

WHITE PAPER
PROMISE – WISDOM WITHIN

The Promise of Increasing Business Value with PLM and Smart Products



EXECUTIVE SUMMARY	3
Introduction to PROMISE	3
1 PLM: Now and in the Future	5
2 Business Benefits of PLM	7
3 Smart Products in 2006	9
4 Business Benefits of Smart Products before PROMISE	10
5 PROMISE, going further, PLM and Smart Products.....	11
6 Business Benefits of PROMISE.....	12
7 Examples of PROMISE in Practice.....	14
8 Next Steps for You.....	16
Appendix 1. The PROMISE Project is Going Further.....	17
Appendix 2. References	18

EXECUTIVE SUMMARY

This White Paper describes PROMISE, an innovative project that brings together, and builds on, Product Lifecycle Management (PLM) and Smart Product technologies to offer companies a new business model and new ways of creating business value. Smart Products are products that can sense and communicate information about their condition and environment. The core concept of PROMISE is that this information can be transformed into knowledge to support existing products and to help create new high-value products and services. PROMISE addresses the complete lifecycle of a product, with emphasis on capturing and managing information during the last two phases of life - the Middle-Of-Life (e.g., use, maintenance) and the End-Of-Life (e.g., recycling) - and the way that information from these phases can be used in the design, production and support of future products, thereby closing the product information loops.

Today's highly competitive, highly demanding globalised environment for products leaves little room for error in their development, support and retirement. The cost of not getting everything right can be high, as events at Airbus and Sony showed in the second half of 2006. In response to the requirements and risks of this difficult, fast-changing environment, PLM emerged in the early years of the 21st Century. It's the strategic business activity of managing a company's products across their lifecycles, from the very first idea for a product all the way through until it is retired and disposed of, in the most effective way. The objectives of PLM are to increase product revenues, reduce product-related costs, and maximise the value of the product portfolio. To achieve these objectives, the product has to be managed superbly in every phase of the lifecycle. PLM, the joined-up holistic management of products across the lifecycle leads to many benefits. It enables a company to maximise product value over the lifecycle. Just as important, PLM gives managers visibility about what is really happening with products. It puts a company in control of its products across the lifecycle.

Companies start to implement PLM in the areas where they see the most immediate benefits. In 2006, the focus of PLM for most companies is the Beginning-of-Life of the product, a time at which they can be highly innovative. However, it's primarily in the Middle-of-Life and End-Of-Life that information can be collected about product use and the environment in which it is used. At present, though, the benefits of PLM in these phases are limited because of the difficulty of getting information from the product back, through some kind of communications network, to a database where it would be easily available for use.

Many products already have some smart functionality - such as "seeing", "feeling" and monitoring (with sensors), "speaking" (with voice synthesisers), and sending data over a network (with transmitters). PROMISE shows how this can be extended - with devices to capture and transmit data about the product, and middleware to enable new application software that can use this data.

The benefits offered by PROMISE are not just technical and financial, but also social and environmental. For example, a key area for application of PROMISE technologies is the reuse, recycling and recovery of materials from products at their end of life. This is a worldwide need, and PROMISE, which started in Europe, is being supported by industry and organisations throughout the world. It is even envisaged that PROMISE certification will be available for products using PROMISE technologies, with certified products carrying the PROMISE logo.

In addition to information about the PROMISE project, this White Paper also shows the next steps your company should take to benefit from PROMISE. Early adopters will be first to deliver new value to customers and achieve competitive advantage.

1. PROMISE is FP6 IST Project 507100, funded by the European Commission, and IMS project 01008. More information about these projects is given in Appendix 1.

Introduction to PROMISE

PROMISE is a breakthrough project that brings together, and builds on, Product Lifecycle Management (PLM) and Smart Product technologies to provide companies a new business model and new business benefits.

In today's global business environment, manufacturing companies are looking for new ways to provide value to customers and gain competitive advantage. Many would like to offer affordable, reliable, intelligent products that can be easily upgraded during their life in response to real product use. Being first to market with such innovative products will lead to a high market share and high revenues. Even better, such products will keep low-cost competitors at bay while additional revenues are earned from upgrades and related services for many years. The premise of the PROMISE (Product Lifecycle Management and Information Tracking using Smart Embedded Systems) project is that this dream isn't as far-fetched as it may seem, and now is the time to turn it into reality.

The core concept of PROMISE is that the information generated by Smart Products – products that are able to sense their condition and environment – can be transformed into knowledge that can be used to better support existing products and to create new product and service value. PROMISE focuses on the complete lifecycle of a product with special emphasis on tracking and managing information during the last two phases of life – the Middle-Of-Life and the End-Of-Life – and how information from these phases can be fed back to the design and production phases of future products, thus closing the product information loops. PROMISE goes beyond current business models in which the flow of product information stops once the product goes to the customer. In the new business model, the product information loops are closed, enabling the flow of product feedback information (such as information about the use and environment of the product) to the manufacturer and/or operator. With such information available, new products and services, corresponding ever closer to customer needs and desires, can be developed and supported.

