

Clothing Durability Report



Enhancing clothing durability and performance. This report is aimed at clothing designers and provides background detail to the Sustainable Clothing Guide.

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.

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Document reference (please use this reference when citing WRAP's work):
WRAP, 2015, Banbury, Sustainable Clothing Technical Report, Prepared by Anthesis

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Front cover photography: Rail of hanging clothes

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Glossary

CLP	Clothing Longevity Protocol
Durability	Physical durability and/or emotional durability of clothing
DCLWG	Design for Clothing Life Working Group
Protocol	Clothing Longevity Protocol (CLP)
Reimagine	This relates to wardrobe re-styling to encourage consumers to rework their clothes for extended use. This enables clothes to be adaptable and adjustable to extend both emotional and functional durability.
SCAP	Sustainable Clothing Action Plan
SCAP signatories	Organisations from across the clothing sector who are working together to improve sustainability and reduce the environmental footprint of clothing
W.A.S.T.E.	A process is based on a problem-solving discipline, which is rooted in continuous improvement and LEAN

Acknowledgements

WRAP would like to thank the members of the SCAP Design for Clothing Life Working Group, and each of the organisations who participated in the Clothing Durability trials, as well as those individuals who contributed to the report's development by providing their feedback to earlier drafts.

Disclaimer

The examples used in this report are based on publically available information (accessed Feb-Mar 2015). Case studies were generated as a result of specific trials carried out by WRAP and the named organisations between January to September 2015.

1.0 Introduction to the manual

The Sustainable Clothing Technical Report has been developed to help clothing brands and retailers to embed durability procedures and thus extend the active life of clothing.

This report provides guidance and showcases good practice in areas that relate to clothing durability such as improved quality, reuse and repair.

1.1 Background

WRAP's vision is a world in which resources are used sustainably. As part of its commitment to supporting the achievement of its vision, WRAP manages the Sustainable Clothing Action Plan (SCAP) 2020 Commitment where leading organisations from across the clothing sector work together to improve sustainability and reduce the environmental footprint of clothing. Organisations signed up to the SCAP 2020 Commitment, pledge to play their part in reducing the carbon, waste and water footprints of clothing they supply or receive in the UK by 15% per tonne of clothing, starting from a baseline year of 2012.¹

WRAP research² has shown that increasing the active life of all clothing by nine months would reduce the annual carbon, water and waste footprints of UK clothing by 15-30% each, and cut resource costs by £5 billion. These are the largest potential savings of all the actions considered in the research.

The Clothing Longevity Protocol (CLP) was developed in 2013/14 to support companies wishing to develop and supply garments designed and manufactured for a longer life than current practice. The CLP offers retailers and suppliers guidelines for good practice on the following key areas:

- an approach to product development which anticipates risks;
- moving towards garments that will last longer;
- helping to protect brand value by screening out garments which fail prematurely; and
- reducing the environmental impact of the clothing sector.

Parallel support to consumers includes the "Love Your Clothes" website at <http://loveyourclothes.org.uk/>

Companies adopting the CLP can follow a specific product development process as far as practical, and utilise guidelines for tests and performance criteria. In combination, these elements enable development teams to set their required level of performance on garment attributes which relate to the common modes of failure or customer dissatisfaction.

The Design for Clothing Life Working Group (DCLWG) was set up to continue to develop the business case and best practice. The DCLWG is made up of stakeholders that

¹ <http://www.wrap.org.uk/content/scap-2020-commitment>

² <http://www.wrap.org.uk/content/valuing-our-clothes>

occupy sustainability, supply and technical roles, plus technical experts from the clothing industry. Between December 2014 and July 2015, WRAP supported a number of brands and retailers to trial the CLP in order to pilot improved durability procedures and build the business case. The results of these trials, along with engagement with the DCLWG, interviews with industry and existing work on durability for WRAP³, form the basis of this report.

1.2 Example actions

The WRAP report Design for Longevity⁴ identified the top five actions for boosting the useful life of garments in eight key product categories which have been summarised below::

- Children's clothing
 - designing-in a growth allowance;
 - selecting fabrics and components that are proven to offer durability and colourfastness;
 - applying fabric finishes to reduce the likelihood of staining;
 - designing garments for multi-functionality (such as reversible coats); and
 - reinforcing weak areas, or areas liable to extra stress such as elbows and knees.

- Occasion wear
 - using classic styles, innovatively, to help transcend fashion fads;
 - ensuring high quality fabrics are used when designing garments;
 - designing garments that are multi-functional, to give the customer the option to wear different parts of the outfit with other clothes;
 - facilitating alteration through adjustable waistbands, generous seams or additional buttons; and
 - selecting materials and components that withstand the chemicals used in the dry-cleaning process.

