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SMART healthcare

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SMART AND INTEGRATED SYSTEM FOR HEALTH CARE AND CRISIS MANAGEMENT

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Abstract :

Emergency healthcare project is a smart system helps to interest by the life of the patients it keeps the patient up to date with the hospital and doctors all the time .

Doctors can easily find their patients any time easily .

The system also help the people to find the available nearest hospitals and nearest operations rooms .

The system helps people to submit compliements for sovereign entities .

The system helps disabled people to keep their life normally.

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1. Introduction

1.1 Purpose

The software requirement specification document is specifically designed to delineate the boundaries of the Healthcare Information System design and functionality. Parties interested in this documentation would include but not be limited to the system owners, the system users, the project manager and the design team.

1.2 Scope of Document

This document will identify the pertinent software products we will develop including a Host DBMS, JAVA,Android software supported and web-based Patient, Physician, and Ambulatory Input/Outputs, and sensor driven inputs for real-time patient monitoring. The SRS will show that we will be utilizing SQL server and ASP for interfacing with the Input/Outputs as well as Java applets for the real-time acquisition of health data from remote sources. Finally, utilizing the security attributes of XML, XSL, and a secure socket layer in the protocol stack we hope to address the valid security concerns about the networking and transmission of confidential health care information.

In addition to the specific design components of this software, this document will make clear the design team's goals of creating value-added software which not only correctly captures patient health information, but then efficiently stores it, sorts it, retrieves it, and delivers this critical care information where it is needed by healthcare professionals. The benefit of having accurate, complete, and timely health information is that it will inevitably save human lives.

This software is deliberately focused on medical records and the associated diagnostics. It is important to point out that this system which is life critical will not have cross functionality regarding appointment management, billing, or insurance functions, however diagnostic codes sets will be compliant with present Federal law.

the system also help the people to find the nearest operations rooms and emergency hospitals.

the system help disabled people to keep their lids on and get their rights easily and faster.

1.3 Definitions, Acronyms, and Abbreviations

1.3.1 Electro-cardiogram (EKG). A device that measures the electrical activity in a biological heart and measures heart rate.

1.3.2 Pulse oximeter. A device that employs monochromatic light to measures percentages of oxygenated hemoglobin in blood.

1.3.3 Systolic blood pressure. The peak pressure in the arterial circulatory system.

1.3.4 Diastolic blood pressure. The pressure at which the heart's aortic valve closes.

1.3.5 Emergency medical technician (EMT). A trained emergency healthcare specialist.

1.3.6 Oscilloscope monitor. A cathode ray tube capable of representing a beam of light that simulates a heart rhythm waveform.

1.3.7 (HIPAA) -The Health Insurance Portability and Accountability Act of 1996

1.3.8 (SDLC)-The Systems Development Life Cycle.

1.3.9 Non-Digitized Professionals. Health Care providers who have no access to digital records through lack of hardware, software, or preference to legacy flat file charting methods.

1.3.10 (AES)-Advanced Encryption Standard

1.3.11 (DSP) -Distributed Services Provider

1.3.12 (ASP) –Application Service Provider

1.3.13 (FAT32) - File Allocation Table 32 Bit

1.3.14 (TIFF) – Tag Image File Format

1.3.15 (JPEG) - Joint Photographic Experts Group

1.3.16 (DOB) – Date of Birth

1.3.17 Vendor. A licensed and authorized agent of the development team or their vested remaindermen.

1.3.18 ISO 8601. A standard format for representing date and time recommended by the International Organization for Standardization

1.3.19 Initial patient information. Information normally gathered during a patient's first arrival in a healthcare provider's office or in an emergency room. This includes but not limited to name, address, Social Security Number and any health insurance numbers.

1.3.20 (fps) – Frames per second

1.3.21 (CISDC) – Computer Information Society Design Competition

1.4 Overview of document

The Software Requirement Specification will define and illustrate the overall project and its requirements- both functional and non-functional. In addition the SRS will define the users and their respective characteristics as well as any constraints to development that the team has identified.

