ELICO®
Connecting Science & Lab

60 INNOVATIVE YEARS ELICO

Case Studies

Software

Contents

1

XRF- Windows Presentation Framework Controls

The Customer

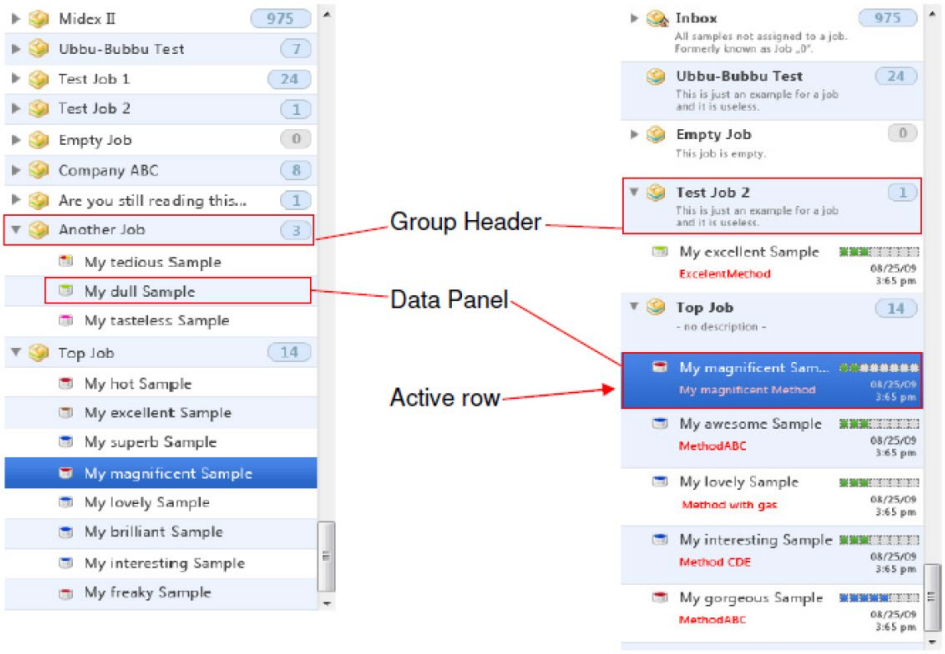
The customer is worldwide leading suppliers of analytical instruments, employing optical emission and X-ray fluorescence spectrometry technology, used for the elemental analysis of materials in industry, research and academia.

The Project

The Customer has imitated a new software platform for our XRF spectrometers, and requested ELICO to support in the development of following modules in WPF.

1. **A panel list for the display/presentation of list like data structures (scrollable, Grouping support).**
2. **Shell extensions: a generic module to integrate the XRF data within the Windows 7 / Vista explorer.**
3. **A spectrum control**
4. **A Report generator**
5. **A client server module to provide online update services**

Panel List Control: The PanelList control allows an eye candy, fast and flexible presentation of repeating sets of information in the Panels.



Salient Features

1. Support for hosting User Defined Custom Controls as List Items known as Panels.
2. Support for Fluent Scrolling.
3. Significant performance gain thru Panel Object Pool Implementation.
4. Support for Lazy Loading and Virtual Scrolling.
5. List Items Grouping and Sorting.
6. Runtime style switching based on the style package.
7. Windows 7 touch screen compatible.

The Advantage

1. Non-core & performance intensive modules of the XRF software have been outsourced to ELICO. Customer focuses on the core domain functionality.
2. Agile mode of development.
3. 2 year fixed project contract (6 months have been completed till date).
4. Milestone review done on-site with the customer team.
5. Development of control usage documentation.

2

Online & Benchtop Color Analysis Platforms

The Customer

The Customer is world leader in Color Analysis. The instruments are used in a wide variety of industries including building material, chemical, food, paint, paper, pharmaceutical, plastic, textile and many others.

The Project

Development of a Software application for Color Analysis of data acquired from an Online Process instrument and Bench Top Instruments. The Software is used in textile, plastic, paper, glass and metal industries.

