



I N C O G E N

INCOPEN Professional Services

Custom Solutions for Life Science Informatics

Whitepaper

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Introduction

INCOGEN, Inc. is an experienced leader in providing customized informatics solutions for life science corporations, institutes and laboratories of all types and sizes. Through INCOGEN Professional Services, the company offers industry-leading technological expertise to assist researchers with every phase of design, development and implementation of their informatics environment. INCOGEN Professional Services capabilities range from providing advice regarding a specific aspect of an application or infrastructure to performing complete turn-key operations. Through INCOGEN's *unmatched commitment to customer satisfaction* and state-of-the-art tools, the company continues its role as one of the leaders and innovators in the rapidly evolving field of life science informatics.

For many scientific research groups, evaluating the technologies required to support a project can be daunting, let alone implementing and maintaining them. The breadth of solutions available both within and beyond the life science field is extensive, and in most cases more than one solution is applicable to the problem at hand. More challenging, however, and in fact more common, is the discovery that no solution specific to the problem exists. Over the years, INCOGEN Professional Services has created a broad suite of customizable, extensible software components that can quickly be assembled into a base platform upon which use-specific enhancements can be built. In this way, INCOGEN enables researchers to accelerate knowledge discovery by providing tools to optimize the analysis, mining, and management of life science data.

INCOGEN also provides several distribution-ready products, such as the High Density Filter Reader (HDFR™), Multiple-Application Gel Analyzer (Magelan™), GenePort®, and the Visual Integrated Bioinformatics Environment (VIBE™). To ensure quality of our custom bioinformatics solutions, we apply the same rigorous procedures to all aspects of our Professional Services creations, from thoughtful requirements analysis through complete system testing.

Our Experience

Experience matters. INCOGEN introduced its consulting and turn-key services to the life science community seven years ago and has since then provided unmatched customer satisfaction while meeting its customers' business and technology requirements. The broad technical base of our professionals ensures INCOGEN's ability to maximize and leverage your existing technology investments while advancing your overall research environment.

INCOGEN Professional

Services represents the best choice for scientists looking to maximize their return on investment through:

- » *increased productivity*
- » *reduced operational costs*
- » *a flexible and extensible research environment.*

The list of customers who continue to benefit from INCOGEN Professional Services spans the entire industry. It includes single labs at universities such as the University of Delaware and Michigan State University, as well as large pharmaceutical, agricultural and biotechnology companies, such as Novartis, Syngenta, BASF, and Sigma - Aldrich. INCOGEN has also been engaged by the United States Department of Agriculture and the Federal Bureau of Investigation. These projects have ranged from small-scale data processing to site-wide data warehouse and web-access infrastructures to multi-application integration for data and analysis requirements.

The flow of information and access to data is critical to the success of your project. We understand that effective, system-level knowledge management goes beyond simple "data integration" and strive to provide you with the ability to correlate information on various levels to maximize the knowledge extracted from your raw data.

What can INCOGEN do for you?

- **Data management and access:** Back-end storage, correlation and transformation, web- and rich-client user access
- **Software outsourcing:** Component or whole application design, implementation and testing
- Project design and implementation **planning**
- Scientific application or site **hosting**

Trusted Advisor and Long-Term Partner

An expert life science informatics professional will work with you and your staff to gather your requirements, and be your liaison as the INCOGEN Professional Services engineers design and implement the proper solution for your needs. You will receive a comprehensive requirements specification and design documentation that includes hardware configurations, database schemas, user interfaces and experience, as well as a precise timeline and cost of the entire project. At every stage of the project, you will rest assured knowing exactly what to expect and exactly what will come from your investment.

After the completion of the development phase, INCOGEN continues its involvement by training and mentoring you or your IT staff to independently operate the installed software or system. In the case of any solution involving a back-end component (such as a database or website), you may also choose to have the system hosted on one of INCOGEN's state-of-the-art computational servers and access it remotely over a secure connection. This option proves popular with organizations that wish to avoid any administrative or computational maintenance issues.

