# Technical Specification: Bio Cap

BioCap is a web-based data capture solution using a rich client concept to provide a thrilling graphical user interface. Based on our proven software architecture Annwyn, the solution contains various modules which can be combined by the user to form a certain workflow and run on a certain workstation. Services to applicants/citizens can be operator defined and fine tuned. Built in quality assurance measures and functions for all biometric images assure the storage and use of ICAO compliant photo and fingerprints The backend application server has all the services built in to provide the entire business logic for a document register, a civil register or even a national population register.

## Key Features

### User Friendly GUI

We put importance on the design of the graphical user interface to guide and optimize the workflow steps a user has to perform. We are combining vast functionality with ease of use to provide an intuitive and appealing user-interface.



### Architecture

The system architecture has been carefully designed from scratch to benefit from the latest trends in software development:

- **Service Oriented**: A modular service layer, based on messages, is used to glue the system together. This flexible design allows maximum extensibility without outgrowing the initial design.
- **Rich Client paradigm**: The intuitive and powerful user interface of desktop applications; the ubiquity and easy deployment of Web-based applications.
- **Truly scalable**: From a single machine setup to thousands of simultaneous users and an enterprise-grade cluster of servers. From a local network to later embrace the Internet or a virtual private network.
- Developed on the best-fit platforms: **Microsoft.NET** for the best end-user experience, robust and scalable **Java's J2EE** on the server side.
- Based on **standards**: For the best interoperability between different platforms and systems.

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### Online/Offline Mode

The smart clients based on our **Annwyn** architecture are capable of working either online or off-line. In offline mode, when no network connection is available the client works in an autonomous way. After reconnecting to the network all encrypted and temporarily stored data on the hard drive of the client is sent to the server and processed, transparent to the operator.

Taking our architecture to the extreme we can intentionally force the smart clients to work in offline mode for as long as we decide. At scheduled time intervals, by example daily or weekly, the client will connect to the network to send to the server the data that has been acquired locally and retrieve the latest information available in the server.

Technically speaking, this feature works thanks to the messaging infrastructure of Annwyn. **Annwyn** is a Service Oriented Architecture (SOA) and the communication to and from services is designed with a messaging paradigm in mind: there are request/response one-way messages, fine-grained updates that allow precise auditioning and batch processing, local caching of received messages and acquired data, local caching of messages to send for delayed delivery, pull technology for real time distribution of the latest data, etc.

## Optional Features

### Various Input Devices

BioCap is not developed for specific input devices only. Our architecture permits us to connect and integrate with little effort new external input devices like cameras, finger scanners, form scanners and signature pads.

Currently we support:

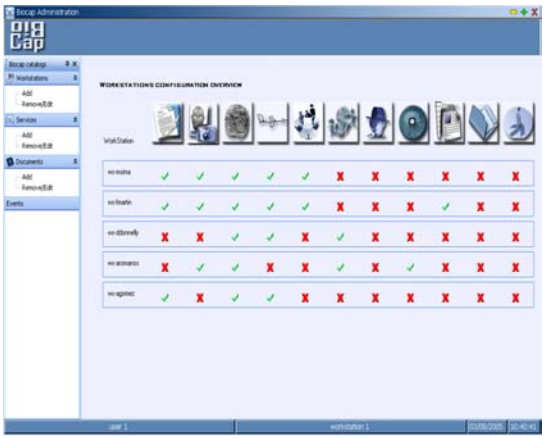
- Crossmatch Verifier 300
- Crossmatch Verifier 500
- Smiths Heimann LS2/Check
- Canon Powershot 85
- Videology live video camera
- Topaz SigGem 4 x 5

### Register

Due to its architectural concept, BioCap integrates seamlessly with a document register or population register. Our BioCap application server connects our population register to the smart clients of BioCap and provides other functionalities as well, to represent all business logic and rules of a document register. Please refer to our datasheet **Doculon** for more information.