Customer Issues

1. **The current software application being used is from an OEM vendor, which has been acquired by the client s competitor.**
2. **Legacy code of windows based application build in early 90 s running on Windows 3.1 available, which was written in Borland C++ Version 1.0.**
3. **The Online Software Application needs to run 24X7, QA Methodologies employed to make the application 100% crash proof.**

The Challenge

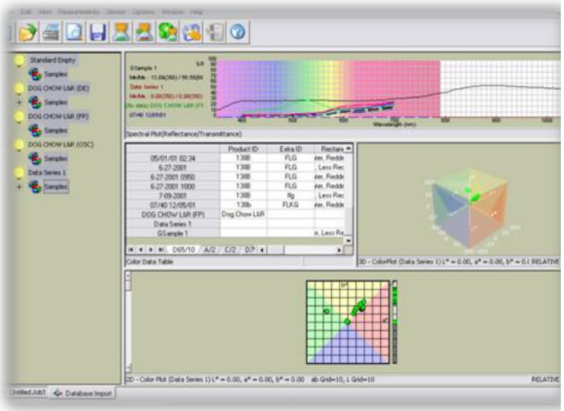
1. **The Client was participating in a Trade Fair, which happens only once in 3 years and wanted the basic functionality of the software application to be completed in less than 3 Months.**
2. **Acquiring the Domain Knowledge in Color Spectroscopy**

The Solution

1. Visual Studio 6.0 (VC++), COM & DCOM frameworks have been used for the Software Development.
2. Common Platform developed to be customized as per instrument requirements.
3. Supports more than 12 instruments.
4. XML used for data storage and archiving.
5. Support for multiple database SQL Server, Oracle.
6. Rational Purifier used for Unit Testing of the modules to eliminate memory leaks and possibility of access violations.
7. The Client has shipped the Online Color Process Instrument to ELICO on returnable loan basis for System testing.

The Advantage

1. The basic functionality of the software application was completed in less than 3 months; Client was able to demo the product at the Trade Fair.
2. Exposure to validation tools like Rational Purifier to make the product more stable.
3. Implementation of Sephaine Test Track pro software for bug & issue life cycle management, from Clients distributors and customers.
4. Scalability of the Project Team based on the New Customer requirements (CMR s)
5. To Provide Software Release and Configuration Management to the Client.
6. Billing based on Per Resource Cost rather than the conventional hourly cost rate



Customer Benefits

1. ELICO has been working with the customer for the past 15 years.
2. 7 Dedicated resources, Project Manager act as an extended engineering team for the customer.
3. Migrated the software platform from the Windows XP to Windows Vista to Windows 7.
4. New Platform initiated on WPF with web based access to the instrument.

3

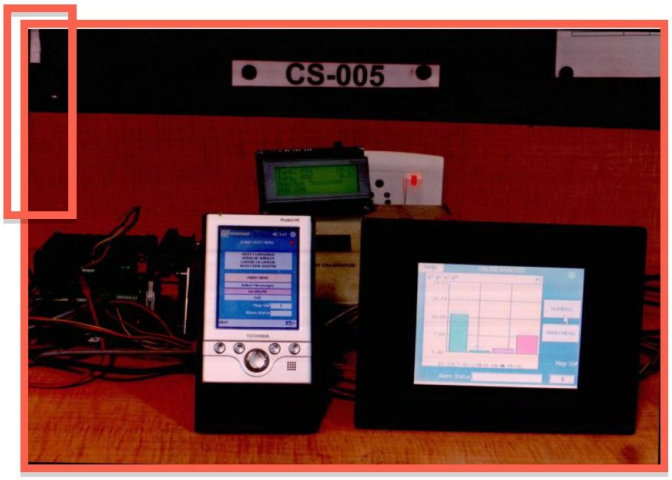
Windows CE Development

The Customer

A leading Instrumentation process instrumentation company in USA.

The Project

Development of Software Application on Windows CE for a Process Instrument to measures inline process turbidity, suspended solids and color.



Customer Issues

1. Project Management and Coordination with the teams located in Germany (Hardware
2. Design and Prototyping) and USA (System Integration).
3. Application User Interface Design to consider Pocket PC, Touch Screen terminals and
4. Desktop with different screen resolutions and easy navigation.
5. Support for multiple languages - German, English, French, Spanish, Simple Chinese etc.., which was not available default with the development environment.
6. Application to work on Mod-bus protocol, which is time-sensitive.
7. Internal Paperless data logger stores 8000 data points of historic data in HEX format inside the device memory, to be read into the pocket pc and process it in less than 45 Sec.
8. Re-usable components to be developed, which can be used on both Windows CE, Windows 98, NT, 2000 environments.

