Invisible Business

A White Paper

By

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Soon the Internet will have trillions of users it does not have today. Most of them will not be human beings. Source: Harbor Research, Inc. CodeRealm Corporation offers solutions that allow machine-generated information to operate automatically and autonomously in a distributed enterprise. We make this valuable information available on-demand, as a service, over the Internet, to the data owning enterprise. Machine-generated information operating automatically and autonomously is called invisible business. Our on-demand solutions are flexible, can be customized, and can adapt to our customer's needs. Our web site offers sample industry applications and demonstrations. You may contact us directly to adapt our solutions to your needs.

This white paper will discuss machine-generated information functioning automatically, operating autonomously, optimizing for end using enterprise applications, and creating invisible business for a business' advantage. The real end-users are the enterprise applications that utilize DIDs (Data Information Devices) captured information. Invisible business happens when machine-generated information affects multiple DIDs, multiple enterprise applications, and multiple organizations and companies. This white paper also discusses the difference between a service oriented business model and solution delivery method, and SOA (Service Oriented Architecture). The prior is a solution delivery business model, and the later is an enabling technology architecture. Invisible business must capture functioning information, on-demand, in a service oriented business model and solution delivery method, through a SOA, and can use the Internet.

The Internet of Things is Our Basic Concept
All Things generate information. This is our basic concept, and is known as the Internet of Things or Internet Zero. This information from Things can include anything such as temperature, pressure, liquid content, parts, flows, and location.

All four states of matter (solid, liquid, gas, and plasma) can generate information. Our solutions also address a fifth property we call intangible objects. These include items such as spreadsheets and electronic documents. This fifth category can also generate and use machine-generated information. Here are some examples.

Solids include machines and machine parts. A truck on the road has many moving parts and may carry a cargo load. The owners of all of the truck's parts and the cargo load may wish to know information generated from these solid objects such as where they are, their age, and their usage.

Liquids include petroleum and water. The owners may wish to know temperature, pressure, content mixture, and evaporation. A city and county may wish to know their river water content after a rainstorm.

Gases include chemicals and natural gases. The owners may wish to know a container's temperature, pressure, mixture, and quantity remaining. A chemical company supplying nitrogen to their customer's storage tank may want to know their customer's on-site facility tank current quantity, typical weekly usage, and current available storage space. This same customer may want to know the delivery tank's available supply.

Plasma may take multiple physical property characteristics of the other three states of matter (solids, liquids, and gases), and take its own characteristics. Parts of the Sun are already in a plasma state. Rocket engine fuel may begin as a solid and change to a gas or a liquid, as temperature increases.

Temperature increase may also change that original solid to plasma. In this most chaotic state, there are free ions everywhere, and generates the most energy for the rocket. The rocket may want to track fuel and energy on the molecular level. A Mars spaceship with a spectroscope uses large numbers of colors of light in the spectrum, in its quest of seeing elements on Mars. In this case, tracking different, autonomous molecules may allow depth perception, ultimately finding elements on a planet. An interaction between molecules and a robot may be desirable.

Intangible objects also generate and use machine-generated information. A commercial bank may have many Excel spreadsheets and word documents. The loan department may have different uses and needs than the treasury department for the same financial information.

Capturing and Using Thing-Generated Information Leads to Invisible Business
An enterprise that owns Things wants to capture their information and use that information to its advantage. Capturing this information may be as simple as using one of the many commercially available DIDs (Data Information Devices). The real end-user of this information is the enterprise's software applications including SCM (Supply Chain Management), CRM (Customer Relationship Management), ERP (Enterprise Resource Planning), DB (Database), PLM (Product Lifecycle Management), BPM (Business Process Management), and Procurement. CodeRealm Corporation's solutions allow this Thing-generated information to operate automatically and autonomously between and within the DID and the owner's enterprise applications. The information is optimized when there are multiple end points receiving and acting upon automatic and autonomous instructions. Now, we have invisible business.

What is a DID?
There are many commercially available DIDs (Data Information Devices). All of the DIDs help capture machine-generated information. We anticipate many more DIDs available over the next several years. Current DIDs include sensors, mesh sensor networks, RFIDs (Radio Frequency Identification Devices), EPCs (Electronic Product Codes), motes, tiny semiconductor chips, and other proprietary and not proprietary software solutions. We believe all of the current and future DIDs will need and want to interact with CodeRealm Corporation's solutions.

The Real End-User
Every enterprise seeking to use their machine-generated information has enterprise applications. These include enterprise applications such as SCM (Supply Chain Management), CRM (Customer Relationship Management), ERP (Enterprise Resource Planning), DB (Database), PLM (Product Lifecycle Management), BPM (Business Process Management), and Procurement. These enterprise applications are the real end-users of the machine-generated information.

Machine-generated information can prompt actions within and between the enterprise, enterprise applications, DIDs, and the Things that generate information. Here are examples of how each of these enterprise applications benefits their company, and how machine-generated information may help these enterprise applications.

