

# Sustainable clothing

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**A practical guide to  
enhancing clothing  
durability and quality**

June 2017

# Introduction

**Producing better quality, longer lasting clothes is a win-win situation that brings real benefit to manufacturers, retailers, and to customers.**

## Collaborative action

Working together, the clothing industry can pioneer sustainability throughout the life cycle of clothing. WRAP's research, *Valuing Our Clothes: the cost of UK fashion*, found that taking practical action reduces the environmental footprint of clothing and transforms the clothing industry.

The most significant opportunity for savings is to increase the active life of clothes.



Extending the life of 50% of clothes by an extra nine months of active use would reduce carbon, water and waste footprints by around 4-10% each.

Valuing Our Clothes:  
the cost of UK fashion, 2017



## In this guide

This guide has been researched and developed with industry. It shares simple steps and best practice on how to design, produce, and sell sustainable clothing that lasts longer and that can easily be repaired and re-used.



For us, it's not a contradiction. We want people to buy better quality, durable goods, and at the end of their lives, recycle them.

Rose Marcario, CEO, Patagonia

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## Using this guide

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# What does durability mean?

wrap



# Defining durability

For some brands, 'durability' and 'quality' are interchangeable. As well as reducing the environmental footprint of clothing, durability helps to drive quality, which:

- safeguards against garment failure;
- strengthens brand reputation; and
- cements customer satisfaction and loyalty.

For a consumer, the durability of a product is measured by how long the product provides a useful service to them. Expectations for individual items vary; ties, jackets, blazers, coats and outdoor wear are expected to last for over five years, while underwear and tights have an active life of less than three years.

[Research shows](#), women are more likely to say that clothes are no longer in active use because they don't fit or are not to their taste. Wear and tear is more of an issue for younger people, and older people are more likely to store items or not get around to disposing of them.



In a saturated marketplace, quality and durability will help retain customers while attracting new buyers from your competitors.

**In this guide we refer to two definitions:**  
**[physical and emotional durability.](#)**

## Physical durability...

... considers garment design and construction in order to create products that can resist damage and wear.

It is impacted by a number of factors including:

- garment construction. This might include raw material choices; style, cut and fit choices; and manufacturing processes;
- resistance to surface abrasion, odour and staining, including choices of raw materials and finishes;
- colour fastness, including selection of appropriate colouration techniques and dyes; and
- communication with consumers, including the sharing of information about care, as well as available repair and re-use options.

## Emotional durability ...

... takes into account relevance and desirability to the consumer. For example, does the item still fit; is it still to the customer's taste?

It is impacted by factors related to how the wearer feels about their clothing, including:

- comfort, including raw material choices; cut, fit and size choices;
- ageing, including the way that the surface and colour age over time with washing and wearing, and the ability for the garment to resist odour and staining; and
- style, including whether the item is of a style that transcends trends and fashions across seasons.



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# Enhancing clothing durability

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# Enhancing clothing durability

The WRAP report, [Design for Longevity](#), identified the top five actions for enhancing durability, within eight key product categories. These have been summarised here. The guidance has been developed to suit all market segments. However, the approaches to product durability will need to be tailored to each company.

## Children's clothing

1. Design-in a growth allowance.
2. Select fabrics and components that are proven to offer durability and colour fastness.
3. Apply fabric finishes to reduce the likelihood of staining (*see pages 15-16*).
4. Design garments for multi-functionality (such as reversible coats) (*see page 11*).
5. Reinforce weak areas or areas liable to extra stress, such as elbows and knees.

## Occasion wear

1. Use classic styles innovatively to help transcend fashion fads.
2. Ensure that high quality fabrics are used when designing garments.
3. Design garments that are multi-functional, to give the customer the option to wear different parts of the outfit with other clothes (*see page 11*).
4. Facilitate alteration through adjustable waistbands, generous seams or additional buttons (*see page 11*).
5. Select materials and components that can withstand the chemicals used in the dry-cleaning process.

## Knitwear

1. Use quality yarn and fibres to improve the strength and colour fastness of knitted garments (*see pages 12-13*).
2. Ensure care and laundry advice is clear and simple (*see page 23*).
3. Take steps to preserve the quality of knitted fabric (including colour fastness) and garment manufacture throughout production.
4. Provide guidance to design for re-use and encourage consumers to down-cycle old garments.
5. Focus on classic design and loose shapes.

## Tailoring

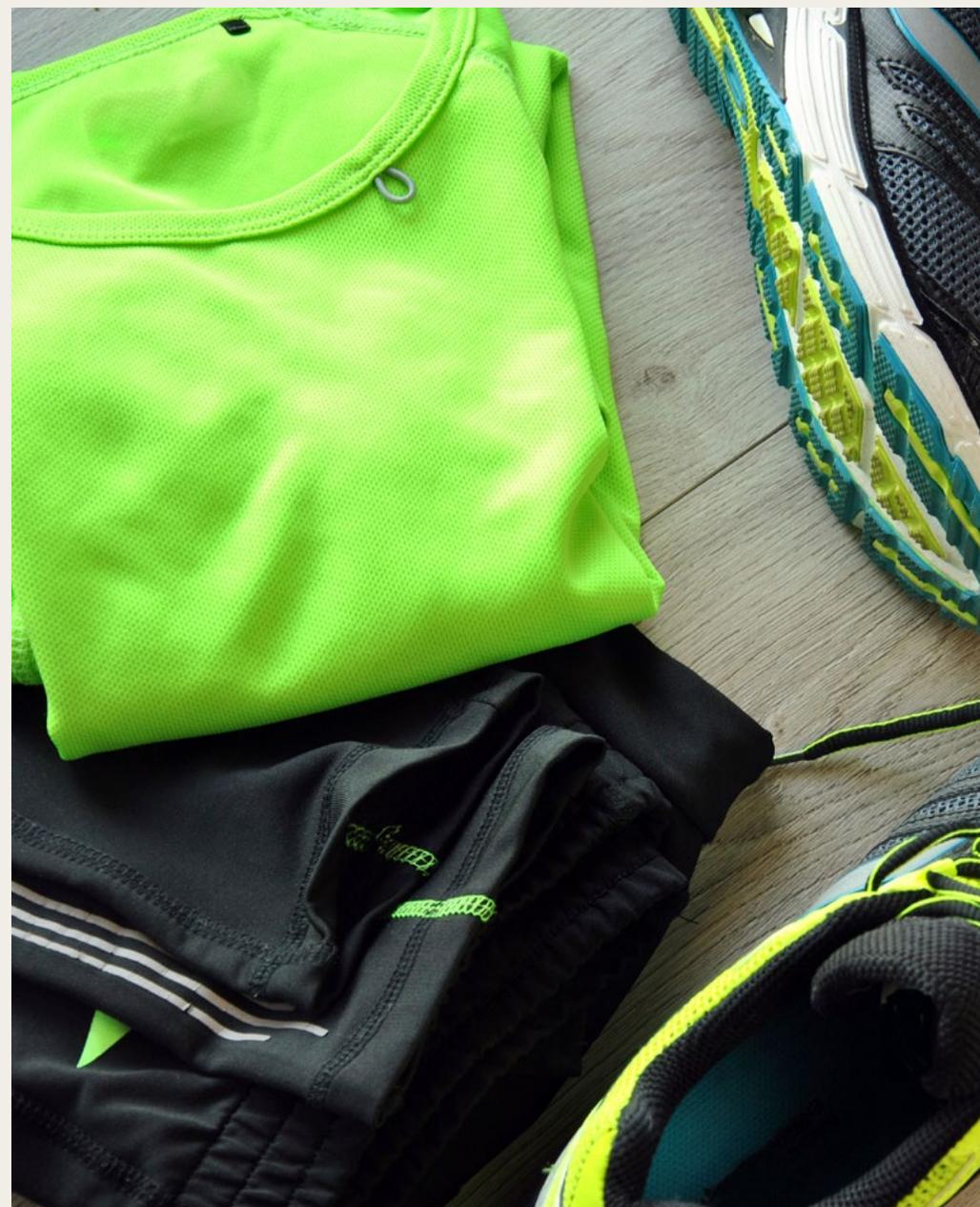
1. Use high quality outer fabric, and ensure that lining and interlining are compatible (*see pages 12-13*).
2. Apply classic styles, cut and colours, and build-in features to allow easy adjustment to size and shape.
3. Include clear guidance and advice on the care label (*see page 23*).
4. Where possible, utilise detachable elements, such as collars or linings, which can be replaced when worn.
5. Provide a specialist aftercare service, as well as mending and repair advice.