## Modules & Functionality

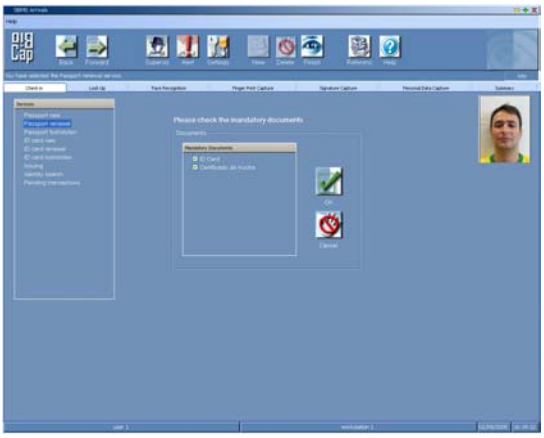
### Administration



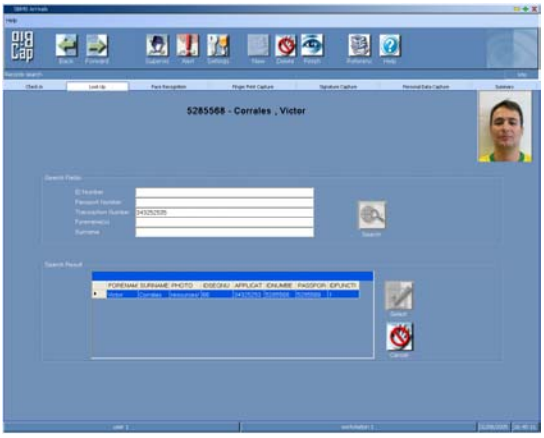
The administration application provides various functions to configure BioCap regarding its services, modules and database catalogues. BioCap is highly configurable to provide user organizations flexible means to organize their workflow.
The BioCap application can be configured by the end user so that various modules are working on dedicated workstation only, in order to create a workflow that suits the organization. For instance it is possible to configure a workstation that does all the image capture modules and another one that does all the demographics and prints the receipts. If a dedicated workstation is used to collect fees then such a configuration can be done using the administration application. The screenshot above shows how the various modules are assigned to physical workstations within the data capture system using BioCap.

### Check In

The Check In module is the first module in the workflow of BioCap. Its objective is to determine the service that the applicant requests and based on the chosen service is determines the business logic in the server and the workflow steps (modules) in the smart client.
CheckIn supports the check whether an applicants provides all the necessary papers or documents for that service by providing list boxes with all mandatory documents.
CheckIn also supports the creation of a unique transaction id that can either be printed as a barcode label or written on the application form or can be used to print a routing slip.



## Lookup




The Lookup module permits the search and retrieval of applicant records from the document register to determine if the applicant is eligible for the selected service. Certain input fields are designed and a scrollable result window helps to select from a list of hits. According to the business logic defined, the operator will be prompted whether the service can be granted or whether the service must be cancelled.

## Fee

For services that request the applicant to pay a fee for, the fee module is invoked and the payment is recorded accordingly. Basic cash register functions are available to consolidate and report payments. Optional an electronic cash register box can be connected to support the fee collection process.

## Photo

Photo is the photo live capture module inside the BioCap application. Photo is an easy to use module which is designed especially for capturing and obtaining uniform images of good quality, according to the standards for identification of documents that quality assures the images according to the ICAO standards and guidelines of photographs for travel documents. As a special feature photo will find the eyes automatically, will adapt the capture frame alongside the position of the eyes, and will automatically crop the image according to the pre-defined frame, if desired.

## Signature


Signature is the live signature capture module within the BioCap application.
The applicant has to sign on the signature pad while the operator can follow the signing process on the screen. If the signature is in the right shape the operator will click the "Take Image" button for taking the image. As a result the image of the signature will be shown enlarged as well as in the original size.
The operator can now optimize and adapt the signature according to his needs over the Advanced Functions Menu. The Menu provides the possibility to adapt the stroke strength, to define the measurements and choose from a pull-down menu the format for a travel document according to which the signature should be converted, i.e. passport, visa, ID card or custom. The operator also has the possibility to delete all the captured data to restart the process by a single mouse-click.