The Challenge

1. Project Management and Coordination with the teams located geographically.
2. The Serial Communication tools provided along with the Windows CE Development Platform are not suited for mod-bus protocol communication.
3. The application has more than 40 User Interface screen, development of easy navigation and intuitive user interface model.

The Solution

1. Developed Communication and Documentation methodologies, which was later implemented across all the teams in Germany and USA.
2. Development of Custom C++ Serial interface Driver for Windows CE serial communications, which takes care of data conversion from HEX to ASCII using UNION concept and increasing the processing speed.
3. Build the application based on Windows CE Logo Certification Guidelines.
4. eVC++ and eVB have been chosen as software development platform, advantages of both the tools have been used as a part the Project.
5. Single source code code graph control has been developed in eVC++, which runs on Windows CE and Window 9X Platforms. Integrates as ActiveX control in the main application.

The Advantage

1. Availability of resources with cross-functional technical expertise to take advantage of multiple development tools.
2. Multiple teams provide 24X7 support to coordinate activities with teams across the globe, but billed based on a single resource cost.

4

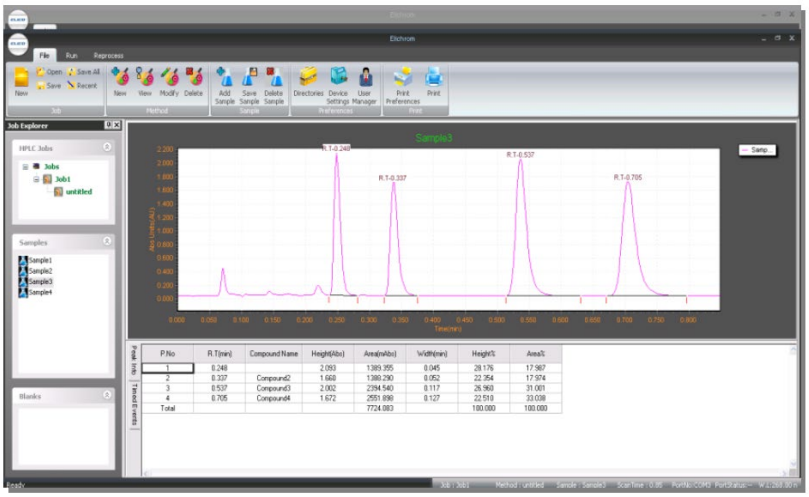
Chromatography Data Analysis System (CDS)

The Customer

A German based company, manufacturer of chromatography & UV-Visible Spectrophotometers.

The Project

1. Analyzing the legacy C++ Source code written using Neuron Open Data Interface Toolkit of a Chromatography Data System (CDS). Understanding and Documenting the Peak Detection, Integration, Data Acquisition and Data Processing algorithms.
2. Development of Chromatography Data Analysis (CDS) Software.



Client Issues

1. The major part of the core Software is in DOS architecture, using a flat memory model.
2. The Graphical User Interface is though Neuron Open Interface Toolkit and major parts of the software emulating DOS.
3. Required breaking down the application and documenting to the algorithmic level.
4. Implementation of the new software in Visual Studio 2008, VC++.

The Challenge

1. The client was unable to provide us with the source code compiler, since only 1 License available and, which was required for maintenance of existing installations.
2. The Source Code Size spans in the range to 80,000 to 1,00,000 lines.
3. NO Documentation available.

The Solution

1. Reviewed the existing source code.
2. Identified the Major modules in application, documented the overall application architecture.
3. Reviewed each major module and highlighted the algorithms.
4. Documented each individual Algorithm, sighted examples for better understanding.

The Advantage

1. To Perform the Code Documentation & Algorithm Analysis without having the compiler.(Without disturbing the existing maintenance setup of the client).
2. Detailed Desgin Document and Low level program specifications with PESUDO CODE have been prepared, which could be used as input for Re-engineering the existing application in a new platform
3. The project was completed in less than 1 year.

5

CFR Part11 Toolkit

The Customer

An UK based company, leading manufacturer of Life Sciences Products.

The Project

Implementation of add-on software modules for an UV Visible Analytical instrument and Chromatography Data System (CDS) with data acquisition and processing capabilities to meet the requirements of FDA - 21 CFR Part 11.