- Knitwear
 - using quality yarn and fibres to improve the strength and colourfastness of knitted garments;
 - ensuring care and laundry advice is clear and simple;
 - taking steps to preserve the quality of knitted fabric (including colourfastness) and garment manufacture throughout production;
 - providing guidance for use and design in re-use and encourage consumers to downcycle old garments; and
 - focusing on classic design and loose shapes.

- Tailoring
 - using high quality outer fabric and ensuring lining and interlining are compatible;
 - applying classic styles, cut and colours, and building-in features to allow easy adjustment size and shape alteration;
 - including clear guidance and advice on the care label;

³ www.wrap.org.uk/clothing

⁴ http://www.wrap.org.uk/sites/files/wrap/Design%20for%20Longevity%20Report_0.pdf

- where possible utilising detachable elements, such as collars or linings, which can be replaced when worn; and
- providing a specialist aftercare service, as well as mending and repair advice.
- Denim
 - using ozone bleaching, laser engraving and resin finishes to create the desired effects with a lower environmental impact;
 - enhancing fabric strength and surface quality by applying sustainable dyeing, bleaching and surface treatments;
 - applying traditional, robust manufacturing methods and mass customization strategies to products;
 - educating consumers about the unique characteristics of denim and how to care for it and repair, re-use or repurpose it; and
 - creating emotional attachment through ethical sourcing and production, no waste and craft design approaches.
- Sports wear
 - using durable material, with reinforced seams in areas where rubbing or chafing occurs;
 - providing care instructions that encourage airing clothes or washing promptly after use;
 - encouraging longer attachment to items through the use of wearable technology or personalisation;
 - adding soil-resistant or antibacterial finishes to reduce problems from body perspiration and odour; and
 - selecting warp-knitted fabrics with open fabric structures (e.g. nets and mesh) to help the transport of moisture.
- Casualwear (garment types in this category include t-shirts, sweatshirts, leggings, trousers, shorts, skirts, blouses and shirts)
 - selecting high-quality fabric and testing rigorously for performance, including colourfastness and pilling;
 - providing clear and simple care and laundry instructions;
 - designing-in adjustable features to accommodate fluctuations in body shape;
 - where appropriate, designing garments with detachable parts which can be replaced when they become soiled or worn; and
 - providing styling guidance for the consumer to encourage longer use and potential re-use.
- Underwear
 - using more durable fabrics, trims and construction methods;
 - removing seams where possible, and recognising that comfort is crucially important for prolonged daily wear;
 - scheduling in time for multiple fittings during the design process to ensure that underwear fits well and supports where necessary;
 - providing expert advice on fit on product packaging and at point of sale; and
 - designing underwear to be easy to launder.

The report also suggests the following actions to increase product durability:

- providing basic repair kits including threads or yarn, buttons and instructions;
- providing factsheets to customers in-store, online or in accompanying packaging;
- enhancing product care and labelling information;
- using elastomeric yarns in knitted structures to enhance the recovery of stretch fabrics, particularly at cuff and hem ribs;
- using inexpensive acrylic yarns to produce long lasting garments which are hard wearing and are particularly suitable for lower-cost garments and knitwear likely to experience heavy use, such as childrenswear;
- exploring fibre dyeing, which can sometimes be used in preference to yarn dyeing for assurance of colourfastness when using some types of fibre (i.e. wool or cotton); and
- applying pre-shrinking treatments to the fabric as a finishing process.

2.0 Defining durability in the clothing sector

Although 'durability of clothing' is a simple statement, defining what this means in reality for businesses and for consumers is not straight forward, and like many aspects of the fashion and clothing industry it is subject to a multitude of interpretations. This section explores what durability means from a physical and emotional standpoint, and in the eyes of business and consumers.

2.1 The simple definition of durability

In its broadest sense, durability implies a long life. Durability can also refer to the length of service or tenure that is provided by a product and it is this definition that may offer an insight into what longevity for clothing is.

Clothing performs a number of functions for the wearer, which can generally be categorised into two broad aspects. There are the technical functions of meeting the fundamental needs of the wearer; warmth and the protection of modesty. There are also emotional needs or desires, where clothing acts as a set of symbols that reflect our personality and identify us with certain groups; clothing is a communication device about the individual to society.

In this report we refer to two different types of durability:

- **Physical durability:** design for physical durability considers construction and strategic reinforcing in order to create products that can resist damage and wear.
- **Emotional durability:** in order for a product to last, in addition to physical durability, design also needs to consider the product's ability to stay relevant and desirable to the consumer.

When we consider clothing as providing a service – whether technical or emotional – the durability of the clothing product is determined by how well and for how long that product provides that service.

2.2 The definition of durability in brands and retailers

Defining 'durability of clothing' in the fashion and clothing industry is subject to a multitude of interpretations. Engagement with SCAP members from the DCLWG

revealed that for some brands durability and quality are interchangeable terms, where the durability of the product determines its lifetime.

