

## White Paper



### Green PLM

Not just another database solution...!

Series 2 of 2

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Jagmeet Singh, Hardik Kansupada

#### Abstract

*The successful transformation of current products into those of the future is vitally important to most organisations. For future products to be sustainable and environment friendly, they must be born out of a cradle-to-cradle product development process. This paradigm shift is the result of new thinking which calls for a business model that strongly endorses green product development.*

*Infosys Green PLM framework is closely aligned with the new paradigm. As described in part I of this paper, the framework defines green product development across industry segments. Besides facilitating clear understanding of the framework, this paper discusses some approaches to Green PLM implementation. It also shares insights from various leading organisations that are actively working on green product development.*

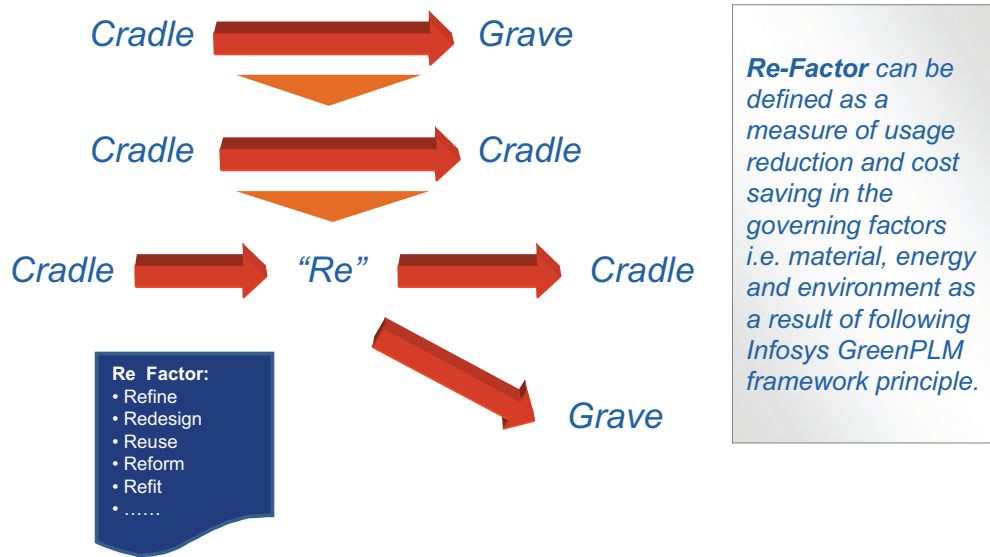
The first part of this series can be downloaded from <http://www.infosys.com/offerings/industries/consumer-packaged-goods/white-papers/Documents/green-PLM.pdf>

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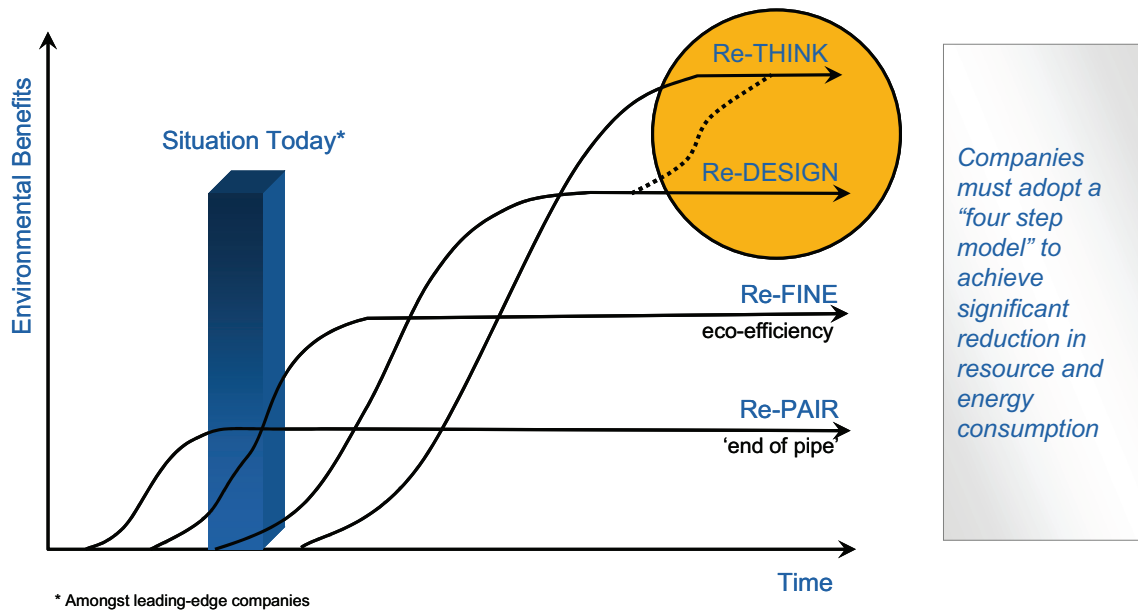
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## The “Re-Factor” in the Product Life Cycle