## Denim

1. Use ozone bleaching, laser engraving and resin finishes to create the desired effects, with a lower environmental impact.
2. Enhance fabric strength and surface quality by applying sustainable dyeing, bleaching and surface treatments.
3. Apply traditional, robust manufacturing methods and mass customisation strategies to products (see pages 17-18).
4. Educate consumers about the unique characteristics of denim, and how to care for, repair, re-use or repurpose it (see page 22).
5. Create emotional attachment through ethical sourcing and production, or no waste and craft design approaches.

## Sportswear

1. Use durable material, with reinforced seams on areas where rubbing or chafing occurs (see pages 17-18).
2. Provide care instructions that encourage airing of clothes or washing promptly after use.
3. Encourage longer attachment to items through the use of wearable technology or personalisation.
4. Add soil-resistant or antibacterial finishes to reduce problems from body perspiration and odour (see pages 15-16).
5. Select warp-knitted fabrics with open fabric structures (e.g. nets and mesh) to help the transport of moisture.





## Casualwear

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Garment types in this category include t-shirts, sweatshirts, leggings, trousers, shorts, skirts, blouses and shirts.

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1. Select high-quality fabric and test rigorously for performance, including colour fastness and pilling (*see page 19*).
2. Provide clear and simple care and laundry instructions.
3. Design-in adjustable features to accommodate fluctuations in body shape (*see page 11*).
4. Where appropriate, design garments with detachable parts which can be replaced when they become soiled or worn.
5. Provide styling guidance for the consumer, to encourage longer use and potential re-use.

## Underwear

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Garment types in this category include men's and ladies' pants, socks, tights and other hosiery.

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1. Use more durable fabrics, trims and construction methods.
2. Remove seams, where possible, and recognise that comfort is crucial for prolonged daily wear.
3. Schedule in time for multiple fittings during the design process to ensure that underwear fits well and supports where necessary (*see pages 20-21*).
4. Provide expert advice on fit and size on product packaging, and at point of sale (*see page 11*).
5. Design underwear to be easy to launder.

# Design and technology considerations

**Designers and technologists have a key role to play in improving clothing sustainability. They should work together to ensure the most suitable materials are selected from reputable suppliers who understand the brand's performance requirements. Identifying the most appropriate processes is also key to ensuring that the final product performs well.**



A good way to improve durability – and potentially reduce costs and returns – is to introduce specifications for all production tasks and materials.

## Design and specifications

The design stage is pivotal to the eventual durability of a garment. Choices around style and cut, fit, fibre and yarn, construction, trimmings and finishing all have an impact on the final product. Many designers and buyers will, rightly, focus much of their attention on selecting and specifying the main fabric for their products. However, a garment may be returned or disposed of, not because the main fabric falls short, but due to a failing in a low cost component, or as the result of a poorly-specified aspect of construction or manufacture.

### Key points

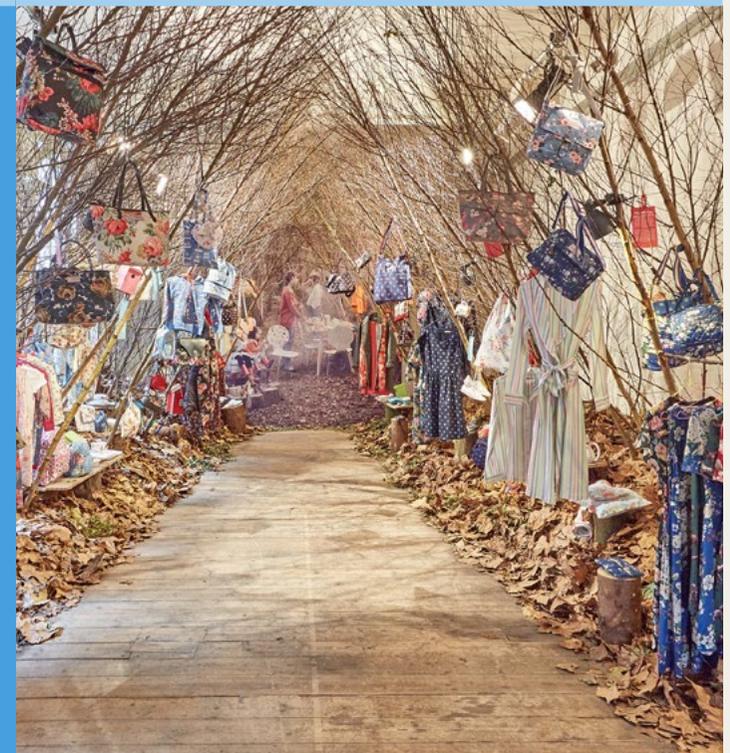
- ✓ Early choices about style and cut, fit, fibre and yarn, construction and trimmings, all have a big impact on the final product.
- ✓ Introduce specifications for all production tasks and materials.

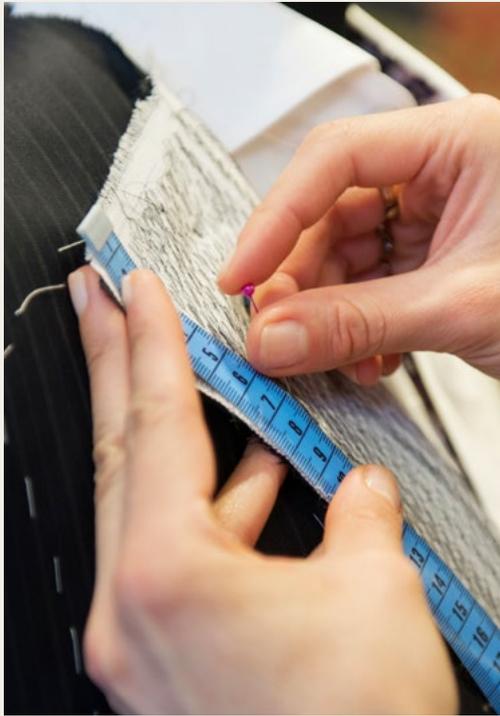


### Cath Kidston Case Study

Cath Kidston created a template for fabric and yarn specifications to share with suppliers. The aim was to show a clear link between raw material specification and the resulting product, which would lead to quality improvement and, finally, greater durability. Cath Kidston plans to record the changes in order to map and learn from the experiences, enabling it to replicate the work across its product range.

