

Intellix



Automating Expertise

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A Birds Eye View of Intellix

*What began as an artificial intelligence learning solution launched in the mid 1990's has expanded today into the **Intellix Designer** and **Intellix Expertise Server**: forming a unique decision support tool improving excellence in business operations through the automation of expert advice. The Intellix product suite combines human experience and breakthrough learning systems in a straightforward, easily understandable manner allowing customers to create effective and meaningful knowledge solutions.*

The Knowledge Management market

Intellix participates in the fast growing multi-billion dollar knowledge management market.

Global Knowledge Management market revenues were an estimated \$34.17 billion in 2007. United States leads the global market, with revenues estimated to exceed US \$20.6 billion by the end of the year 2008. Knowledge Management Services are estimated to account for about 67.6% of the global knowledge management revenues, at an estimated US \$31.21 billion in 2008. Worldwide, Knowledge Management Software revenues are projected to grow at a CAGR of 45.3% over the years 2002 through 2010. Global Knowledge Management market revenues are projected to exceed \$157 billion by the year 2012 (source: Global Industry Analysts, Inc.).

The reasons for this growth are simple: knowledge and information management remains a key driver of cost reduction and success for businesses today. Against this backdrop, many companies also face labour shortages and skill deficiencies – not to mention an aging workforce. These trends are causing some concern as the loss of key personnel requires expensive rebuilding of organizational expertise.

Task automation

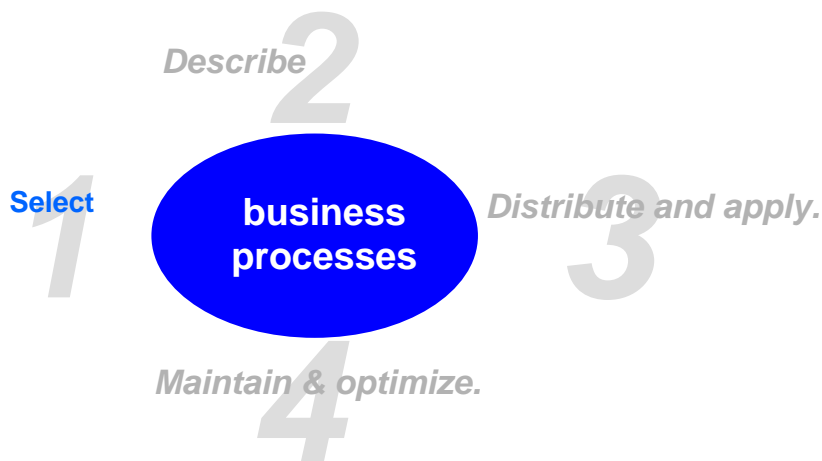
Intellix knows that human experts are rare, and where possible, human resources should be used for tasks that are complex and of a high-value added nature. Intellix could theoretically help any industry with their approach, from gardeners to medical doctors, though the current product range targets four key industries: the healthcare-, process-, financial services- and government sector. Within these industries, repetitive tasks have tended to be automated, but complex, infrequent ones have not.

As the frequency of a task increases, it often becomes cost-effective to automate it. However, many tasks are performed infrequently, or change often enough to make it seemingly not worthwhile to automate. Intellix significantly lowers the cost for companies to automate tasks by allowing the experts themselves to automate their own expertise, and therefore opens up a number of possibilities for companies to improve operational excellence.

Intellix -- unique in the market

Intellix develops software that helps companies automate decision processes to improve consistency, lower costs and promote innovation. Intellix' focus is on 'Business to Employee' or 'Expert to Employee' applications, where the knowledge of a company's experts is distributed throughout the organization. An Intellix project is easy to roll out, and an XML framework ensures easy integration to back-end systems and databases – so there is no need for large-scale IT involvement. The experts themselves are able to build, deploy and maintain knowledge solutions. Minimal training is needed and no programming skills are required to build basic solutions.