Customer Issues

1. **The existing Software Product is not 21 CFR Part 11 compliant, which is requirement of the FDA to maintain electronic records.**
2. **Functional Specification Document & Implementation details on, how each module meets the regulatory requirement to be provided to the customer based on the runtime executable before the contract was signed.**

The Challenge

1. **The add-on modules integration requires minimal changes in the source code.**
2. **The source code should have a command line option to compile as CFR part 11 executable or as regular executable.**

The Solution

1. A detailed Gap analysis report has been prepared based on the FDA CFR Part 11 guidelines with respect to the software.
2. The add-on modules have been design as VC++ COM components based on the plug & play architecture.
3. A detailed documentation has been provided to the client explaining the changes to made to the source code, when a new feature needs to be added into the software to make it CFR part 11 compliant.
4. Some of the features implemented include
5. System Logins and Passwords integrated with
    i. Windows NT/XP/VISTA.
    ii. Access Control and User Privileges.
    iii. Auto Detection of Data Tampering.
    iv. Comprehensive Audit Log.
    v. Electronic Signature records.

The Advantage

1. In-house expertise with domain knowledge in execution of CFR part 11 regulatory compliance projects.
2. Our software development process is ISO 9001:2000, CMMI Level 3 compliant and meets the requirements of US FDA or audit.
3. Project duration less than 6 months including final validation from customer.

6

Ion Mobility Spectroscopy (IMS) Software

The Customer

World Leader in Home Land Security provides government regulated technology products and advanced services to security experts and governments worldwide, for threat detection.

The Project

Development of PROCLAIMS® PC Software based on Ion Mobility Spectrometry (IMS) for pharmaceutical applications including cleaning validation/verification, containment studies, and personal air monitoring.

Customer Issues

1. **The customer wanted to develop a new vertical for pharma.**
2. **The detection technology used for homeland security purposes, need to be incorporated in the new product.**
3. **Product Manager was only available, no technical team.**

The Challenge

1. **Interactions with the end customer to draft the product requirements.**
2. **Understanding the complex data analysis algorithms.**
3. **Complete responsibility of the software from concept to product release.**

The Solution

1. Benchmarking of available products in the market.
2. Agile software development processed has been followed.
3. Mock UI made for the customer to get the feedback from the market.
4. Day to day communication with the Product Manager.
5. The UI Look & Feel made similar to the CDS, because of the same user profile.
6. Software Feature include
    i. Client/ Server Architecture
    ii. A simplified wizard to aid in method development
    iii. The capability to overlay plasmagrams
    iv. The ability to run multiple methods on up to 120 samples
    v. Universal Database support (SQL/Oracle)
    vi. 21 CFR Part 11 Compliant

The Advantage

1. Availability of cross-function resources.
2. Application Domain Knowledge (PhD chemists involved as part of the team).
3. Project executed in 8 months with a team size of 7 resources.
4. Automation Scripting using QTP for Regression testing.
5. Fixed cost pricing
6. On-site visits for product validation.

7

iSoilLab – Integrated Soil Laboratory Information Management System

The Customer

A Farmers Fertilizer Cooperative Limited, a leading Player in the domestic market, which is making substantial contribution to the efforts of Indian Government to increase food grain production in the country.

The Project

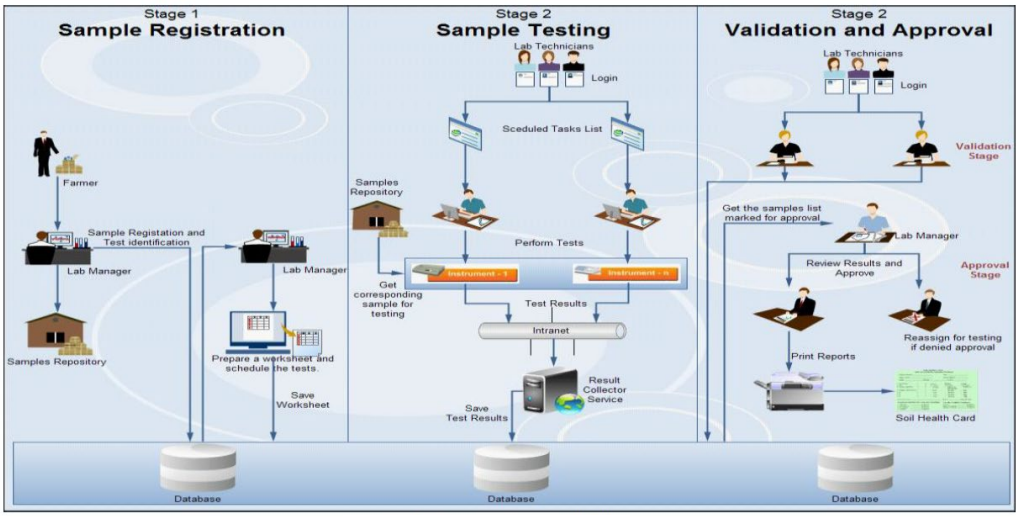
Development of iSoilLab, a Web based application, which will assist the Soil testing Departments from easy Soil Test Sample registration to automatic report generation based on ready Reckoners.