The PROMISE project extends existing Smart Product and PLM technologies, making use of industry- and product-specific Product Embedded Information Devices (PEIDs) based on a combination of existing technologies, such as bar-code, RFID transponders and short- as well as long-range wireless communication technologies. PROMISE technologies are being tested in 10 demonstrators in the automotive, railway, heavy vehicle, electronics and white goods sectors.

Closing the information loop creates benefits for many participants in the product lifecycle:

- Customers get better products and services
- Manufacturers get more information about the conditions and modes of product use and disposal
- Service engineers get up-to-date information about the status of the product and its parts
- Product developers use real-life experience with previous products to improve future products, reduce over-engineering and achieve lifecycle quality goals
- Recyclers get complete information about the EOL value of products, parts and materials

New services and improvements made possible with PROMISE include:

- Innovative products and services that go far beyond competitor offerings, and are difficult for less-skilled competitors to copy
- Improved customer relationship management based on up-to-date real-life product data
- Simplified product authentication, enhancement of product and user security and safety
- New types of product leasing and insurance services
- Improved maintenance and service at reduced cost

1 PLM: Now and in the Future

PLM: Managing products throughout the lifecycle – from cradle to grave

1.1 Introduction to PLM

Today's highly competitive, highly demanding globalised environment for products leaves little room for error in their development, support and retirement. The cost of not getting everything right can be high, as events at Airbus and Sony have shown in the second half of 2006.

In response to the requirements and risks of this difficult and fast-changing environment, PLM has emerged in the early years of the 21st Century. It's the strategic business activity of managing a company's products all the way across their lifecycles, from the very first idea for a product all the way through until it is retired and disposed of, in the most effective way.

One important characteristic of PLM is its coherent, 'joined-up' approach to the management of a product across the lifecycle. There are usually five main phases in a product's lifecycle: Imagination; Definition; Realisation; Use/support/maintenance; and Retirement/disposal/recycling. The first three of these - imagination, definition and realisation - are referred to as the Beginning-of-Life (BOL) of the product. The phase of use, support & maintenance is referred to as the Middle-of-Life (MOL). The phase of retirement, disposal & recycling is the product's End-of-Life (EOL). PLM manages a product throughout these phases - 'from cradle to grave' - making sure everything works well with the product and making sure the product makes good money for the company.

The objectives of PLM are to increase product revenues, reduce product-related costs, and maximise the value of the product portfolio. To achieve these objectives, the product has to be managed superbly in every phase of the product lifecycle:

- When it is an idea (e.g., making sure the product idea doesn't get lost or distorted)
- When it is being defined (e.g., making sure that the development project meets its objectives)
- When it is being realised (e.g., ensuring the right version of the definition is used for production)
- When it is in use (e.g., ensuring maintenance takes account of its serial number, evolution, etc.)
- When it is being disposed of (e.g., making sure toxic materials don't get into the food chain)

Although it may seem obvious that products should be managed across the lifecycle, in practice it's not that easy. The reality is that companies have traditionally been organised so that the resources that are easy to control – such as money, people and machines – were managed as “effectively” as possible. Other resources, such as products, were managed as “well” as possible within the resulting boundaries and constraints. Making things even more difficult, for much of the lifecycle, products are not physically present in the company, and the company has little or no information about their use. And at other times, products only exist as ideas – which are also difficult to control. The difficulty of maintaining control over products is a major source of risk. PLM allows a company to take control of its products and reduce these risks.

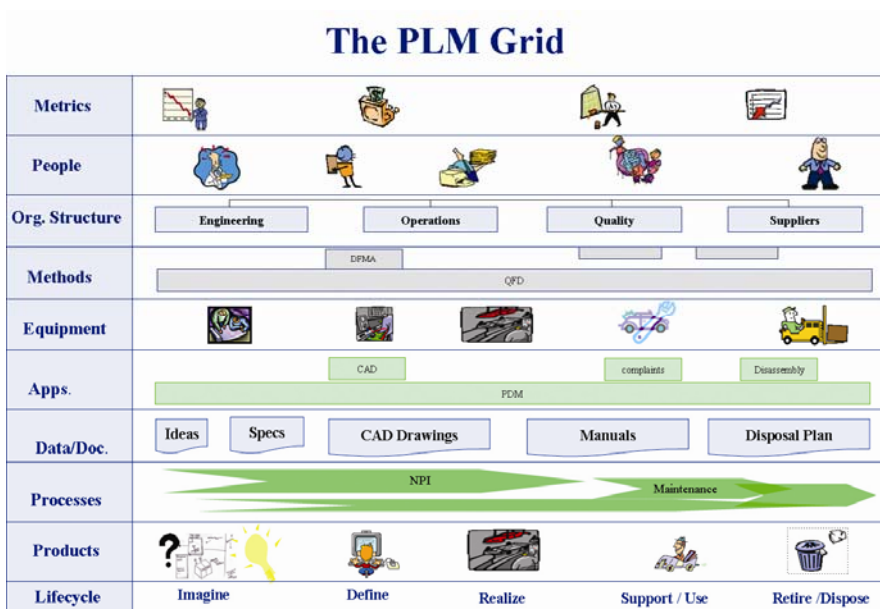
PLM joins up many previously separate and independent processes, disciplines, functions and applications - each of which, though addressing the same product, had its own vocabulary, rules, culture, language and even location. Without PLM, there was the danger that, throughout the lifecycle, things would fall through the gaps between these, and create problems and pain.