How 'durability' is defined and therefore communicated within an organisation may determine the understanding and level of buy in. Furthermore, the way in which clothing durability is defined also determines how it is measured, which, in turn, has implications for how designers, buyers and technologists create products for longevity in different garments, for different markets and across different brands.

In terms of the technical service or performance that clothing provides, the durability of the product can be affected by a wide range of factors, factors that are often related to quality. For example, the durability of a knitwear garment may be determined by the extent of pilling that has occurred; for a white formal shirt it may be determined by the abrasion of the collar tips; and for socks it might be determined by the degree of colour fading.

Identifying which items in the portfolio are experiencing quality issues through processes such as returns data analysis, may be a more straight forward process than assessing garments for emotional durability. Understanding consumer perception and where brand perceptions influence customer behaviour in relation to garment management and durability, may involve further research.

2.3 What durability means to consumers

For a consumer, the durability of a product is measured by how long the product provides a useful service to them. There are a complex set of conscious and subconscious decisions that consumers take when determining the ability of clothing to fulfil technical and emotional functions, and it is these decisions that determine the durability of the product. Consumers buy clothing items for a range of different purposes and reasons including necessity (e.g. school uniform), functionality (e.g. winter coat), vanity (e.g. fashion item), prestige and status (e.g. brand item) and peer/other influence. Clothing is, for many people in the UK, a symbol of personal, social and cultural identity. Clothes often also help to define a person's role in society or a specific social group, or help to express life-style choices. As consumers continually re-construct their personal identity, the tools they use to signify their position are also continually changing.

Choices which determine which clothing brands and items are purchased are equally diverse with customers basing their decision making on a range of factors including colour, shape, style, fit, wearing comfort, appearance, functionality, price etc. It is these factors which tend to determine why and when garments are discarded by consumers. Therefore in order for a product to last, in addition to physical durability, design also needs to consider the product's ability to stay relevant and desirable to the consumer.

In the era of high product consumption, clothing and fashion items clearly have a key role to play and an emotional value beyond the technical function. Thus the emotional durability of products is determined by how well these products fulfil the role of projecting the consumer's identity. The success of fast fashion is a potential indication of how quickly products are becoming emotionally redundant and no longer fulfilling the

emotional functionality required by modern consumers. It is also clear that there are a complex set of conscious and subconscious decisions that consumers take when determining the ability of clothing to fulfil technical and emotional functions, and it is these decisions that determine the durability of the product.

In April 2013 WRAP carried out an online survey with Ipsos MORI, using an Online Access Panel, with a total of 3,244 panellists completing the survey. Quotas were set on a range of key demographics in order to ensure the survey covered a representative cross-section of the population, and the results presented are weighted to reflect the Great Britain population. The survey found the average active use of clothing is 3.3 years. This is an average across all types of clothing measured in the survey, across six different purposes for wearing.

The details of the survey findings are available in the WRAP Clothing Longevity and Measuring Active Use report⁵, which identifies the demographic subgroups more likely than others to keep their clothes in active use for longer. Figure 1 shows that some subgroups are more likely than others to keep their clothes in active use for longer, including:

- men;
- older people;
- people on low incomes;
- people in higher social grades;
- people with a larger wardrobe (200+ clothing items);
- people who have a higher number of clothes they have not worn for at least 12 months (41+ items); and
- those who claim they do everything they can to buy clothes that are made to last and look good for longer.

⁵ <http://www.wrap.org.uk/content/clothing-longevity-measuring-active-use>

Figure 1 Active life of clothing by acquisition, occasion, and key subgroup



Source: WRAP ⁶

<http://www.wrap.org.uk/content/clothing-longevity-measuring-active-use>

The survey found that:

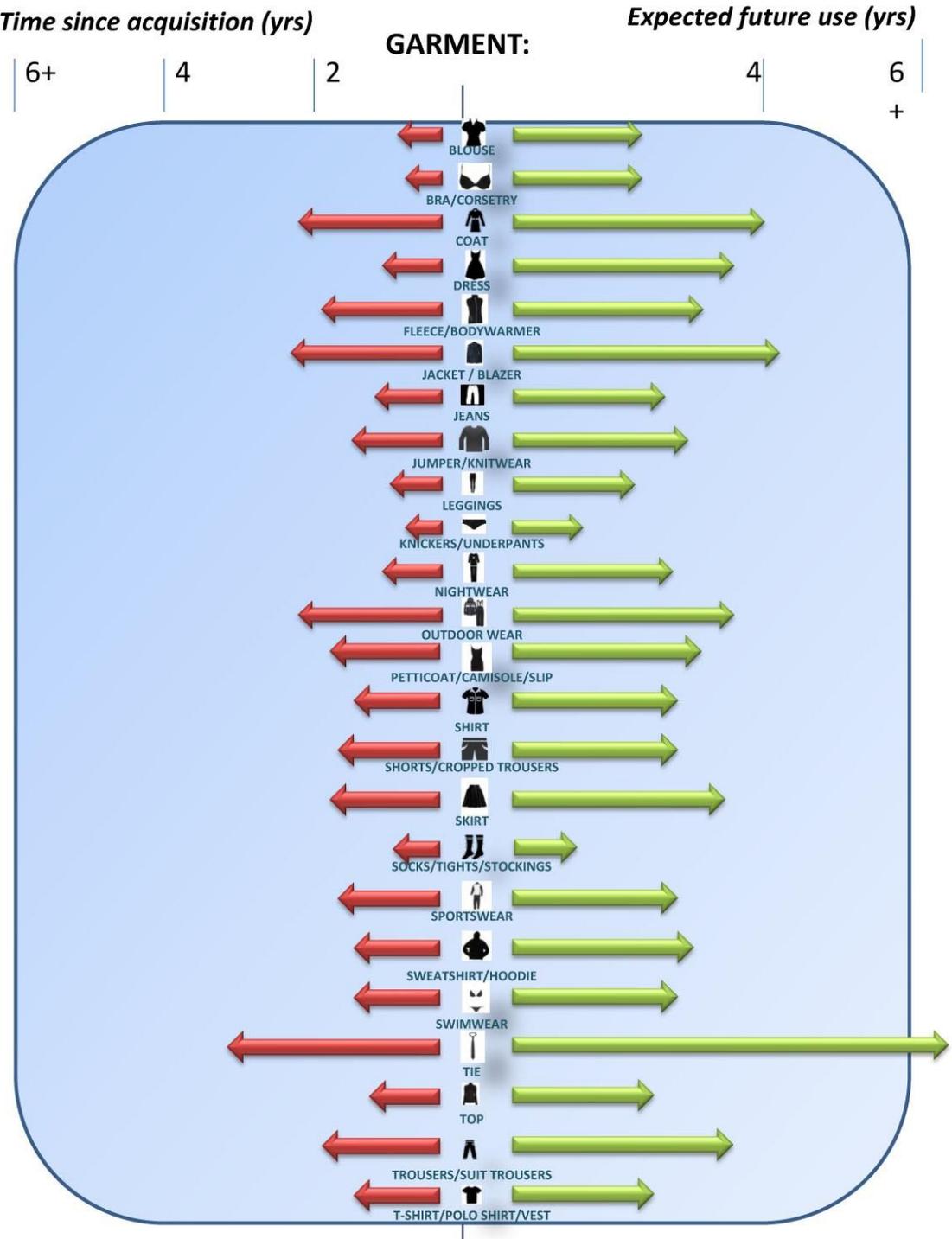
- women are more likely to say clothes no longer fit or are no longer to their taste;
- wear and tear is more of an issue for younger people;
- older people are more likely to store items or not get around to disposing of them; and
- people on lower incomes are less likely to cite a range of reasons e.g. clothes no longer to style or taste, or no longer fashionable, indicating that financial reasons push them to keep clothes in active use for longer.

The survey found that estimated active use varies by type of clothing:

- Ties, jackets or blazers, coats and outdoor wear on average expected to be actively used for five years.
- Leggings, bras and corsetry, knickers, underpants, socks, tights, and stockings have an expected active use of less than three years.

It also explored customers' perceptions about how long specific garments or product types should last. The survey found that expected clothing active use differs depending the purpose for which clothes are worn; for example, 'casual clothes for everyday wear inside the home or in the garden' were expected to have a life time of 3.1 years where 'formal clothes for an occasion outside of work' were expected to last 4 years. This seems likely to reflect a number of factors including the relative cost of the clothes, the frequency with which they are worn, and their relative durability. This is illustrated in Figure 2.

Figure 2 Time since clothing acquisition vs. expected future use, by clothing type



Source: WRAP⁷

From the sample of respondents, the survey revealed that the perceived quality of clothing is an issue for a minority of customers, who feel their clothing tends to wear out sooner than they would expect, and a minority also felt they lack the skills or knowledge

⁷ <http://www.wrap.org.uk/content/clothing-longevity-measuring-active-use>

to care for clothing. The report revealed there is scope for behaviour change, with around a third of respondents interested in doing more to buy clothes that are made to last and in doing more to care for their clothes so they are kept in regular use for longer.

Survey participants are split when it comes to their ability to check clothing for durability and the extent to which they do this at the point of purchase. This indicates there is significant potential to influence more sustainable clothing purchases, and more product information relating to garment durability may be helpful. Those groups who are less confident in their ability to tell whether one garment will look good and last for longer compared to another include men, younger people and those who are not wearing clothes which they own due to wear and tear. Conversely when it comes to examining seams and stitches, women and middle-aged people are more likely to agree they usually take action.

Half of respondents in the survey reported that they feel they already do enough to buy clothes that look good and last for longer, with a further 37% saying they would like to do more. Younger respondents, more affluent households and women are amongst the key target groups who feel they could do more to buy items that are made to last for longer and would like to do so. Men are more likely than average to feel they could do more to buy clothes which are made to last for longer, but are not interested in doing so.