Intellix products are applicable in many different areas. Solutions range from troubleshooting wizards for a few employees deployed within a week, to highly integrated enterprise-wide solutions used by several hundreds of concurrent users. Solutions support employees as they interact with their (internal or external) customers, or to optimize/troubleshoot processes. Experts are enthusiastic because the routine enquiries are handled automatically by the system and staff are freed up to concentrate on exception situations and other processes that challenge their expertise in the organisation -- and to put more creativity into their work.



How Intellix works

The core product suite is based on the premise that a company's experts have knowledge and experience that can be used to improve a business processes. These areas of expertise, once **selected**, can be **described** and structured using the **Intellix Designer**. The **Intellix Expertise Server** is then used to **distribute** the captured expertise so that it can be **applied** and business process performance improved. Experts play a vital role in both the capture and the **maintenance** of the expertise.

The Intellix Designer

Intellix Designer is a unique product that helps experts model and automate human expertise and overall decision processes. The **Intellix Designer** provides a structured method for a non-programmer to build a knowledge model. Business Experts lay the foundation for the model by providing examples of known situations or business cases. The Intellix Designer applies the neural network to generate the actual knowledge model. If necessary, the Intellix Designer poses questions to the business expert in order to make the model more robust. All modelling steps are completed without the need for programming skills.

By taking full advantage of the flexibility and versatility of the **Intellix Designer**, customers can separate business logic from more technical matters in knowledge management solutions. This allows business experts to maintain best practice models themselves without involving their IT department or consultants.

And, in the era of empowerment, Intellix software is centred on a concept of giving solution ownership to the business expert who uses the **Intellix Designer**, much like a spreadsheet, to register best practices, solve known problems and provide options for unknown problems based on recording past experience.

When a knowledge model has been created, it is then deployed using the **Intellix Expertise Server** so that anyone can quickly tap into the knowledge of experts. The model is easy to maintain and develop by further input and users can 'feed back' information or exceptions directly to the expert. After it has been created the model can be distributed via a web interface simply and effectively to any channel using the **Intellix Expertise Server**.

The Intellix Expertise Server

The **Intellix Expertise Server** is a highly robust and scalable server-based product that enables users to deploy knowledge solutions built with the **Intellix Designer**. Knowledge solutions can be accessed using a standard web browser. They can be tailored to the differing needs of customers, employees, and business partners.

The Intellix Expertise Server provides enterprises with a tool for deployment of decision support using advanced knowledge solutions. It is easily customised to support transaction logging (via the Intellix tool called "Session Store") -- a requirement of the financial services community.

Naturally, integration is the cornerstone as Intellix' product suite can be linked to external databases and legacy applications by use of XML, the glue that is used to connect systems.

The **Intellix Expertise Server** makes it possible to distribute models of specific business processes built with the Intellix Designer. These models usually contain a mix of best practice knowledge, business rules, and company policies. By making such a knowledge-based business process model available in-house you obtain several substantial advantages:

- ✓ The knowledge held by company experts is made available throughout the organisation
- ✓ Business processes and best practice knowledge is documented efficiently
- ✓ The experts spend less time dealing with routine tasks, and the core competencies of the organisation are made available where they have maximum impact.
- ✓ Business policy changes can be implemented rapidly