PrePLM, Pain Throughout the Lifecycle

Imagine	Define	Realize	Support / Use	Retire / Recycle
Ideas pirated	Projects late/ failing	Pollution costs	Upgrades ignored	Waste
Lack of ideas	Costs too high	Poor factory layout	Missing applications	Pollution
Uncontrollable	Uncontrolled changes	Scrap	Poor communication	Low recycle rate
Ideas Suppressed	Unclear processes	Rework	Data out of control	Materials wasted
Missing applications	Needs not clear	Costly prototypes	Culture of risk	High disposal costs
Culture of sterility	Design faults	Supplier problems	Customers lost	Fines
Failure punished	Application Islands	High material costs	Liability costs	No training
Bureaucracy	Long time to market	Excess inventory	Missing services	Lack of control
Priority #1 CYA	Data silos	Limited part re-use	High service costs	Missing applications
Unknown cost	IP lost/missing	Slow ramp-up	Processes unclear	Processes undefined
No training	Project status vague	Safety problems	Product recalls	Lack of procedures
No process defined	Standards ignored	Wrong data versions	Product failures	Costly disassembly

Another important characteristic of PLM is its holistic approach to the management of a product. Nine important resources are addressed together for PLM: the product itself; related data and documents; processes; applications; methods; equipment; people; organisational structure; and metrics (such as costs and revenues). This holistic approach distinguishes PLM from atomistic activities, such as Computer Aided Design (CAD) and Product Data Management (PDM), which are focused on individual product-related resources.

Together, the nine components of PLM and the five phases of the product lifecycle form the PLM Grid, a two-dimensional grid or matrix that shows the scope of PLM – the scope of the resources and activities to be addressed for the management of a product. The way that these resources and activities are managed can make all the difference between an unsuccessful product and one that benefits its users and its manufacturer.



2 Business Benefits of PLM

PLM: Maximising Product Value

2.1 Benefits

PLM, the joined-up holistic management of products across the lifecycle leads to many benefits. Most important, it enables a company to maximise product value over the lifecycle and to maximise the value of the product portfolio.

PLM puts a company in control of its products across the lifecycle. Not being in control can have serious consequences. If a company loses control of a product during product development, the product may be late to market and exceed the targeted cost. If it loses control during use of the product, the results for the customer may be frustration and a lack of satisfaction, or much worse, injury and death. For the company, the results may be damage to the company's image, loss of customers concerned about product problems, revenues lost to low-cost competitors, and reduced profit due to costs of recalls and legal liabilities.

PLM gives transparency about what is happening over the product lifecycle. It gives managers visibility about what is really happening with products. With access to the right information, they can make better decisions about the product in all phases of its life. With accurate, consolidated information about products available, revenues from new products can be increased and low-cost ways found to extend the revenue-generating lifetimes of mature products.

Product development, the creation of new products and related services, is the source of future revenues and portfolio value. PLM helps improve product development, enabling a company to grow revenues by developing innovative new products and reducing time-to-market. It enables a company to reduce product-related costs such as material and energy costs that are fixed early in the product's life. And PLM helps cut recall, warranty and recycling costs that come later in the product's life and eat into profits.

Four Main Areas of PLM Benefit



The potential benefits of PLM are high. In particular, companies are looking to PLM to significantly increase revenues.

PLM Targets

Percentage Increase in Revenues due to:

- Faster product introduction 15%
- Extended product life 10%
- Wider product range 20%
- Wider range of services 5%

Percentage Reduction in Costs due to:

- Reduced recalls, failures, liabilities 5%
- Reduced headcount 1%

2.2 PLM Benefits in 2006

Each company is different, so it's no surprise that companies implement PLM in different ways depending on where they see the most immediate benefits. Some look to PLM to help respond to product innovation needs. Others are faced with an increasing number of regulatory requirements that are liable to frequent changes. For them, compliance is a major issue, and PLM is introduced to give product developers rapid access to the right information, and provide regulators the proof that their requirements have been met. In other companies, the driving factor for PLM is the need to manage mechatronic products - products with mechanical, electrical, electronic and software modules.

