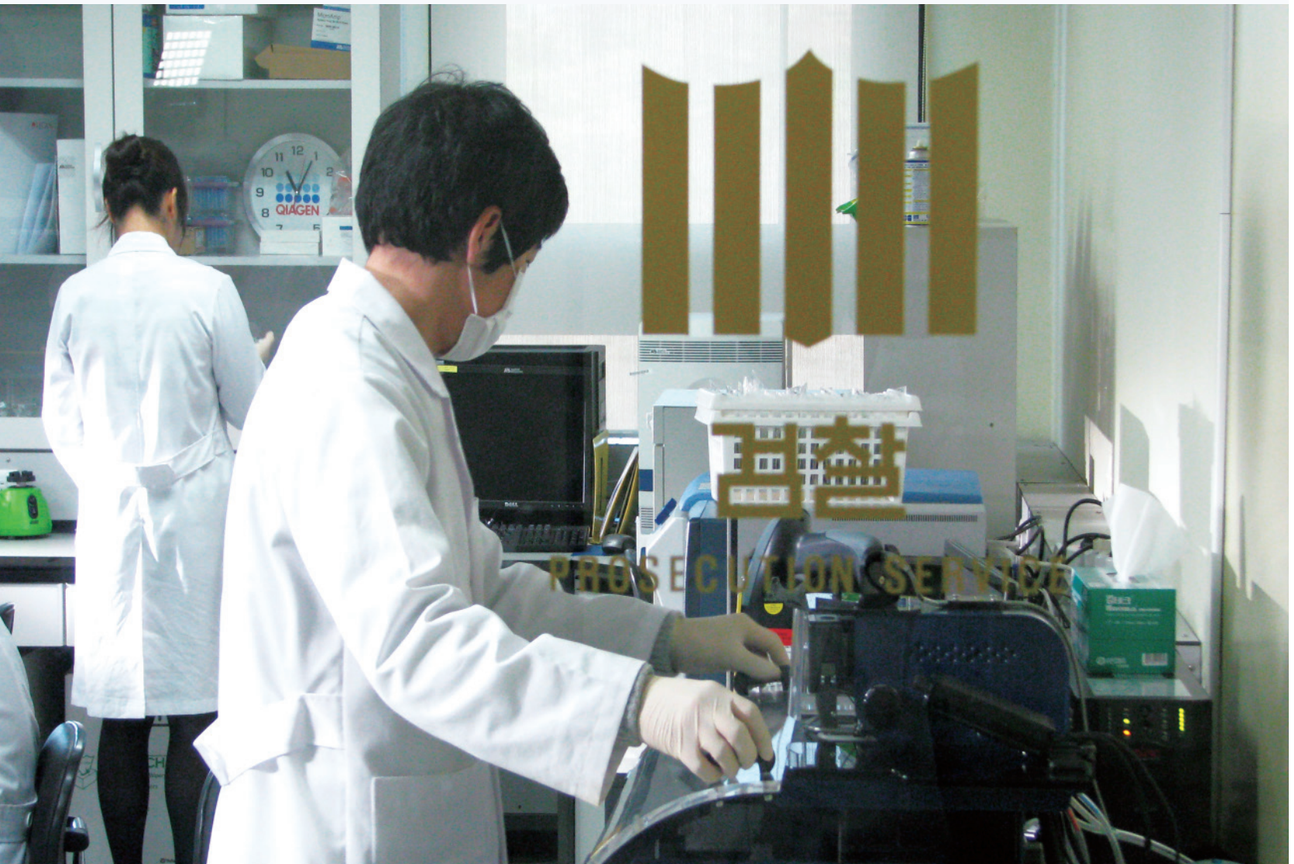
● Research on Analysis Techniques

- 2011 Patent application of novel 16 STR loci multiplex system for Korean population
- 2012 Patent application of body fluid identification technique
- 2014 Patent application of body fluid identification technique through DNA methylation marker
- Patent application of body fluid identification technique through miRNA
- 2012~2015 The research project for practical use and advancement of forensic DNA analysis (Molecular biological studies for advanced forensic genetics)
- 2016 Many different research projects to upgrade our DNA profiling capabilities are in progress.
- Conducted a research about a detection method for minute traces on crime scenes, participated in overseas short-term training
- 2017 Held International Society Forensic Genetics in Seoul
- 2018~ Conducted several research projects about strengthening the SPO's DNA analysis capability such as detecting minute traces

3. DNA Database Management

Since the enactment of the Act on Use and Protection of DNA Identification Information on 26 July 2010, the Lab has developed a database by identifying the DNA types of criminals designated under the Act.

The criminal DNA database is a system that registers and administers the DNA profiles of offenders as designated under the Ac t, in order to arrest them at the early stage of an investigation, by searching against unsolved crime scene evidence. It has evolved into a powerful investigation infrastructure that delivers outstanding effectiveness. Its effects are expected to increase even more as the database accumulates.