For large, medium and small applications

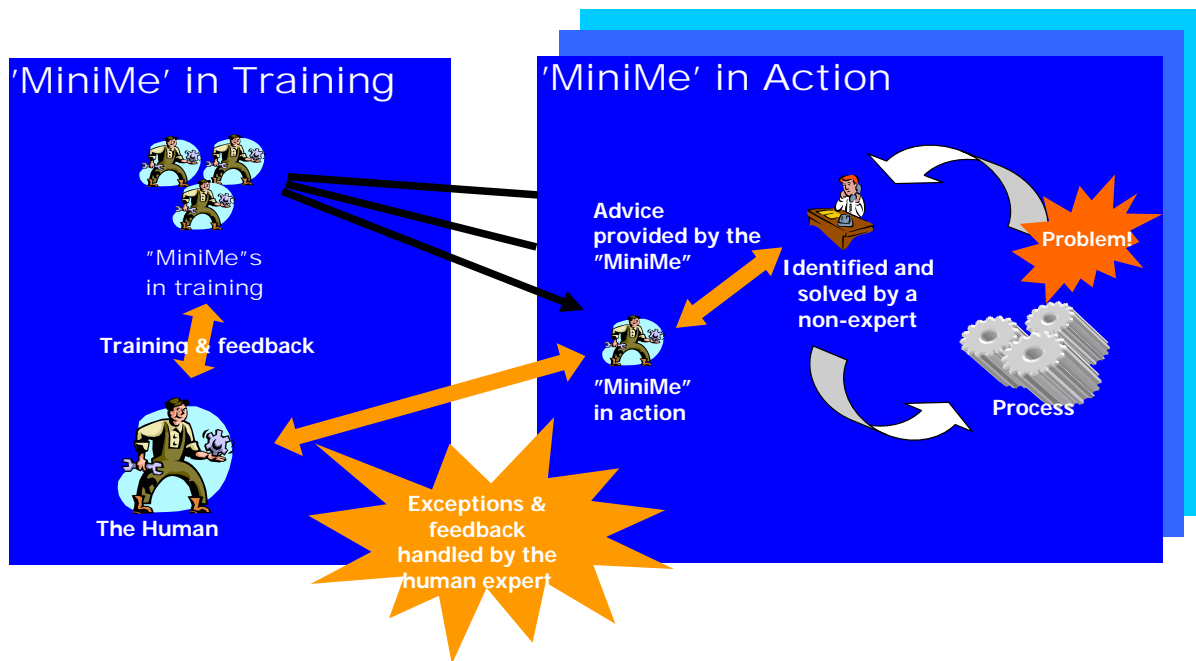
Scalability is a main feature of the Intellix Expertise Server. It allows companies to distribute expert knowledge to large numbers of users - Intellix has installations where several hundred employees utilize a knowledge solution simultaneously.

The Intellix Entry-level ease

Intellix market research confirmed that companies are generally not willing to dedicate major capital to new systems, before they are actually able to try the application in-house. That is why Intellix makes its entry-level package very affordable. The start-up kit provides customers a full working solution including training, the software and many of the necessary add-ons.

Introducing the concept of a "MiniMe"

Once expert users have entered in the necessary parameters by describing situations (cases), they have in fact replicated their knowledge. Intellix calls this a "MiniMe." These "MiniMe's" can be deployed wherever the automated process is run, thus distributing expertise 24/7, improving operational performance and freeing up the expert's time allowing them to concentrate on more meaningful, forward-looking issues.



Intellix envisions a world of *MiniMe's* acting like intelligent software agents trained by business experts to provide services, mostly in the form of advice, on the experts' behalf. *MiniMe's* allow businesses to profitably address problems where it previously was not cost-effective to deploy an expert.

Case Study: Solving Problems in the Process Industry

The need for continuous improvement as well as innovation in increasingly congested markets are all part of the challenges driving this \$USD 6 trillion per year business, of which the chemical industry accounts for some \$1.4 trillion. Intellix is a new and active player in the process industry helping customers automate and distribute their expertise to improve operational excellence and promote innovation. Intellix' reference customer in this industry is Eastman Chemical, one of the top 10 global suppliers of custom-manufactured fine chemicals for pharmaceuticals, agricultural chemicals and other markets.

Intellix: Meeting customer needs

Chemical companies support vast numbers of processes -- ranging from complex and continuous to simple and infrequent batches. The needs with each process are different, but almost all require expert support in some form. With continuous processes the ability to quickly detect and resolve process bottlenecks as soon as they occur is critical. With batch processes, it may be troubleshooting of set-up that is the factor limiting the process efficiency.