Different industries have different characteristics, needs and priorities. As a result, companies in different industries implement PLM in different ways. In high tech industries, it's important for companies to bring innovative new products to market before competitors. They need short development cycles and maximum reuse of existing parts. Typical results with PLM include greatly reduced product change cycles; improved document management; reduced change management headcount; increased outsourcing; enhanced history tracking; global accessibility to product data. In the consumer electronics industry, PLM is used to help meet environmental regulations and compliance issues such as those resulting from the Restriction of Hazardous Substances (RoHS) and Waste Electrical and Electronic Equipment (WEEE) Directives introduced by the European Union. In industries such as industrial equipment, factory automation and heavy vehicle, reliability is important for customers. Products are often complex and engineered-to-order. Configuration Management is a key issue. Typical results with PLM include change cycle reductions; reduced scrap and rework costs; reduced time to volume production; reduced time for generation of Bill of Materials. The medical equipment industry uses PLM to help bring innovative products to market rapidly and to demonstrate compliance with Food and Drug Administration (FDA) regulations requiring correctly controlled documents, drawings, and data management procedures.

In 2006, the focus of PLM for most companies is the Beginning-of-Life of the product. They invest in PLM applications such as CAD to improve product definition and PDM to improve product data management. They invest in improving the New Product Introduction (NPI) and Engineering Change Management (ECM) processes. To be sure that the products being developed really correspond to business requirements, they introduce Product Portfolio Management and Requirements Management. To improve the performance of product development projects, they introduce methodologies such as Stage & Gate. They use techniques such as Design For Manufacturing to be sure that product designs take account of manufacturing needs.

3 Smart Products in 2006

Today's Smart Products have much of the functionality needed to enable PLM benefits in MOL and EOL

In addition to the many benefits already available with PLM in the early stages of the product lifecycle, benefits are increasingly achievable in the middle of life and end of life. Some of these are similar in nature to those at the beginning of life - others are very different. For example, PLM provides secure data management functionality at all stages of the lifecycle, and PLM provides an overview of the status of the product throughout the lifecycle – at the beginning, middle and end of life. On the other hand, it's primarily in the MOL and EOL that information can be collected about product use and the environment in which it is used. At present, though, the benefits here are limited because missing functionality makes it difficult to get information from the product back through some kind of communications network to a database where it can be analysed.

However, part of the missing functionality is similar to the existing functionality of Smart, or Intelligent, Products. These are products that, in addition to their primary functionality (e.g. a dishwasher has primary functionality to wash dishes), have functionality to decide or communicate about their situation or environment. For example, a washing machine equipped with a scanner can read the labels on clothes, and select the most appropriate washing and drying cycle.

The smart functionality of products includes “seeing”, “feeling” and monitoring (with various types of sensors), “speaking” (with voice synthesisers), moving (with motors), locating (with GPS), indicating information (on a display), “thinking and computing” (with a microprocessor), self-identification (with a memory), and sending information over a network (with a transmitter).

Smart functionality isn't limited to products. There's also Smart Packaging, such as labels in transparent foil around meat products that change colour from blue to red in case of insufficient refrigeration.

Many different types of smart products and smart packaging are available and they carry out numerous tasks. For example, a smart lawn mower can be programmed to cut the grass for you. Its sensors see if there are any obstacles, identify the height of the grass, and switch on its motors to go down the garden and cut the grass. Smart vacuum cleaners have similar functionality to make life easier for their owners. A smart microwave oven can identify the food to be cooked, then set the timer and the temperature. A smart water softener can identify the hardness of the incoming water and treat it just as required depending on its hardness and the intended use. As well as working independently, smart products can also work together. For example, smart home appliances such as an electric blanket, a toaster, a coffeemaker, a bathroom scale and a blood pressure monitor can be networked together to make life better for their user.

Voice applications include the scales that speak your weight and the voice in your car that reminds you to fasten your safety belt. Smart security devices will listen to your voice and look into your eyes before giving you access to a secure zone. Other smart products can work in dangerous areas to render them safe, or to identify parts and materials that can be reprocessed or reused.

4 Business Benefits of Smart Products before PROMISE

Before PROMISE, business benefits of Smart Products were limited

Before PROMISE, from the customer point of view, Smart Products offered benefits such as:

- Increased functionality
- Improved usability
- Improved user-friendliness
- Easier to use
- Making life easier

For the user of the Smart Product, these translated into:

- Time savings
- Reduced costs
- Reduced effort

The main business benefit for the manufacturer of a Smart Product without PROMISE technology was the increased revenue that resulted from making more sales of the product at a higher price. From a business point of view, Smart Products were good for differentiation, in particular against low-cost bottom-of-the-range products that only offered primary functionality.

These business benefits are important, but even more important benefits could be achieved if information could flow directly back from the product about its use. If such information about the use of products could be automatically collected, and transmitted back to the manufacturer - and other participants in the product value chain - it could be used in many ways. This would offer new opportunities to understand the way products are really being used and how they behave in the field, and to use this understanding to improve products and services.