SCM applications help a company plan, implement, and control their processes from stages of raw materials, to work-in-process inventory, and to finished goods and finished goods inventory. SCM may help a company answer strategic questions such as where are my distribution centers, and those of my suppliers and my customers? Tactical decision questions include how much should be produced, how much inventory should there be, and what is the best frequency of transportation of goods and their travel routes? Operational decisions include the planning for the demand of your products and your subsequent production of your products. Machine-generated information from across the supply chain can additionally aid a company with its planning. Sample input information can include the age of existing products, and their service and breakage history. Not all end products are exactly alike, especially after usage. Sensors on an airplane may suggest a particular structural member has a shorter or limited life span, which may help the airplane manufacturer with its future building plans, and an airlines carrier with its future purchase decisions.

CRM applications help an organization interact with its customers. As a result, a company may have better basic marketing, sales, and service processes, may be able to better understand customer behavior, and may have better customer communications over the telephone, with email, and through their web site. A beverage vending machine may be a great test market for a beverage company. If that beverage company wants to introduce a new raspberry flavored water product, it would want to test it in an area with established vending machines currently selling plenty of water products. This vending machine-generated information becomes valuable to the beverage company.

ERP applications help a company with its "back office" operations such as their accounting and human resources. Traditional uses track their human being employees. Simple tracking may include an employee's current home address, telephone number, and employment start date. ERP applications could also utilize machine-generated information. The beverage company from the CRM example may want to know where all their vending machines are located, and where the high volume water sellers are, if they are testing a new raspberry flavored water product.

DB applications are simply an organized collection of data. A Microsoft Excel spreadsheet may be used to keep track of my friends. Columns can be first name, last name, street address, city, state, zip code, telephone number, and email address. A vending machine company may keep locations, service history, and amount of beverages sold, and may share this machine-generated information with the beverage company to maximize their sales.

Procurement applications help a company understand its total cost of ownership in its acquisition of goods and services. Machine-generated information may help. The vending machine company may find their vending machines in cold or hot climates may cause more frequent or regular repairs. The beverage company may find more and prevent spoilage. An airline carrier would add-in maintenance and repair costs, given a certain material or structural member used to build an airplane. All of these costs are in addition to the original product and influence the total cost of ownership.

PLM applications help a company understand the entire lifecycle of a product. A product must be conceived, designed, manufactured, tested, sold, used, serviced, upgraded, and finally disposed. Machine-generated information can greatly help in all of these phases, and help in the planning of the lifecycle of other products. An airplane manufacturer can plan its next airplane model, given past knowledge and experience from parts and structural materials.

BPM applications can help a company perform the best it can, given its existing structure, and adapt itself to a new structure if necessary. BPM is presently about human management. We anticipate machine-generated information may also have an impact on future BPM.

Machine-generated information will have a great impact on a company's decisions. The real end-users of this information are the enterprise applications that a company uses to help it achieve its best performance. We believe a company will want to use its machine-generated information to its advantage.

Automatic, Autonomous and Optimized Equals Invisible Business
DIDs (Data Information Devices) are now capturing machine-generated information. Enterprise applications are now utilizing machine-generated information to their advantage. Machine-generated information can automatically function between a DID and an enterprise application. Machine-generated information can now operate autonomously on its own between a DID and an enterprise. Optimization happens when machine-generated information affects multiple DIDs and applications. Invisible business happens when this machine-generated information affects multiple DIDs, multiple applications, and multiple organizations and companies.

In a local government, traffic signals on a road can operate automatically based on the vehicle traffic volume. The same traffic signals can operate autonomously, without human intervention, once the rules

and instructions are set such as allowing for emergency vehicles. Optimization occurs in future planning such as new roads, new signals, or fewer signals. Invisible business happens when contractors automatically submit their bids and actually replace light bulbs, add or delete signals, repair existing roads, and build new roads. Not all events are machine driven such as paving the road, replacing the bulb, or adding or deleting a signal. Machine-generated information can help the process.

Set Up
An organization or company must set up its rules and instructions so machine-generated information can function automatically, operate autonomously, optimize the end using enterprise applications, and create invisible business affecting and involving multiple DIDs, applications, and other organizations and companies. Set up also defines ongoing reporting, control, and testing in all of the multiple users and endpoints creating invisible business.

Portals can allow humans to see real-time snap shots of progress and process. Not all organizations and companies may value or want to see the exact same information in their portals or have the exact same rules and instructions in their set up. These are customizable, adaptable, and flexible, based on needs and desires.

Service Oriented Business Model and Solution Delivery Method
A service oriented business model and solution delivery method is not the same topic as SOA (Service Oriented Architecture). This section addresses a service oriented business model and solution delivery method. The next section addresses SOA. A service oriented business model and solution delivery method means exactly what it says. A common similar phrase is "Software As A Service". Both describe offering and delivering a solution as a service for the delivering company's business model.

There are many moving parts and interested parties in machine-generated information. They all require automatic, autonomous, optimized, and invisible business information as a service oriented business model and solution delivery method. All must have access and be able to use machine-generated information to their advantage.