INCOGEN provides unsurpassed customer satisfaction and return. Our professionals are proud of the very high percentage of customers who return to INCOGEN for their additional needs, months or years after the initial project.

Cost

Engineering software systems from square one is always expensive. Over the last several years, INCOGEN developers have created an extensive library of modules that can be used to quickly and efficiently develop a solution that often costs significantly less than the equivalent in-house development. In addition to saving costs, outsourcing also greatly reduces development time, as compared to most in-house development. This allows scientists faster access to the software tools they need for their research. Our experience ensures a quality and longevity of work that few in-house development teams can match.

CIO Magazine has published an overview of the cost and time savings that can be obtained when outsourcing software development.

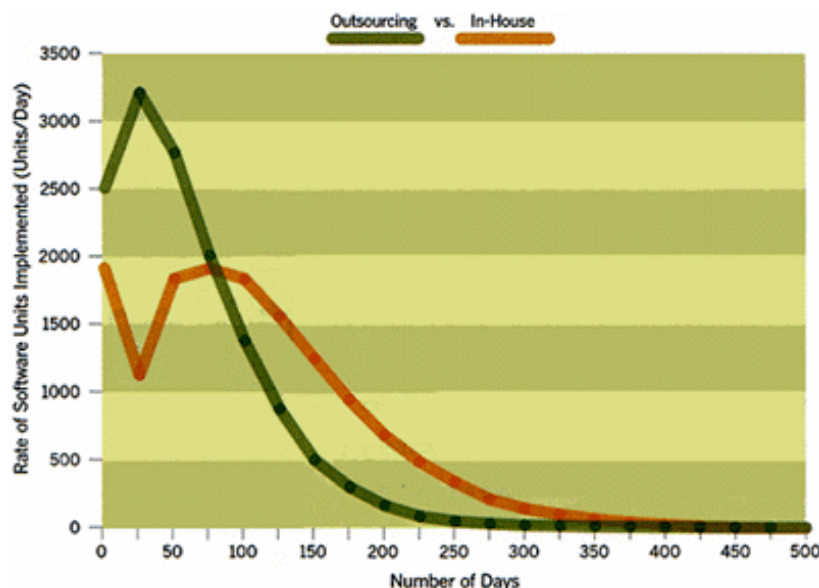


Figure 1: Development Time - In-house vs. Outsourced; Source: IDC (A Sister company to CIO'S Publisher, CXO Media) Document #27743, "In-house Versus Outsourced: A Systems Dynamic Comparison"

The complete CIO Magazine article is available at this URL: http://www.cio.com/archive/020103/tl_numbers.html



1. Bioinformatics Infrastructure Development: Data Warehouse Design

By taking advantage of INCOGEN's expertise in data warehouse design, clients minimize the risk of this large and avoidable expense. Of course, all information regarding the design is made available to the client, which allows them to be self-sufficient and not rely on continued support, if so desired.

Further, the choice of database implementations – such as Oracle, MySQL, or Microsoft SqlServer – can have an impact on performance, cost and design considerations. Certain capabilities or limitations can be exploited or avoided by the INCOGEN engineers who have extensive practical experience with a variety of such choices as specifically applied to life science data.

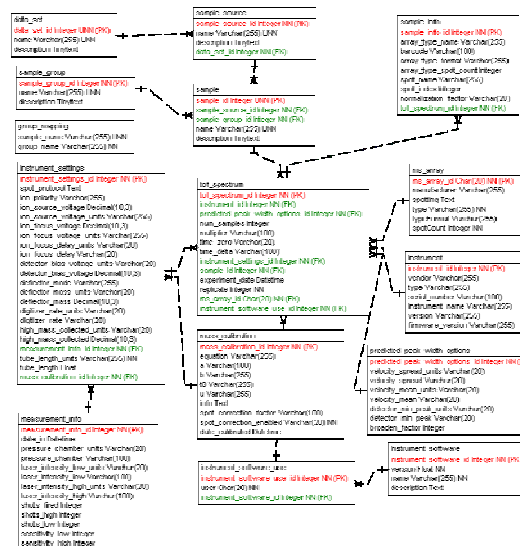


Figure 2: Sample Database Schema

2. Bioinformatics Infrastructure Development: Design and Implementation of High-throughput Analysis Pipelines

and use of industry standards such as XML and Perl provide flexibility and extensibility of data capture, analysis, and mining pipelines. The source code for all scripts and programs is made available to facilitate independent in-house development and future modifications.