The format of the SRS document will address the overall project first- including functions and objectives in an overview. This section will also address how this software interfaces with other legacy systems and/or diagnostic equipment connected to it. Then the subsequent sections will specifically addresses the components of the larger software system. These sections delineate specifications for every facet of the components design.

2. Description of Project

2.1 Project Overview

Medical records are the keystone to the healthcare profession; however these records are not utilized to their fullest potential. Often records are inaccurate, misplaced, and /or duplicated unnecessarily. In a world which recognizes the improvement of data digitization and networking as a constructive force which often increases efficiency while

lowering costs; it is our view that medical records networking could only benefit the quality of healthcare offered in the United States.

An information system which is primarily linked between a physician's office and his hospital would be able to capture and store data from either location giving access to diagnostics from satellite locations. Added functionality could include ability to gather data in real time from a remote monitor or an inbound Emergency transport vehicle. [2]

This information system is an industry-compliant application, based upon an open architecture (Microsoft NT/SQL relational database), and is designed to function within a standard IEEE compliant Ethernet (10 or 100) Local or Wide Area Network environment, and will also include Wireless capabilities. The communications protocol is TCP/IP, and is supported under any routing protocol within an infrastructure (routed or bridged).

The software is based upon standard and emerging web technologies, requiring a workstation to only be capable of running an Internet Browser such as Microsoft's Internet Explorer and Netscape Navigator. Within the browser Java applets will parse and display real-time data in the form of streaming MPEG 4 video, still images in JPEG or Tiff format, and a java bean real-time graph plotter from diagnostic equipment anywhere within the network.

As a Distributed Systems Provider (DSP) the system offers all the advantages of an Application Service Provider (ASP), but overcomes security and proximity issues by allowing hospitals to keep the primary system at their facility.
the application help the mobile users to find the nearest operation rooms and other medical services faster and easily .

the software is applicable to more than more functions easily .

2.2 Project Functions

2.2.1 The software code should be portable between different operating systems such as Linux and Windows.

2.2.2 The software should be easy to use and should require minimum manual operation.

2.2.3 The software should have a user-familiar interface so that the system would not pose an additional workload to the users.

Note. Interface design would follow generally accepted model conventions for placement of dropdown menus and toolbars.

2.2.4 The software should allow bidirectional synchronous communication between the user and the data source in real time.

2.2.5 The software should provide security of operation and confidentiality of information (restricting access to non-privileged users), by FAT32 compression of data and Rijndael (AES) encryption algorithms.

2.2.6 The software should allow collection of vital signs and still images of the patient for visual inspection by experts.

2.2.7 The software should have tools for computer assisted diagnosis like an electronic stethoscope, a blood oxygen sensor, EKG, and a digital sphygmomanometer.

2.2.8 The software should be able to avoid congestion while transmitting high volumes of data and images in real-time.

2.2.9 The software should sample video images from diagnostic equipment automatically at 30fps or rates compatible with the transmission capacity available.