This report intimates that there is therefore a business benefit to be realised for some brands and retailers and for some specific garment ranges to connect durability with customers' loyalty and satisfaction levels.

Defining durability in the clothing sector: Key questions

- 1) What does "clothing durability" mean to your organisation?
- 2) What would be best to call it to communicate through your organisation? (e.g. longevity, durability, quality)?
- 3) Does your organisation currently address clothing durability?
- 4) If yes, how?
- 5) If no, why not?
- 6) What data do you have on returns and garment failure?
- 7) Do you have any information on what emotional functions your clothing provides to consumers?
- 8) If no, could you undertake some research with shop staff and consumers?
- 9) What is the demographic of your consumers?

3.0 Strategic considerations

3.1 The case for durability

In an era in which many clothing business models are based on frequent, low-cost purchases, increasing durability may seem counter-productive. However, the increased sales volumes of recent years have not been associated with an overall increase in the

amount of money spent on clothing.⁸ This implies that fewer clothes can be sold for the same overall value, and therefore an important step in making a business success of increased durability is not only to make clothes that last longer, but to make this desirable such that consumers are willing to pay more for each item of clothing. Increasing durability clearly involves both the technical aspects of making clothes more durable *and* the more emotional aspect of making clothes desirable both up front and such that they remain in use for longer.

3.1.1 *The drivers for durability*

The drivers for durability will vary from organisation to organisation. Some may be purely quality driven and part of core values, or may align with meeting customer expectations, sustainability drivers or as a key performance indicator (KPI) measured against competitors.

Common drivers include:

- **Environmental footprint:** Increased durability creates savings to the brand owner and manufacturer on the basis that by lasting longer, fewer new clothes would be needed to meet the UK's annual clothing needs. This would reduce the need for new production as well as the quantity of clothing discarded each year, which together form the majority of clothing's annual carbon, water and waste footprints.
- **Supply chain security:** The argument for clothing durability is reinforced when the impact of future resource scarcity and instability within the commodity markets are considered. With a growing global population and limitations on resource availability as a result of environmental and social factors, the ability of clothing retailers and brands businesses to continue to offer low cost, short lived products under the current business models will be significantly impaired. Limited supply, and increased demand for the materials used in textiles, will drive changes in the way products are designed, valued and the expected lifetime required by society. Increasing the durability of products is one of the key opportunities to minimise the impacts of the future challenges on resource availability.
- **Quality:** There was a consensus among SCAP members that quality is built into the product, and is considered at every stage of the design, development and manufacturing process. The definition of quality between brands is consistent, with many brands referring to the same quality factors such as pilling, colour fading, fabric failures and fit as being important measurements for quality. However, there appears to be divergence in terms of what is considered to be a suitable level of quality. The importance of material selection was seen as a key factor for ensuring good product quality and, therefore, good technical durability.
- **Reduced garment failure and returns:** Collecting and understanding returns data, particularly caused by garment failure, are essential to building durability into a product range, and in improving product specifications, textile manufacture and garment construction, to in turn minimising failures and returns. Minimising returns can have positive cost and reputational advantages.

⁸ Cooper T et al, 2013, *Design for Longevity: Guidance on increasing the active life of clothing*. WRAP: Banbury.
<http://www.wrap.org.uk/content/clothing-design-for-longevity>

3.1.2 Benefits to business

SCAP respondents cited the main business benefits of durability to be:

- demonstrating quality to customers;
- reducing returns;
- building brand reputation; and
- establishing customer loyalty/satisfaction

3.1.3 Demonstrating quality to customers

SCAP respondents agreed that many consumers and retailers think of durability and quality as tightly linked concepts, with one high-street retailer surveyed saying that they focus on garment durability as a measure of quality compared to their competition. How long a product provides a useful service to the customer links into both perceptions of quality and value for money.

3.1.4 Reducing returns

Returned products, due to failures, cost money in terms of the embedded cost of manufacture and transport of the product and in its eventual disposal, whilst taking staff time in receipt and administration. Returns also detract from the customer's perception of the brand and retailer. Increasing durability by understanding failure rates and how these can be impacted by design and manufacturing inputs can reduce overall failure rates and therefore reduce returns, administration complexity and costs overall. Durability as a product feature can therefore lead to reduced costs and increased overall margins.

3.1.5 Building brand reputation

Relating quality and durability means that product failure can detract significantly from the consumer's perception of the brand owner. Optimising durability can support a reputation for quality, which can be reflected in brand loyalty, consumer recommendations to friends and family, and future purchases.

3.1.6 Establishing customer loyalty/satisfaction

In many fields of consumer purchase, consumer loyalty follows quality brands, particularly for more affluent consumers; products with a long useful life and with minimal failures therefore support consumer loyalty and overall satisfaction.

