# Design for Repurposing: A Sustainable Design Strategy for Product Life and Beyond

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As a society we are running out of resources and the number of products discarded everyday is no longer sustainable. How can design facilitate a solution to this problem? *Design for Repurposing*, presents a new strategy for incorporating the concept of repurposing in product design, which aims to extend the longevity of products by intentionally designing features or details that facilitate repurposing.

Source: Gertsakis and Lewis 2001

> Given the growing levels of environmental degradation around the world, few would argue that we need to take a more ambitious and longer-term view of how products are designed, manufactured, utilized and disposed of. The need for fundamental change and thinking in relation to the design process and its outcomes cannot be overstated in any discussion about sustainability.

The mass-produced objects that surround us shape our lives. They have brought what is perhaps the peak of human comfort to those who can manage to pay for them. However, in a world that is facing global warming, environmental degradation and running out of resources, the way we design and manufacture products is not sustainable. Most products are discarded before they are physically worn out or are technically obsolete because their design is no longer fashionable or appropriate to current circumstances. Many products in good shape and working perfectly end up in landfills. “Landfills around the world swell with fully functional appliances—freezers that still freeze and toasters that still toast” (Chapman, 2005:26). On the other hand, planned obsolescence is a strategy where companies deliberately introduce obsolescence into their products, with the objective of generating long-term sales volume by reducing the time between purchases (White, 2008). One example is the automobile industry, which every year releases new and appealing models with innovative features, colors and technology that draw consumers to purchase them. However, these vehicles are designed to wear out within approximately five years, pushing consumers to replace them after that period of time. “Ours is a consumer society that profits from disposability under the logic that the sooner things break the sooner they can be replaced. […] Since the 1930s, manufacturers have been designing their products to be replaced frequently just as fashion designers keep us buying by making last year’s fashions look outdated” (White, 2008). People acknowledge that contemporary products don’t last as they used to. Some of them try to keep their objects in a working order by replacing essential parts. However, in the developed world it is often cheaper to buy a new version of the same appliance (even if it is more expensive) than to pay someone to repair the original item. Even if we design products to last longer, we still tend to be working with a cradle-to-grave model. Braugart and McDonoungh (2002:28), define this model where “resources are extracted, shaped into products, sold and eventually disposed of in a “grave” of some kind, usually a landfill or incinerator.” Because not everything is recyclable or reusable, most garbage goes to landfills. Landfills, or dumps, are sites for the disposal of waste materials by burial. In a commercial context, companies have discovered landfills sites as abundant sources of materials and energy and many have begun harvesting them. Landfill mining and reclamation (LFMR) is a process whereby solid wastes, which have been previously buried, are excavated and processed. Processing typically involves a series of mechanical processing operations

designed to recover one or all of the following: recyclable and reusable materials, a combustible fraction, soil and landfill space ("Landfill Mining"). It is clear that burying waste and harvesting it is not sustainable or viable. While LFMR offers a supply of materials that can be reprocessed or repurposed, it is an inefficient point of exchange. My intention is to advocate another method that supports a point of exchange of materials before they end up in a landfill, or even not landfilled at all.

It is likely that, the amount of consumer goods we create and dispose of is constantly increasing because:

- People are buying more products and disposing them quickly.
- Increasing population means that there are more people on the planet that buy products.
- Fashionable lifestyles encourage buying trendy products that we don't really need, which means that we create and dispose additional waste.

It is apparent that the world needs and would definitely benefit from another solution or strategy for all those objects that are being disposed of every day.

**Repurposing in Context**

Before jumping into what design for repurposing is, it is important to first understand what *repurposing* stands for. Repurposing is creating a new or a second life for an existent product by making some transformations to it. It is a common practice. People have been transforming things in ways that were not originally envisaged since they began appropriating objects.

Large scale repurposing of existing objects can also be observed during times when a population experiences a shortage of products or materials. A good example of this is the Post-war period in Germany, where some objects experienced a significant transformation when it came to meaning: children's clothing made from uniforms, manuals for the construction of cooking boxes out of discarded aluminum, among others (Brandes, Stich, and Wender, 2009: 42).

Repurposing is not confined to post-war Germany. The use of Coca Cola in some countries is another example of total transfer of function and meaning. In Russia, women use it to smooth wrinkles. In the Japanese Island of South Ryukyu, the Coke bottles are seen as symbols of luck and now are placed on altars (43). In Mexico we use Coke as a drain cleaner, and it really works. These objects are taken out of its original context/purpose/function and transformed and used in a different environment for purposes that for many seem to be "wrong."

There are design studios around the world that are already using discarded objects and transforming them into new objects: Studio Campana in Brazil, Resource Revival in the U.S. and Reestore in the U.K., among many others. Also, Readymade and Real Simple are examples of some of the many magazines that highlight other uses for everyday objects. However, none of them are addressing the design of objects from scratch, to make them suitable for repurposing once they become obsolete or broken.

Repurposing needs to be understood in comparison to some other practices. The commonly understood definition of *recycling* is to collect similar materials and reprocess them into new products; some examples of recycled products are egg cartons and toilet paper, among others. According to Ann Thorpe (2007: 42), "most recycling actually degrades material quality resulting in 'down-cycling': with each recycle, the materials lose structure and concentration". Recycling is often thought of as the great solution for unwanted or broken objects and materials. However it comes with a number of disadvantages, such as the need to reprocess the original material and

the energy required to accomplish this task. *Thermal recycling* involves incinerating the waste materials (mostly metals and plastics), while chemicals are added and toxins are released, and "even the new product can release more toxins during use" (Braugart and McDonough, 2002: 40). As well, it takes fuel to transport the discarded products to the reprocessing plant. In contrast, repurposing does not involve the reprocessing of the material.