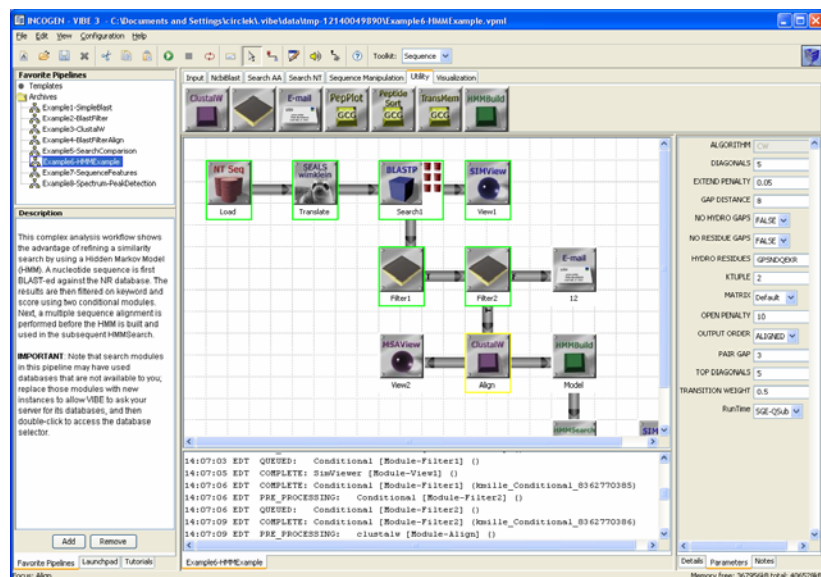


Figure 3: Sample Sequence Analysis Pipeline in mid-execution.

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Most existing in-house computational tools or scripts can also be integrated into the workflow platform and frequently become the cornerstone of a pipelining solution for the Professional Services client. INCOGEN recognizes the investment you have already made to facilitate internal tasks and processes and maximizes that value by improving its accessibility, utility and performance.



3. Web-based Project Management Tools

The INCOGEN research team recognizes the value of easily accessible high-level tools to manage and coordinate the status of multiple research projects. A web-based, client-server architecture provides efficient and user-friendly information exchange and a means of collaboration with a colleague “down the hall” or across the world. Multi-level authentication protocols ensure that only authorized users are able to access or modify project information according to the organization’s desired policy.