The following illustration describes the evolution of product development concepts:



Having moved from a cradle-to-grave approach to a cradle-to-cradle one, the product life cycle is now evolving into a cradle-**Re**-cradle format. This approach holds that not every product component can be put back into a new life cycle, and hence, some will have to be disposed of. The term “**Re**” in **Re-Factor** not only encompasses innovation but also collaboration between different departments involved in the development of a product life cycle. A while back, Charter & Chick [1] illustrated the Re concept in their “four steps model”, which is reproduced below:

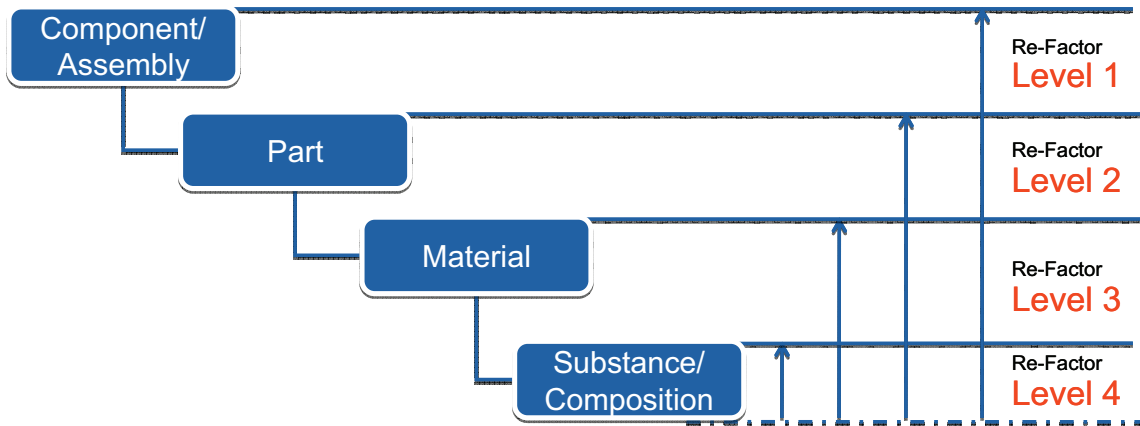


They state that at present, most companies are at the Re-Pair stage dealing with end-of-life cycle (EOL) solutions. Some leading organisations have managed to move to the Re-Fine stage where they are able to improve resource conservation and reduce product development costs. The visionaries are a step ahead, progressing towards the Re-Design stage at which they will be able to factor the environment, material and energy into product development. Clearly, achievement of the highest stage of “Re-Think”, demands a paradigm shift in product development thinking. It is evident both from the “four steps model” and “Infosys Green PLM framework” that future product development must follow the “**Re-Factor**” philosophy.