Repurposing is a closer relative to *reuse*. It means, "to use an item more than once." By taking useful products and exchanging them, reuse helps save time, money, energy and resources. An object is passed along, but used again for the same function, without suffering any transformation. A sweater passed onto a sister is one of many examples.

*Non-intentional design* (NID) is using objects not only in traditional ways, but also in new contexts without any deliberate design intention. In many households, Mason jars—glass jars used in canning to preserve food—are constantly used as drinking glasses. It is unlikely its creator, John L. Mason, in 1858, anticipated this use.

After analyzing the previous strategies, it is clear that repurposing offers benefits that could be observed in multiple ways:

- *Repurposing saves energy.* The amount of energy consumed when repurposing is minimal compared to the energy required to acquire and transport raw materials from their source. Also, the energy destined to recycle objects is saved.
- *Repurposing preserves environmental conditions and reduces pollution.* It helps the environment by minimizing the energy spent on industrial production and recycling (which creates toxic material that pollute the environment).
- *Economic benefits*. Repurposing saves money demanded for the production of new products from raw materials. These expenses include the entire production cycle starting from acquiring the raw materials, transferring them from their origin to production places, processing, manufacturing and disposal costs.
- *Repurposing eases the need of space for waste disposal.* Most of the landfill sites are filled up with a lot of waste products. Some of these waste materials belong to non-biodegradable objects, which take a long time to decompose. Repurposing avoids discarding objects by expanding products longevity.

So far we know that repurposing is a practice in which objects are transformed into different things from their original purpose, and that repurposing has different environmental and economic impacts than recycling.

Therefore, what is design for repurposing?

**What is Design for Repurposing?**

*Design for Repurposing* sets the conditions for repurposing. It is an evolved design strategy that proposes that it is possible to design a product with qualities, features and details that facilitate repurposing. Through the course of my research, I identified artifacts that are easier to repurpose than others and detailed those qualities and features that supported the eventual repurposing. I propose that with this understanding, it is possible to design to enable future repurposing, even though the conditions of repurposing are not fully known in advance. When designing for repurposing, the designer does not necessarily control or direct the ultimate repurposing, but only sets the stage for possibilities. In this way, design for repurposing and the act of repurposing are distinctly different acts.

Design for repurposing aims to deal with the abundance of products we discard of everyday (as long as they are not designed already for composting, reusing or represent any kind of danger to human beings), and where the original materials are not necessarily reprocessed. In the original design, products are intentionally given qualities that facilitate their transformation into another product with different purpose/function once their first life span has expired. The main goal of this strategy is to extend products' longevity.

In contrast to the Mason jar example cited earlier, the designers of the Nutella jar (Fig.1) most likely planned its second life. The clarity of design indicates a purpose: once the product is consumed, the jar becomes a drinking glass.

**Figure 1. Nutella Jar, photograph by Darinka Aguirre**


However, it is nearly impossible for designers to anticipate what the second life or purpose of the object would be once the repurposer takes over, and certainly, not everything can or should be repurposed. There are items that represent potential dangers to our health because of their toxicity, or because they are designed specifically to be used only once and not to be manipulated or transformed into something else. Examples like surgical needles and personal items come to mind.

As an industrial designer, I can see that there is a latent opportunity to facilitate repurposing in most objects, which would lead to many positive benefits for both the earth and people. I strongly believe that this strategy, especially in the industrialized countries, would be very welcomed. Shedroff (2009: 176) states, "It is not enough anymore to simply design better, more durable products. In order to be truly sustainable, solutions need to both last longer and have a life after their normal use period."

**Design for Disassembly**

It is clear that we may not be able to sustain our current lifestyles for long without considering the environmental impact this has on the planet. Long-term sustainable solutions are needed. Design for repurposing is one of them. However, in order for repurposing to be possible, products first have to be designed for disassembly. *Design for Disassembly* (DfD) is an example of a deliberate strategy originally to facilitate recycling and reuse, although it also facilitates repurposing. It is one of the strategies designers and manufacturers are currently employing to design with more responsibility. DfD involves designing a product to be disassembled for easier maintenance, repair, recovery and reuse of components and materials (Chiodo). This disassembly process can be performed by automated machinery, such as robots, or manually. However, manual labor does provide jobs.

Implementing DfD into a new design allows the product and its components to be better suited for reuse or recycling when it has reached its end of life, thus reducing the quantity of resources required to create new products. Complex products such as Herman Miller chairs use DfD guidelines ("Herman Miller"). However, there are high-risk products where disassembly is better left to trained people, such as medical devices, high-voltage electronics and automobiles.

Design for Disassembly increases the effectiveness of Design for Repurposing. For instance, products designed for manual disassembly for repurposing facilitate the work of the repurposer. She is able to more easily take apart all the components of an object and make use of most them.

"It is not too difficult to design more easily disassembled products when it is part of the initial phase of the design specification and goals. However, once engineering, design and production are already decided, it is nearly impossible to redesign for disassembly" (Shedroff, 2009: 185).

Now that DfD has been explained, what if, for instance, we could divert four components from an object (let's say a chair) that was designed for disassembly for recycling (as mentioned earlier, recycling is problematic), and instead repurpose them? What about ten components from the same chair? I believe that the environmental impacts would be very significant, because, as I explained in earlier, repurposing has several advantages over recycling: consumes fewer resources, is less intensive and expensive, and releases fewer toxins from thermal processes.

**Mexico Research**

The context of Design for Repurposing, such as cultural and social conditions and circumstances, is undetermined. Innumerable examples of repurposing can be found all around the globe at different economic strata. However, it is important to acknowledge that, indeed, there is a correlation between economic status and repurposing. The examples described below were compiled during my research in Mexico and are part of my inspiration for Design for Repurposing.