*Cath Kidston*<sup>®</sup>





The clothing industry boasts a wealth of technical know-how and production expertise around classic or simply-styled items. This experience can aid production quality and reduce costs.

## Style and cut

Style and cut are crucial to the creativity of fashion. If used skilfully, they can also have an impact beyond the look and feel of the garment. For example, 'classic' styles (e.g. the little black dress, tailored shirts, pencil skirts, chinos) tend to be long lasting, especially if core colours such as black, white, navy or grey are used.

Tailored and semi-tailored garments last longer because they frame the form well. Some tailored items feature integral undergarments that absorb chemicals and help prevent outer garments from being stained by deodorants and other personal hygiene products.

Oversized knits and kimono shapes are versatile and comfortable and, therefore, potentially wearable for longer. Some brands are also adopting unisex collections or updateable, [multi-functional designs](#), which increase the wearability of clothing.

### Key points

- ✓ 'Classic' styles, tailored and semi-tailored garments last longer.
- ✓ Think versatile, multi-functional, updateable styles.

## John Lewis Case Study

WRAP worked with John Lewis to develop four block patterns for men's short and long sleeved shirts. The aim was to enhance fit and to implement standardisation across like-for-like products sourced from multiple suppliers and countries. By owning these blocks, John Lewis aimed to improve the ratio of 'first time right' samples at the product development stage. This benefits the environment through a reduction in sampling, and their business commercially through better and more consistent fit, and a reduction in sourcing lead time, which maximises full price sales. John Lewis is now working with suppliers to use this project as proof of concept to roll out the method to other products.

## John Lewis

## Fit and size

Customers do not come in standard sizes or have the same preferences in terms of comfort and fit. One way to embrace these differences is to offer built-in size adjustment or alterations. This might involve generous seams, or the use of strategic fastenings. Assuming the garment's construction allows it, a customisation service could also be offered.

To enhance fit consistency and size control at production stage, it is important to align methods of measurement with suppliers. This also increases the chance for right-first-time samples at the product development stage.

Click here to access our [How to Measure Guide](#).

### Key points

- ✓ Comfort and fit are important, but needs differ between customers.
- ✓ Adjustable fastenings allow for increased wearability.

## Raw materials

Raw materials include fabrics, linings and components (trims). Fabric quality depends on many variables, such as fibre type, blends, yarn structure, and fabric construction, as well as dyeing and finishing. Fabrics may carry the same description, such as 100% cotton, yet vary greatly in performance and durability.

### Fibres

Man-made fibres such as nylon, polyester and acrylic have good physical durability attributes such as strength, abrasion resistance and shape resilience. Polyester, in particular, is commonly used because of these attributes, as well as being wrinkle-resistant, good at retaining colour, and relatively low cost. Natural fibres like cotton, meanwhile, need to be carefully selected, to allow for variations in harvests. A poor quality, short staple, immature and weak fibre is more likely to cause fabric pilling than long staple cotton. Wool is a hard-wearing fibre but can also be fine and delicate.

The durability and performance of products may be enhanced by blending different fibres. Nylon and polyester fibres can be successfully blended with natural fibres to enhance the durability of fabrics and improve the comfort of the final product. However, poor selection of fibres can have a detrimental impact on quality. For example, cotton polyester blends can be very susceptible to pilling. Furthermore, blending of fibres compromises opportunities for recycling the product at the end of its life.



One way to influence the durability of a garment is to specify key standards that the fabric must meet.



## Raw materials cont.

### Yarns and fabrics

The structure and composition of yarns can be fine-tuned to ensure the finished product is fit for purpose. For example, using long staple fibres in cotton yarns can produce fabrics which tend to be more durable, with improved yarn strength and reduced pilling. A high yarn twist generally improves pilling and strength, although it should be noted that increasing twist can also increase the cost of yarns. For more information on how yarns can reduce surface abrasion such as pilling, [click here](#).

For knitwear, acrylic yarns tend to be inexpensive and hard-wearing. However, care should be taken to ensure that the acrylic fibre used is a low pill variety – acrylic knitwear tends to pill with abrasion. The specification of the fibre thickness and length, yarn structure, fabric construction and weight all play a part in determining the durability of the finished product.

For wovens, plain and twill weaves are commonly considered the most durable options and are used in garments that require high levels of physical durability, such as denim jeans and school uniforms. However, as trends call for lighter-weight garments, there may be a decrease in the durability of the final product, unless changes are made to fibre, yarn and fabric constructions.

### Specifications

One way that designers and technologists can influence the durability of a garment is to identify key standards (specifications) the fabric must meet, and then task buyers to source fabrics that have been tested to meet those standards. It is also important to understand the durability of trimmings and components, which are used in clothing production, including zips, buttons and garment linings.

For example, specifying collarbones that minimise abrasion and the use of woven rather than non-woven interlinings in a shirt, all increase its durability.

Template specifications are available to SCAP signatories and supporters [here](#).

Where changing a choice of raw material is not an option for the production of particular garment types, it may be appropriate to provide customers with clear care guidance.

### Key points

- ✓ Processes, usage and care impact significantly on durability.
- ✓ Identify key standards for the garment's main components (main fabric, trimmings and linings).

### Ted Baker Case Study

WRAP worked with Ted Baker to resolve a colourfastness issue on a womenswear garment. As part of this work, the critical paths for design and production were reviewed to identify the information requested from suppliers at each stage of the product development. Consequently, Ted Baker identified an opportunity to review part of its quality management process and has subsequently developed a Fabric Technical Sheet to be used in advance of booking bulk production. By engaging at this earlier stage, Ted Baker's production team will be able to collect information on high-

risk fabrics and help resolve issues before they impact significantly on cost or delivery timescales.

It will ensure consistent quality of materials across suppliers and allow Ted Baker to build on its understanding of fabrics which, in turn, will help continual improvements both within Ted Baker and its suppliers.

**T E D B A K E R**  
L O N D O N

## Colouration and dye selection

When customers choose new clothes, colour is one of the most important influences. It also plays a significant role in deciding when a garment has reached the end of its life. The choice of a cheap or unsuitable dye, or cutting corners in dye application, has a significant effect on the durability of a garment, so correctly specifying dye use and application should be a key part of product specification.

Whether the colouration process happens at the fibre, yarn, fabric, or garment stage of the production process, it is important to ensure the specifications have been clearly defined and that suppliers are aware of the necessary standards. Using standard test methods to determine the characteristics of the selected dye is quick and cheap to complete. For example, fading due to the effect of washing powders can be tested via oxidative bleaching tests.

Colour fading (particularly of cotton fabrics) is also caused by an optical effect due to surface disruption. Abrasion of fabrics tends to bring loose fibres to the surface; these fibres then alter the way in which light is reflected off the surface, giving the impression of fading. Minimising

surface disruption is one way to reduce the apparent fading of garments and extend their life.