## Finger


Finger is the live fingerprint capture module inside the BioCap application.
Within the Admin module the operator defines for each service the respective fingerprints to be captured for that service. Depending on the selected service it is now predefined which fingerprints needs to be mandatory captured. Therefore only the mandatory fingers will be visible and labeled, the others not. To take a fingerprint the operator simply has to double click in the desired label. Furthermore the operator can perform a fingerprint match between the actual taken fingerprint and any previous captured and/or stored fingerprint, showing the verification score below each single image. In the Advance Functions Menu the operator can adjust the threshold for the matching function and the format of the images or disable a finger through right-click on the label, in case that the person does not have that finger for example. Needless to state that all the captured data can be easily deleted by one single mouse-click.

## Iris

Iris is the Live Iris Capture Module inside the BioCap application. It captures a high resolution image of the iris of the actual processed person. This capture process is optimized for the preparation of the taken image for biometric verification issues or to place it in an RFID chip as a biometrics identifier.

## Demographics

All demographics of an applicant will be recorded in this module. As much as possible we support default values, preset values and pull down menus to speed up the entry and increase accuracy.
This module is likely to be adjusted on a project by project basis to reflect the document register or database connected.
The business logic in the application server performs, based on the selected service, the necessary crosschecks, queries and external interface actions.


## Receipt

The Receipt is the summary module inside the BioCap application.


**SUMMARY SCREEN**
The summary screen displays all relevant information to be stored during the data capturing process, in order to let the user verify in a very fast way which information was captured and which information might be missing. The user can also print a summary and receipt by clicking the "Print" button in this page.

The upper part of the summary screen shows header information:

- Name of the service.
- Example: New Passport
- Customer first names and surnames
- Customer signature
- Customer live picture
- Transaction barcode generated or assigned during Check In

Below this, information about all other modules are displayed:

- Demographic data (Addresses, citizenship, etc.)
- Customer fingerprints for all the fingers available

**PRINTED SUMMARY & RECEIPT**

The summary & receipt is printed at the end of the capturing process and is given to the customer so that he/she can check that all the stored information is correct. If there was some mistaken information then the operator would open the module again and correct manually the errors, or would capture a fingerprint again, etc., whatever was wrong could be corrected after the summary & receipt was printed.

The summary & receipt also facilitates the later completion of a prematurely terminated process.

The receipt contains the following information:

- **Barcode**: It is read when the customer comes back to take his/her document so that his/her record is automatically obtained from the system and the issued document can be easily located, or the data capture process can be re-initiated.
- **Live picture**: The picture helps to ensure that the customer is issued with their own document and not somebody else's.
- **All** other captured data that the applicant may need to verify. This data will be project specific and totally configurable depending on the needs.

Upon request 2 separated documents can be printed to cater for customer specific preferences.

**Archive**

Within the archive module we enable the operator to scan all supporting documents that are part of an application and link them to the transaction and the data record in the register. Scanning mode and compression format and ration can be selected. This module is not a form scanning tool that automatically cuts and processes various part image parts; such module is an own application.

**Issue**

The Issue module supports the hand out of documents to applicants. The transaction barcode or number is read and the transaction is retrieved and displayed. Information where to search and identify quickly the document is being displayed to guide the operator to the right date, box and document number.

**Supervisor**

The supervisor application of the BioCap system at a location has exact the same functionality as an operator, to start with. Additionally he has a collapsible tool bar on the left side of the application window that permits him to perform special tasks according to his profile:

- Extended query and lookup function
- Query of external systems

- Statistics & Reports
- Exception report form
- BioCap administration
- others

**Help**

The BioCap suite has a comprehensive context-sensitive online Help System which provides a set of documentation for each single module of the BioCap suite in an easy accessible way.