Although much of the required functionality already exists, it is not integrated, and there are no standards to simplify integration. To close the product information loop, and get information to flow back from the product, would require bringing together and integrating functionality found in:

- Smart Products (such as a Smart vacuum cleaner) that can sense their environment
- Smart Products (for example, an aircraft's "Black Box") that can remember their operating conditions
- Smart Products (such as Smart Cards) that can send information over communication networks

Other requirements would be that:

- The information sent over the communications network can be stored in a database
- The information can be converted to knowledge
- Applications are developed to use information in the database to improve performance
- The applications are used to increase business value

5 PROMISE, going further, PLM and Smart Products

The four technologies of PROMISE lead to more than just a Smarter Product

Closing the product information loop will help the participants in the product value chain to achieve even more benefits with Smart Products. Achieving these benefits is the focus of the PROMISE project. To achieve these benefits requires parallel advances with four technologies.

1 The product needs to be equipped with a Product Embedded Information Device (PEID). This is a data storage device which identifies a unique product (or sub assembly or component) and which can be read or written to. For some products, it may be a very simple device. Other products may have more sophisticated onboard data processing devices that are connected to sensors or actuators on the product. The objective is to capture data about lifecycle events or conditions, such as temperature or pressure, which can impact product performance.

Various identification technologies such as barcode and RFID transponders can be used. Depending on the particular product, and the intended use of the data from the PEID, the data can be stored onboard, stored locally at the site of the owner of the information or where the information has been created, or stored in a centralised or decentralised data warehouse. The device also needs to have a means of communication, which may use short- or long-range wireless communication technologies, or a physical connection into a network.

2 Middleware enables management and communication of data between devices and the database. This ISC layer (Inter System Communication) is a key PROMISE element that allows information to flow between different phases of product life and allows the information loop to be closed. It also enables controlled and secure access to relevant information for many participants in the product value chain.

3 A Product Data Knowledge Management application is needed to integrate and manage information from all phases of the product lifecycle. This is more than a basic Product Data Management application. It can locate information for a given unique item via the ISC layer and make this information available to users and Decision Support applications.

4 The business benefits of PROMISE come from the value-adding use of the data from the PEIDs by knowledge workers and applications. Applications will support many tasks, some, for example, providing decision support for predictive maintenance, diagnosis and analysis of use patterns. Some will use up-to-date and accurate lifecycle information to influence residual life decisions about products. Others will support the development of innovative new products.

In the future, certification of products using PROMISE technologies will be possible, and certified products will carry a PROMISE logo. Products carrying the PROMISE logo will give customers confidence that the product was designed, manufactured and serviced on the basis of “fit for life” principles, with maximum value for the user and minimum impact on the environment.

6 Business Benefits of PROMISE

Five key benefits of PROMISE-based products

The Smart Product, middleware and knowledge management technologies developed in the PROMISE project enable new applications that will increase product and service quality. By feeding up-to-date lifecycle information back into design (design for X) and production (adaptive production) it will be possible to make fast modifications and have an immediate impact.

By bringing together PLM and Smart Products, the PROMISE project opens the way to a new business model and the following ways to add value to the business:

1. PROMISE increases business value and product revenues by enabling the development and support of innovative products that are clearly differentiated from those of competitors, and allow you to define and create new market segments. PROMISE-based products add value for your customers, yet continue to increase your revenues and earnings. They provide a clear competitive advantage over basic products and services proposed by companies in lower-cost countries. PROMISE-based products maintain the loyalty of existing customers who see the benefits of the company's products and services relative to those of competitors. PROMISE helps increase sales by lengthening the life of existing products, e.g., enabling more frequent product enhancements, product derivatives, niche offerings, and add-ons to product platforms. PROMISE-based products attract new customers. Their added value stimulates customers of competitors to switch away from the competitor product to the PROMISE-based product.
2. PROMISE helps reduce product costs and operating costs. Information received from products in the field about their use helps eliminate unnecessary features and costs, and reduce product cost. With more experience and better information available about real product needs, manufacturing and support costs can also be reduced. For example, the length and cost of service visits can be reduced due to knowledge of the exact status of the product
3. PROMISE makes it easier to comply with the increasing number of environmental standards and requirements. PROMISE provides precise information for regulators during the Middle-Of-Life and at the End-of-Life. And, during the Beginning-Of-Life, it helps ensure that new products will comply with regulations.
4. PROMISE-based products create a new channel for communication with your customers. The information they provide helps you to increase customer satisfaction with existing products. And information about use of the product can be jointly reviewed with the customer to identify improvements to be included in upgrades and future products.
5. PROMISE-based products enhance the corporate image. Customers associate the company name with the high-tech image projected by products with the PROMISE logo.