Technical support for dyestuff selection, testing and performance can be requested from a number of dyestuff manufacturers.

The Ecological and Toxicological Association of Dyes and Organic Pigments Manufacturers (ETAD) is a good source for further information. Members are obliged to adhere to ETAD's Code of Ethics, which is based on the principles of responsible care. They must also comply with all national and international chemical regulations. [Click here for more information.](#)

### Key points

- ✓ Retention of colour plays a significant role in deciding when a garment has reached the end of its life.
- ✓ Dye selection and dyeing methods all have a huge impact on colour fastness and colour fading.
- ✓ Minimising surface disruption is one way to reduce apparent fading and extend the life of products.



By working closely with dyestuff manufacturers and suppliers it is possible to select dyes that best meet the performance requirements of the garment.

**Dye chemistries which work particularly well with specific fibre types and, therefore, increase colour fastness and durability, are demonstrated in the table below.**

Dye Type	Fibres
Acid dyes	Silk, wool, nylon and modified acrylic fibres
Azo dyes	Cotton (cellulose) fibres
Basic dyes	Acrylic fibres, wool and silk
Direct dyes	Cotton and paper, wool, silk and nylon
Disperse dyes	Cellulose acetate, nylon, triacetate and polyester fibres
Reactive dyes	Cotton and other cellulosic fibres
Vat dyes e.g. indigo	Cotton, wool

It should be noted that the range of colours and brightness of dye type classes does vary, so colourfastness and brightness often have to be balanced.

## Finishes

Finishing processes are used to improve the look, performance, or 'hand' (feel) of the finished clothing. They are usually applied directly to fabrics after, or in combination with, dyeing. Mechanical and chemical finishing treatments produce a range of effects, including:

- changing the texture, drape and feel of the fabric – including stiffening/softening, brushing or smoothing;
- improving appearance – including colour, sheen and pattern;
- adding functional properties – including crease resistance, stain resistance, and waterproofing; and
- facilitating care requirements – including easy wash, quicker drying times, colourfast, pre-shrinking or 'sanforising', applying anti-pilling treatments (such as bio-polishing) or anti-microbial treatments.



Understanding likely impacts and giving clear instructions on where, and how, the final product will be used needs to be an integral part of an overall product specification.

Technologies available for mechanical and chemical finishing of fabrics are very diverse and extensive, with new finishing opportunities constantly being developed. Opportunities for mechanical finishing will be determined by the availability of the necessary finishing equipment in the supply chain. However, the majority of chemical finishes are relatively easy to apply, and most good suppliers can provide the bulk of chemical finishing. Careful consideration of chemical management in the finishing processes, as well as other parts of the textile supply chain, is essential, and should form part of a Quality Management System (see page 26).



The market for finishes is fast-paced and changes frequently. For information about the latest finishes, contact recognised responsible finishing manufacturers. They will be able to supply information on their developments and the direction the market is moving. These manufacturers can be found through a variety of sources; via primary suppliers, fabric mills or trade associations.

Many finishing treatments can affect performance and durability, or help extend the active use of a garment. Understanding likely impacts and giving clear instructions on where, and how, the final product will be used needs to be an integral part of an overall product specification.

### Key points

- ✓ Mechanical and chemical treatments produce a range of finishing effects.
- ✓ How the product will be used impacts on the type of finishing that is needed.
- ✓ Bio-polishing can reduce the abrasion that causes pilling, to extend the life of the product.

### F&F Case Study

F&F has been working with its supply chain to improve durability and quality across its product range. From engaging with customers and colleagues, F&F saw that there was a need to make its black jeans retain their colour for longer. To resolve this issue, it worked with its suppliers Kipas and Huntsman. Through the use of Huntsman's special black dye, it has been able to develop a fabric that stays black even after 20 home laundry washes with the shade change of grade 4.

Importantly for customers, the original price point for the jeans has been retained, and wearer trials showed that the fabric performed exceptionally well.



## Finishes cont.

Examples of chemical finishes and their applications are provided in the table below.

Type of Finish	Fabrics used on	Examples of applications	Process	Limitations
<b>Anti-pilling</b>	Cotton, wool and blends	Knitwear and jerseys	Applied to fabric	Washes reduce the anti-pilling effect, but the use of washing conditioners can help prevent this
<b>Water proofing</b>	All fabrics	Outdoor products such as jackets	Chemicals are sprayed onto fabric to give it a showerproof, water resistance to waterproof finish, depending on desired performance	Must be re-proofed regularly (often through washing or tumble drying)
<b>Stain resistance</b>	All fabrics	Schoolwear, children's clothing	Applied to fabric	Application washes off over time
<b>Easy care</b>	Cotton and cellulosic fabrics	Shirts	Chemicals are applied to fabrics to reduce creasing or make it easier to iron clothing	Tumble drying is often recommended to renew the effect
<b>Shrink resist</b>	Wool	Any woollen clothing	Applied to fabric to reduce felting and shrinking and to allow machine washing and tumble drying of wool and wool blend garments	Impacts 'hand' (feel) of the fabric (can reduce softness)

### **Novozymes** Example

Enzymes are increasingly used in the textile industry and have proved to be very successful in reducing pilling for many fabric types, including knitted jerseys and woven cotton. Independent analysis has shown bio-polishing can significantly reduce the occurrence of pilling and there is evidence that, as a result, the lifetime of a product could be increased by up to 20%. Novozymes is one of a number of companies that has developed bio-polishing technology based on enzyme finishes.

## Manufacturing

Designers have numerous stitch types, sewing threads, machine models and settings to choose from, as well as an array of methods for garment construction. Each technique will be best suited to a particular fabric or garment type and can be exploited to achieve greater durability. For example, choosing the correct stitch density for seams will minimise fabric slippage and puckering, while making sure that the correct operating procedures are in place for the application of linings helps to avoid delamination.

Product failures can occur when the seam technique used is incompatible with the fabric. Particular care should be given to the construction of performance garments, such as waterproof products and close-fitting or stretch garments.

### Trimmings

The quality of trimmings and the way they are attached need to be given special consideration, to give the finished garment the longest possible life.

### Size control

Poor size control in manufacturing can lead to garments being wrongly labelled. Inconsistency is problematic for customers, but this will also have an impact on durability. Undersized garments are more likely to have less tolerance for any small shrinkage that may occur. This can lead to fabric and seam failures. Therefore, it is important to correctly manage sizing control (and labelling of garments) in the production process.

Find out more in our [How to Measure Guide](#).



Co-ordinating design and manufacture to align specifications will improve the durability of the product.



## Flint and Tinder Example

Inspired by a factory visit that opened their eyes to the link between product durability and manufacturing issues (such as combining unsuitable fabrics, or stitching which leads to faster wear and tear), the founders of Flint and Tinder made it their mission to offer a hooded sweatshirt that could last a lifetime. The 10-year hoodie, 100% American-made, is manufactured from high quality domestic materials, utilising reinforced stitching for extreme durability, and heavy weight Lycra ribs to retain shape. The garment is guaranteed to last a decade and comes with a free of charge mending service.