3.2 Barriers to durability

In talking to SCAP members there was consensus between the brands interviewed that the final level of quality and therefore durability of clothing is a result of a compromise between brand values, cost prices, lead times and the ability to deliver newness to the consumer. The extent to which these component elements will create barriers or opportunities to brands will depend upon the business model and preference of the brand. The following perceived barriers were raised by those SCAP members surveyed and for the purposes of overcoming the barriers WRAP has developed a number of mitigation measures:

Table 1 Barriers and mitigations to durability

Perceived barrier	Mitigations
Customer demand	
More fashionable items or fast fashion items are perceived to have lower life expectation due to trends and the insatiable desire for new. Therefore there is a perceived lack of customer demand, particularly by the young.	<ul style="list-style-type: none">• Focus on concept durability = quality = fewer returns = value for money.• Focus durability on more classic designs.• Focus on environmental impact and education.

Perceived barrier	Mitigations
Price points	
The impact on product cost and the investment in time and resource without a clear business case on return on investment (ROI).	<ul style="list-style-type: none"> ● Use of case studies and evidenced benefits. ● Understanding of impact on supply chain and supply chain costs. ● Cost benefit and life cycle analysis. ● Use of durability principles to minimise returns. ● Build durability principles throughout product range to give economies of scale and long term reduced costs.
Consumer education	
Consumer knowledge about product care, in particular how to wash garments. Further challenge in consumer behaviour related to intensity of wearing item e.g. daily wear rather than twice a week.	<ul style="list-style-type: none"> ■ Improved garment labelling on repair and reuse. ■ Instruction leaflets, fact sheets and websites, on repair and reuse options, environmental impacts etc. ■ Marketing input.
Internal culture shift	
Understanding the key terminology to communicate within the organisation. Translating durability benefits in to water, energy and waste savings.	<ul style="list-style-type: none"> ■ Internal publications and workshops. ■ Understanding of impact on supply chain and supply chain costs. ■ Cost benefit and life cycle analysis. ■ Use of case studies.

The case for durability: Key questions

- 1) What are the drivers within your organisation?
- 2) How important is quality in the way you market your products?
- 3) Are you experiencing any quality issues?
- 4) How useful is the returns data your organisation collects/has access to? Does this need improving?
- 5) Do you know the full cost of returns in your organisation?
- 6) What other data do you collect on the useful life of your products?
- 7) Are there process improvements that could be made?
- 8) How can longevity be built into your business model and marketing strategy?

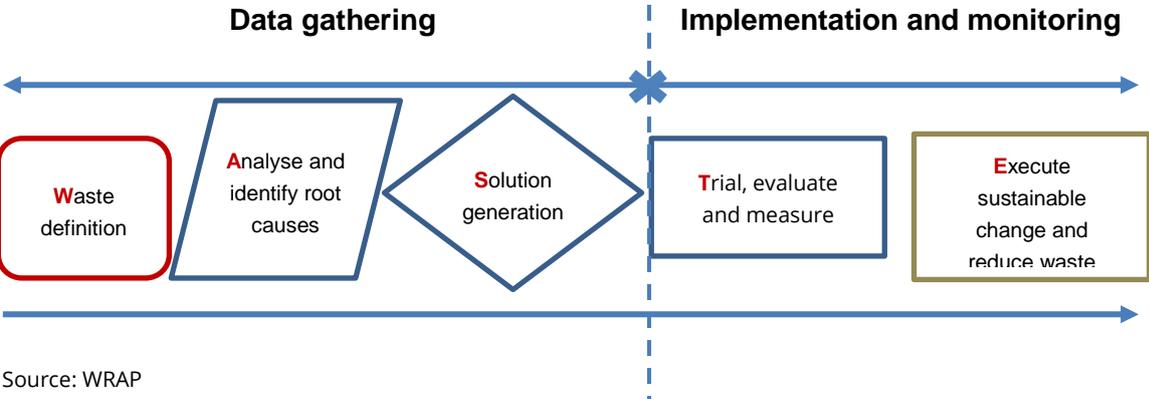
3.3 How to build a durability business case for your business

3.3.1 The process

This section provides specific information about how to build a business case and action plan for change.

WRAP has developed the W.A.S.T.E. process to help businesses identify and reduce waste within their operations and across supply chains. The W.A.S.T.E. process is based on a problem-solving discipline, which is rooted in continuous improvement and LEAN⁹ manufacturing strategies and builds on established techniques.