PROMISE Benefits in BOL, MOL and EOL

Beginning of Life	Middle of Life	End of Life
<ul style="list-style-type: none"> • develop products fast, on time • develop innovative, high-value products clearly differentiated from those of competitors • understand better how products will behave over the lifecycle • get more input from downstream players in early stages of product life • prevent future product failures through knowledge of past failures • learn from field experience of existing products • develop new versions and generations of products that correspond ever closer to customer needs and desires 	<ul style="list-style-type: none"> • provide superb product support • reduce response time to customer complaints • close information loops • provide version control and history. Manage configurations • schedule maintenance based on actual product use. Provide up-to-date information on line • reduce spares needs by better knowledge of spares use • give mobile service workers access to all required data • analyse and resolve issues that arise during the lifecycle • monitor product progress during the lifecycle • upgrade products in the field • minimise product recalls • replace components before they fail - not after 	<ul style="list-style-type: none"> • manage product retirement • disassemble the product quickly and at low cost • recycle and dispose of products most effectively • recycle and dispose of products in an environmentally-sensitive manner • provide accurate information about the value of parts and materials for reuse/recycling decisions at the end of life • comply with EOL regulations • eliminate product data effectively at the end of a product's life

PROMISE technologies can be used in many industry sectors, for example:

- In MOL, a PROMISE-enabled train carriage can send a message to the operator when it needs maintenance, and send a message to the manufacturer to say which parts were over-engineered
- In MOL, use of white goods can be optimised to minimise energy loss and pollution
- At EOL, full information on a car's history will be available, enabling selective component reuse and recycling
- In BOL, development processes can be improved, taking account of more field data
- In MOL, key components can be replaced before failure, rather than after failure, avoiding costly out-of-operation time
- In MOL, maintenance activities can be optimised, thereby reducing costs and time
- During MOL, the amount of carbon dioxide produced by a car can be measured to be sure it is within environmentally acceptable limits

PROMISE provides benefits for many participants in the product lifecycle:

- Customers benefit from intelligent, user-friendly, reliable, high-value products
- Customers preferring to buy functionality rather than hardware can be offered attractive customised leasing contracts based on actual usage
- Marketers get complete data about the modes of use and conditions of retirement and disposal of their products
- Service, maintenance and recycling engineers get real-time assistance and advice as well as complete and up-to-date data about the status of the product over the Web
- Designers can, based on extensive know-how and experience of the product's lifecycle and behaviour, improve product designs
- Recyclers and re-users get accurate information about the value of residual parts and materials arriving via EOL routes. This will help them take refurbish/recycle decisions
- Companies can show good governance for their products, showing they are in control of the product both during its life and when it gets to the end of life
- Companies achieve a positive environmental image through improved and more efficient refurbishment and recycling decisions and actions

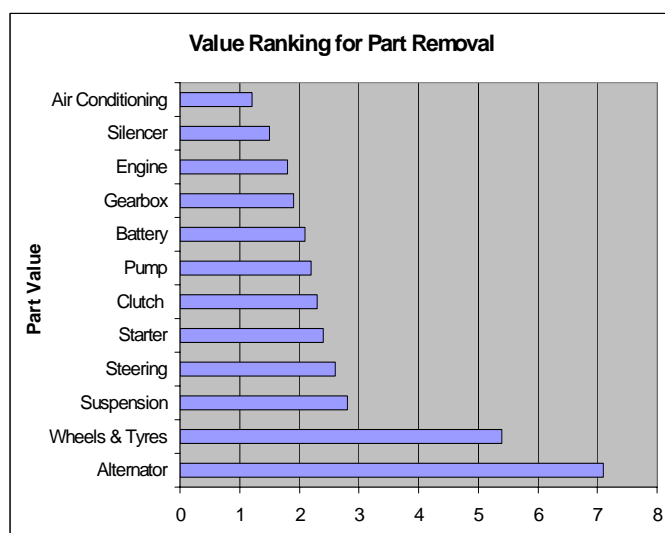
7 Examples of PROMISE in Practice

Benefits of PROMISE are being demonstrated in many industry sectors

Manufacturing companies participating in the PROMISE project are testing its results in “Demonstrators” in the automotive, railway, heavy vehicle, electronics and white goods sectors.

In one of these Demonstrators, a car manufacturer is assessing the possibilities of making better EOL decisions about parts based on the history data stored on the PEID, and of achieving the European Union’s targets as defined in the ELV (End of Life Vehicle) directive (EU/2000/53). This directive specifies targets for the reuse, recycling and recovery of materials from ELVs. In 2006 the ratio of materials in an ELV which should be reused, recycled or recovered is 85% of the total vehicle weight, by 2015 it will be 95%.

In this Demonstrator, a vehicle that has reached its end of life is taken to a dismantler. The vehicle is deregistered, and its ownership transferred to the dismantler. The dismantler gets basic information - such as the type of vehicle, its ID, the assembly date - from a top-level PEID. Mission profile information and statistics about the use of the vehicle and its components, e.g., kilometres travelled and environmental conditions such as humidity, external temperature, temperature in the engine area, etc. are also available. Based on this information, and the maintenance history - in particular for replacements - parts and assemblies worth reusing or remanufacturing are identified and removed. Some may be immediately reusable as “used spare parts”, others may need some remanufacturing or repair. Glass, bumpers, foam and cloth are removed for recycling. Some parts, such as catalysers containing precious metals, are removed for further treatment. The vehicle is sent to the shredder where it is shredded and permanently deregistered. Statistics on volumes of material treated are updated for environmental records.