When accessed, the Help System will open in a new Browser-window using Internet Explorer 6.0 or a compatible Internet Browser like Opera, Mozilla, Netscape, etc.
The Help System will start with an introduction page of what BioCap is all about and an introduction how to use the Online Help system. Afterwards, the Help will be self-explanatory and will guide the user through the documentation to the specific point of interest. Alternatively, a more proficient user is able to navigate directly to the Help-system using the contents, index or search menus.

Additionally there is the option to watch demos on how to handle the main features of the BioCap suite, such as CheckIn, Fee, Lookup, Photo, Signature, Finger, Iris, Demographics, Bookmarks are created to help the user navigate efficiently through the help document, in order to provide them with quick and comprehensive help. A supplementary printed version of the extensive Online Help serves as the User Manual.

# Technical Data

## Software Architecture

BioCap is based on our software architecture Annwyn. Its architecture follows the SOA paradigm: Service Oriented Architecture. This design methodology helps to build flexible solutions that can easily been upgraded and maintained. We are using all standards to maximize the interoperability and keep the architecture up to date: Web Services technologies, WSDL, SOAP, XML, XML Schema and others.

From a technical point of view, the BioCap consists of the following building blocks:

**The rich client applications:**
They are the BioCap, FormScan and Admin applications. All of them are .NET applications built over a common framework called Annwyn agent that is responsible for all the interactions with the service layer. They exploit all the grandeur of the User Interface on the Windows platform to offer an unparalleled user experience.

**BioCap Server**
VeriDoc Server is a J2EE 1.4 application running on the Oracle Application Server. It is possible to scale it either vertically, running multiple application servers on a single machine, or horizontally, were the application is seamlessly distributed between different machines on cluster or over the network.

The BioCap Service layer services the client applications and is built upon Web Services and Web authoring technologies (WS-I Web Services Basic Profile 1.1, SOAP 1.2, WSDL, XML, XML Schema, WebDAV). It has been designed based on a messaging paradigm, whereby everything is a message. These messages are written in XML and are checked against the grammar contained on an XML schema for validation and completeness. This data on transit can be signed and encrypted by using Web Services Security (WS-Security).

The Content Management System subsystem is based on Oracle Content Management SDK, included on Oracle Application Server. This subsystem is highly optimized to handle binary content. All the images the BioCap system has to process are managed by it.

The Persistent Engine subsystem, based on Oracle TopLink, is a layer between the business objects to data stored in a relational database. TopLink is an Object Relational Mapping (ORM) tool that allows clean application of object-oriented design, analysis, and programming techniques to the business logic whilst hiding the specifics of dealing with the relational system.

The Legacy Interface is a placeholder for different integration scenarios. The architecture is designed for being as open as possible and we support integration at the data store level by JCA (Java Connector Architecture) or JDBC (Java DataBase Connector) and TopLink. We can easily integrate with third-party Web Services, which is the preferred way.

The server side infrastructure is supported by Oracle products: Oracle Application Server and Oracle Database. They are supported on many combinations of hardware platforms and Operating Systems. Also, VeriDoc Server is a J2EE 1.4 fully conformant application and can be easy ported to any other J2EE Application Server such as IBM Websphere or BEA Weblogic. Finally, Oracle TopLink provides us with portability between databases.

Technical Infrastructure

- Client Environment
  - Windows XP
  - .NET Framework 1.1
- Server Environment
  - Oracle 10g DBMS
  - Oracle Application Server 10g
  - Supported Operating Systems: Windows Server 2000/2003, Solaris and Red Hat Linux
  - Supported Hardware Platforms: Intel x86, Itanium 2, AMD64 and Sparc.
- Development Tools:
  - Microsoft Visual Studio .NET
  - Oracle JDeveloper
  - Cognitec SDK, Identix SDK
- Digital camera, signature pad, live finger scanner