## Achieving a higher Re-Factor value

It is necessary to examine all aspects of product development in which Re-Factor might play a pivotal role. A product consists of assemblies comprising parts, which in turn are made of materials that come from naturally extracted or chemically processed substances. While Re-Factor value is calculated at each stage, its impact varies from one to the other. In other words, Re-Factor value for Reusability, Redesign, Reform or Repair differs at individual levels. For instance, direct reuse is possible at component level 1 but not at level 4. Similarly, while level 4 as the highest control over green information, level 1 does not, since at this level the product is already built.

The figure below illustrates the Re-Factor at various levels.



*Dell Green and Energy-Efficient Product Development [2]*

*To achieve their goal for 2010, Dell is taking an innovative “green by design” approach for all their products. If there are reasonable scientific grounds to believe that a substance or group of substances could pose significant environmental or human health risks, Dell considers the same as a substance(s) of concern. In January 2009, Dell launched the G2210 and G2410 LED monitors that are free of PVC, BFRs, chlorinated flame retardants (CFRs), arsenic and mercury.*

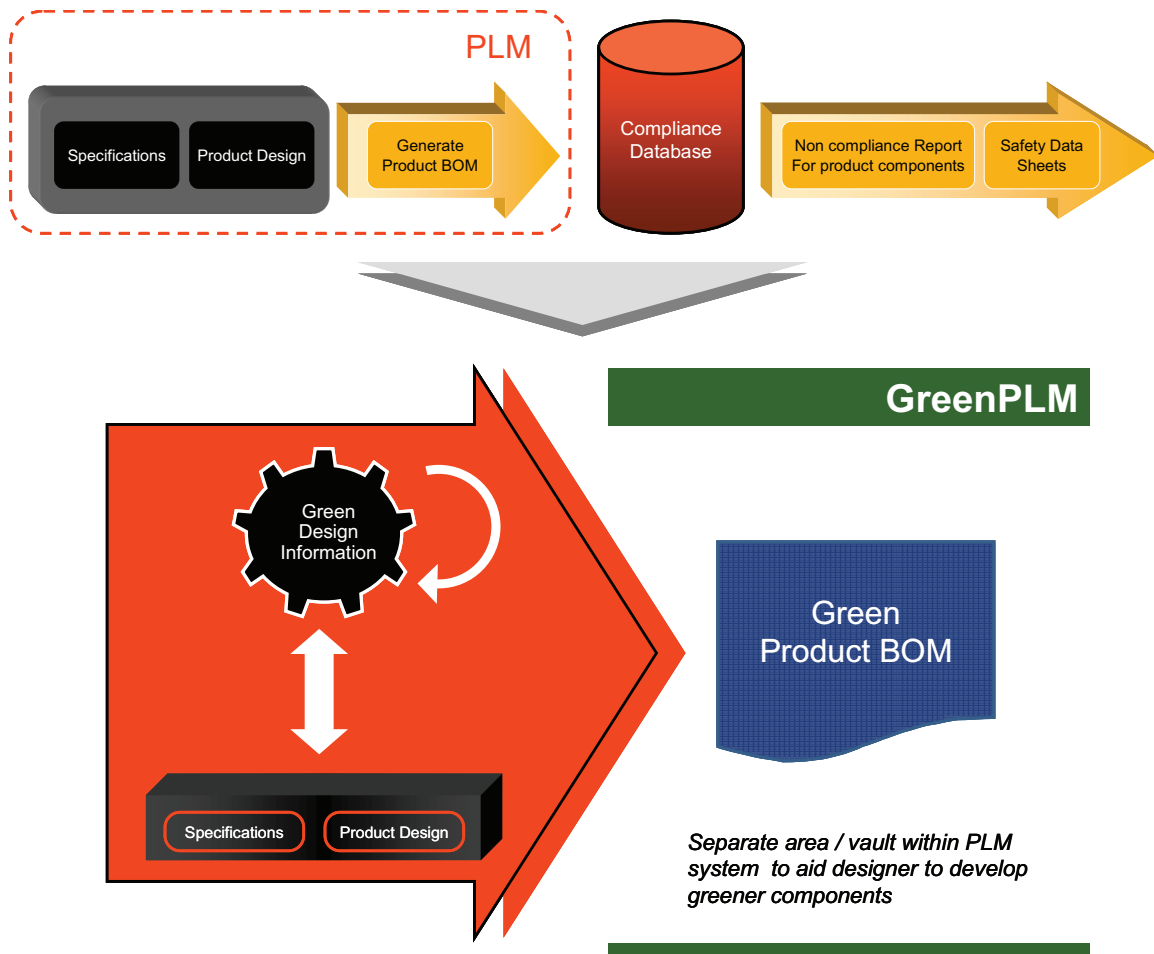
The figure above depicts that by controlling Level 4 the impact at level 1 can be reduced to arrive at a higher Re-Factor value.