As is often the case, because PROMISE “closes the product information loops”, there are many potential beneficiaries of this Demonstrator. Marketing and Engineering get useful information about the vehicle at its end-of-life, helping to identify, for example, over-designed components and subsystems. Detailed data about the BOM, materials, and disassembly operations can be fed back into design and manufacturing. Regulators will get precise information about ELV compliance. The dismantler minimises disassembly time and effort, yet increases earnings from sales of parts.

A Demonstrator for a company in the construction & mining equipment sector focuses on information that is acquired during the Middle-of-Life of heavy vehicles. The objective is to show how this information can improve MOL performance. The main business implications are:

- Valuable data about the vehicle can be obtained without the expense (for the customer) of taking the vehicle out of service

- Customer satisfaction is improved
- The manufacturer's network of dealers can service its customers better, giving the manufacturer an advantage over its competitors
- The dealers can manage their resources better and, as a result, be more profitable

A Demonstrator in a recycling plant uses PROMISE technology to track plastic waste that could be recycled into high quality plastic materials. The goal is to eliminate all paper and human interaction related to transfers between the different steps in the process from reception of waste, through sorting, milling and extrusion, to final recycled material. The main business implications are:

- Reduced costs for information handling and transfer
- Optimised decision-making in the recycling plant, for example resulting in higher yield
- More visibility of progress in each process
- Less paper and less manual information tracking

A white goods manufacturer is running a PROMISE Demonstrator with the objective of reducing production and maintenance costs by improving the testing of the complete units after production. The main business implications are:

- Reduce maintenance costs by gathering and analysing data from the white goods product while it is in use in MOL so as to prevent faults or malfunction
- Reduce production costs
- Reduce energy use in MOL
- Enable extended warranty and service
- Better understand, using data from MOL, how to design and manufacture better appliances
- Better understand, using data from MOL, dismantling and recycling options

A locomotive manufacturer is running a PROMISE Demonstrator with the objective of closing the information loop between the experience embedded in field data and the knowledge needed by engineers to improve designs and develop more competitive products. In this case, the field data and experience is captured by service engineers and/or by PEIDs on locomotives. The knowledge is used widely in Design for X. The main business implications of this Demonstrator are:

- Develop more competitive products by improving proven designs
- Increase customer satisfaction by better fulfilling their requirements
- Reduce design effort by giving engineers direct access to field data
- Minimise design changes during product service life by improving the initial design

Preventive Truck Maintenance



8 Next Steps for You

There are several ways for you to move ahead with PROMISE

There are various ways to work with PROMISE and achieve increased business benefits with Smart Products and PLM. You can work directly with PROMISE project team members, or you can work independently, with indirect support from the PROMISE team.

Working with the PROMISE Project

The project team members recognise the importance of working together with other companies to ensure early adoption of PROMISE and achieve the resulting benefits. The participation of industrial companies wishing to develop PROMISE-based products and improve their existing PLM practices is strongly encouraged.

By joining the project's Industrial Reference Group (IRG) you will have early access to project know-how and deliverables, and can participate in defining future PROMISE activities.

Next Steps for Manufacturing Companies

A "PROMISE Status Review" has been developed by the project. It gives you an opportunity to see how your current operations rate against PROMISE standards.

A "PROMISE Technical Feasibility and Business Viability Study" has been developed by the project. It can be carried out rapidly to show your company the opportunities that PROMISE offers, the threats that may arise, the likely impact on revenues, where your products would gain most benefit from PROMISE, and what is required to achieve those benefits.

A "PROMISE Implementation Project" will implement a PROMISE-based solution for your company.

Next Steps for Technology Providers in the PLM Arena

PROMISE technologies open up new opportunities for vendors of PLM applications, middleware, and PEIDs. Specifications for PROMISE functionality can be prepared on the basis of your current products and services.

Next Steps for Industry and Government Organisations

The results of PROMISE will impact society and the environment. A "PROMISE Domain Survey" will identify the opportunities and likely impact of PROMISE in areas of importance to your organisation.

To find out more about participating in the above activities, please contact

Lion Benjamins
Marketing Manager Promise
E-mail: lion.benjamins@promise-plm.com

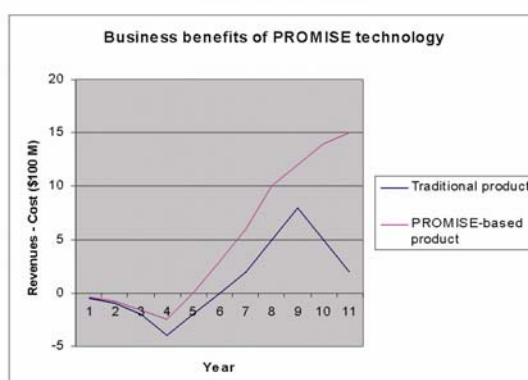
Appendix 1. The PROMISE Project is Going Further

PROMISE is an EU FP6 IST funded project (Reference 507100) that started in 2004. The project consortium brings together 21 partners from 9 countries. These include industrial companies such as Bombardier Transportation, Caterpillar, Fiat, Fidia S.p.A., Intracom and WRAP. Research partners in the project include BIBA, Cambridge University, CIMRU, EPFL, Helsinki University of Technology, ITIA-CNR, Politecnico di Milano and SINTEF. Technology and consultancy providers in the project include Cognidata GmbH, ENOTRAC, Indyon, Infineon, InMediasP, SAP AG and Trackway.