Main duties

● DNA Database Registration and Maintenance

- Information concerning the personal identity of offenders and their DNA profiling information are maintained separately at all times in order to prevent any abuse or misuse of the information imported to DNA database.
- The division manufactures and distributes DNA sample collection kits to the each prosecutors' office to help them collect samples in a consistently precise manner.

Forensic Genetics & Chemistry Division manages samples that do not include personal identification data

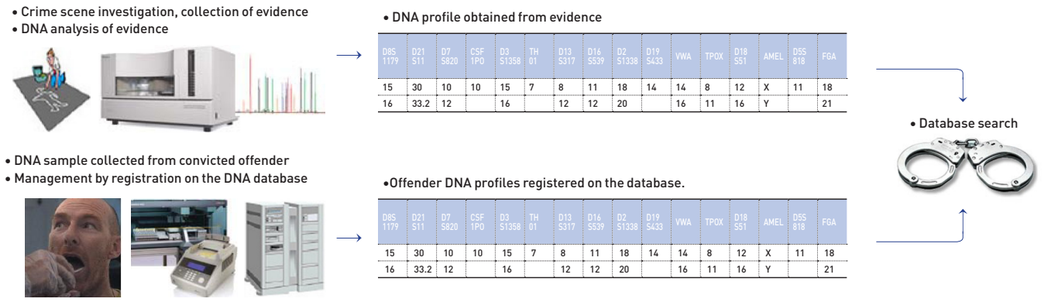
DNA collection kits are distributed by Forensic Genetics & Chemistry Division

● Published DNA DB annual report

- 2015 Published a white paper of DNA identification information database operation
- 2018 , 2019, 2020 Published DNA DB annual report

● Search on the DNA Database

- For accurate and rapid search and maintenance, we use both the KODNAD(KOREA DNA DATABASE) system self-developed by the Supreme Prosecutors' Office.



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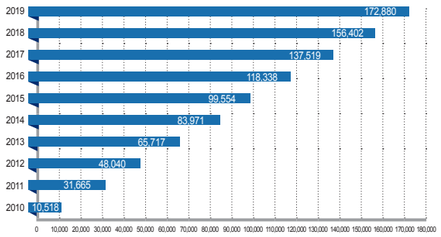
● Research on Analysis Techniques

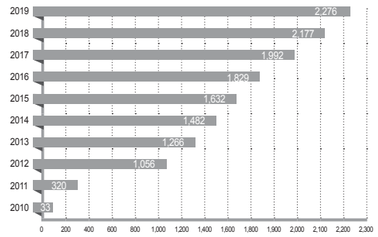
- 2010 Research on automatical DNA identification system for database
- 2010 Development of operation guidelines of DNA identification system for database
- 2011 Research on nationalizing STR analysis kits for DNA database
- 2014 Method for Autosomal Analysing Human Subject of Analytes Using Multiplex Gene Amplification
- 2012~2015 The research project for practical use and advancement of forensic DNA analysis (Development of practical DNA DB and analysis method Next Generation Technology)
- 2016 Research on policies for the expansion of DNA-DB markers
- 2017 Awarded a prize of excellence in saving national finance by improving analysis process and localizing of reagent
- 2018 Increased accuracy by adding DNA DB analysis marker (13→20)

● The Number of Registration in DNA Database and the Number of Solved Cases

※The DNA database was launched on July 26, 2010. The number of solved criminal cases will rise exponentially as the number of offenders registered on the DNA database is increasing by 20,000 persons per each year.



Number of convicted offenders registered on the DNA database (persons, cumulative total)

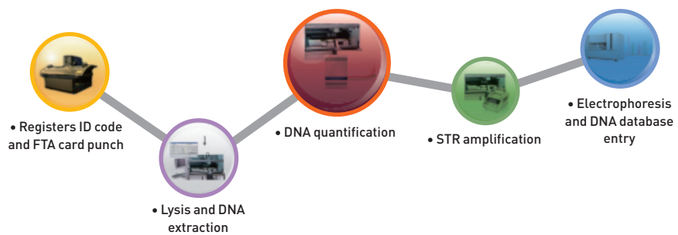


Number of solved criminal cases a using DNA database (cases, cumulative total)

● Main Cases of DNA Database Utilization

- 2012 Geochang case of a habitual sexual criminal
- 2013 A sexual violence case from 15 years ago
- 2014 Rape and injury case of sisters
- 2015 A sexual violence case from 8 years ago
- 2016 Murder of a climber in Muhak Mountain, Masan
- 2017 Murder of a female high school student near the Deudeul River, Naju
- 2018 Analyzed serial sexual assault cases which occurred in Gwangju and Daejeon 15 years ago
- 2019 Identified t he suspect o f a long-time u nsolved erial m urder c ases in Hwaseong city by searching prisoners' DNA database (so-called " Lee C hun Jae c ase")

• Workflow of DNA analysis for criminal DNA Database



4. Non-human Forensic DNA Analysis

We support illegal·unsanitary food investigation through identification of species with DNA from the non-human tissue, narcotic plants, and manufactured complexes from the crime.