*Flint  
AND  
Tinder*

## Manufacturing cont.

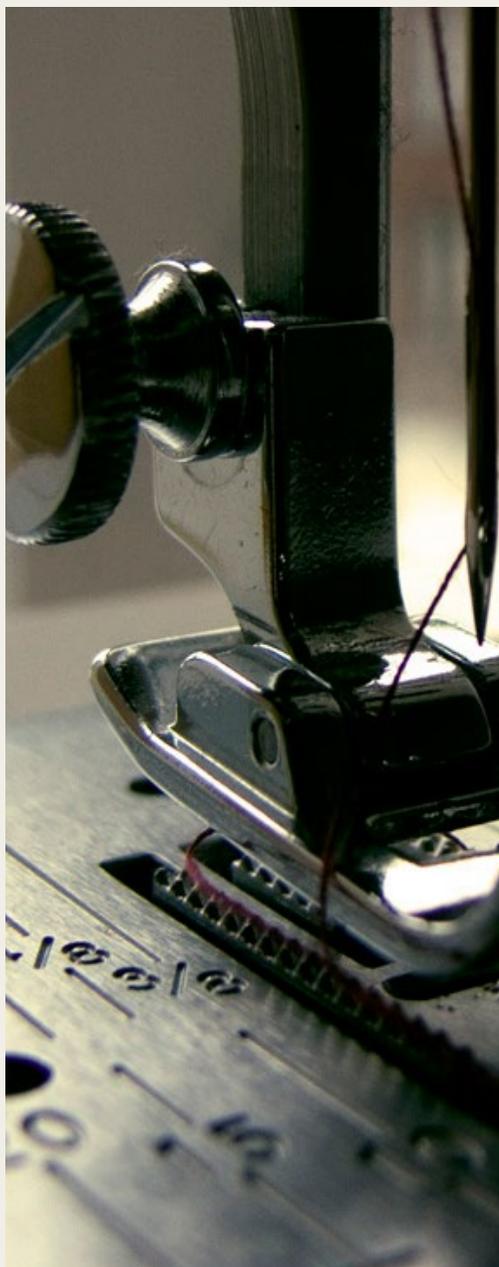
### Stitching

To enhance durability, the use of reinforcement stitches and bar tacks at stress points on the garment is recommended. A high stitch density should preferably be used on heavier, tightly woven fabrics. It is also possible to directly contact thread suppliers for in-country support at garment factories. To increase comfort, consider the use of flat seams for seams close to the body.

[For more information click here.](#)

### Key points

- ✓ A variety of sewing techniques can be used on particular fabrics to enhance durability.
- ✓ Consider the way in which trimmings are attached.



### ASOS Case Study

ASOS identified an issue with the blind felled hems on its tailored garments and their tendency to fail – i.e. fail after washing or wearing. ASOS worked with WRAP to trial a bonding seal on both menswear and womenswear tailored trousers. ASOS selected one lightweight style and one heavyweight style of both menswear and ladieswear trousers that were already on sale. Three pairs of each trouser type were sent to a selection of suppliers, and one trouser leg in each pair of trousers had Coats 'Hemseal' applied; this thread is a 'fusible low-melt thread that creates a reliably secure hem'. The garments were then subjected to a series of durability washes

to assess how the hem strength performed. Upon analysis, the hems that had the Coats 'Hemseal' applied performed much better than the standard hem, especially for lightweight trousers. ASOS intends to develop this trial further and has identified some possible opportunities to modify the hem structure, including potentially offering customers garments with hems they can seal at home, or a re-sealable hem.

**ASOS**  
discover fashion online

## Product testing

The use of clearly defined testing protocols for components and manufacturing elements can be built into product specifications to ensure consistency of quality. Industry standard tests cover physical testing, colour fastness, chemical testing and flammability, and can form part of a product specification. Standards may be British (BSI), European (CEN) or international (ISO), and even retailer-specific. Marks & Spencer, for example, led the development of clothing technology standards for the industry.

Main physical tests include:

- seam rupture;
- tear strength;
- burst or tensile strength;
- pilling;
- abrasion;
- elasticity;
- stability to washing; and
- seam slippage.

Colour fastness tests include:

- domestic laundering;
- commercial laundering and dry-cleaning;
- rubbing (wet and dry);
- chlorinated and sea water;
- hydrophobicity (drop test);
- phenolic yellowing; and
- testing for print durability.

There is no absolute single standard for all products. Many standards relate to the process and equipment, while the assessment criteria can be subjective, as well as depending on how and where the product will be used. For example, a ball gown would be expected to undergo occasional commercial cleaning, whereas a swimsuit needs to be colourfast in a variety of water conditions with multiple uses.

For more detailed information on product testing, see our [Clothing Durability report](#).

### New Look Case Study

New Look identified an issue with fabric failure on different styles of womenswear stretch jeans, specifically on the shank button waistband and fly area. Although suppliers had carried out significant testing at an earlier stage to try to ensure products met New Look's high standards, failures and subsequent returns occurred across a number of different styles and from a number of different suppliers. In order to understand why the issue was occurring, New Look worked with WRAP to analyse the returns and product testing data. The button

failure was often associated with the main waist button, and a study of the faulty New Look samples indicated that the failure tended to be caused by stress at the button attachment area leading to fabric failure. There was no evidence of the button itself failing. New Look is now looking at working with suppliers to review the types of testing it undertakes, to ensure it is consistent and aligned with industry standards, following the recommendations from the pilot programme.

NEW LOOK

#### Key points

- ✓ A number of industry standard tests now exist for fabrics and garments.
- ✓ There is no absolute single standard for all products.
- ✓ Each product specification should include clearly defined testing protocols.



The use of clearly defined testing protocols for components and manufacturing elements can be built into product specifications to ensure consistency of quality, leading to stable product durability.

## Extended wash tests and wearer trials

A good way to find out how suitable a fabric or trimmings may be for their intended use is through pre-production wearer trials. This method can be used to assess a range of issues that directly affect the durability of the garment, such as how well it withstands washing, its susceptibility to staining, the durability of fabric and trimmings, and understanding of care instructions.

By conducting such trials over a reasonable time period, manufacturers can identify any issues and take appropriate steps – such as changing fabric quality – to resolve them. A full lifetime test may not be feasible. In the case of knitwear, for example, this would require 30 repeated care label wash/dry cycles and 1,800 hours of wearer trials. It is therefore important to identify an appropriate testing regime that would give a good indication of garment lifetime, measured against a set of performance criteria. The time needed could then be factored into product development lead times.

See the table on page 21 for further details on wash and wear frequencies.

Examples of extended wash tests and wearer trials for core products are given in the table below.

Test / Trial	Knitwear	Shirt	Jeans	Socks	T-Shirt
Number of repeated wash/dry cycles	20 (cashmere)	40	40	50	50
Target wearer trial hours	200+	200+	200+	200+	200+
Average hours per wash in wearer trials	73 (cashmere) 24 men's (other fibres) 11 children's (other fibres)	18	39	24	28

### COS Case Study

COS, which is part of H&M group, ran wash test trials on four different menswear merino wool jumpers, in order to review and assess the optimal care instructions to maximise the garments' life. Five different wash cycles were undertaken, at 30°C gentle, and in cold wash. After each wash cycle, samples were assessed in terms of stability to washing (via flat measurements); visual assessment of pilling and any colour variation; and overall general appearance.