Born and raised in a privileged position in Mexico, I observed (rather than directly experiencing) how marginalized people meet their needs with what is available. I have been particularly interested in this practice, because, in Mexico, as in many other low-income countries, waste represents an available resource. "Affordability isn't everything; it's the only thing" (Smith, 2007: 9). For these people, repurposing does not seem to arise out of ecological awareness; nor does it represent a spontaneous act. Instead, it is the way they survive.

During my field research, I spent two and a half months researching, taking photographs, filming and interviewing people from 12 communities and three major cities in Mexico. I did this in order to know better their motivations, considerations and limitations when "designing" objects with cast-off materials. I also wanted to find out what makes some objects more *repurposable* than others.

The objects I selected to describe in this section are the most interesting in matters of shape, function and repurposing possibilities. In addition, I include one more example that is found in many high and low income countries and has strong obvious features for repurposing. These objects are intended to open a discussion about the specifics of repurposing.

Artifact A. Sink-grill

Mr. Humberto Mijangos, a retired worker from the oil industry, transformed an old single-bowl stainless steel kitchen sink into a charcoal grill. Due to the large number of benefits that it offers, stainless steel makes the perfect *material* for kitchen sinks. It is flexible, resilient and malleable. Apparently, Mr. Humberto Mijangos identified these characteristics as suitable for transformation.

The basic form of the sink is a *vessel*. This is an easy invitation to make use of it. The flat *edges* at the top are crucial affordances since they allow the attachment of a lifting cooking grid through welded hinges. This cooking grid makes it easy to place the charcoal/lumber into it. Because both sides of the sink are identical, this *symmetry* or *balanced* proportions make it simple for the repurposer to weld a metallic structure (as well symmetric) made of iron rods to it. Symmetry means that an object is identical on either side if divided by a line or a plane. As well, Mr. Humberto took advantage of a *hole* in the bottom of the sink by adding a removable cap for the ashes.

**Figure 2. Sink-grill, designed by Mr. Humberto Mijangos**


Artifact B. Washing machine drum (multiples)

I also discovered that the most common repurposed objects in the area I travelled through were cylindrical-shaped washing machine drums transformed into planters (Fig.3). They were everywhere. Their large number (I observed 60) suggests that there's something about their original design that calls out to users to transform them. It was the sight of all these transformed washing machines that inspired further research into what makes an object good for repurposing.

**Figure 3. Washing machine drum planters, photograph by Darinka Aguirre**

In answering this, I look to J.J. Gibson's "Theory of Affordances" (Gibson 1986: 127) defines *affordances* as "the capacity of objects to talk to the user in an intuitive way." Donald Norman, in the book, *The Psychology of Everyday Things*, describes the term *affordance* as "the perceived and actual properties of the thing, primarily those fundamental properties that determine how the thing could possibly be used" (Norman, 1988: 9). What both authors mean by *affordances* is that people do not need a manual in order to interact or to know what to do with certain objects. Its capabilities are revealed to us. "Complex things may require explanation, but simple things should not. When simple things need pictures, labels or instructions, the design failed" (Norman, 1988: 9).

The washing machine drum proves Norman's point. As in the case of the sink grill, the drum has an obvious capacity as a *vessel*. It also has tiny *holes* all around its perimeter, which are small enough to hold the soil in place and allow the excess of water to flow out, while providing aeration. *Material* is also important. "Most washing machines are made out of steel coated with zinc to improve rust resistance". […] "On some models the drum is made of stainless steel". […] "All other models use a steel (called enameling iron) designed for porcelain coating" ("Washing Machine"). This water resistant and long lasting material makes drums ideal as outdoor planters.

Furthermore, washing machine planters tend to be highly *decorative***.** In Mexico they are often used for large flowering plants or for the cultivation of small herb plants or even for planting trees. More affordances are its cylindrical *shape* that invites the addition of a standard base (Fig. 4) and their curved planar *surface*, which people paint or paste things on. The person that came up with the planter idea probably identified the former characteristics without a great deal of analytic thought and chose this object for its ability to transform.

**Figure 4. Washing machine planter, designed by Mr. Humberto Mijangos**


Artifact C. Rim-grill

Another interesting example of affordances is found in Mr. Victor Blanco's Rim-grill. This grill is composed of a truck's wheel rim, an iron plaque, a supporting structure made out of rods and a cast iron cooking grid (Fig.5). Mr. Victor Blanco selected a truck's wheel rim to transform it due to its affordances. Its *material* (steel) can withhold hot temperatures; it is rust resistant and offers good weldability. Coming from a truck, its *diameter* is big enough for cooking. Along with its diameter, its *width* (separation distance between opposing rim flanges) and its capacity as a *vessel* are also features that make a good charcoal chamber. However, since the rim was *hollow*, Mr.

Blanco had to weld an iron plaque –which he also made- to the rim's lower flange in order to convert it in to a chamber. Its *contours* allow a cooking grid to rest on it. By welding iron rods onto it, Mr. Blanco created a four-legged supporting structure for his grill.