Non-human Forensic DNA Analysis has not only analyzes the non-human tissue to provide scientific evidence to the crime, but has a wide range of scope. Food Forensic identifies species of the foreign substance · raw material of the questioned food. Wildlife Forensic analyzes the species of animals like birds that cause airplane accidents, animals that became victims of poaching, or those sacrificed by roadkill. Forensic Botany·Forensic Entomology·Soil Analysis helps estimate the crime scene and path. Microbial Forensic analysis is respond to bio-terrorism.

● Areas of Non-human Forensic DNA Analysis

- Identification of species and/or types of crime scene evidence, including non-human body liquids and organs
- Identification of narcotic opium and marijuana
- Analysis of ingredients in processed food and medicinal herbs
- Identification of species of agricultural or fishery products
- Analysis of Beef, whether it come from Native Korean cows
- Other means of support such as introducing experts

• Non-human Forensic DNA barcode database system

● Research on Analysis Techniques

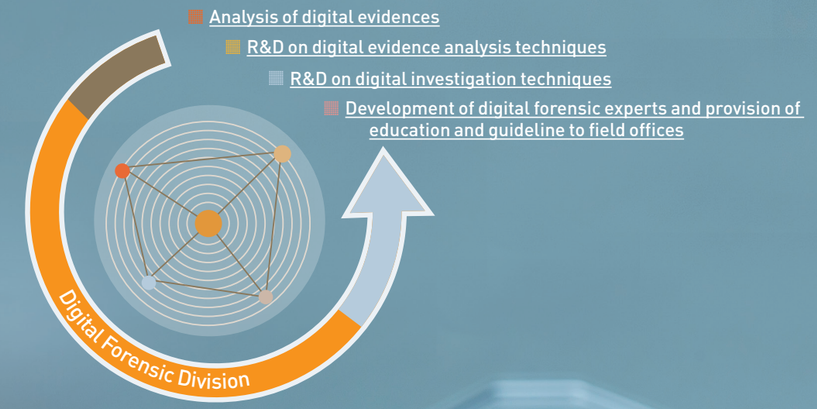
- 2014 Copyright registration of Non-human Forensic DNA barcode database system
- 2012~2015 The research project for practical use and advancement of forensic DNA analysis (Research on advancement of Forensic DNA identifying through establishing Non-human Forensic DNA barcode database of animals, plants, and microorganisms)
- 2016 Development of a forensic biological database of DNA barcodes and opening of the related Website
- 2018 KOLAS certification of techniques for identifying narcotic ingredients in opium poppies using DNA
- 2019 Developed a DNA identification marker for marijuana
- 2020 Developed a body fluid prediction and identification technology based on metagenome using AI

● Main Cases of Non-human Forensic DNA Analysis

- 2013 Identification of botanical species of diet tablets
- 2014 Identification of species of narcotic opium poppy
- 2015 Authentication of whether the Baeksuo(Wilfordii) product contains Iyeobupiso(Auriculatum) and if so, in what ratio
- 2017 Distinguished a species of fish(corvina) marinated in a red pepper sauce, Gochu-jang
- 2018 Distinguished type of tobacco plant ingredients in hand-rolled tobacco
- 2019 Identified species of cannabis contained in cannabis infused edibles(cookie, chocolate)

Digital Forensic Division

As digital media become increasingly diverse, the target areas of digital forensic services are also expanding rapidly. We are now able to get one step closer to the substantive truth by using state-of-art digital forensic analysis techniques.



Digital Forensics

1. Computer Forensics
2. Mobile Forensics
3. Database Forensics
4. Anti-Anti Forensics

Development of Human Resources

R & D

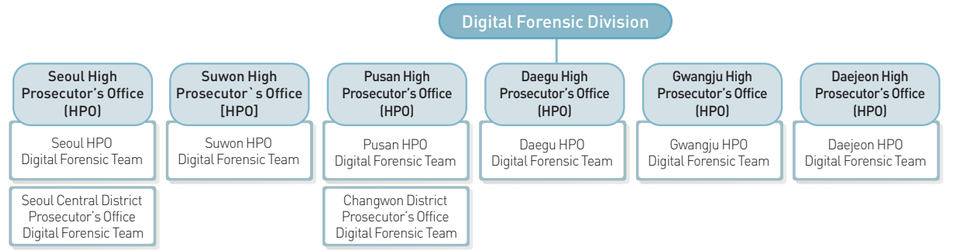
Establishment of infrastructure required to provide digital forensic support

Digital Forensics

'Digital forensics' refers to a series of acts and procedures implemented with the aim of identifying digital information which may serve as evidence from data stored in computers or digital storage devices or data transmitted on networks, and which may be submitted to the court after collecting and analyzing it in a precise and scientific manner so that it may function as evidence until the conclusion of a criminal trial.