Because of the wide range of issues that can arise in such an environment, IT solutions to improve the efficiency of processes can be complex and are often not cost-effective to develop. Consequently, humans are often still the first line when it comes to problem solving – especially for complex, high value and infrequently run processes. Given the scarcity of experts, this can be a limiting factor in improving efficiency and lowering costs.

Intellix provides a solution to improve productivity by allowing process experts themselves to 'replicate' and automate their expertise. This has a number of benefits:

- Improved efficiency on the processes, lowering costs
- Expert quality advice is available 24/7
- Experts are freed up to spend more time on more productive tasks
- New employees can quickly access and apply the expert knowledge
- Consistent advice offered

As an industry innovator in the application of IT technologies to the chemical industry Eastman immediately saw the fit of Intellix products to their company. Their decision to deploy Intellix enterprise-wide came after a six-month evaluation by Eastman in their Kingsport, Tennessee (USA) facility during which time pilot systems were built for a range of applications.

"We chose Intellix because of the ease-of-use of their Designer software and the diversity of applications that can be built with it. The Intellix Designer gives the business experts the capability to build, and more importantly maintain their own knowledge-based systems. This allows the true experts to capture their knowledge in a system and to make that knowledge

available to a wide range of individuals without relying heavily on IT resources. By using the Intellix suite of applications, we captured knowledge that might have otherwise been lost through retirements or reorganizations – leading to a more efficient company."

Mike Pearce, Eastman Chemical

Case Study: Serving the financial service industry

*Operating in increasingly competitive financial markets, Intellix has a proven record of accomplishment serving this industry dating back to the foundation of the company. Today Intellix serves both insurance companies and banks with **expertise automation** systems that enable them to offer their customers the best total value across their broad range of products.*

Intellix helps advise banking customers

For bankers, investment advice is a complicated area, notably in today's choppy markets. Many factors influence the choice of an investment strategy, since this requires investment knowledge and the ability to understand and match a strategy to a customer's situation. Such expertise exists centrally in most banks, but the challenge lies in distributing that expertise to a bank's customer advisors in all its branches.

To address and solve some of those issues, an Intellix solution was pivotal in rolling out an Online Investment Advisor product to a major Danish financial institution, Jyske Bank (2010: Denmark's 3rd largest bank with 4,000 employees and 12.8 bn DKK in own capital. The Online Investment Advisor has consequently been able to provide investment advice support to all investment advisors in Jyske Bank's 116 branches in Denmark as well as in Switzerland, Gibraltar, France, Holland and Germany - allowing a consistent approach in assessing the needs of customer and recommending an investment portfolio based on this.

Question and Answer: a step-by-step approach

Customer needs are determined through a series of questions asked by the system. The Intellix Online Advisor uses patented neural network technology so that based on the answers initially given, and the direction the questioning takes, an individual process results that leads to the establishment of the "ideal investment strategy" for the customer. Besides finding the optimal solution, the Intellix system also provides valuable documentation of the entire process.

The Expert learning process at work

The Intellix Online Advisor was originally 'trained' using examples of daily advice sessions where customers had received investment counselling from the most experienced and knowledgeable experts in the bank. Using those cases as a base, sufficient expertise was gained for the Online Advisor to act independently and today the system is able to recommend an expert solution for nearly any situation.

Online Access for all

All Jyske Bank's investment advisors have access to the system; a plus for branch offices located throughout Denmark and abroad. Investment strategies and portfolio recommendations are updated on a daily basis from a central location.

Not only does the Online Advisor meet Danish legislation on broker ethics, it is also provides the bank a strong legal-compliance tool as it references the original criteria for the advice given in case of disagreement.

Intellix removes bottlenecks

By automating investment case evaluation, the time needed for an advisor is reduced. Therefore the advisor is free to spend more time on the more complicated issues, and of course on interpersonal relationships, vital in the banking industry. Additionally, investment advisors are able to rise to the challenge of the more sophisticated cases.