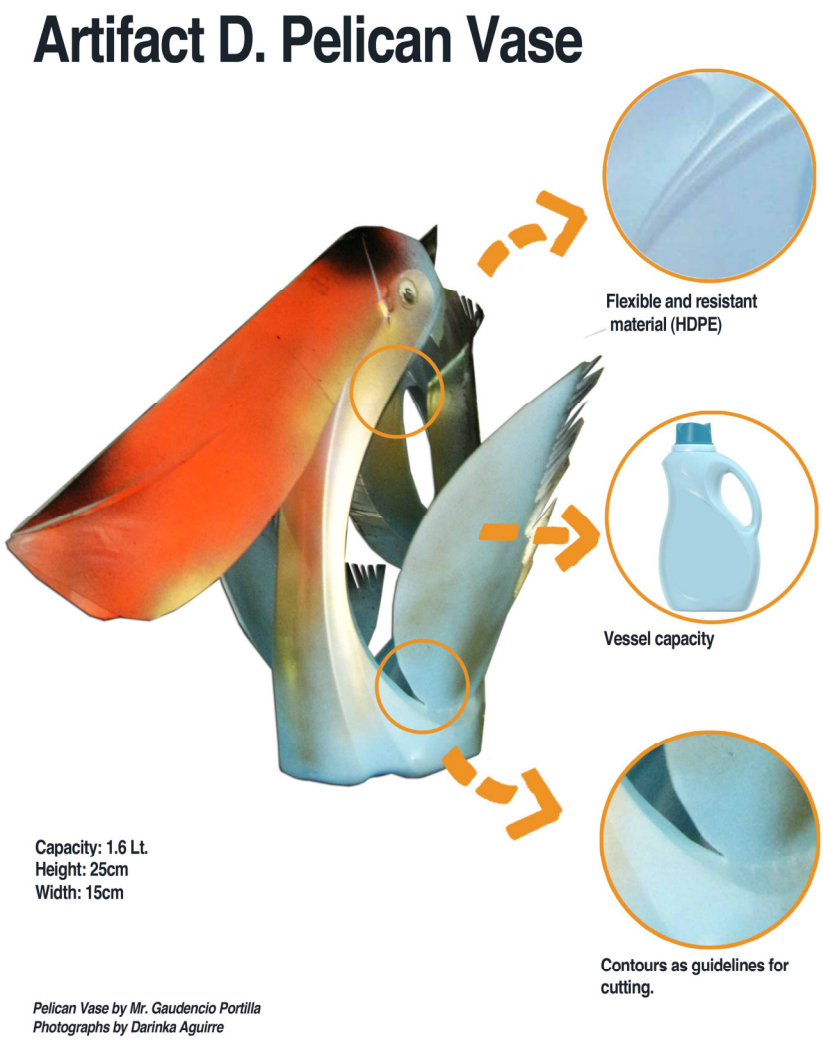
**Figure 5. Rim-grill, designed by Mr. Victor Blanco**


Artifact D. Pelican vase

Mr. Portilla turns High-Density Polyethylene (HDPE) detergent containers into ornamental artifacts. He makes vases, penholders and decorative magnets, among others, which he sells at his butcher shop. HDPE containers have three main affordances: material, vessel capacity and contours. Their *material* is harder and can withstand high temperatures compared to PET (polyethylene) bottles. It is *flexible* and *resistant*. It can be cut with simple tools such as stanley knives. Since it is already a *container*, Mr. Portilla takes advantage of this affordance by transforming it into a vase (Fig.6). *Contours* are key components. They act as *guidelines* or paths for cutting. I believe its

designer shaped the contours merely as aesthetic value (and perhaps to add rigidity to the thin walled vessel) and never anticipated this application.

**Figure 6. Pelican vase, designed by Mr. Gaudencio Portilla**




Artifact E. Shopping cart

Shopping carts have many affordances. Almost all are made of long lasting *materials*, such as metal or plastic. The artifact analyzed is a metal one, because I believe it offers more possibilities due its material and other components. These carts have an iron tubular frame, a wire basket, a rear gate and lower tray with a gray-coated finish for added rust and corrosion resistance. Carts are generally fitted with four rubber *wheels*: two *swivel or rotating wheels* at the front and two-fixed orientation wheels at the back. These provide *mobility*, which offers an immediate function-

ality and easy portability. It is an *open wire mesh* yet still it has a great *capacity for carrying*, which invites the user to *add* goods equally in the wire basket or in its lower tray. In addition, it invites the possibility of *hanging, tying* or *clipping* things onto it. Its main iron wire basket offers several possibilities. It can be *cut* into smaller wire meshes following its *edges/contours*. These *meshes* could be used as material for other purposes. The *spaces* between the grid lines could act as *ventilation openings* if transformed into enclosures such as cages and storage bins.

**Figure 7. Shopping Cart, photograph by Darinka Aguirre**


There are numerous visible examples for a cart's repurposing. "Carts […] have been used for such purposes as barbecue pits, go-carts, laundry trolleys and even shelters" (Wilkinson). Some design agencies, such as Reestore in the United Kingdom, repurpose shopping carts by turning them into pieces of furniture (Evans n.p). The basic tools used to achieve this transformation might have been pliers, bolt cutters and a hacksaw; some welding equipment was likely required as well.

**Figure 8. Annie, designed by Reestore**

All of the previous examples enable us to see how certain detailing provides specific affordances that enable repurposing. It seems that people detect certain affordances in a hierarchical order:

1. Vessel capacity: It is number one because objects with this capacity act as containers, enclosures and storage spaces.
2. Shape: Usually it is the first thing that inspires the repurposer's imagination.
3. Material: It determines whether the object is suitable for transforming with available tools. For instance, some metals can be welded, rolled up, cut and punched, among other things. It also dictates its possibilities as future raw material.
4. Symmetry: Proportionality and balance offers an advantage over non-symmetrical objects. This means that the repurposer can divide the shape into two or more equal parts.
5. Dimensions: Size matters. It can determine how the object can be potentially transformed.
6. Flanges: Flanges allow other objects to rest or hang from them.
7. Holes: Holes allow repurposers to imagine how to connect, attach or introduce other parts or objects.

8. Profiles/contours: The user can use them as guidelines to cut or fold areas of a product.
9. Mobility: The possibility of carrying. Portability.

As a result of this study, I became aware of the fact that many everyday objects have attributes or affordances in their design that are rarely if ever considered by their designers in the initial design stages. However, people do identify these affordances as opportunities for creation. Here is the opportunity for design: to design and detail products to enhance the possibility that people will rework and reconfigure product components in unpredictable ways. "This means that designing as steering more than designing as shaping. From thinking of ourselves as the authors of a finished work, we had better evolve toward thinking of ourselves as facilitators whose jobs is to help people act more intelligently, in a more design-minded way, in the systems we all live in" (Thackara, 2005: 214).