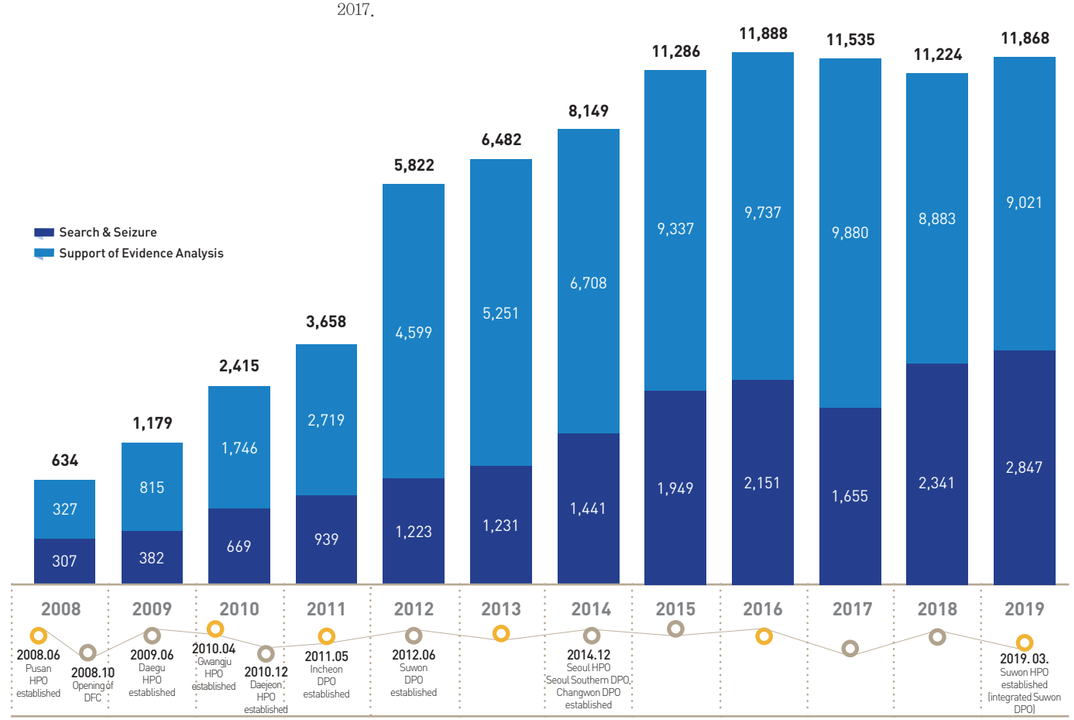
Importance of Digital Forensics

Our contemporary society is a knowledge and information-based society that is becoming increasingly reliant on digital services to function effectively. As nearly all human actions are being converted into digital activities, the means and evidence of crimes are also becoming closely linked to digital services. Therefore, the collection and analysis of digital evidence is now a matter of paramount importance. Furthermore, as media for storing and transmitting digital evidence are becoming ever more diverse in line with the rapid development of digital technology, the field of digital forensics - which began life on personal computers - is expanding rapidly to include databases managed by businesses, networks that use the Internet, smart phones, portable storage media, CCTVs, digital cameras, and an array of IoT related appliances.



Organization of Prosecution Digital Forensic Teams across the Nation

The Supreme Prosecution Office's Digital Investigation Division set up a digital forensic team at the Seoul Central Prosecution Office in 2007 to provide prompt but accurate assistance with confiscation, search and evidence analysis, as its workload has increased exponentially every year since it launched the related services in 2005. It also installed digital forensic teams at the Pusan High Prosecution Office in 2008, the Daegu High Prosecution Office in 2009, the Gwangju High Prosecution Office and the Daejeon High Prosecution Office in 2010. To address the exponential growth of demand for digital forensic services since that time, it established additional digital forensic teams at the Incheon Prosecution Office in 2011, the Suwon Prosecution Office in 2012, the Seoul High Prosecution Office, Seoul Southern Prosecution Office and Changwon Prosecution Office in 2014, and the Seoul Northern Prosecution Office and Chuncheon Prosecution Office in 2017.



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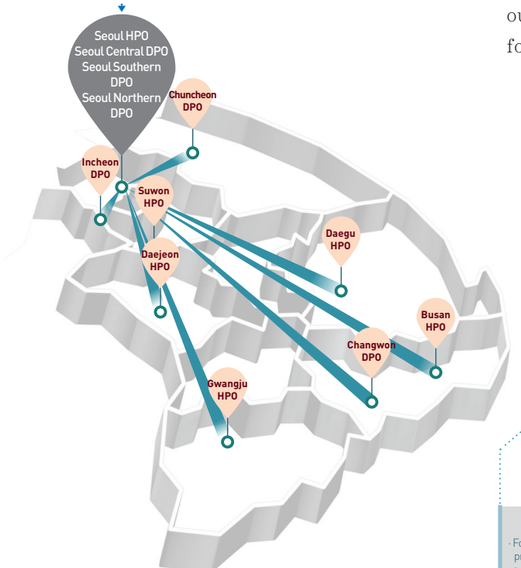
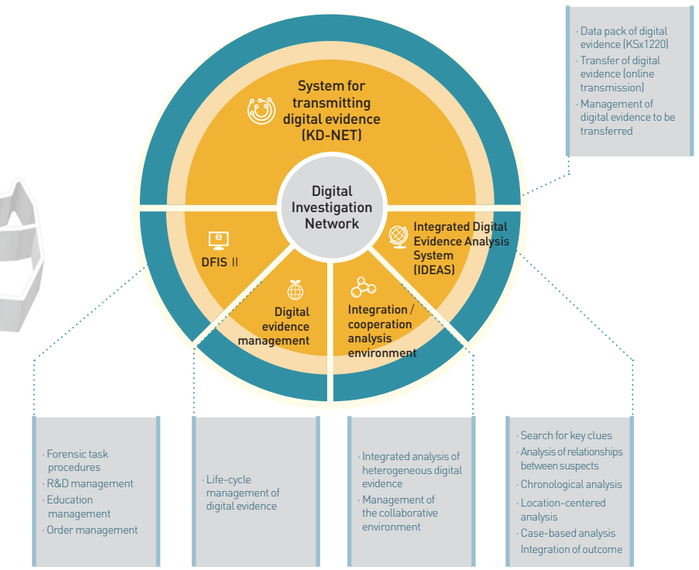