DIDs (Data Information Devices) can capture machine-generated information. Enterprise applications are the real end-users of machine-generated information. The machine-generated information can function automatically between the DIDs and the enterprise, and operate automatically with rules and instructions. Machine-generated information is optimized when end-users act on their information. Invisible business happens when multiple users, organizations, and companies capture, use, and act on machine-generated information.

For invisible business to happen, multiple users must have access to automatic, autonomous, and optimized machine-generated information. A service oriented business model and solution delivery method will allow this to happen. There is a need for free flowing, real time, continually updated solutions that are service delivered, can be turned on to use, and can be accessed on-demand over the Internet. Invisible business allows interaction, affecting, and involvement of multiple users.

There is not a need for traditional license, maintenance, and service enterprise applications installations business models in a service oriented business model and solution delivery method world. There is not a need for a new operating system or even a tiny operating system for machine-generated information to become optimized and create invisible business. Companies that have existing pre-installed traditional enterprise applications can however access the information flow and ultimately use invisible business to their advantage. Many large companies may wish to continue with their traditional installations. These customers are also welcome to the invisible business world.

The great news for customers and users in a service oriented business model and solution delivery method world is that there is no need for a new lengthy enterprise application installation. Just set up your rules and instructions and start using machine-generated information to your advantage. A usage revenue

model from the solution provider may save a great deal of heartburn and stress for human users and customers.

Service Oriented Architecture
SOA (Service Oriented Architecture) is an enabling technology that is behind the scenes, not visible to the users, is waiting to be used, and has a client user interface as a front such as a portal. A SOA is independent of development technology such as Java and .Net, and is reusable because the interface is standards compliant. SOA should not be confused with a service oriented business model and solution delivery method, or "software as a service", discussed in the previous section, which are really solutions business delivery models.

Hao He, author of "What is Service-Oriented Architecture" (published in XML.com on September 30, 2003), eloquently describes SOA's loose coupling, which is achieved when artificial dependencies among systems are reduced to their minimum, and not effecting real dependencies. A simple example of real dependencies is the need for electric power. Artificial dependencies are the power adapters. Loose coupling is achieved when power adapters size and shape variants are reduced so you can just plug it in to an outlet and get electric power. SOA achieves loose coupling among interacting software agents. Hao He offers a great example of SOA everywhere. Let's say you have a CD (compact disc) that you want to play. The CD can be played on your portable CD player, your car stereo, or your expensive "living room" stereo. All play the same CD, but offer different quality of service.

Hao He defines web services as a SOA within interfaces based on HTTP (Hypertext Transfer Protocol), FTP (File Transfer Protocol), and SMTP (Simple Mail Transfer Protocol) Internet protocols, and except for binary data attachments, messages must be in XML (Extensible Markup Language). The two main styles of web services are SOAP (Simple Object Access Protocol) and REST (Representational State Transfer).

SOAP has constraints. Except for binary data attachments, SOAP must carry messages, and the description of the service must be in WSDL (Web Service Definition Language).

REST also has constraints. They are less complicated than those in SOAP. Interfaces are limited to HTTP, most messages are in XML, simple messages can be encoded with URL (Uniform Resource Locator) encoding, and service and service providers must be resources, while a consumer can be a resource. REST web services require little infrastructure support other than standard HTTP and XML. The simplicity of HTTP is its advantage.

Beyond SOA
Accenture projects future architectures, uses, and users. Architectures will be ubiquitous broadband, any-to-any, with ubiquitous devices and sensors. Uses include enterprise mobility and universal portals. Users include every type of company, employee, customer, and consumer. Users also include every device anytime, anywhere, and in every economy.

WWW is not the Internet
Harbor Research, Inc., published an essay titled "The Web is not the Internet" on December 21, 2004. Some points it makes are critical in a world of automatic, autonomous, optimized, and invisible business machine-generated information. The World Wide Web provides a human oriented interface to a global data network. The network is the Internet. Machine-generated information uses the Internet.

Invisible Business Needs CodeRealm Corporation's Solutions
Machine-generated information can function automatically, operate autonomously, optimize the end-using enterprise applications, and create invisible business effecting and involving multiple DIDs (Data Information Devices), applications, and other organizations and companies, which use optimized information to their advantage. Making invisible business work requires free flowing information, on-

demand, in a service oriented business model and solution delivery method, through a SOA (Service Oriented Architecture), over the Internet. CodeRealm Corporation can make this happen.

Why is there a need? Soon the Internet will have trillions of users it does not have today. Most of them will not be human beings.

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Hao He author of "What is Service-Oriented Architecture", published in XML.com on September 30, 2003.

Neil Gershenfeld, Raffi Krikorian, and Danny Cohen authors of "The Internet of Things", published in Scientific American in October 2004.

OASIS (Organization for the Advancement of Structured Information Standards) for their many essays, especially "Reference Model for Service Oriented Architecture 1.0" published on February 10, 2006.