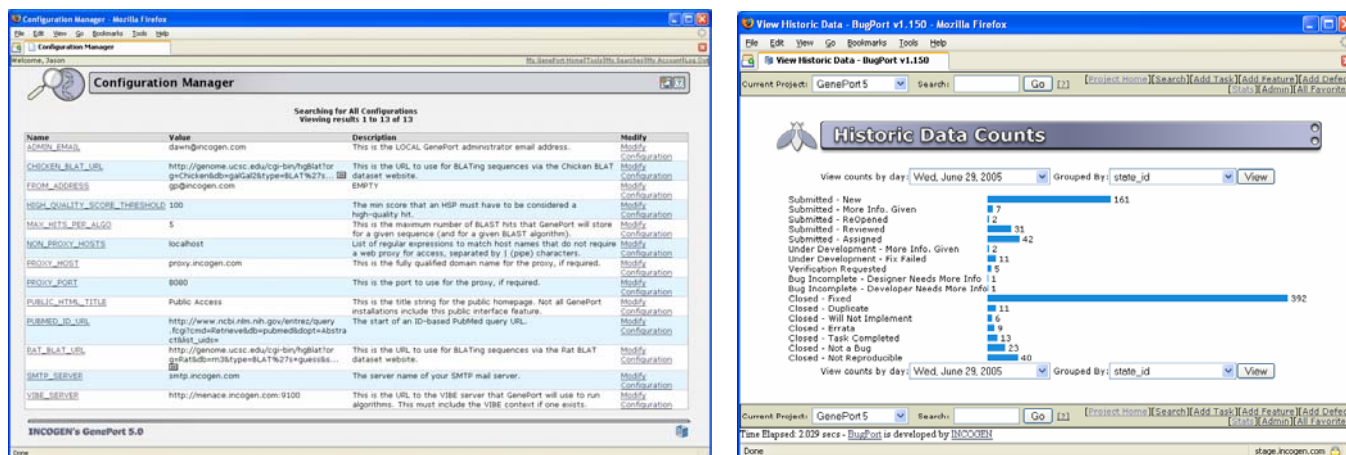


Figure 4: Management web sites with different purposes built from the same components.

4. Design and Implementation of Data Management and Data Mining Tools

Similar to the philosophy concerning project management, INCOGEN solutions provide researchers with web-based and/or standalone tools to manage, manipulate and further analyze data. Intuitive and user-friendly web pages and software components provide simple interfaces to powerful search agents and data mining tools. These types of tools are standard components for any service engagement involving a data warehouse, and the tools can also be adapted to fit an existing schema.

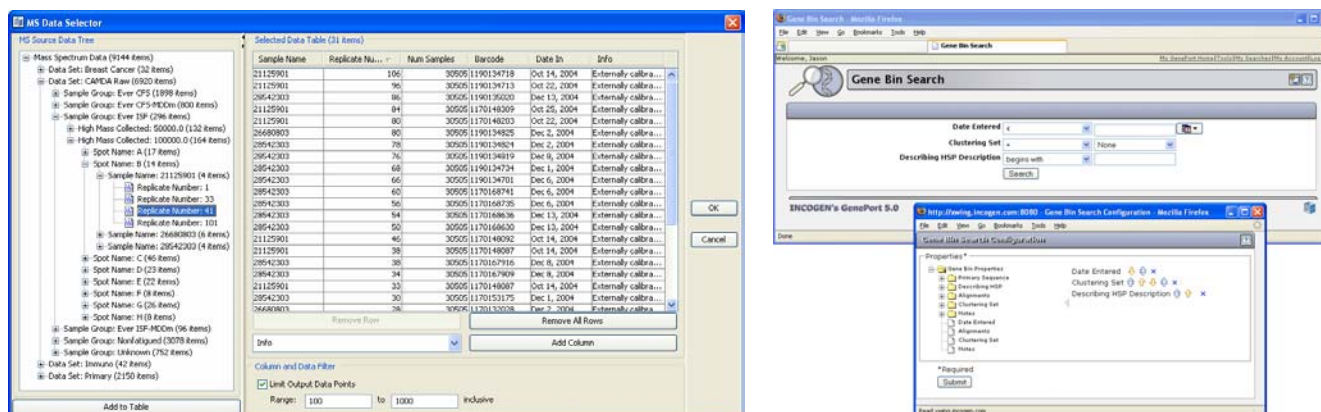


Figure 5: Workstation- and web-based tools for browsing and manipulating stored data.



5. Web-based Data Integration, Visualization, Analysis, and Dissemination

INCOGEN has developed a suite of visual interfaces to provide rich, state-of-the-art, graphical tools to interact with data and analysis results. For web users, the resources deliver portal-type, top-down access to data and analysis information, cross-referenced with related data elements to give the researcher a broader context for an individual data item. Many INCOGEN viewers can be used within a browser for easy access or as a stand-alone tool for more localized usage. In addition to browser-based tools, fully independent, stand-alone applications can be developed and implemented, as user requirements dictate.