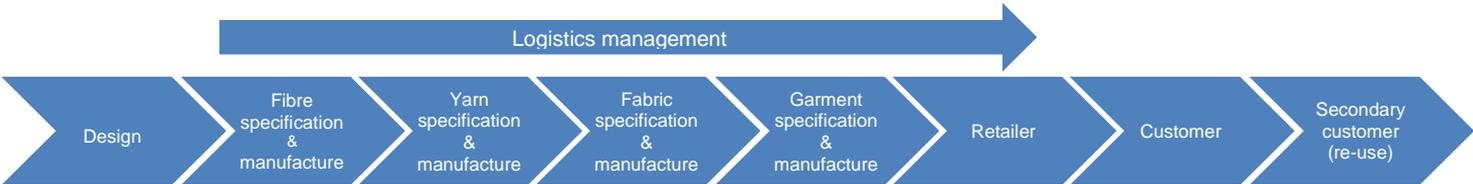
Figure 3 The W.A.S.T.E process



Source: WRAP

Product durability is determined right from the initial stages of raw material sourcing to the final stage of finished product use by the customer. Identifying areas for improvement therefore requires a whole supply-chain view as illustrated in Figure 4.

Figure 4 Clothing supply chain



The best opportunity within the clothing lifecycle to increase durability is at the product design stage, where changes to design practices and agreed specifications with suppliers can have a significant impact on how long individual items remain wearable. This report outlines steps that users can take to implement the W.A.S.T.E process throughout their supply chain to drive clothing performance improvement.

3.3.2 Stage 1 of the W.A.S.T.E process - data gathering

The data gathering exercises are crucial to defining where to begin addressing durability. It is important to focus on activities which will enhance durability where there will be most return on investment. Spending time collecting and analysing information about the product range and its current and potential durability performance, and cross referencing it with information about the customer base and their expectations is

⁹ Lean manufacturing or lean production, often simply "lean", is a systematic method for the elimination of waste within a manufacturing system. Lean manufacturing is a management philosophy derived mostly from the Toyota Production System (TPS) and is renowned for its focus on reduction of the original Toyota seven wastes (Transportation, inventory, motion, waiting, over-processing, over-production and defects) to improve overall customer value.

essential. The following sections have been provided to help identify steps that can be taken by any SCAP signatory regardless of business model, garment type/ranges or supply chain partners.

3.3.2.1 Step 1: Defining durability failures (waste definition)

Typically failures can occur at each stage of the supply chain for a garment, which results in waste before the product reaches the customer, after the customer has made the purchase and during the useful lifetime of the garment. Understanding what impacts the durability of products in your portfolio is key to being able to address changes.

WRAP has found that there are four fundamental areas where changes to design practices can help extend a garments useable life. These are:

- 1) size and fit; one of the primary reasons for discarding undamaged items is that they no longer fit. By designing clothes that can be easily adjusted to allow for reasonable variations in an individual's shape, designers can help increase durability;
- 2) fabric quality; higher quality fabrics are more likely to withstand wear and tear over a prolonged period. The nature of that wear and tear depends on the way the item is worn (for example, there are different expectations of children's wear and occasion wear);
- 3) colours and styles; while there will always be a higher turnover of fashion items, designers can help extend the durability of many garments by using 'classic' or timeless styles and colours, that are less likely to go out of fashion; and
- 4) care; designers and retailers have an opportunity to influence how customers care for their garments by ensuring they provide appropriate advice on care and on opportunities for re-use and recycling.

At the fibre, yarn and fabric and garment specification and manufacturing stages of the garment supply chain the following are potential causes of early failure:

- fabric quality; for example the use of low cost fabrics with low stress tolerance and/or the potential to stretch/shrink under recommended consumer washing conditions;
- colour effects; for example the use of dyes which do not last recommended consumer washing conditions (for example, dyes where, when washed in accordance with the clothing label instructions leach and/or fade);
- sewing defects; for example weaknesses in seams caused by the use of unsuitable stitching techniques, poor colour matches and different tolerance of dyes in sewing threads and fabrics under washing conditions, creasing of the garment during sewing processes (i.e. permanent creases sewn into garments in error), erroneous thread tension and raw edges; and
- garment defects; for example, faulty zippers, irregular hemming, loose buttons, raw edges, improper button holes, uneven parts, inappropriate trimming, and difference in fabric colours.

3.3.2.2 Step 2: Identify, analyse and cost root causes

It is unlikely that it will be feasible to carry out a root cause analysis for early failure across all product categories and garment ranges provided by any one retailer and/or manufacturer because of the scale of the task, which is related to the frequency of product change (for example, with season and fashion) and the diversity of garments.

Setting a realistic scope is therefore important. High volume sales lines are usually a good starting point, although, cross referencing these with previous product returns data for the garment or similar garments will also refine the scope.

To analyse and identify the root causes of early failure is essential to addressing opportunities for change. There are typically three areas of information which should be analysed to identify root causes of failure:

- 1) pre-production stages wearer trial quality and product performance data;
- 2) manufacturing stage walk around waste reviews; and
- 3) product return data.

Product and supply chain decisions are made significantly in advance of garment production. Table 2 provides an indication of some of the timelines for key stages of product development ahead of a new garment’s selling season.