**How to Design for Repurposing**

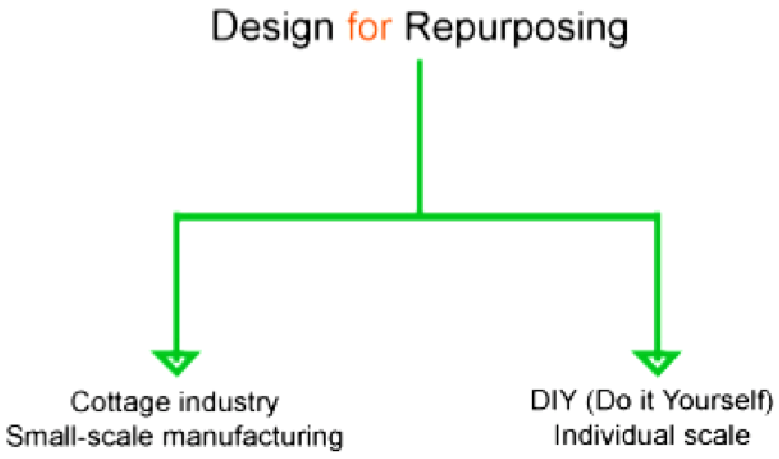
In previous sections, I established design for repurposing as an evolved design strategy that could help ease the negative environmental impacts in today's world.

But how do we design for repurposing?

In this section I am listing the criteria, features and affordances that enable repurposing framed as guidelines. These are listed in two checklists according to their repurposing potential scale. One intended for batch production, small-scale or cottage industry and the other for individual scale.

**Figure 9. Design for repurposing slopes**

Source: Aguirre, 2010




An aspect of batch production scale is that a steady supply of repurposable artifacts would have to be sourced and delivered to a production site. This can be facilitated by local municipalities. According to the Recycling Council of British Columbia (RCBC), in Vancouver, Canada, plans are underway to divert solid waste into particular streams and can be sorted and accessed by entrepreneurs (Macdonald Interview). In the case of the DIY scale, design for repurposing connects to and

supports the widespread movement of individuals who are wishing to modify objects and create their own products and environments. As mentioned earlier, design studios, such as Reestore in the U.K. and Studio Campana in Brazil, and some magazines and publications, such as *Readymade*, and *Design it Yourself* are examples of the DIY scale.

**Design for Repurposing Checklist 1**
Source: Aguirre, 2009

| | Design for Repurposing Checklist (Batch Production)<br>Steps to get started |
|---|---|
| | |
| ☐ | Designed for disassembly. This is a core value. In brief, most of the components can be separated through simple processes/tools. If there are parts that won't be used in the repurposing process, they are suitable for recycling or reuse. These components are identified either by color, display tag or label. |
| ☐ | Durable materials. In products designed for repurposing, materials and components are durable and capable of functioning well in another role. It is ideal that materials are long lasting. For example, stainless steel is ideal because it is rust resistant. |
| ☐ | Affordances. The designer provides cues and clues. Some of them are:<br><br>-Symmetry. If a shape is symmetrical, it can be divided into two equal parts. It also means repetition in sub elements, like the pattern of veins in wood, for instance.<br>-Holes. Perforations or openings that allow to insert or pass things through them.<br>-Contours/edges. Guidelines or patterns that could indicate possibilities, such as cutting, peeling, etc.<br>-Flanges. Flanges act as resting surfaces, as limits or attachments for other objects, and as structure strengtheners.<br>-Panels. Usually they refer to rectangular surfaces in an object. They can be used as raw material. |
| ☐ | Sharp edges. Sharp edges are design, situation or context dependant. In some cases they might be desirable, in some others they won't. |
| ☐ | Not hazardous. Products designed for repurposing strive to be safe, for instance, from toxicity. If perilous at any level, explanatory labels should be provided so that components could be easily removed. |

**Design for Repurposing Checklist 2**
Source: Aguirre, 2009

| | Design for Repurposing Checklist (DIY: Do It Yourself)<br>Steps to get started |
|---|---|
| | |
| KK☐ | Designed for disassembly. This is a core value. In brief, most of the components can be separated effortlessly and safely through simple tools, such as screwdrivers, pliers, hammers, etc. If there are parts that won't be used in the repurposing process, they are suitable for recycling or reuse. These components are identified either by color, display tag or label so the repurposer identifies them easily. |
| KK☐ | Durable materials. In products designed for repurposing, materials and components are durable and capable of functioning well in another role. It is ideal that materials are long lasting. For example, stainless steel is ideal because it is rust resistant. |
| KK☐ | Immediate functionality. Consider the possibility that some of the dismantled components might offer immediate functionality, such as containers, vessels, strainers, etc. Strive to retain that potential in the newly configured design. |

| | |
|---|---|
| KK | Inviting. The product invites the repurposer to transform it. Its engagement is partly informed by its material quality. It might also be appealing via its formal qualities. |
| KK | Easy and obvious. No explanations, if any are needed. The simpler, the better. |
| KK | Affordances. The designer provides cues and clues for the repurposer. Generally, affordances reveal themselves. Some of them are:<br><br>-Symmetry. If a shape is symmetrical, it can be divided into two equal parts. It also means repetition in sub elements, like the pattern of veins in wood, for instance.<br>-Holes. Perforations or openings that allow the repurposer to insert or pass things through them.<br>-Contours/edges. Guidelines or patterns that could indicate the repurposer many possibilities, such as cutting, peeling, etc.<br>-Flanges. Flanges act as resting surfaces, as limits or attachments for other objects, and as structure strengtheners.<br>-Panels. Usually they refer to rectangular surfaces in an object. The repurposer can use them as raw material. |
| KK | Avoid sharp edges. Sharp edges mean that a subsequent craftsperson or repurposer will have to be very careful. This can inhibit or intimidate repurposing. Sharp edges should be avoided as much as possible. |
| KK | Not hazardous. Products designed for repurposing have to be safe, for instance, from toxicity. If perilous at any level, explanatory labels should be provided so that components could be easily removed. |

Products won't necessarily meet all these criteria, but I encourage designers to consider the potential of most of them. As stated earlier, my goal with these criteria is to encourage designers, engineers and manufacturers to design for repurposing.

