

# MegaMatcher Case Study



## Bosnia and Herzegovina Biometric Passport and ID System Based on MegaMatcher Technology

*Ensures Quality and Accuracy Required to Meet European Union Standards*

**With abundant natural resources, a rapidly growing tourism industry, relatively low national debt and a strong currency, the nation of Bosnia and Herzegovina (BiH) is on track to become a member of the European Union. In order to meet the EU standards for security and quality in the issuance of biometric passports and personal ID cards, BiH has implemented a biometric identification system based on MegaMatcher technology from Neurotechnology.**

The Agency for Identification Documents, Registers and Data Exchange (also known as IDDEEA) was established in June 2008 as an administrative organization within the Ministry of Civil Affairs of Bosnia and Herzegovina. IDDEEA is charged with governing all aspects of personal identification documents, including issuance and personalization, storage, transport and maintenance of the central registers and data exchange between the competent authorities in Bosnia and Herzegovina. IDDEEA is also responsible for ensuring that all identification documents meet EU standards.

IDDEEA required a fingerprint identification system that would enable them to ensure accurate identification of BiH citizens and meet the security and quality required by the EU for the issuance of biometric passports and national ID cards. They also required a system that could be cost-effectively developed and implemented within a strict timeline.

After considering a number of options, the agency decided to develop the system in-house using the MegaMatcher Extended Software Development Kit (SDK) from Neurotechnology.

### Background

- ◆ **About BiH:** The government of Bosnia and Herzegovina is comprised of the administrative regions of the Federation of Bosnia and Herzegovina and The Republic of Srpska, with a third region, the Brčko District, which is administered by both.
- ◆ **The customer:** Headquartered in Banja Luka, the Agency for Identification Documents, Registers and Data Exchange (IDDEEA) of Bosnia and Herzegovina is responsible for the personalization and technical processing of passports, identity cards, driving licenses and other identification documents for the nation's more than 4.6 million people.
- ◆ **The need:** Bosnia and Herzegovina is a potential candidate for becoming a Member State of the European Union. EU standards require very high levels of security and quality in the process of issuing personal identification documents, particularly biometric passports and ID cards.
- ◆ **The solution:** IDDEEA developed the biometric identification system in-house using the MegaMatcher Extended SDK from Neurotechnology. The system, which was launched in October 2009, uses both MegaMatcher Client and MegaMatcher Cluster.

*“During the integration project, the most important thing was to have a complete, reliable solution,” said Boris Benda, Head of Support and Security Department IDDEEA. “There were some other companies considered, but it seemed to us that Neurotechnology had the most complete system to offer. After analyzing the products through a trial period, it showed that our positive speculations regarding Neurotechnology turned out to be true.”*

## **BiH Needed a Biometric ID System That Could Be Developed and Implemented Quickly, While Still Ensuring High Quality and Reliability**

Events over the past 20 years in the former Yugoslavia have led to large migrations of the population. This has made it difficult for governments in the region to keep accurate citizen records, as people sometimes claim citizenship in more than one new country or claim more than one identity in a single country. The government of Bosnia and Herzegovina recognized that the database of citizens they inherited from the previous government was not entirely accurate, so they set in motion a plan to issue new passports and ID cards with a biometric system that would enable the identification of duplicate identities and ensure accurate records of its citizenry.



In June 2008, as a result of the European Commission visa dialogue with all Western Balkan countries, the [Visa Liberalisation with Bosnia and Herzegovina Roadmap](#) was adopted, with the aim of eventually implementing a visa-free travel regime for BiH. A relatively short timeline was set, with one of the main conditions of the Roadmap being the issuance of biometric travel documents. BiH, which was already planning their biometric passport and ID program, accelerated their development efforts in

order to comply with the Roadmap timeline. At the same time, BiH needed to ensure that the new system would support the high standards for quality and security required for future entry into the European Union.

BiH considered offerings from a number of companies and determined that MegaMatcher Extended SDK from Neurotechnology provided the high quality face and fingerprint algorithms required meet EU standards in a SDK that enabled rapid development and deployment of the new system.

The biometric data identification system developed by IDDEEA was launched in October 2009. It uses MegaMatcher Client for enrollment and quality assurance and MegaMatcher Cluster Server to analyze biometric fingerprint data and identify duplicate identities in the system.

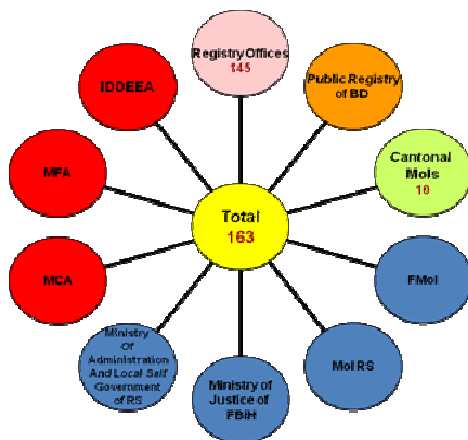


## How the System Works

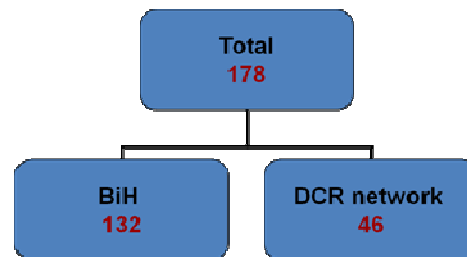
IDDEEA required a single system and workflow that would efficiently and cost-effectively connect the activities of multiple issuing authorities and affiliated government bodies while ensuring that the highest quality and security standards are maintained during the entire process.