Dell has demonstrated how the control of factors at the bottom level can result in higher value at the top.

This enablement is possible by strong application/tool support in line with business objectives. By capturing information of the required granularity and providing it in a usable format to product designers right at the component/part development stage, green products can be launched faster and at lower cost.

Green PLM's process oriented and tool-based approach provides exactly this type of support to designers. At present, in order to understand any rework requirements, designers must generate a design BOM, run that against compliance databases and finally analyse the non-conformity report. Clearly, they have to expend much time and effort on multiple iterations before arriving at a final product that is compliant in every way.

Green PLM creates a separate area/vault within the application suite to store information on different regulations, restricted materials/chemicals and other design-related issues. The designer can leverage this to experiment with various design and material options in order to determine the optimal Green Product BOM to be released for production. Green PLM not only offers a clear advantage in terms of reduced development time and cost but also stores the Re-Factor value at each level inside the vault.



In order to leverage Green PLM to arrive at a “Green Product BOM”, product development must take an integrated view unlike the conventional or departmental silo-based approach. In the paper titled Integrated Product Management [2], Deshmukh and Singh have discussed how Integrated Product Management (IPM) can help create a desired “single view” of a product which minimises the isolation of people and processes. Further, any information that results in design modification in the product development loop will ripple through the supply chain, thus bringing out the true essence of the IPM approach. Airbus has leveraged such an integrated approach along with tools/systems to reduce environmental impact throughout the product life cycle.

#### Airbus Environmental Management System [4]

Airbus has become the first and only aerospace company worldwide to receive the ISO 14001 environmental certification not only for production sites and corporate headquarters but also for all products throughout their life cycle. The ISO 14001 corporate certification recognises that Airbus uses a robust Environmental Management System to continually monitor and minimise the environmental impact of its production processes and products throughout their life cycle.

The “single green view” enabled by Green PLM can potentially deliver the following benefits:

- An opportunity for designers to choose the right material and design/develop a Green Product BOM.
- Compliance with changing mandatory requirements with minimal effort expended on product variation.
- Easy monitoring and management of Re-Factor value resulting in cost reduction. Collaboration on green issues between different units within the organisation and its partner eco-system.

- Improved operational efficiency and cost management across supply chain activities including inventory management, transportation, packaging and so on.
- Components expected to be directly reused, in adherence to “take back” legislation, can be tagged in the system during the initial phase of design. This will help organisations manage components inventory since it will tell them which and how many components would be plugged back into the supply chain.
- Re-Factor indicators in the system will help to identify the process of decomposition during end-of-life cycle (EOL) phases.
- Also, Re-Factor indicators will help determine the total expected value from a returning product. This will have a bearing on the price of the product at the time of its launch.
- Deeper insight for OEMs into the product development process especially for products built in offshore factories.