**Design for Repurposing Categories**

As a result of the artifact study and the design for repurposing checklists, I have come to the conclusion that products designed for repurposing generally share the central attribute of extended longevity. In all cases, repurposing increases longevity. Products are designed to have a second life or incarnation in order to extend their lifespan. St. Pierre (2008: 1), in the article "Here Today, Here Tomorrow: Design Strategies to Lengthen Product Life Span" states her concern about the amount of waste generated by products that have short life spans. "At a fundamental level, the way that we think when we are designing a product when we know it will be out of date in a year is radically different from how we would be able to think of it if we believed it might be handled with care and respect over generations." While St. Pierre is referring to how we think when we design for a long product first life, I believe that the designer's creative thoughts can also turn to seeding the ground for future repurposing. Designers can imagine repurposing potential in the early stages of the design.

There are three major ways of approaching design for repurposing.

Planned repurposing.

The designer has most likely planned the second life of the product with some probability of success. The Nutella Jar previously described in chapter three, is another good example of a product that appears to have been designed for repurposing with a planned and obvious application: a drinking glass.

Coached repurposing/suggestions.

While designers can't predict what products will be used for or transformed into, they can make suggestions that may or may not be acted upon. Labels and tags could be included in the product, suggesting how to transform it beyond its first life. This category is the exception of the second checklist's (individual scale) guidelines, where I suggest the object to be as easy and obvious as possible.

Open-ended repurposing.

Here the designer acknowledges that the repurposers will do what they wish when they repurpose the product and simply details the final components according to the repurposing guidelines, to allow for the greatest flexibility. Open-ended repurposing mean that objects are not restrained by definite limits. They can be turn into yet to be imagined things. Objects are adaptable to changes, so the user can take over and decide what to do with them

The following is the second of my master's degree completion requirements (thesis essay + visual component). These panels and messenger bag were exhibited on May 1, 2010, at the Charles Scott Gallery, at Emily Carr University of Art + Design. I designed these items following some of the guidelines in my checklists. See appendix I for both panels and messenger bag in detail.

**Figure 10. Design for repurposing exhibition panels**

Source: Aguirre, 2010


In terms of affordances, the panels are made of vinyl, a long lasting and flexible material; and have symmetrical notches and grommets, which can be used to roll them, tie and strap them. I also included a pattern to make a messenger bag. While the inclusion of this pattern falls into the cate-

gory of coached repurposing, I would like to draw your attention to how the details and material quality support open-ended repurposing, where the product can be transformed into anything. Some of the sketches in panel three display some repurposing ideas.

Anne Thorpe (2007: 146) discusses open design processes "the most important aspect of an open process may be that objects that produce better fit, […] or appropriation […] replace some of the commercially driven meanings we have now." In the previous example, Mr. Blanco appropriated this artifact by spending time working and customizing it. Therefore, open design processes create meaning. "To avoid […] obsolescence, products must mutually evolve alongside users, sustaining value by revealing their true beauty only through the slow passing of time" (Chapman, 2005: 47). I believe that repurposing is a process of engagement.

**Design for repurposing possible scenarios**

In this paper I have attempted, through various perspectives and explorations, to offer an understanding of why objects should be designed with a second life in mind. I hope that the discussions and examples presented here will inspire and provide the reader with an informative and stimulating set of ideas from which to consider the importance of designing for repurposing instead of allowing obsolescence.

Imagine a world where design for repurposing has become standard practice. Take, as a fictional example, Peter, a resident of Vancouver, Canada. He is visiting the new Repurposing station, which is subsidized by the government. He just read that it gathers landfill-bound materials and objects from local business and industry (who pay a collection fee) and makes them available to other individuals, such as companies, entrepreneurs, teachers, students, parents and other groups, at no cost. Also, every weekend it offers repurposing workshops for adults and children at $5 dollars per class. Material of course is supplied for free. After walking around for a while, Peter comes up with a clever way to transform old springs from trucks into stools. These are not common springs and Peter acknowledges this. They have been part of a truck that clearly displays the *designed for repurposing* seal. These have special features: they are not sharp and they have a cylindrical profile and rounded ends. He develops expertise working with these springs, and he starts a business selling his stools to bars and restaurants. The business becomes successful and he hires workers to help him in his business. He has to order truckloads of them (which come from a repurposing station) in bulk (at minimal cost) to satisfy the demand.

During the repurposing process, it is detected that some of the springs have sections that have been damaged during their previous life. Thus, the damaged springs have to be cut in order to repurpose the good sections of them, while the damaged sections are sent back to the repurposing station. It is likely that someone else may find a new use for these. The repurposing of springs has become a success. Peter has also developed a new line of stools for children. From one single spring he gets two children's stools. This process involves cutting the springs in half to be shorter for a child's scale. The stools become popular at birthday parties. The result of refining and adapting the design is that even more potential waste from discarded springs is avoided.

In the old cradle-to-grave model, these springs would have been thrown away, or hopefully would have been recycled, which would have involved consumption of energy. But through Design for Repurposing, valuable materials and energy are saved, and Peter is making money and expanding his business. In this scenario we have two businesses—the repurposing station which makes money from the shipping fees that charges companies and industry to pick up discarded material

and objects, and from the workshops it holds every weekend; and Peter's small business—but no waste, because the waste was turned into a resource.