Customer Issues

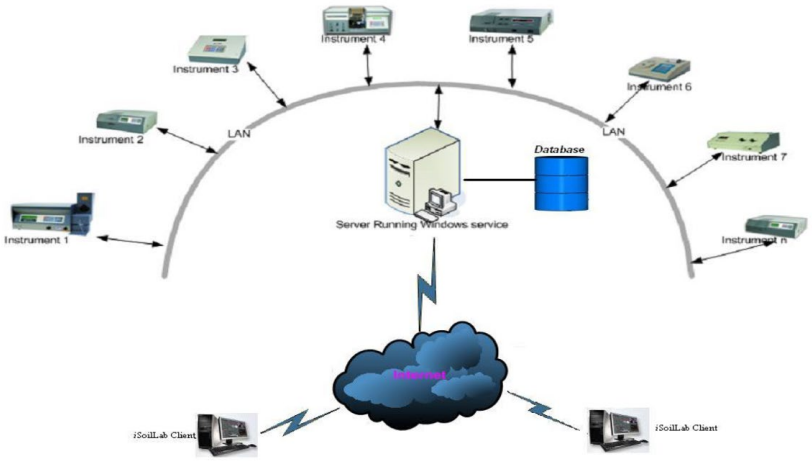
1. **Integration of instruments in the Soil Laboratory**
2. **The customer wanted to automate the existing Soil Testing Work Flow and Work Sheet Management.**
3. **Providing authorized personal, the privilege to select what tests to be performed on a particular sample and keep track of assigned tasks.**
4. **Automated Recording of the Soil sample test results from instruments to a networked database for later usage.**
5. **Validation of sample results by authorized personal and Report generation of sample.**

The Challenge

1. **Defining a generic Protocol for logging the Soil Sample Test results from different type of Soil test instruments.**
2. **Defining a customizable Soil Sample Test Workflow management.**
3. **Report generation of samples in preferred language, once the sample is done with complete testing.**



Soil Testing Workflow



The Solution

1. Mock UI made for the customer to get the feedback.
2. Agile software development process has been followed.
3. Day to day Interaction with the Customer.
4. Software features include
    i. A SOA based Web Application.
    ii. A simplified wizard for Creating and Managing the Soil Test Workflow.
    iii. A network service to collect the test result data from different Soil Test instruments connected in network.
    iv. Assigning, Scheduling and Tracking the Soil Tests for a given sample.
    v. Authorize the Users /Group to perform the operations based on their Access Privileges.
    vi. Generate and Send the Reports as hard copy or e-mail.
    vii. Database Support for PostgreSQL, SQL and Oracle.

The Advantage

1. Application domain expertise.
2. Ensure the testing and managing of laboratory samples efficiently.
3. Project executed in 8 months with a team size of 4 resources.
4. Fixed cost pricing for the project.

8

GTF & Dilatometer Software using LabVIEW

The Customer

A World leader in manufacturing the instruments for Pyrometric Monitoring Devices for Thermal processing and Design and build Analytical Instruments for measuring Thermal properties for Ceramics and Glass.