2.2.10 The software should be able to interface and link all components of system refer to Figure 2.2.1

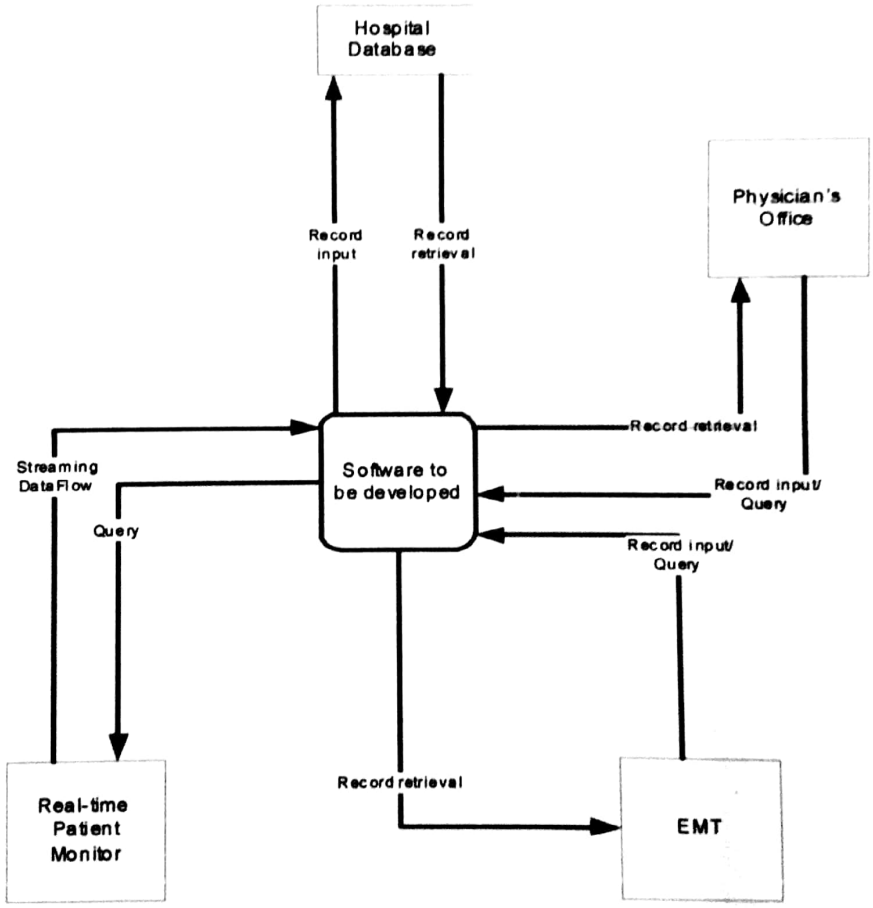

Figure 2.2.1 Context Diagram

2.2.11 The system will extend the data capabilities of the Physician's office, the hospital, and emergency personnel. Refer to Figure 2.2.2