"As a customer counsellor and dealer, I am certainly not an IT expert. Despite this, I am able to train the Intellix system, and am living proof how easy the system is to use. That was a key issue when choosing Intellix. Some of the profiling questions we asked in the past may not have carried the value we needed.

So, turning things upside down and formalizing our practices has been a valuable lesson to us. Expertise has not only been gained by the Intellix system but also by the human experts driving it. Our overall level of service and ability is much higher now"

Enjar Frederiksen, Jyske Bank

Company history and the Intellix® story

The founder of the company, engineer Christian Liisberg, laid the foundation for Intellix in 1986 in connection with the Chernobyl disaster. Liisberg, while employed at the Risoe Danish National research centre headed a group of scientists in studying neural networks and their use for monitoring multiple processes at nuclear plants. Their research led to intense attention to a specific technology - the N-tuple Classifier which led to the development of a proprietary technology called Self Optimising Universal Learner (SOUL) targeted at image recognition.

Liisberg developed a decision support system called ZEUS in 1990 whose aim was to permit users to access expert knowledge. Although the system only enjoyed limited take-up, it was the incubator to transform ZEUS into a product called Case Agent (whose aim was to make informed and consistent decisions for local governments).

Liisberg soon recognized the vast potential of the SOUL technology, after winning the unofficial world championships in pattern recognition (in the finals with his IBM laptop with a 386 processor beating a supercomputer from Thinking Machines with 56,000 processors), and started his own company Chr. Liisberg A/S in 1992. The neural networks of the mid-1990's were no doubt akin to a "technology in search of a solution," they were the forerunner of today's applications. The beauty of the technology was incremental learning and unlearning meaning the ability to "learn" and "unlearn" in real time, without having to re-train/teach it every time.

In 1997, the company name changed to Intellix -- the mission was "delivering software to capture, store and communicate knowledge" – tenants still true today.

In 1998, the concept of knowledge domains was born and Intellix released its first decision support system called the Knowman Designer. Consequently, the SOUL Analyser became the Knowman Advisor. Intellix then introduced the Knowman Knowledge Server to make knowledge domains accessible through the Internet. This product portfolio laid the foundations for the development of today's Intellix' product suite.

What has characterized Intellix as genuinely unique is the fact that the products were designed and built 'bottom up' and decisions about the look-and-feel of the product were made on a 'need to' basis. In fact, when the development team embarked on the software creation itself, they had no pre-conceived notions regarding the final product, liberated from the traditional development constraints; they thought "out of the box." The basic and overriding goal was to create a

knowledge delivery tool where anybody with minor computing training could store knowledge for later use and improve on decision-making.

In 1998, a major Swiss insurer adopted Intellix' solution to report claims over the Internet.

A Danish financial institution adopted an Intellix solution for its help desk in 1998, and in 1999, research on a server prototype began, targeting integration to back-end open IT frameworks.

From 2000 to 2001, Intellix matured and deployed that framework allowing them to fulfill key customer requirements. New development processes were introduced and overall R&D was strengthened. Intellix also won "Reader's Choice PC World Product", further evidence of the product's applicability. Jyske Bank, Denmark's 3rd largest bank chose Intellix software for building and maintaining best practices in investment advising for its clients and used by the banks 1,200 advisors all over Denmark, and at the Banks foreign branches. The same year Dial Insurance, Swedens first on-line insurance company, chose Intellix for selling insurance and managing claims online. The year after, Intellix won a large IT project for automating claims handling at IF Insurance – Scandinavia's largest non-life insurer in competition with the Nasdaq listed Pega Systems.

In 2002 Intellix, in competition with iLog/IBM, won an enterprise business into the process industry of shrink-wrapped software to Eastman Chemical, a \$6n global business and one of the top 10 specialty chemicals companies in the world. Eastman did a thorough evaluation of competing products on the market, and implemented several pilots of varying purpose and scope, before making the final purchase decision.