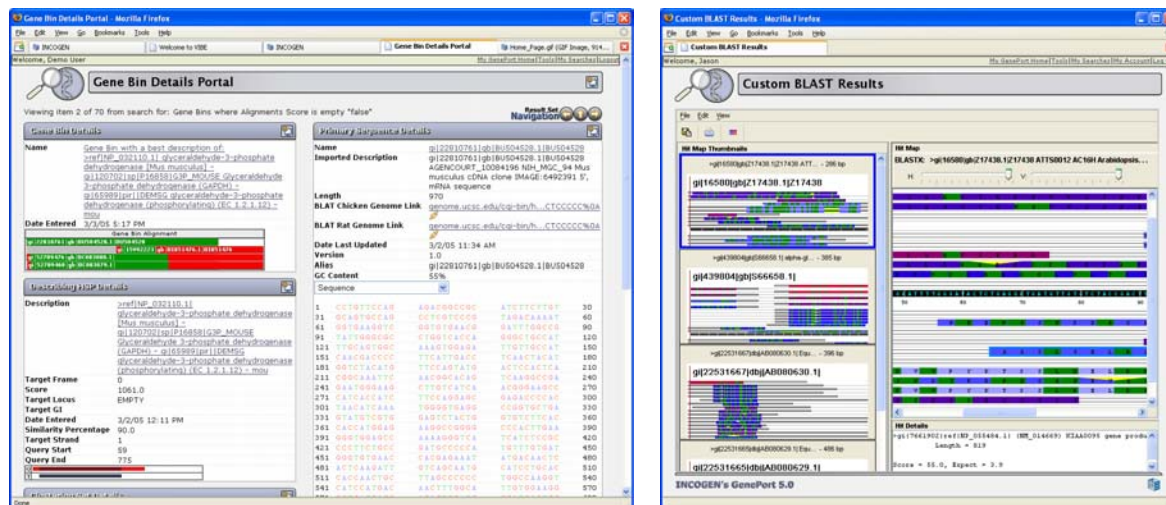


Figure 6: Portal-style data visualization and an interactive graphical results viewer.

5. Web-based System Administration Tools

Project administrators (Researchers or System Administrators) rarely have the time and may not have the expertise to administer a project and data management system in a low-level (i.e. command-line) environment. For all INCOGEN Professional Services solutions that involve site-specific configuration or automated tasks, a suite of browser-based system administration tools is available to make this task as user-friendly and efficient as possible. A secure intranet provides information on issues such as system performance, web access history, and data tracking and importing.

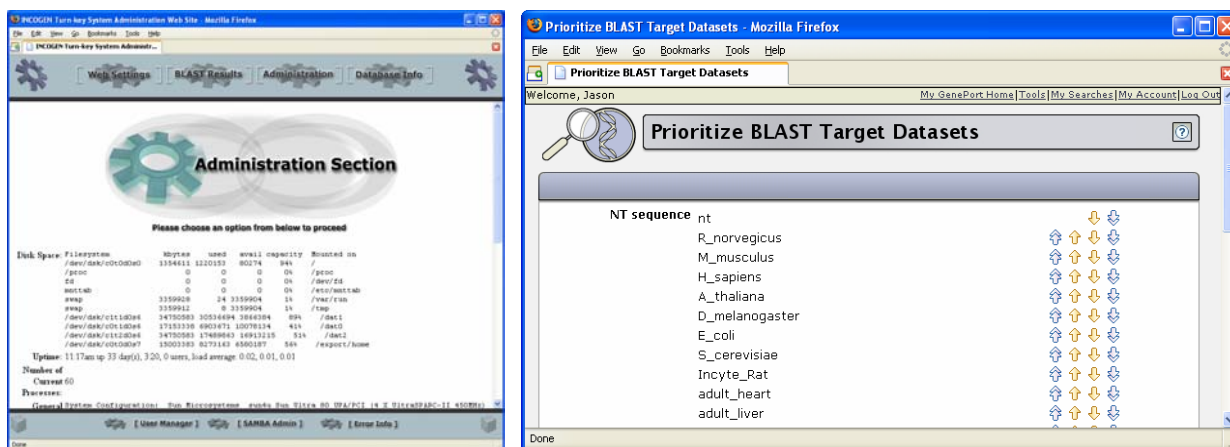


Figure 7: Web-browser-based administration tools.