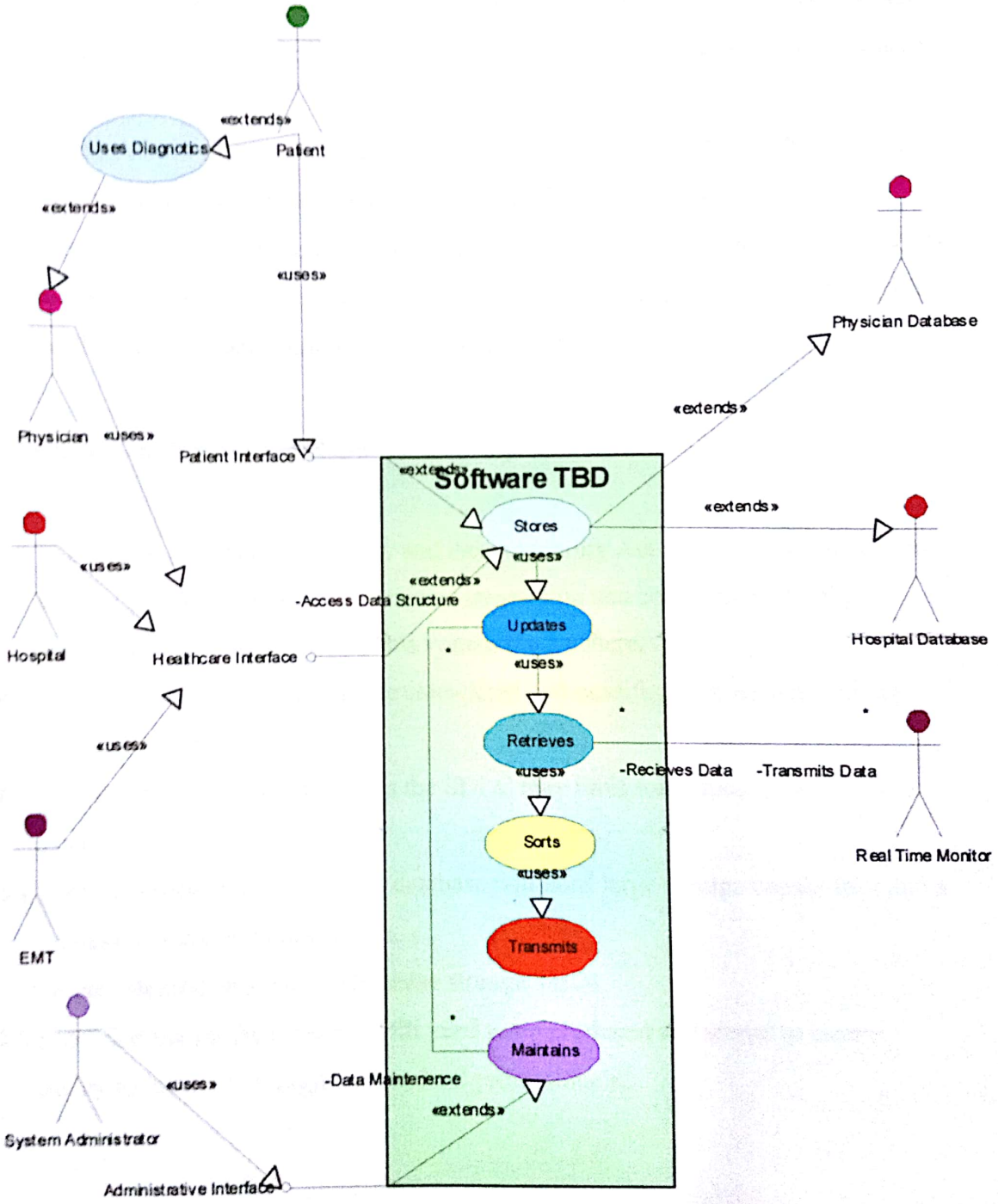

Figure 2.2.2 Use Cases

2.3 User Characteristics

2.3.1 The primary user will be a healthcare professional like a physician, a nurse, or an emergency medical technician.

Note. This is a Medical Information System therefore to limit access and ensure integrity of the data only licensed medical personnel have access to input, search, and update functions.

2.3.2 Nurse Administrators, Physician Office Administrators, System Administrators and/or Therapists will have limited access and information capabilities.

Note: For the reasons clearly stated in 2.3.1 the System Administrator (or Vendor) will only be able to access data with his Admin access code in combination with the Physician's code while in the physician's presence.

2.4 Constraints to Project Development and Implementation

2.4.1 The Health Insurance Portability and Accountability Act (HIPAA) has mandated various standards on security, privacy, transaction and code sets, and unique healthcare identifiers to which this system must adhere.

2.4.2 Legacy systems in place must be considered and modified to interface with the new system design.

2.4.3 The timebox which encapsulates the SDLC may limit some functionality of the system.

2.4.4 Both the hospital and physician database will need large storage capabilities and a process to archive outdated data.

(Note. Method and size of Database storage TBD)

2.4.5 Paper flat file medical records will need to be produced and stored to ensure ability to handle non-digitized medical professionals.

2.5 Assumptions and Dependencies

2.5.1 The system relies on a Physician relationship with a hospital system with which he/she is a staff member.

2.5.2 The SDLC chosen to implement the system will be model driven and based on subsequent versions to insure data integrity and functionality. Refer to figure 2.5.1

2.5.3 Due to report length constraints imposed by CISDC, HIPAA regulations will be strictly followed but kept as a stand alone document.