The performance of the garments washed at 30°C gentle showed

that current care recommendation is correct. At this temperature, there was little evidence of surface disruption or shrinkage, and there was also little variation in colour, even after 20 washes. The results highlighted that care label advice is critical to ensure performance is sustained throughout the life of a garment.

**COS**



## Extended wash tests and wearer trials cont.

Wash tests and wearer trials are complementary, each providing valuable insights into predicting a product's lifetime and potential sources of failure.

- Wearer trials reveal insights into the 'real world' effects of garments being worn and laundered.

- Repeated wash tests reveal insights into laundering processes, particularly colour retention, and can do so in a relatively short period of time.
- Ensuring that garments used in wearer trials are manufactured from the production fabric limits the possibility of variations in finishes, and in quality between sample batches and final garments.

### Key points

- ✓ Pre-production wearer trials can be used to fully assess fabric and trimmings suitability.
- ✓ Issues can be identified from wash and wear trials and appropriate steps taken.
- ✓ Ensure that garments used in wearer trials are manufactured from the production fabric.

For more information on wearer trials [click here](#).

For an example of a wearer trial template (see page 31).

The table below is a guide to likely wear and wash frequencies that may help designers and manufacturers set up their own testing regime.

Row	Longevity factors	Knitwear	Shirt	Jeans	Socks	T-Shirt
A	Current lifetime estimate (years) <sup>1</sup>	3.7	3.6	3.1	1.8	3.3
B	Target lifetime (years) <sup>2</sup>	5	5	4	2.5	4.5
C	Average wear days per year <sup>3</sup>	30	16	75	50	25
D	Implied wear days per month <sup>4</sup>	2.5	1.3	6.2	4.2	2.1
E	Total days of wear for the target lifetime <sup>5</sup>	150	80	300	125	112.5
F	Hours of wear for the target lifetime <sup>6</sup>	1800	960	3600	1500	1350
G	Assumed days of wear per wash <sup>6</sup>	5	2	10	2	2
H	Hours of wear per wash <sup>7</sup>	60	24	120	24	24
I	Average number of washes for the target lifetime	30	40	30	62	56

The figures are indicative only and depend upon unknowns such as the wearing and laundry habits of individuals, and the extent of their wardrobes. The data will also be fibre dependent, especially for knitwear.

## Cath Kidston Case Study

Cath Kidston carried out wearer trials on core products, including a cardigan, jumper and babygrow. The objective was to understand the impacts of wear on the garments in order to better understand product life cycles. Over the two-week trial, each garment was worn for 200 hours.

The results were used to better understand where pilling occurred and under what circumstances the babygrow experienced colour fade. At the same time, wearer trials were also undertaken on equivalent items produced by competitors to compare quality and durability.

*Cath Kidston*®

<sup>1</sup> Based on WRAP Data

<sup>2</sup> Based on lifetime increase of one third

<sup>3</sup> Working assumption (validated by industry interviews)

<sup>4</sup> Row C / 12

<sup>5</sup> Row B x Row C

<sup>6</sup> Row E x 12 (assumed avg. 12 hours wear per day)

<sup>7</sup> Working assumption (validated by industry interviews)

<sup>8</sup> Row G x 12

<sup>9</sup> Row F / Row H

# Consumer use

## Customer education and messaging

Given a little direction, customers would be able to gauge the quality and potential durability of garments before they buy.

Information could include advice on:

- evaluating seams, including advice on looking for loose threads and broken stitches. Consumers could be made aware that a higher density of stitches per inch is generally better; that stitching should be relatively tight; and that serged seams or double straight seams are usually stronger and may last longer than an equivalent item with single straight seams;
- examining garment linings and reinforcement. For example, looking at facing around zips, buttons, or other high-use areas;
- understanding that fibre content will play a role in clothing durability. For example, natural fibres may last longer and launder more easily in some garment applications than synthetic alternatives;

- reading care instructions, and ensuring that they are followed. For example, garments should be dry cleaned when necessary, cold washed and/or dried flat if appropriate; and
- looking for stains, rips, and other obvious damage caused in store or in transit before sale.



.....  
Giving customers clear advice will help them to choose more durable products.  
.....

## John Lewis Case Study

The Selling Partner Learning Guide provides John Lewis with information to be communicated to customers on the shop floor. The Learning Guide has been updated to include messaging from WRAP's [Love Your Clothes](#) campaign, which is used to assist in sharing three key messages which support clothing durability:

- making the connection between clothing that is more durable and higher quality, and the environmental impact of those garments in comparison to disposable fashion;

- explaining how the use of the right detergent and lower washing temperatures can affect the life expectancy of clothes and reduce the environmental impacts of washing, wearing and disposal; and
- giving customers the opportunity to extend the life of clothes (particularly linking to in-store haberdashery departments to demonstrate how simple changes to garments can increase the lifetime of clothes).

## John Lewis

## Wash and wear guidance

The way that people wash their clothes at home has the potential to change the characteristics of fibres and fabrics and, as a result, to reduce durability.

WRAP's research shows that consumers are willing to change clothes care habits; due to a decrease in tumble drying, ironing, and washing temperatures, the carbon footprint of clothing in the UK has reduced by 700,000 tonnes CO<sub>2</sub>e, since 2012.

Improving care information on labels, packaging, at point of purchase, or on supporting websites is a low cost way that could further decrease the carbon footprint, whilst increasing durability.



Advice might include:

- washing coordinating products together (for example suits, twin-sets or lingerie), and removing accessories before washing;
- dry cleaning garments, when necessary;
- considering steam clean options;
- washing when necessary, rather than after each wear;
- airing garments as a means of freshening;
- not rubbing stains or marks, to avoid causing damage to the fabric;
- avoiding the use of solvents for spot cleaning, as they can cause discolouration;
- storing appropriately – for example on hangers – using any garment loops or other features provided; folding, and removing from sunlight when not in use;
- using moth balls when storing woollens;
- using a specialist laundry bag for delicate items; and
- washing and ironing garments at the right temperature, according to the care label, and reversing those with motifs to avoid damage.

Advising customers that some garments are likely to experience pilling may help to reduce customer returns, while providing advice on how to remove fabric pills could also be appropriate. Fabric pilling can be prevented to some extent by washing garments inside out on a shorter wash cycle and removing them from the dryer promptly.

[Click here](#) for more information on care labels

### Whistles Case Study

In order to generate a clear picture for all customer returns and service, Whistles undertook a due diligence exercise to amalgamate data captured across different elements of the business including Customer Services, Technical, and throughout individual stores. This process helped Customer Services and Technical Compliance teams to identify why garments are most frequently returned, and to understand customer behaviour patterns. In some specific instances, this work also helped identify a recurrent garment failure, allowing for product redesign to be launched for SS17.

## WHISTLES

Whistles also identified that in many instances failure occurs when customers mismanage their clothes at home. To help ensure customers have a positive experience in-store and at home, Whistles has developed a Customer Care Guide for store staff. This guide has information about different fabric types; how to wash, store and care for garments, including details of WRAP's consumer-facing Love Your Clothes website. The guides are now in every store, and in the coming months, the information will also be available on the Whistles website.