Typical Engagement Process

The typical engagement process for INCOGEN Professional Services entails an extensive effort by the INCOGEN development team to fully understand the project details and the needs of the customer. Initial email, phone, and face-to-face information exchange results in the development of a pre-proposal. The pre-proposal is a preliminary document that identifies the needs and specifies the requirements of a given project and includes recommendations about hardware, operating systems, and third party software. The pre-proposal also serves as a preliminary document to the full proposal which specifies the following three items: 1) Deliverables, 2) Time Frame (Project Duration), and 3) Costs – typically involving a multi-stage payment plan.

The proposal undergoes several iterations of design updates based on client feedback to clearly specify all aspects of the project, as well as milestones and project report requirements. This document provides clear guidelines for the developers and eliminates all assumptions during the entire process. These iterations continue until the expectations of the client and the INCOGEN team are in perfect harmony.

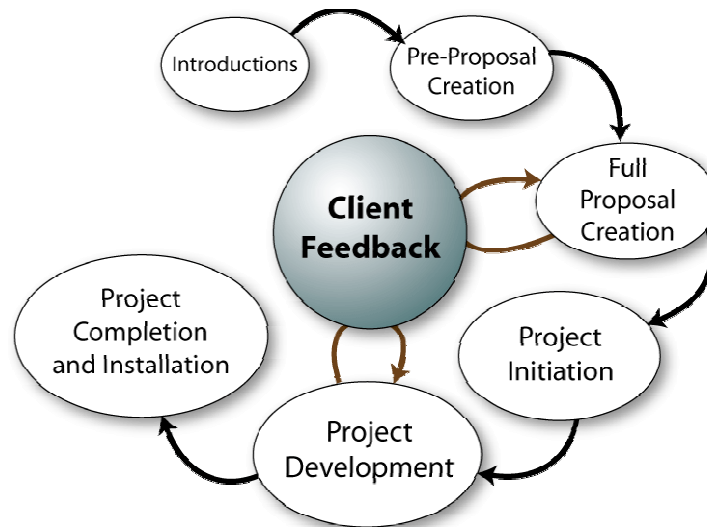


Figure 8 - Project Stages

Once a project is initiated, a secure web site provides customers with immediate access to new developments as the project unfolds. In a similar fashion for stand-alone projects, periodic WebEx online demonstrations or incremental installations on-site are performed. This access allows customers to provide feedback about the design, tools, interfaces, and other aspects of the project. This instant feedback ensures complete satisfaction and minimizes re-development time. Additionally, throughout the implementation phase of the project, the Professional Services liaison arranges phone or WebEx meetings with the customer to deliver progress reports and ensure that the project path is still appropriate. Full system or application documentation is an integral part of the delivery as well.

The customer relationship does not end once the project has been completed. A client may elect to receive training for any personnel on the developed software or system, conducted on-site with the production system. All Professional Services implementations are also accompanied by a support and upgrades contract, providing the client with a route to follow should help or changes be required. Finally, hosting and maintenance by INCOGEN are available for most engagements.



Summary

At INCOGEN we are committed to accelerating knowledge discovery by providing tools to optimize the analysis, mining and management of life science data. Our continuing goals are to meet and exceed the expectations placed on us by our customers and to discover new avenues leading to the advancement of life science informatics. Through the INCOGEN Professional Services, we empower scientists with the necessary infrastructure that allows them to focus their efforts on the science behind their project and keep pace with this rapidly evolving field.

Additional Information

For more information, simply contact INCOGEN at info@incogen.com and we will be happy to discuss your needs in more detail.

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