Model Driven System Development Life Cycle

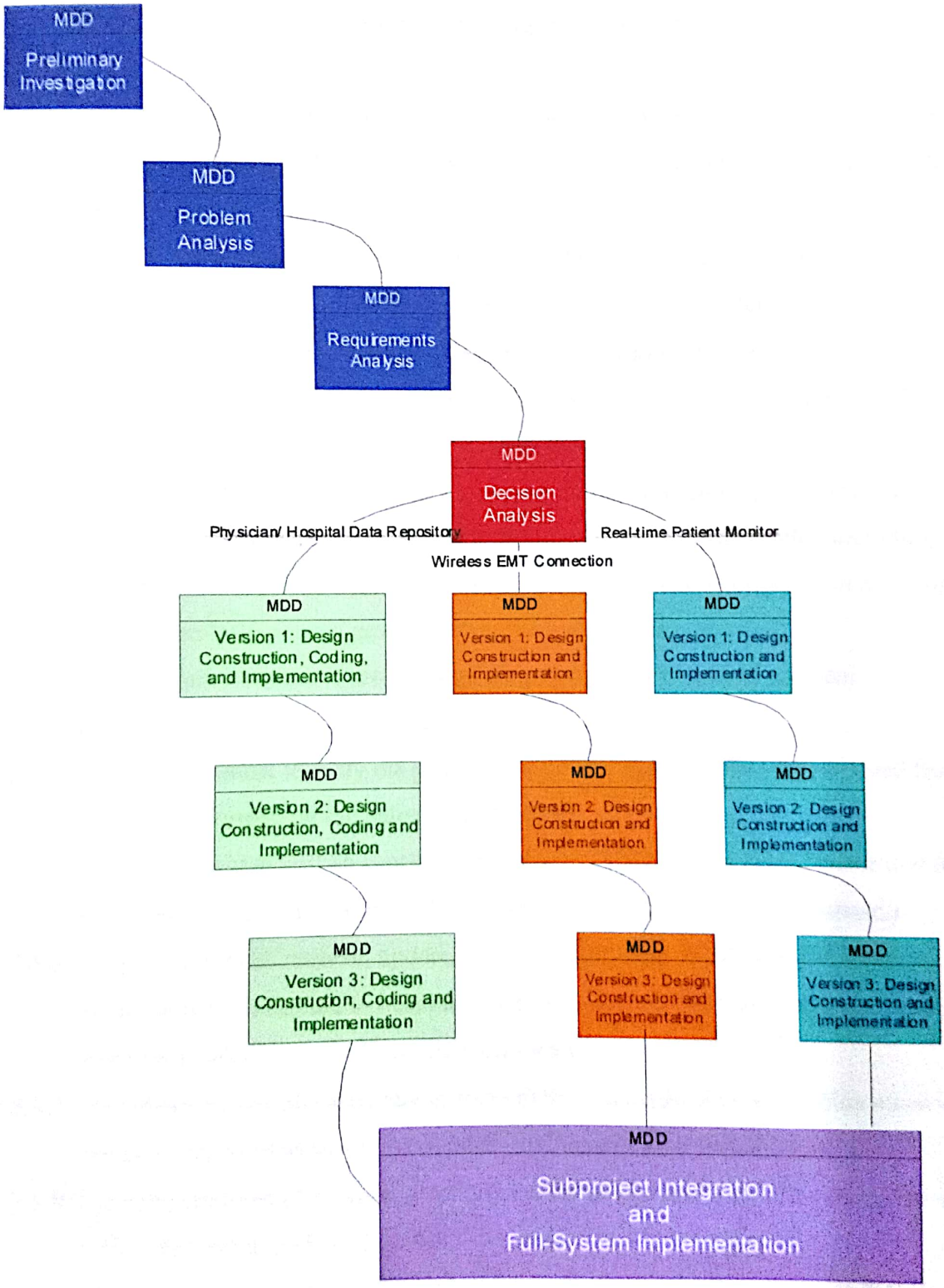

Figure 2.5.1 Model Driven Hybrid SDLC

Summary

After the research that, we find many about the information of biometrics and many different kinds of the biometrics system. In fact, there were many technologies were used the biometrics technology. It is the truth and it must be more popular in the future. Now a day, many old systems are displaced by the biometric system. For example: access control system, payroll system, banking system, etc. During the project development, the biometric hardware is used. There are TiFace system, U are U fingerprint system. TiFace system enables to capture and enroll user's face. U are U fingerprint system is used to capture and enroll user's fingerprint. So, we have to use the biometric in the future life.