## Repair, alteration and re-use support

### Repair and alterations

Although most people are able to sew a button on, [research suggests](#) that fewer now have the skills to make more complicated repairs such as altering a hem or darning holes. Instead, people may store or discard items in disrepair or in need of alteration.

At a national level, however, TV shows such as The Great British Sewing Bee have helped promote clothing repair and alteration as a hobby activity and lifestyle choice. This trend could be supported through the provision of basic repair kits – including threads or yarn, buttons and instructions – in garment packaging and/or on product labels. It can also be supported by factsheets offered in-store, online or in packaging.

Some department stores with haberdasheries are promoting sewing materials and running open courses in stores. Where self-repair or alteration may not be appropriate, some brands and retailers are entering into national agreements with chains of tailors, or even offering this service themselves.



Retailers can encourage self-repair by incorporating repair kits into clothing sales, or building relationships with national firms to offer repair services to customers.



### Patagonia Example

Patagonia believes in offering its customers the chance to have their items repaired to extend product life. In 2016, its repair department mended over 45,000 garments. Taking this one step further, Patagonia is also empowering the consumer to repair clothing themselves, by launching a new repair programme in collaboration with iFixit. Customers can download free, easy-to-follow online repair guides for Patagonia clothing and are also offered an Expedition Sewing Kit for on the spot emergency repairs.

patagonia



Explore options to encourage re-use by working with charities or promoting re-use through a voucher or store-based scheme.

### Re-use support

A number of brands and retailers have formed partnerships with charities to support and encourage consumer re-use by:

- providing in-store take back options;
- promoting the delivery of second hand clothing to charity shops;
- incentivising re-use through the use of money off vouchers for new products; and
- supporting workplace-based, used clothing amnesties and working with community-based organisations for re-use of specific clothing items such as sportswear.

[Research suggests](#) that raising awareness of a number of re-use options increases collections of textiles across the board, rather than moving clothes from one re-use outlet (such as a charity shop) to another (such as a textile bring-bank). Promoting one or more options for re-use can therefore boost the active life of a wide range of clothing.

Visit the [Love Your Clothes website](#) for more information on repair and re-use.

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# Getting started within your organisation

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# Aligning Quality Management Systems

Quality management is essential throughout the manufacturing process – from the sourcing of raw materials, to the sale of the finished item. Product quality is defined in terms of the quality and standard of fibres, yarns, fabric construction, colour fastness, surface designs, and the final, finished garment. Implementing a good Quality Management System (QMS) is the first step to addressing product durability.

A QMS establishes a strategy, action plan and responsibilities, underpinned by formal processes, which help to achieve high performance standards and continual improvements. A good QMS will be aligned to corporate objectives and customer expectations. It will implement and monitor business processes, and improve the quality of finished products. The benefits of a well-maintained QMS include reductions in customer returns, and improvements in satisfaction levels,

lower levels of wastage and product failures, and the potential to reduce costs.

Some key actions to address quality control include:

- developing and using specifications;
- establishing acceptable tolerances;
- establishing a fault rate and customer returns recording systems;
- ensuring quality standards are clear, unambiguous and communicated to the relevant organisations and people in the supply chain; and
- using a due diligence approach to assess bulk production quality.

## Risk assessment

In order to identify potential failure points, risk assessments should be carried out. The risk assessment should cover all aspects of the manufacturing and supply chain, both internal and external, taking

into account design; materials; manufacturing processes and capacities; suppliers and dependencies; and consumer use, as well as results from performance and durability tests, washing trials and consumer wearer trials.

This could be addressed through:

- identifying and defining failure risks which could impact the longevity of the garment;
- determining risk tolerance i.e. an acceptable level of variation;
- assessing the likelihood and impact of these risks occurring, and determining responses;
- evaluating the likelihood of residual risk and impact; and
- collaborating with suppliers to optimise processes.

[For more information click here.](#)

## Key questions to consider

- ✓ Have procedures for controlling quality been identified and described in terms of workplace practices?
- ✓ Are sampling plans and methods, and testing and inspection methods, in place?
- ✓ Have all suppliers been provided with clear specifications to support your quality requirements?
- ✓ Is data being collected from all stages of garment production and from customer returns?
- ✓ Is data being analysed and interpreted in order to report successes and drive continual improvement?

# Getting the right people together

Making clothing more durable starts at the design stage and requires buy-in from stakeholders throughout the supply chain. An introductory workshop for some of the following colleagues can be a useful way to get started.

## Key contacts within the organisation to engage with could include:

- designers and technologists;
- quality managers;
- supply chain directors/managers;
- buying and sourcing teams;
- merchandising teams;
- in-country support teams;
- area and store managers;
- corporate social responsibility (CSR) and sustainability teams; and
- finance managers.



## George at Asda Case Study

George arranged a successful workshop with a range of representatives including buyers, the design team, and sourcing and quality departments. The aim was to highlight the benefits of durability (which at George is referred to as 'quality'), and to build connections between key stakeholders who could influence development, while at the same time promoting existing initiatives and exploring new opportunities.

George.

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# Key questions to consider

- 
- ✓ How might you measure physical and emotional durability?
- 
- ✓ How do choices about the design and cut of a garment impact on its durability?
- 
- ✓ Can fit adjustments be incorporated into garment design?
- 
- ✓ How are choices about components, fibres, colour, dye selections, fabric finishes and construction impacting on product failures, which reduce durability? How can these be addressed?
- 
- ✓ What can be learned about garments from product tests or wearer trials?
- 
- ✓ What information and supporting material is available to support customers with repair and re-use of clothing items?
- 
- ✓ What wash and wear information is available to customers, and is it widely understood?
- 
- ✓ What additional information could be, or has already been, provided to consumers to educate them on ways to extend product durability?
- 
- ✓ How many new initiatives have been introduced to improve durability?
- 
- ✓ What does clothing durability mean to your organisation (e.g. long-lasting, quality, customer satisfaction)?
- 
- ✓ Does your organisation currently address clothing durability? If so, how?
- 
- ✓ Who else should you engage to get discussions started?
- 
- ✓ Who needs to make the change?
- 
- ✓ What goals should you set and what reporting methods could you use?

Here is a tool from the Clothing Durability Toolkit that could help you get started within your organisation:

# STRATEGY CARD

What are our goals?

How will we achieve them?

What is needed for success?

Who is involved (leader & team)?

SHORT TERM (within 6 months)

.....	.....	.....	.....
.....	.....	.....	.....