Nike -Design for Innovation [5]

Nike is building information systems and web-based tools to capture accurate and real-time information. As sustainability becomes a differentiator for brands and a source of competitive advantage, Nike thinks it is crucial that the consumer has accurate, complete information on not just the delivery of “green” products, but the extent to which the company is committed to greening its entire supply chain.

Another good example is that of Nike’s green product, “Considered Boot”. This boot has a single shoe lace woven between the leather parts of the upper conforming to the size and shape of the foot; stitching secures the upper to the sole, eliminating adhesives and providing both environmental and performance benefits; and cross stitching across the external seams gives robust structural support to the shape of the shoe.

The Considered Boot was recognized with the 2005 Industrial Designers Society of America’s Gold Industrial Design Excellence Award

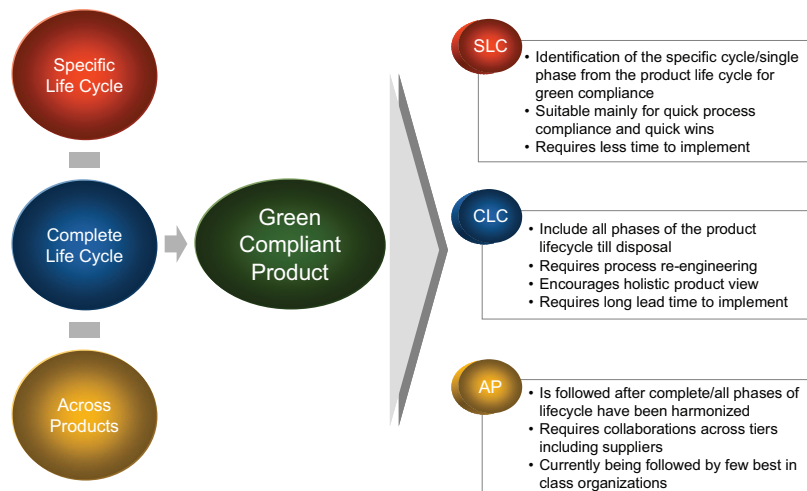
## The best way to implement Green PLM

Understanding the challenges of implementing Green PLM is a good place to start

Infosys’ research shows that the biggest challenge is a lack of knowledge and collaboration across the supply chain. Industry’s expectation from green implementation ranks second.

For instance, the apparel industry wants a holistic view of green product development. Not only this, significant importance has also been given to the management of documents to ensure compliance, safety, conformity of the products.

There is no universal mantra for Green PLM implementation. The approach depends on various considerations of product, industry, geography, regulation and business need. Broadly, implementation is of three types, as illustrated below:



## Specific Life Cycle

Specific life cycle implementation is conducted on a smaller scale to establish proof of concept in cases where green product development is new to the business or much ambiguity surrounds the implementation. The results of the pilot form the basis of a final decision which is taken jointly by the concerned units and other stakeholders, after weighing it against their business objectives. Since specific life cycle implementation overcomes time and budgetary constraints and produces quick results, even leading companies take this approach to debut a new green product development program.

### *Salient features of this approach are:*

- It is less expensive and can be implemented on small products
- Process re-engineering is not mandatory, although it might be strongly recommended in specific cases.
- It can be implemented at one site or location, using a single team.
- It does not generally involve extended collaborative parties, unless required
- It is mostly carried out to benchmark current capability.

## Complete Life Cycle

Complete life cycle implementation is best suited to large organisations with clear vision and process-centric fundamentals. However, this approach requires process re-engineering to ensure that all collaborative parties and units are made aware of the green initiative and the process changes it may bring. Understandably, it works on a longer lead time. Complete life cycle implementation is generally advised or undertaken when an existing product line has to be modified to incorporate greener aspects. Re-Factor plays an important role in such implementation, which takes a complete cradle-Re-Cradle approach.

### *Salient features of this approach are:*

- It is process-centric, but also involves application aspects.
- It is expensive and requires longer lead time.
- It involves collaborative parties.
- It is implemented at multiple sites and requires the support of larger teams.
- It has the capability to generate a “single green view” across the supply chain.
- It promotes innovation by establishing new business practices and process-centric approaches.