Multiply these scenarios thousands of times and we can see how design for repurposing can unleash the creative power of people, create jobs and opportunities and help the environment. Design for repurposing can give repurposers/entrepreneurs free rein to turn the "waste" into something of value, because when anything that is unwanted and discarded gets reused or repurposed, it immediately re-enters the global economy with practically no energy expenditure at all. It doesn't need to sit around for a million years turning to rust or topsoil; it doesn't need to be shipped to China and melted down and recast as ingots and then shipped to a factory and turned into a low-quality copy of whatever it was during its first life. Without having to travel anywhere or use enormous amounts of energy, the object once again becomes useful to humankind without the time and investment of a great deal of processing. I believe design for repurposing deserves to be recognized alongside existing strategies as a way to address our current environmental problems.

To conclude, I point out the three main benefits of design for repurposing for people and the environment:

- *It can be less resource intensive and expensive than thermal recycling.* Repurposing costs less. Is a straightforward manipulation of materials, it is less process-intensive than recycling.
- *It preserves natural resources for future generations.* Repurposing reduces the need for raw materials, therefore conserves natural resources for the future.
- *It creates employment opportunities.* Repurposing invites people to become entrepreneurs. They can sell their creations, trade components, set their own shops/ businesses and refurbish and repair other peoples' objects.

"What can change are the products themselves—how they are made, what they are made of and what happens to them once their immediate usefulness has expired" (Shreve, 2006: 15).

I strongly believe that Design for Repurposing will become more important as our understanding of sustainability and the environment continues to grow.

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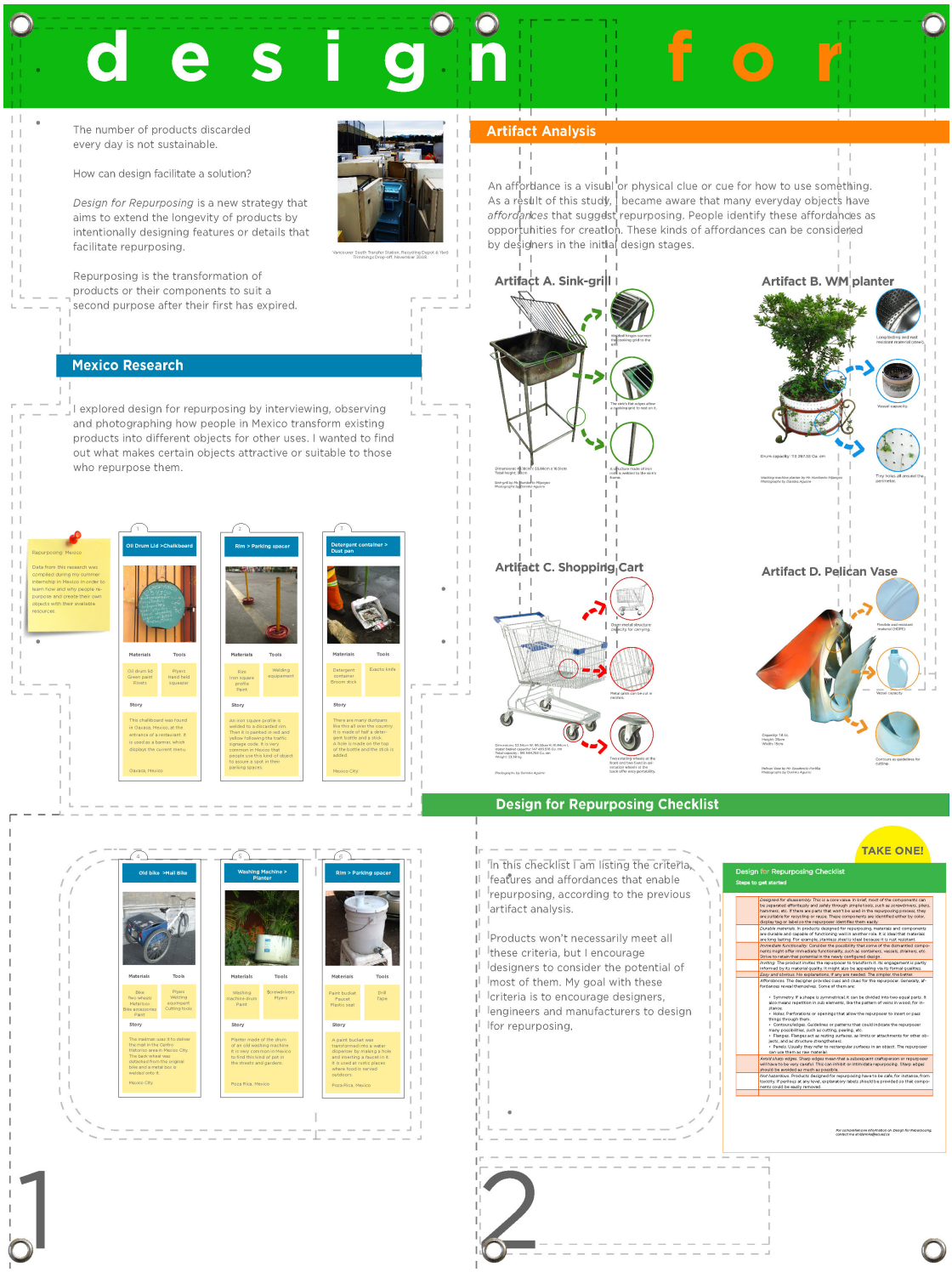
## Appendix I.