Main duties

The Digital forensic team provides assistance aimed at facilitating the investigative activities of criminal investigators while helping maintain the admissibility of evidence in court by stringently administering them through a series of systematic processes for handling digital evidence, ranging from confiscation and search at crime scenes to evidence registration, analysis and outcome reporting, including computer forensics, mobile forensics, database forensics, and measures for responding to attempts to evade analysis.



1. Computer Forensics

The Digital Investigation Division also collects, recovers and analyzes digital evidence data related to criminal acts on digital appliances such as computers, notebook computers, external hard drives, USB memory sticks, etc. at the scenes of confiscation or search, analyzes evidence on confiscated digital storage media and evidence data, prepares analysis reports, provides court testimony, and preserves evidence, etc.

† Research on status quo of forensics

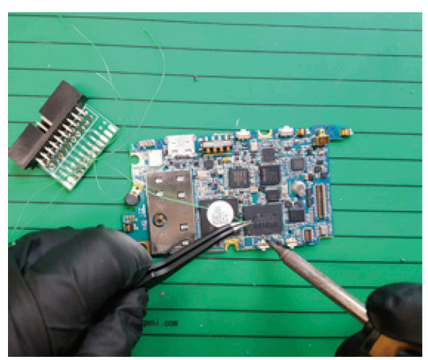
- 2012 Development of software restoring damaged MS office Excel files
- 2013 Study about analyzing and collecting overseas OS Artifacts
- 2014 Research on restoring methods of damaged MS office Excel 2013 and Word files
- 2015 Research related to strategies for upgrading CFT (Computer Forensic Tool)
- 2016 Research on analysis of filing systems via the acquisition of digital forensics-based technologies and methods of using them
- 2017 Analysis of Application Program File System
- 2019 Study about collecting evidence in OS and cloud-based services

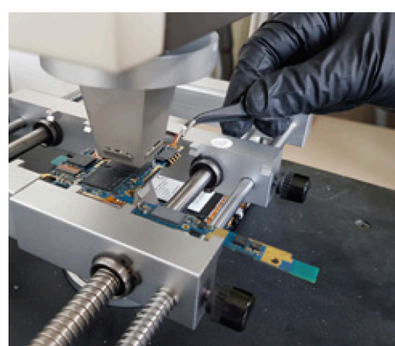
2. Mobile Forensics

The Mobile Forensic Team, which conducts analytical services in an EMI-shield lab, performs the service of recovering or analyzing text messages, call details, phone directories, photos, and video files by obtaining data from terminal memory from mobile handset, smart phones or tablet PCs. Also performs court testifying of analysis outcome, and technical counseling to investigation teams.

† Research on status quo of forensics

- 2012 Fundamental research for foreign smartphone forensics
- Development of audio file converting equipment
- 2014 Analysis of smartphone users' data and Development of educational materials
- 2015 Development and provision of mobile forensic tools (MFA)
- 2016 Basic research for collecting physical evidence from mobile appliances
- 2017 Research on the Secure Boot Chain technique
- 2018 Study about vulnerability of mobile devices, study about smart phone backup protocol
- 2019 Study on analyzing anti-forensic app and description





3. Database Forensics

It provides digital forensic data acquisition, analysis and recovery for information systems about accounting, email, electronic approval, etc. used by businesses or agencies. It also provides it provides court testimonies based on the outcomes of analysis and technical counseling to criminal investigation teams.

† Research on forensic issues

- 2012 Development of Email Seizing Tool
- 2012 Research on the basic techniques in acquiring data from virtual environment
- 2013 Research on techniques in imaging small NAS storages
- 2013 Research on digital forensic model of bigdata based on Hadoop
- 2014 Research on the recovery method of deleted database records (1st)
- 2015 Research on the recovery method of deleted database records (2nd)
- 2016 Research on the recovery method of deleted database records (3rd)
- 2016 Research on forensic collection and analysis of accounting data
- 2016 Publishment of the manual for the forensic collection of accounting data
- 2017 Research on the collection and analysis of accounting data for small or medium businesses (FAST, FAAT)
- 2018 Research on digital forensic methods for cloud-based IoT system

4. Anti-Anti Forensics

It also conducts research on decryption or release techniques to assist field investigation teams with the use of encrypted files as evidences by automatically identifying, detecting, decrypting and releasing encrypted files saved on digital evidence. It also carries out research on techniques for acceleration and deployment of the super computing environment, and other operational functions.