Through the industry-led, international Intelligent Manufacturing Systems (IMS) R&D program, PROMISE has achieved the status of a global project. Five IMS regions are collaborating in the project, referred to as IMS project 01008. In addition to partners from the EU and Switzerland, the project includes partners from Japan (Toyota Motors; University of Tokyo; Toyoda Machine Tools; Ricoh; Chuo University and Waseda University), the USA (University of Cincinnati; University of Michigan; Stanford University and the IMS (Intelligent Maintenance Systems) center, Australia (IRIS-University of Swinbourne; MTI Pty and AEEMA) and South Korea (Hankuk Aviation University; KAIST; KITECH and SEIL CO Ltd.).

PROMISE offers the following business proposition to Product Lifecycle stakeholders worldwide: to create value by transforming information into knowledge at all phases of the product lifecycle, thereby improving product and service quality, efficiency and sustainability. PROMISE creates product and service value of different types:

- Technical: optimal achievement of required functions and needs, exploiting field knowledge gathered throughout the product lifecycle
- Economic: creation of additional value for the producer (new products that leave competitors trailing, better customer relationship management), for the service provider (new business opportunities, better customer relationship management), and for the product owner (extended and enriched product use)
- Environment: minimisation of pollution, resource and energy consumption through optimal BOL, MOL and EOL planning
- Social: comfort, safety, security and satisfaction of the product user, whether the operator of the product (e.g. the driver of a truck) or the user of the service (e.g. the passenger of a bus, the user of an elevator, etc.)



Appendix 2. References

On the Web

- PROMISE for Industry
<http://www.promise-plm.com/>
 PROMISE Project, academic and training centre
<http://www.promise.no/>
 10 Critical PLM Facts Every Executive Should Know
<http://www.softtech.com/whitepapers/10-critical-plm-facts.php>

Books

- RFID Strategic Implementation and ROI: A Practical Roadmap to Success
 Charles Poirier, Duncan McCollum
 Intelligent Vehicle Technology And Trends
 Richard Bishop
 Product Lifecycle Management: 21st century Paradigm for Product Realisation
 John Stark
 Product Lifecycle Management with SAP
 Gerd Hartmann, Ulrich Schmidt
 PDM: Product Data Management
 Rodger Burden
 Implementing and Integrating Product Data Management and Software Configuration Management
 Ivica Crnkovic, Ulf Asklund, Annita Persson Dahlqvist

Journal Papers and Conference Proceedings

- Smarter Products
 Roberti M.
 RFID Journal. January / February 2006, page 16 – 23
 Research issues on product lifecycle management and information tracking using smart embedded systems
 Kiritsis, D., Ahmed Bufardi, Paul Xirouchakis
 Advanced Engineering Informatics, 17 (2003), pp. 189-202.
 EOL information management for tracking and tracing of products
 Schnatmeyer, M. ; Schumacher, J. ; Thoben, K.-D.
 18. ICPR conference
 Product Lifecycle Management and Information Tracking using Smart Embedded Systems for machine tools
 2nd PROMIS Virtual International Conference on Intelligent Production Machines and Systems
 Meo, F. ; Panarese, D.
 Streamlining asset maintenance throughout analysis of its usage data
 Jun, H.-B. ; Ruibal, M. ; Kiritsis, D. ; Xirouchakis, P.
 APMS 2006, September 2006, Wroclaw, Poland.
 Intelligent products – a step towards a more effective project delivery chain
 Computers in Industry/, Volume 50, Issue 2 February 2003. pp. 141-151.
 Kärkkäinen, M. ; Holmström, J. ; Artto, K. ; Främling, K.
 Design of an End-of-Life Decision Support System using Product Embedded Information Device Technology
 Hui Cao ; Folan, P. ; Zheng Lu ; Mascolo, J. ; Frantone, N. ; Browne, J. - ICE 2006
 Designing a Decision Support System for Trucks Predictive Maintenance
 Sorlini, M. ; Zangiacomi, A. ; Fornasiero, R. - INCOM 2006
 A Service-Oriented Middleware for Integration and Management of Heterogeneous Smart Items
 Environments
 Anke, J. ; Müller, J. ; Spieß, P., ; Weiss F Chaves, L.
 4th MiNEMA Workshop, 2-3 July 2006, Sintra, Portugal.
 PLM-Einführung, Übersicht, Normungsrelevanz
 Anderl, R.
 34. Konferenz Normenpraxis: PLM - Prozesse, Kosten, Rechtssicherheit, 2005
 IMS Project PROMISE: Product Lifecycle Management – the Industrial User Perspective Advanced
 Frey, M.
 Manufacturing Conference, Nov. 16-17, 2005, Leuven.