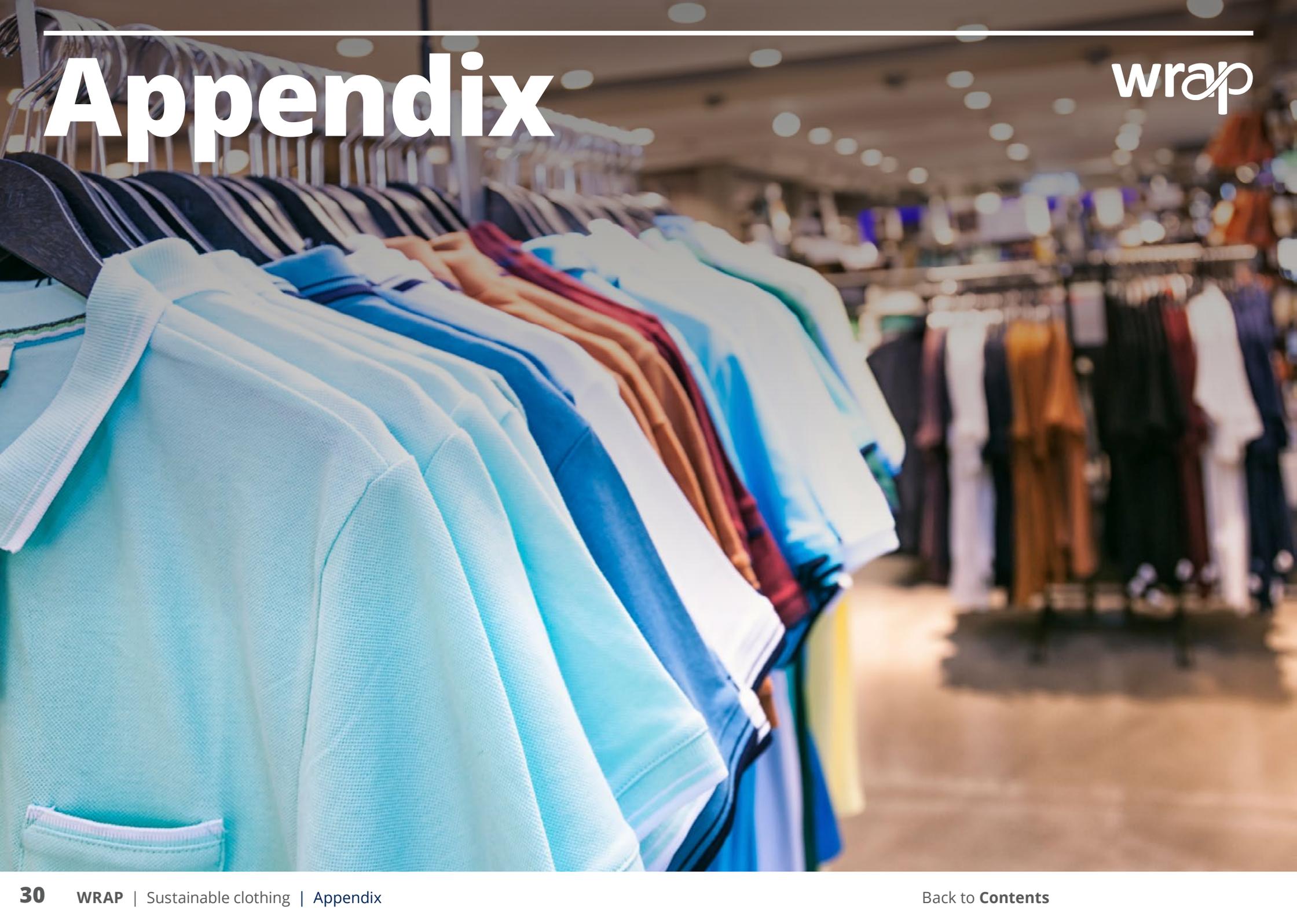
MEDIUM TERM (6 months to 2 years)

.....	.....	.....	.....
.....	.....	.....	.....

LONG TERM (2 to 5 years)

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.....	.....	.....	.....
.....	.....	.....	.....

**Source:** Cooper, T., Oxborrow, L., Claxton, S., Hill, H., Goworek, H., McLaren, A. (2016). Clothing Durability Dozen. Preliminary Draft. Defra: London.



# Appendix

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# Wearer trial template

- Garments used in wearer trials should be manufactured in production fabric, according to an approved sample.
- All garments used in wearer trials should be measured before they are given to the wearers.
- Clear instructions must be given to wearers, with target number of days/hours of wear, and target number of washes.
- Regular product reviews should be planned with wearers, including the taking of pictures of the products.

At the end of the trial, summarise your findings and make appropriate recommendations:

- How did items perform over time? What could be improved?
- Which items performed the best/worst? Why? What choices could you recommend?
- Did items perform as expected in consumer laundry conditions? What guidance could you offer or changes could you make?

WEARER TRIAL			
Product code/name		Care label (CL) instructions	
Number of wearers		Target number of days/hours of wear	
Summary/ comments		Target number of CL wash cycles	
Wearer X		Product reference	
Review after X washes		Number of days/ hours of wear	
Feedback	Overall garment appearance		Colour
	Fabric look and feel		Components
	Comments		Picture

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# Useful sources of information

## Further information to help drive change

This appendix signposts to guides and other support materials to help clothing designers and manufacturers improve the durability of garments within their range.

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### Clothing Longevity Protocol

Offers good practice guidelines designed to encourage the manufacture of longer lasting garments; to screen out items which fail prematurely; to protect brand value; and to reduce the environmental impact of the clothing sector.

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### How to use the Clothing Longevity Protocol

A guide on how to integrate the Clothing Longevity Protocol into your business.

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### Clothing Longevity: Measuring Active Use

Offers insights for improving understanding of how long people keep and regularly wear their clothes.

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### Clothing Knowledge Hub

The Clothing Knowledge Hub showcases new initiatives, processes and technologies which can reduce the environmental impact of clothing. The Hub includes an area on durability and longevity, covering physical durability, emotional durability, versatility and co-creation.

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### The Clothing Durability Report

The WRAP Clothing Durability Report has been developed to help clothing brands and retailers to embed longevity procedures into their processes, and thus extend the active life of clothing. This report provides guidance and showcases good practice, such as improved durability, quality, re-use, and repair.

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### Sustainable Clothing Action Plan

WRAP leads the [Sustainable Clothing Action Plan](#) (SCAP). SCAP's ambition is to improve the sustainability of clothing across its life cycle. By bringing together business, government, and charities and social enterprises, we have developed industry-wide targets to reduce resource use and secure recognition for good practice.

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### Valuing Our Clothes, 2012

WRAP's ground-breaking report provides the first big-picture look at the financial and environmental impacts of clothing.

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### Valuing Our Clothes: the cost of UK fashion, 2017

WRAP's report provides the latest research and evidence on the environmental impacts of the clothing industry in the UK, and an update on the progress made by the Sustainable Clothing Action Plan.

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### Strategies to Improve Design and Testing for Clothing Longevity

Nottingham Trent University has produced this report, which summarises the outcomes of the Defra and WRAP-funded project: Strategies to Improve Design and Testing for Clothing Longevity. The project consisted of a comprehensive literature review; primary research, including interviews with 31 industry practitioners; three consumer focus groups; a series of three industry and consumer round tables, and an expert workshop.

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### Clothing Durability Dozen

This toolkit, which was produced by Nottingham Trent University with support from Defra and WRAP, provides practical guidance and strategies to improve design and testing for clothing longevity.

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### Design for Longevity

Guidance on increasing the active life of clothing.

## WRAP's vision is a world in which resources are used sustainably.

Our mission is to accelerate the move to a sustainable resource-efficient economy through re-inventing how we design, produce and sell products; re-thinking how we use and consume products; and re-defining what is possible through re-use and recycling.

**WRAP**  
Second Floor  
Blenheim Court  
19 George Street  
Banbury  
Oxon OX16 5BH  
[www.wrap.org.uk](http://www.wrap.org.uk)  
@WRAP\_UK

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