Development of Human Resources

It transfers its advanced digital forensic techniques to law-enforcement and investigation agencies at home and abroad. It also trains forensic specialists to realize the "Open Prosecution Office," and responds effectively and collectively to certain types of crimes that are becoming increasingly advanced and transcend national borders.

● Development of Digital Forensic Specialists

It trains the related specialists by providing external law enforcement and investigation agencies that perform public functions, as well as the investigators of prosecution offices, with theoretical and practical education and training on digital forensics for computers, mobile devices and database twice a year.

● Contents of Education

- Procedure for general digital forensic services and confiscation or search
- Techniques for the acquisition, recovery and analysis of digital evidence
- On-site training in the confiscation / search of digital evidence

※ Some 293 persons from 29 agencies underwent training in 2019.

● Transfer of Digital Forensic Techniques to Foreign Law Enforcement Agencies (CFT-training program)

The Supreme Prosecution Office transfers digital forensic techniques and tools to Mongol, Uzbekistan and other CIS countries, Vietnam, the Philippines and other Southeast Asian countries, and Peru and other South American countries based on the digital forensic techniques and experience it has accumulated over the past ten years, jointly addressing international crimes with other countries while raising the international profile of Korea.

R & D

It leads the international standardization of digital forensic technologies while researching and developing advanced analysis techniques related to computer forensics of diverse storage media, mobile and database forensics, and analysis and response to evasion attempts, and also develops methods and test tools for verification of digital forensic tools.

Establishment of infrastructure required to provide digital forensic support

- **Digital Investigation Network (D-NET)**

  The Digital Investigation Support System administers the entire process of confiscating digital data identical to the original from digital media (PCs, mobile appliances, USB memory sticks, servers, e-mail messages, etc.) from the time of confiscation or search to the admission of valid (digital) evidence in court by analyzing data to detect clues to suspected crimes.

- **Digital Forensic Information System (DFIS)**

  This functional support system maintains standardized processes - ranging from requests for assistance to digital forensic services between regional digital forensic teams and field investigation teams, to the registration of evidence and the reporting of outcomes.

- **Integrated Digital Evidence Management System (IDEMS)**

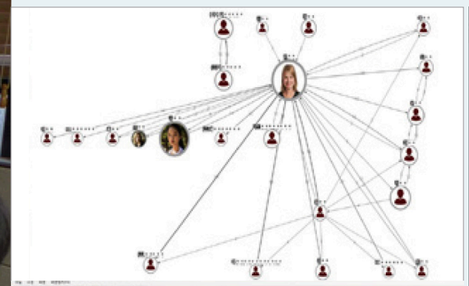
  Integrated management and monitoring of digital evidences throughout the entire process - ranging from the acquisition of confiscated digital data to their saving, storage, and destruction.

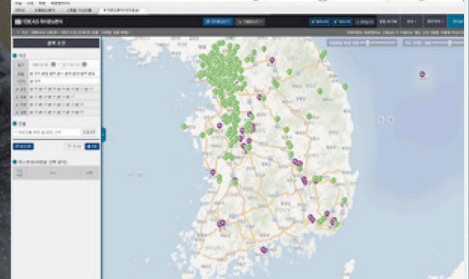
- **Integrated Digital Evidence Analysis System (IDEAS)**

  This system assists the integrated search and analysis of digital evidence to find clues to suspected crimes, including files, call histories, account transaction details, SNS messages, accounting data, etc. from confiscated PCs, notebook computers, smartphones, and tablet PCs. It also provides functions for analyzing correlations between key suspects, chronological and location data.

- **Digital Evidence Online Transfer System (KD-NET)**

  This system enables the online transfer of digital evidence between national police, special judicial police and public prosecution agencies and the step-by-step integrated management of digital evidence.





Cybercrime Investigation Division

We protect the people from cybercrime and keep the cyberspace safe and free.

Cybercrime Investigation Division

Although cyberspace has brought about more opportunities and benefits, it also faces new challenges and threats, including crimes and terrorism, and international disputes. The Cybercrime Investigation Division will keep cyberspace free and safe by conducting advanced investigations and maintaining close international cooperation.

Being a control tower of cybercrime investigation in Korea, the SPO's Cybercrime Investigation Division leads the investigation of major cybercrimes, develops policies in response to cybercrime, and improves the relevant laws and regulations. IT-specialized investigators are working to prevent cybercrime and trace suspects with the help of the advanced investigation infrastructure and cooperative networks in place at home and abroad.

1. Cybercrime Investigation Support

Main duties

The Cybercrime Investigation Division analyzes trends on major cybercrime such as cyber terrorism, hacking, and personal information leakage; assists cybercrime investigations by prosecutors across the country; trains investigators; conducts R&D on investigation infrastructure.