## Across Products

This approach calls for a paradigm shift in the way companies go about their business and hence, is appropriate for visionary organisations. Since this type of implementation demands fundamental change, it is time intensive, sometimes taking between 3 and 5 years to complete. Therefore, it is also viewed as an ongoing activity. On account of the stringent demands of this type of implementation, not many organisations have been able to rollout Green PLM across product lines.

### *Salient features of this approach are:*

- It is extremely expensive, especially since it is an ongoing activity.
- It requires that a team be dedicated exclusively to oversee the implementation of Green PLM.
- It needs very strong support from top management.
- Financial returns are realised only in the longer term.
- Since Re-Factor realisation across all product lines is its true essence, it helps set industry benchmarks.

## Conclusion

With green regulations making inroads into most industries and geographies, the need for Green PLM can no longer be ignored. As consumers become more environmentally conscious, the future will belong to green products. The right mix of process and technological solutions will help organisations in their quest for sustainable products. With Green PLM, they can take the lead in this journey.

## Further Reading

- “The Journal of Sustainable Product Design”, Issue 1, April 1997, UK, <http://www.cfsd.org.uk/journallindex.html>.  
Reproduced with permission from Author: Martin Charter
- “Environmental Responsibility” Dell Corporate Responsibility Summary Report’ 2009, <http://content.dell.com/us/en/corp/cr.aspx?c=us&l=en&s=gen>
- “Integrated Product Management”, Sourabh Deshmukh, Jagmeet Singh, Infosys Limited, 2005, [www.infosys.com](http://www.infosys.com)
- “Performance & Best Practices” , Sustainable Growth, EADS Business, Legal and Corporate Responsibility Report 2006, <http://www.reports.eads.com/2006/en/s/downloads.html>
- “Considered Design & Environment” Nike Corporate Responsibility Report’ FY 2005-06, <http://www.nikebiz.com/responsibility/reporting.html>
- “Oeko-Tex® Certification Satisfies CPSIA Lead Testing Requirements for Textiles and TextileBased Products” Press Release, 9/16/2009 [http://www.oekotex.com/OekoTex100\\_Public/content.asp?area=nebenmenue&site=presseinformation&cls=02&id=724](http://www.oekotex.com/OekoTex100_Public/content.asp?area=nebenmenue&site=presseinformation&cls=02&id=724)
- “C-mark® Certification” <https://www.iaaqaservices.bureauveritas.com/cmark/Overview.do>
- “Common Threads Garment Recycling” [http://www.patagonia.com/web/us/patagonia.go?assetid=1956&src=vtv\\_ex0058&slc=en\\_US&sct=us](http://www.patagonia.com/web/us/patagonia.go?assetid=1956&src=vtv_ex0058&slc=en_US&sct=us)
- “Patagonia Chooses TEXbase to Support Fact-Based Textile R&D” <http://texbase.com/customers.aspx>
- “Recycling of Low Grade Clothing Waste”, 2006 <http://www.oakdenehollins.co.uk/pdf/Recycle-Low-Grade-Clothing.pdf>
- “Sustainable Clothing Action Plan launched at London Fashion Week” News Release, 20th Feb 2009 <http://www.defra.gov.uk/news/2009/090220a.htm>

## About the Authors

Jagmeet Singh is a Senior Associate in the Product Innovation Practice at Infosys.  
He can be reached at +91-80-285-20261 or [Jagmeet\\_singh@infosys.com](mailto:Jagmeet_singh@infosys.com)

Hardik Kansupada is a Principal in the Product Innovation Practice at Infosys.  
He can be reached at +1-214-228-8533 or [hardik\\_kansupada@infosys.com](mailto:hardik_kansupada@infosys.com)



For more information, contact [askus@infosys.com](mailto:askus@infosys.com)

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