In BiH, four different authorities manage the issuance of passports and ID cards: the Cantonal Ministries of Interior in the Federation of Bosnia and Herzegovina, the Ministry of Interior in the Republic of Srpska, the Public Register Brčko District in Brčko, and the Ministry of Foreign Affairs for all citizens who live abroad. The identity chain for issuance of personal documents in BiH includes 341 different physical locations in BiH and the diplomatic-consular network (DCR):

- 163 bodies/institutions on different levels of government (Picture 1)
- 178 locations for issuance of passports and ID cards (Picture 2)



Picture 1 – Institutions in the identity chain



Picture 2 – Number of locations for issuance of biometric passports

MegaMatcher Client is used for quality assurance during the biometric data acquisition process. When a citizen applies for a new or replacement passport or ID card in the field office, a digital photo is taken, four fingerprints are enrolled in the biometric system and the individual provides his or her signature. MegaMatcher Client is used in real-time to check the quality of each facial image and enrolled fingerprint image. If the defined quality level is not achieved, the process is repeated until high quality images are obtained. The typical enrollment process takes three to five minutes.

Once the high-quality facial and fingerprint images are confirmed by MegaMatcher Client, the images are sent to a central location where two types of identity checks take place:

- The biometric data identification system, based on MegaMatcher Cluster Server, records the data and checks fingerprint images against existing records to ensure that there are no duplicates in the system.

- Personal data is sent to the appropriate registry office, where it is checked against registers of birth, marriage and death to find any possible mismatches between IDDEEA's Central Register and the register in the appropriate registry office.

Next the personal data is checked against a register of individuals who are restricted from leaving the country. If a person appears on this registry, a passport will not be issued at that time.



When an applicant's data is validated and approved, the personalization process takes place. This process is done in a highly secured environment and involves the generation of the applicant's data page, personalization of the biometric chip, lamination of the data page, quality control and transport of the personalized documents to the issuing authorities.

Once the fingerprints are enrolled in the system, police and other law enforcement authorities are allowed to search the fingerprint database, provided these authorities meet appropriate legal requirements.

## MegaMatcher Provides a Powerful, Yet Cost-Effective Solution

MegaMatcher Cluster Server is designed to maximize the use of distributed computing to create a powerful system that provides both speed and accuracy at a fraction of the cost of larger systems.

The BiH biometric data identification system uses MegaMatcher Cluster on a series of 10 desktop PCs with 3Gb of RAM running Windows XP for MegaMatcher Cluster Nodes, and Intel Xeon 2Ghz, 4Gb RAM running Windows 2003 Server for MegaMatcher Cluster Server. MegaMatcher Client used in the field offices runs on the Windows XP operating system on desktop PCs with 1-2Gb of RAM. Facial images are captured using Canon PowerShot 110SX digital cameras and Dermalog Zf1 fingerprint scanners are used to capture fingerprint data.

*"The MegaMatcher SDK is well-written, with a lot of easy-to-use examples," said Đorđe Cvijanović, Adviser for System Security in the Office of the Director. "It is a very reliable system that is easy to use and administer. Another aspect of MegaMatcher that was important to us was the low cost-per-unit," Cvijanović continued. "Because MegaMatcher Cluster Server enables the use of distributed computing, we were able to develop a powerful system that utilizes multiple, inexpensive nodes rather than larger, more expensive hardware."*

Future plans for the system include implementing additional processes for verification of biometric data at the very start of the fingerprint enrollment process and again at the time of passport issuance to BiH citizens.

## About Neurotechnology Multi-biometrics

**MegaMatcher SDK** is designed for the development of large-scale automated fingerprint identification systems (AFIS) and multi-biometric identification systems using any combination of fingerprint, facial, iris or palmpoint biometrics. The identification algorithms in MegaMatcher were designed from the ground up to work alone or in combination to provide very fast 1:N (1 to many) matching with even higher reliability than AFIS or any other single biometric.

MegaMatcher's matching algorithm can match up to 1,200,000 faces per second, 160,000 fingerprint matches per second or 1,440,000 irises per second on a single processor (based on Intel Core2 processor with 4 cores running at 2.66 GHz). With Neurotechnology's fault-tolerant, scalable MegaMatcher Cluster Server cluster software, these numbers can be multiplied across multiple PCs. For very large applications MegaMatcher Accelerator or an Accelerator cluster can be used. Each single MegaMatcher Accelerator Extended system can store 30 million fingerprints or 50 million irises and matches 100 million fingerprints or 200 million irises per second. MegaMatcher's latent fingerprint template editing capabilities also allow it to be used in forensic AFIS applications.

MegaMatcher supports most biometric industry standards. The iris engine in MegaMatcher is NIST IREX-proven, and because the MegaMatcher fingerprint recognition algorithm is NIST MINEX-compliant, it is suitable for use in US Government Personal Identity Verification program fingerprint recognition applications.

### For more information:

#### **IDDEEA**

For more information about IDDEEA and the services they provide for the government of Bosnia and Herzegovina, go to: <http://www.iddeea.gov.ba>

#### **Neurotechnology**

For more information about MegaMatcher pricing, product capabilities and specifications as well as other products from Neurotechnology, go to: <http://www.neurotechnology.com>

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