- **Malware Analysis**

  Malware is a prevalent crime tool in cybercrime. Malware Analysis detects the hidden crime tool and provides investigators with leads for tracking suspects by analyzing the functions, characteristics and network connections of the malware.

- **Log Analysis**

  Log is information that is automatically generated by various information systems. Through this analysis, we find the trail left by criminals in a variety of logs and track down them step by step.

- **Network Analysis**

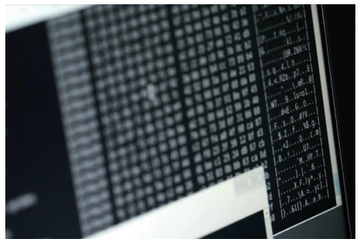
  In the case of system hacking and leakage of personal information, criminals identify the vulnerability of the victim system in advance and collect crucial information about the system. Network Analysis identifies network packets generated in the process of intrusion, and analyzes criminal resources including IP addresses and Domain information.

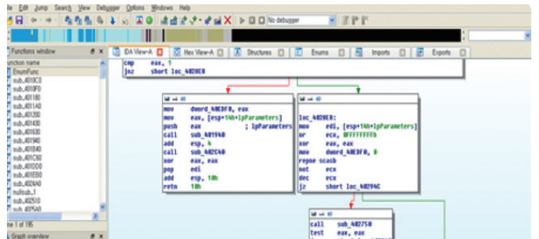
- **Big Data Analysis**

  Big Data Analysis supports analyzing massive and unstructured data that is hard to handle for general investigators. This analysis deals with a variety of on-offline data such as bank account transactions, call history, and access logs.

- **Cryptocurrency analysis**

  Cryptocurrency analysis: Since the cryptocurrency (Bitcoin or Ethereum) is widely used as the means of a payment system in diverse crimes such as narcotic and sexual exploitation material trafficking through the dark web, ransomware and scam, he CID is tracking down the domestic and foreign cryptocurrency exchanges and the origin of related services by analyzing the Blockchain data.

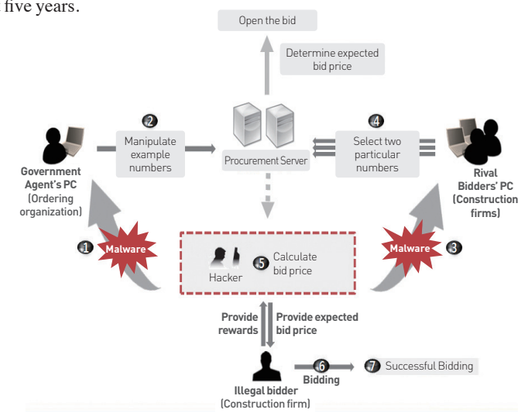






2. Major Cases

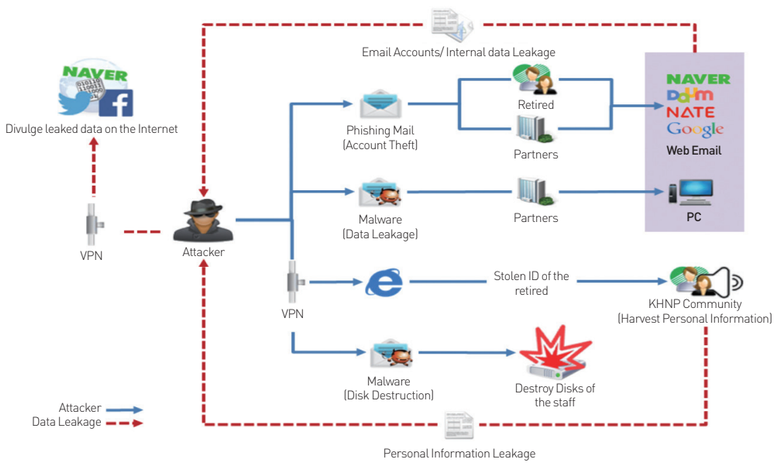
● Illegal Intervention to Government Online Procurement System (2013,Seoul Central District Prosecutors' Office)

This case includes 108 times of illegal bids amounted to 140 billion Won in total where the criminals compromised computers of government officials and other bidders to find out the expected auction price or manipulate the price. Eventually, 46 people were indicted in this case by identifying patterns of illegal bidding and malware developers through analyzing hidden malicious codes from the infected computers as well as analyzing logs generated by the Online Procurement System over the past five years.



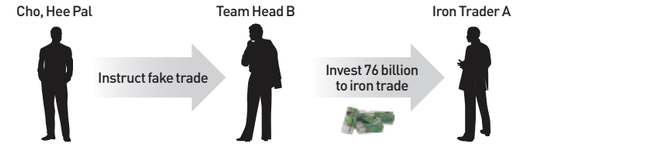
● Cyber Attack on Korea Hydro & Nuclear Power (2014, Seoul Central District Prosecutors' Office)

Internal documents of the Korea Hydro & Nuclear Power were leaked by malware infection and hacking. We supported tracking down the crime path and the origin of attack through analyzing KHNP's network logs, emails, and malicious codes as well as international cooperation with the United States, China, etc.