In 2005 Jyske Bank expanded the use of Intellix to debt management and introduced the debt advisor – an advising system aimed at small and mid-sized companies for managing their debt with advanced financial instruments (futures, swaps etc.). The same year Intellix ventured into the healthcare arena after discussions with professors at the Icelandic National Hospital, Landspítali and Intellix ehf was established. In 2007 Landspítali/IceMedix chose Intellix for developing advisors for diagnosing a variety of diseases and provide treatment recommendations.

In 2009 IceMedix first product was launched – the IceMedix Osteoporosis Risk Advisor ver. 1.0.

The same year Intellix leveraged the results obtained at Landspítali towards the healthcare community in the US and participated with Microsoft at the IDC Healthcare Conference in

Savannah, GA. As a result in depth discussions were initiated between Intellix and MSFT Healthcare Solutions Group and mutual business cases outlined.

Intellix was in 2010 approached by SAP for investigating options were Intellix products and/or core technology could improve SAP's offerings within Business Rules Management (BRM) and Business Process Management (BPM). These discussions have led to that a number of different mutual Business Cases have been identified and Business Plans are now in production by SAP and Intellix.

To maximize the potential of the company's technology, Intellix has now transformed itself into a software product vendor (an ISV), delivering shrink-wrapped software and related services to enterprises large and small. The next stage, which Intellix successfully has entered into, is about launching the product into selected niche markets via partners and to integrate the products into leading software houses product offerings like Microsoft Sharepoint.

Intellix today

For the past years Intellix has undergone a significant transformation, from being a provider of high-end, bespoke solutions with high amount of consultancy in the IT projects towards becoming an Independent Software Vendor (ISV). This has meant restructuring the company leaving a minimal organization in place, focusing on deliver and implementing Intellix standard software to clients via partners and outsourcing software development offshore, leaving the company with a lean organization with key resources in management and research ready to pursue the opportunity outlined above with a valuable, tried and tested asset.

The company is located in Copenhagen, Denmark and Reykjavik, Iceland.

Artificial Intelligence and Intellix

*Intellix capitalises on **artificial neural networks** – a term that was initially inspired from the functions of the human brain. “AI” is a term that is often misunderstood and conjures up many kinds of thoughts. What are neural networks? Why is understanding them capstone to grasping the services provided to Intellix’ customers?*

The backbone of artificial intelligence

One of the basic units of artificial intelligence is the “neural network.” Originally these simulated the basic thinking functions of the brain. The process of designing a neural network is an iterative process and today, Intellix has created a working neural network system. The system is straightforward and users never know they are using neural networks whereas previously one had to tweak many parameters. By eliminating that level, today’s approach is very user-friendly.

Learning: *the brain and Intellix*

Much as the brain learns from experience, Intellix’ neural networks learn by practical examples provided by users. The system *learns* new knowledge by adjusting a set of given parameters making up the learning model. The learning ability of a neural network is determined by its architecture and by the algorithmic method chosen for training.

Neural Networks: *helping to make decisions*

Neural networks perform successfully where other methods do not, recognizing and matching complicated, vague, or incomplete patterns and can solve a wide variety of problems such as collecting knowledge to support decision-making. Neural networks are the backbone of knowledge acquisition for expert systems in stock market forecasting with astonishingly accurate results and are useful for bankruptcy prediction for credit card institutions. Today, Intellix helps financial institutions provide investment advice, insurance sales, claims handling, trouble shooting advisors in the process industry and diagnosis and treatment systems in healthcare to name a few..

Although neural network systems can interpret, predict, diagnose, plan, monitor, debug, repair, instruct, and control, some of the most successful applications of neural networks are in categorization and pattern recognition. Systems classify objects under investigation (e.g., a pattern, a chemical compound, the financial profile of a customer) as one of numerous possible categories that, in return, may trigger the recommendation of an action such as a solution path or a financial plan. Traditionally the term ‘expert systems’ was applied to rigid rule-based decision systems, and today the term is used generically to describe “advisors” or “decision support systems.”