d e s i g n f o r
The number of products discarded every day is not sustainable.
How can design facilitate a solution?
*Design for Repurposing* is a new strategy that aims to extend the longevity of products by intentionally designing features or details that facilitate repurposing.
Repurposing is the transformation of products or their components to suit a second purpose after their first has expired.
Vancouver South Transfer Station, Recycling Depot & Yard Trimming Drop-off, November 2008.
Artifact Analysis
An affordance is a visual or physical clue or cue for how to use something. As a result of this study, I became aware that many everyday objects have *affordances* that suggest repurposing. People identify these affordances as opportunities for creation. These kinds of affordances can be considered by designers in the initial design stages.
Artifact A. Sink-grill
Artifact B. WM planter
Artifact C. Shopping Cart
Artifact D. Pelican Vase
Mexico Research
I explored design for repurposing by interviewing, observing and photographing how people in Mexico transform existing products into different objects for other uses. I wanted to find out what makes certain objects attractive or suitable to those who repurpose them.
Repurposing Mexico
Data from this research was compiled during my summer internship in Mexico in order to learn how and why people re-purpose and create their own objects with their available resources.
Oil Drum Lid >Chalkboard
Rim > Parking spacer
Detergent container > Dust pan
Old bike >Mail Bike
Washing Machine > Planter
Rim > Parking spacer
Design for Repurposing Checklist
In this checklist I am listing the criteria, features and affordances that enable repurposing, according to the previous artifact analysis.
Products won't necessarily meet all these criteria, but I encourage designers to consider the potential of most of them. My goal with these criteria is to encourage designers, engineers and manufacturers to design for repurposing.
TAKE ONE!
Design for Repurposing Checklist
Steps to get started
1
2

# r e p u r p o s i n g

## Design for Repurposing Categories

As a result of the artifact study and the repurposing criteria, I have come to the conclusion that products designed for repurposing generally share the central attribute of extended longevity. Products are designed to have a second life or incarnation in order to extend their lifespan.

However not all objects have the same characteristics or are repurposed in the same way. There are three major ways of approaching design for repurposing.

## Planned Repurposing

*Planned repurposing.* In planned repurposing, the designer has planned the second life of the product with some probability of success. The Nutella package shown to the right is clearly intended to be used as a drinking glass in its second life.


## Coached Repurposing

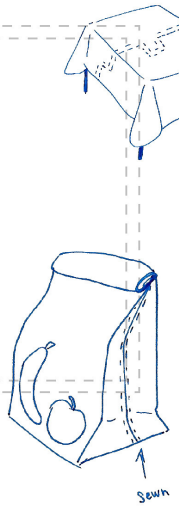
*Coached repurposing.* Designers can make suggestions for repurposing that may or may not be acted upon. Labels and tags could be included in the product, suggesting how to transform it beyond its first life.

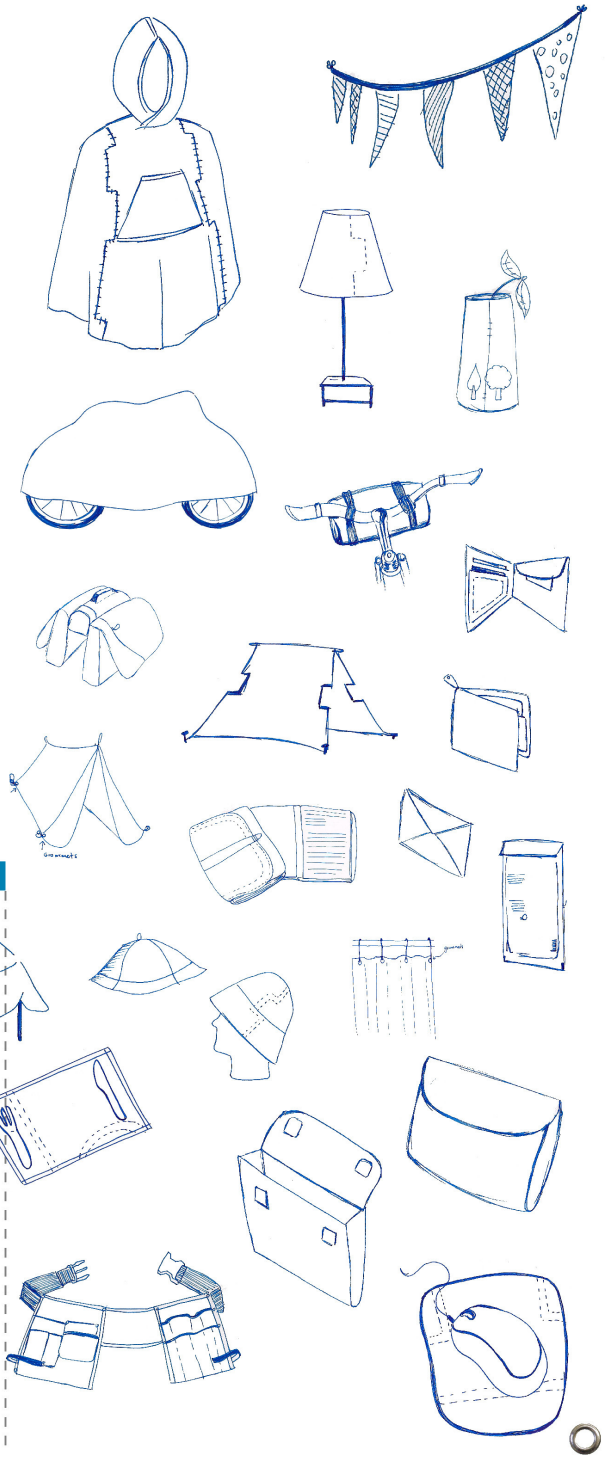
To the right is an example of how juice containers could display instructions or suggestions of how to turn the package into a coin purse.

## Open-ended Repurposing

*Open-ended repurposing.* Open-ended repurposing is when the designer acknowledges that the repurposer will do what they wish when they repurpose the product, and simply details the final components according to the repurposing guidelines to allow for the greatest flexibility. Objects are not restrained by definite limits. They can be turn into yet to be imagined things. Objects are adaptable to changes, so the user can take over and decide what to do with them.

These exhibit panels are a simple example of design for open-ended repurposing.
Affordances such as the durable material, symmetrical notches, grommets, and a background pattern for a messenger bag may inspire many different second.



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