References :

[1] http://www.nwfusion.com/newsletters/converg/2002/01416213.html

[2] http://www.mcclellanconsulting.com/whitepapers/h323.html

[3] http://www.cisco.com/univercd/cc/td/doc/product/voice/sipsols/biggulp/bgsipov.htm#xtocid8

[4] Uyless Black. "Voice over IP," Prentice Hall PTR, May 2001

[5] James Kurose. "Computer Networking," August 2004

Appendix 1: Glossary of terms, acronyms and abbreviations

Glossary of terms

Attributed identifier — An attributed piece of personal information (e.g., a (unique) name, Social Security number, bank account number, or driver's license number)
Biographical identifier — An assumed piece of personal information (e.g., an address, professional title, or educational credential)
Biometric — See *biometric characteristic*
Biometric characteristic — A biological and/or behavioral characteristic of an individual that can be detected and from which distinguishing *biometric features* can be repeatedly extracted for the purpose of automated recognition of individuals
Biometric data subject — An individual from whom *biometric features* have been obtained and to whom they are subsequently attributed
Biometric double — A face image which enters the *gallery* as a sufficiently similar *biometric template* to a preexisting image that belongs to a different individual
Biometric feature — A *biometric characteristic* that has been processed so as to extract numbers or labels which can be used for *comparison*
Biometric feature extraction — The process through which *biometric characteristics* are converted into *biometric templates*
Biometric identification — Search against a *gallery* to find and return a sufficiently similar *biometric template*
Biometric identification system — A face recognition system that aims to perform *biometric identification*
Biometric identifier — See *Biometric reference*
Biometric probe — *Biometric characteristics* obtained at the site of verification or identification (e.g., an image of an individual's face) that are passed through an algorithm which convert the characteristic into b*iometric features* for comparison with *biometric templates*
Biometric reference — one or more stored biometric samples, biometric templates or biometric models attributed to a biometric data subject and used for comparison. For example, a face image on a passport
Biometric reference database — A *gallery* of stored *biometric templates* obtained through *enrollment*
Biometric sample — Information or computer data obtained from a biometric sensor device. Examples are images of a face or fingerprint
Biometric template — Set of stored biometric features comparable directly to biometric features of a probe biometric sample (see also *biometric reference*)
Biometric twin — See *Biometric double*
Biometric verification — The process by which an identification claim is confirmed through *biometric comparison*

Candidate — A *biometric template* determined to be sufficiently similar to the *biometric probe*, based on a *comparison score* and/or rank

Closed-set Identification — A biometric task where an unidentified individual is known to be in the database and the system attempts to determine his/her identity. Performance is measured by the frequency with which the individual appears in the system's top rank (or top 5, 10, etc.), often reported using the *cumulative match score or characteristic.*

Comparison — A process of comparing a biometric template with a previously stored template in the reference database in order to make an identification or verification decision.

Comparison score — Numerical value (or set of values) resulting from the comparison of a *biometric probe* and *biometric template*

Cumulative Match Characteristic (CMC) — A method of showing measured accuracy performance of a biometric system operating in the closed-set identification task by comparing the rank (1, 5, 10, 100, etc.) against the identification rate

Decision boundary — A limit, based on *similarity scores*, at which a face recognition algorithm, technology, or system is set to operate

Developmental set — A set of face images that the developers use to train the algorithm to detect and extract features from a face

Dissimilarity score — See *Distance score*

Distance score — *Comparison score* that decreases with similarity

Enrollment — The process through which a *biometric characteristic* is captured and must pass in order to enter into the image *gallery* as a *biometric template*

Equal error rate (EER) — The rate at which the *false accept rate* is exactly equal to the *false reject rate*

Evaluation set — A set of *biometric templates*, generally separated out from the *training set*, which are exposed to a facial recognition algorithm in order to evaluate its performance

Face template — See *Biometric template*

Facial features – The essential distinctive characteristics of a face, which algorithms attempt to express or translate into mathematical terms so as to make recognition possible.

Facial landmarks — Important locations in the face-geometry such as position of eyes, nose, mouth, etc.