The Project

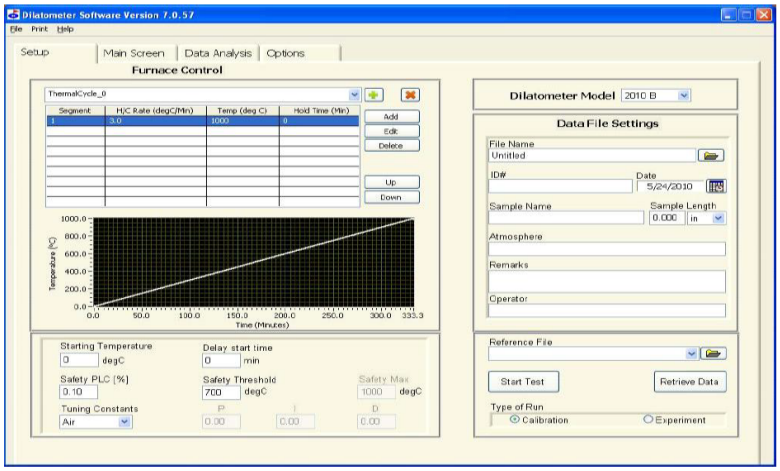
Development of two LabVIEW based applications to control, monitor, acquire and analyze the data from Gradient Thermal Furnace (GTF) and Dilatometer interments respectively.

Customer Issues

1. **The customer has a earlier product in Visual Basic, and required the new software in the LabVIEW**
2. **Complete Application development in LabVIEW using its Graphical G+ language.**
3. **Communication with the instrument by using the VISA runtime of LABVIEW.**
4. **Store the result data into a file for later reviewing.**
5. **Printing and Report Generation.**
6. **Multi lingual support.**

The Challenge

1. **Defining the complete application flow based on the fundamental specifications.**
2. **Understand and Implement the typical algorithms used for the Data Analysis part of the project.**
3. **Refactoring the existing Dilatometer code with new enhanced UI and Analysis features.**
4. **Design Support for easily integrate the new feature additions in software based on Client's feedback.**
5. **Complete the application development in a short period.**



The Solution

1. Modular design of the Applications for easy maintainability.
2. Support the Dilatometer application to be used with different models Dilatometer instruments manufactured by the customer.
3. Developed Communication module using LabVIEW's VISA runtime.
4. Graphical Presentation of all the Data Analysis algorithms.
5. Customized Data Serialization and Report Printing.

The Advantage

1. Providing LabVIEW expertise to the customer.
2. Incorporating LabVIEW best practices.
3. Project is executed in 12 months with a team size of 2 resources.
4. Resource based costing for the project.

9

Software Test Scripting and Automation

Setting up an offshore Quality Assurance Centre for an US Multinational Company.

Client Issues

1. MNC has been facing various issues concerning the Release, Testing and Maintenance of high value software product.
2. Product is generic in nature and needs to be customized each specific customer, which requires considerable.
3. Good amount of manual testing & automation before the product is shipped to the customer.
4. Flexible Quality Assurance team based on the business requirements.
5. Requirement of testing to be a 24X7 activity during the life cycle of the new release of the software.

The Challenges

1. Implementing the configuration management process for Test Asset specifically for test script or Project Requirement.
2. Defining the Test Strategies for the complete Product Life Cycle of the software.
3. Identifying the right automation tool for the Project based on the Application under test.
4. Identifying the regression test cases.
5. Debugging the Automation Test Scripts.
6. Identifying the re-usability of test scripts and enhancing the test scripts.
7. Co-ordinate and Collaborate the test results between Testing and Development teams more effectively and efficiently.

Customer Issues

- Provide an Effective Test Automation Process for Example
    i. By preparing Effective Test Plan
    ii. By using Reuse Concept
    iii. By using Data Driven Approach
    iv. Configuration Management for Test Script.

- Provide the complete testing of Software Product which includes
    i. Graphical User Interface Testing
    ii. Functional and Regression Testing
    iii. Localization Testing
    iv. Compatibility Testing
    v. Configuration Testing
    vi. Performance Testing
    vii. Installation Testing

- Complete involvement of the testing team throughout the Product Life cycle.
- Generate a report on Manual or Automation testing and Stability of Product Quality.

The Advantage

1. 10 dedicated resources deployed on the project
2. 24X7 Test Facility.
3. Development of test cases ahead of UI development.
4. Quick response to customer issues.
5. Low Cost Offshore QA Model.

www.elico.co

ELICO®

An ISO 9001:2018 | 14001 | 27001 Certified Company

B-90, A.P.I.E., Sanathnagar,
Hyderabad 500 018,
Telangana., India

Tel +91 40 44451234
Fax +91 40 23771639
Email info@elico.co

© 2023 Elico. All rights reservd.