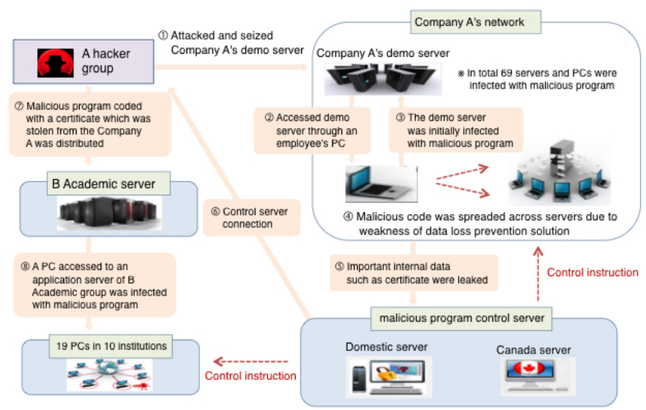
● Cho, Hee Pal's concealment of proceeds (2014, Deagu District Prosecutors' Office)

Cho, who was the main culprit of the nation breaking pyramid scam, concealed proceeds of crime, 76 billion Won, as like legitimate business investment, and embezzled 9.6 billion Won of the money. We identified borrowed-name mobile phones, Cho's clandestine shelters, and suspicious bank accounts related to the money laundering through visualized analysis techniques and integrated database analysis of total 65 GB of about 15,000 emails, 1.4 million bank accounts, 130,000 calls, recovered files, etc.



● Hacking attack on an electronic certificate of a financial information security firm (2016, Seoul Central District Prosecutors' Office)

A hacker tried to paralyze and bring confusion to the society by hacking into company A's electronic certificate, which was being used by the major government agencies for the purpose of information security. The hacker misused the certificate in order to distribute a malicious program pretending to be a calculation program. During the investigation, the NDFC supported the analysis of 12 terabytes (1 terabyte=100 million pages of papers) of data such as malicious codes, servers(C&C server) and emails in order to track the offenders.



3. Collection of Cybercrime Information

● Sharing information of Cybercrime Resources

Crime resources are being shared through cooperation with domestic agencies such as KISA, internet portals, carriers, and security companies as well as international exchange channels such as G7 24/7 Network, FBI, etc. These information sharing channels enable rapid response to a variety of crimes in cyberspace.

Information Type	Details
Malware	• Memory hacking codes to steal financial information • Malicious codes for Phishing or Pharming • APT malware, etc
Domain / IP	• Domain/IP of malware distributor • C&C server, Domain/IP for information leakage • Intrusion IP, Transit IP
Smart Devices	• Malware targeting smart devices • SMS Phishing information (Text, URL, Phone Number, etc)

● Phishing Website Detection System

The Cybercrime Investigation Division developed the Phishing Website Detection System which proactively detects and shuts down fake websites created for phishing crime. With this, we are striving to eradicate cybercrime that has an impact on the lives of ordinary people.

● Malware Analysis System

The Malware Analysis System to electronically proceed a series of processes such as collection → extraction → analysis of malware used in cybercrime rapidly provides crime path and investigative leads to trace suspects.

● Illegal spycam detection system using AI(Artificial Intelligence)

The NDFC is continually tracking the illegal “spycam” videos and images by using AI-based detection system. The system developed by our own technology can extract and analyze the DNA values in the videos and images. Also, we are promptly responding to prevent the secondary damage of the digital sex crimes by preparing the proper support and prevention process.

01 Prosecutor's Office

Ⅰ. Asks a victim whether or not to delete illegal spycam video

Ⅱ. Uploads illegal video file or URL on D-net

Requests for analysis →
← Notifies result

02 Cybercrime Investigation division

Tracks illegal spy cam videos through an illegal spycam detection system which was established by the NDFC

Requests for deletes →
← Notifies result

03 The Korea Communications Commission

Deletes and blocks access to an illegal spycam video

24-hr monitoring

4. Coordination and Cooperation

● G7 24/7 High Tech Crime Network

The world-leading cybercrime investigation agencies from 87 countries including the U.K., U.S., Australia and Japan are participating in this international cooperation network by asking preservation of cybercrime electronic evidence and sharing the investigation intelligence. The CID is responding to tackle the various transnational cybercrimes as a Point of Contact of the network.

● Support for Global Capacity Building to Combat Cybercirme

The CID established a hub to respond to the global cybercrimes, The CID signed a trilateral MOU on establishing an APC-HUB with World Bank and GFCE in November 2019 . The Secretariat was launched in January 2020 and is putting efforts to enhance the global response capability.

● Cooperation with Domestic Organizations

The CID is also actively cooperating with relevant cybercrime investigation and government agencies , ISPs(Internet Service Provider), computer vaccine companies and academia to share any threats in the cyber community and to discuss the method of cooperation between private, government, and academic fields.