False accept — An incorrect acceptance of a false claim to existence or non-existence of a candidate in the reference database during the verification task

False accept rate (FAR) — A statistic used to measure biometric performance when performing the verification task. The percentage of times a face recognition algorithm, technology, or system falsely accepts an incorrect claim to existence or non-existence of a candidate in the database over all comparisons between a *probe* and *gallery image*

False alarm — A metric used in open-set identification (such as watch list applications). A false alarm is when an alarm is incorrectly sounded on an individual who is not in the biometric system's database, or an alarm is sounded but the wrong person is identified

False Alarm Rate (FAR)— A statistic used to measure biometric performance when operating in the open-set identification (sometimes referred to as watch list) task. This is the percentage of times an alarm is incorrectly sounded on an individual who is not in the biometric system's database, or an alarm is sounded but the wrong person is identified.

False match rate (FMR) — See *false accept rate*

False negative — An incorrect non-match between a *probe* and a candidate in the *gallery* returned by a face recognition algorithm, technology, or system

False non-match rate (FNMR) — See *false reject rate*

False positive — An incorrect match between a *biometric probe* and *biometric template* returned by a face recognition algorithm, technology, or system

False reject — An incorrect non-match between a *biometric probe* and *biometric template* returned by a face recognition during the verification task

False reject rate — A statistic used to measure biometric performance when performing the verification task. The percentage of times a face recognition algorithm, technology, or system incorrectly rejects a true claim to existence or non-existence of a match in the *gallery*, based on the comparison of a *biometric probe* and *biometric template*

Gallery — A database in which stored *biometric templates* reside

Gallery image — See *Biometric template*

Grand prize — The surreptitious identification of an individual's face at a distance in uncontrolled settings, commonly described as the "face in the crowd" scenario

Identification— A task where the biometric system searches a database for a biometric template that matches a submitted biometric sample (probe), and if found, returns a corresponding identity

Identification rate — **A metric used in reporting results of "closed-set" tests to indicate the probability that a probe**

and a candidate in the gallery be matched at Rank k when a probe is searched against the entire reference database.

Identification task — See *Biometric identification*

Identity triad — Identity resolution by way of *attributed identifiers*, *biographical identifiers*, and *biometric characteristics*

Impostor — A person who submits a biometric sample in either an intentional or inadvertent attempt to claim the identity of another person to a biometric system

Match — A match is where the similarity score (of the probe compared to a biometric template in the reference database) is within a predetermined threshold

Matching score (deprecated) — See *Comparison score*
Normalization — The adjustment of the size, scale, illumination, and orientation of the face in *biometric probe* and *biometric template*s to ensure commensurability
Open-set Identification — A biometric identification task where an unidentified individual is not known to be in the reference database when the system attempts to determine his/her identity. Performance is normally reported in terms of recognitions rates against false alarm rates
Print — See *Biometric template*
Probe biometric sample — See *Biometric probe*
Probe image — See *Biometric probe*
Rank list — A rank ordered candidate list of the percent most likely matches for any given probe image
Receiver Operating Characteristics (ROC) — A method of reporting the accuracy performance of a facial recognition system. In a verification task the ROC compares false accept rate vs. verification rate. In an open-set identification task the ROC compares false alarm rates vs. detection and identification rate
Recognition — A generic term used in the description of biometric systems (e.g. face recognition or iris recognition) relating to their fundamental function. The term "recognition" does not inherently imply the verification, closed-set identification or open-set identification (watch

Acronyms and Abbreviations

ANSI INCITS — American National Standards Institute International Committee for Information Technology Standards
BKA — Federal Office of Criminal Investigation, Wiesbaden, Germany
DARPA — Defense Advanced Research Projects Agency
EBGM — Elastic Bunch Graph Matching
EER — Equal Error Rate
FAR — False Accept Rate
FERET — The Face Recognition Technology program
FOIS — Federal Office for Information Security, Bonn, Germany
FRGC —Face Recognition Grand Challenge
FRR — False Reject Rate
FRS — Face/Facial Recognition System
FRT — Face/Facial Recognition Technology
FRVT —Face Recognition Vendor Test
ICA — Independent component analysis
ICAO — The International Civil Aviation Organization
IGD — Fraunhofer Institute for Computer Graphics Research
ISO/IEC — International Standard Organization/International Electro Technical Commission
JPEG — Joint Photographic Experts Group
LFA — Local Feature Analysis
NAVSEA — US Naval Sea Systems Command
NIST — National Institute of Standards and Technology