Table 2 Sample timelines for garment production decision making

Factor	Ahead of selling season
Fibre Development	Several years
Colour Forecasts	20-24 months
Textile Development	1-2 years
Fabric Fairs (e.g. Premier Vision)	1 year
Yarn Fairs	18 months-2 years
Apparel Designers and Manufacturers	6-9 months
Competitive shopping (other markets)	4-6 months
Presentation of Apparel Collections (e.g. London Fashion Week)	4-6 months
Apparel Production	1-5months
Retailers	2-6 months

Source: WRAP

A good way to establish the durability of a new garment is through the use of wearer trials in the pre-production stage. This method can assess a range of issues that can directly affect the durability of the garment such as:

- how well it withstands washing;
- susceptibility to staining;
- ensuring seams don’t rub during wearing;
- durability of fabric; and
- understanding of care instructions.

The standard industry practice is to carry out trials for 50 hours and WRAP research has indicated that this is an appropriate time to reveal points of failure that might result in customer returns after a short period of wear. In order to understand how to influence durability in a new garment it is necessary to plan in sufficient time for these trials.

In addition, the trials represent an opportunity to gather information from the manufacturing process by carrying out high level product waste reviews while

conducting a walk around in the manufacturing facility to capture data and information relating to quality and product failure during the manufacturing process. Similar reviews should also be undertaken during the manufacturing stage for mass production of the garments. This is especially important for understanding wastage which results from products which are not manufactured 'right first time'.

The third source of information is the product returns data set for similar garments from previous seasons/portfolios and from the garments themselves.

Product returns data will be recorded in a specific format in each business, and the integration of information from the wearer trials and manufacturing process walk around should be added in the most appropriate way to enable analysis of the information to be carried out. If no existing formats exist for recording product quality failures the following template should be used during data collection exercises to ensure that the necessary information is captured.

Table 3 Sample durability failure recording sheet

Fault	Appearance	Cause	Effect	Responsibility	Action	Solution
Split stitch on seam	Split in seam	Failure to place whole stitch on point	Weakness in seam which will break away under pressure	Manufacturing operative (sewing)	Remove fabric from points and run on	Check seam widths for all future garments to ensure appropriate margin

Source: WRAP

Each of these three approaches requires an input from a range of stakeholders both within your own organisation and up and down your supply chain. Table 4 provides examples of some of the stakeholders that can help to determine where the failures exist in your chosen product range(s). These individuals will be able to both provide documented information and anecdotal references.

Table 4 Stakeholder engagement

Stakeholders within the manufacturing sector	Stakeholders within the retail sector
Operational directors/managers	Store managers
Quality managers	Quality managers
Procurement managers	Procurement managers
Supply chain directors/ managers	Supply chain directors/ managers
Category managers	Category managers
Shift and process managers	Finance managers
H&S managers	
Finance managers	

Source: WRAP

From the stakeholder interviews and data gathering processes it should be possible to develop a process map and flow diagram (for example, cause-and-effect or SIPOC [suppliers, inputs, process, outputs, and customers] diagrams) showing the hotspots where durability failures are most likely to occur. Hotspots can then be costed. To calculate the full cost of the durability failure requires consideration of:

- the cost of raw materials;
- the cost of labour and overheads;
- the cost of packaging and logistics; and
- the lost margin.

If mechanisms also exist for evaluating financial costs associated with negative impacts on customer loyalty these calculations should also be factored in to the costing exercise.

Having carried out this analysis there should be a clear business case to develop actions to address durability failure in the product or garment ranges that were included in the scope of the analysis exercise.

3.3.2.3 Step 3: Solution generation

The Clothing Longevity Protocol Development Process Checklist, available on the WRAP website¹⁰ provides a good starting point for solutions and covers:

- initial design development; for example ensuring that the choice of materials is appropriate for each component of the garment and that 'first fail' areas are addressed; using reliable suppliers who will ensure that fabrics and yarns pass the testing standards; and applying specified make-up methods that reduce early failure;
- pre-contract garment development for buying/selection; for example requesting physical performance test reports from the yarn and fabric suppliers for standard fabrics prior to garment development; carrying out risk assessments to identify possible weaknesses; testing fabric using the relevant physical performance tests for that product (including pilling, dimensional stability and spirality for knitwear); carrying out washing processes in line with care label instructions;
- pre-production testing and sealing; for example, undertake additional durability testing if production fabric and trims are available, addressing potential bulk colour fastness issues and identifying end-of-use guidelines for returns and possible reuse of products;
- bulk production; for example submitting garments to physical performance testing, undertaking random sampling of washing processes in line with care labels and using on-line quality management system (examiners on the production line, faults/rejects analysis, random inspection, etc.) within the critical path process.

Solution generation is something that requires multi stakeholder engagement and is often best done in a workshop environment. The stakeholders that were engaged in the data collection and analysis step (Step 2, Table 4) may well be appropriate individuals to invite to a workshop to brainstorm next steps. Depending on the outcomes of the work undertaken to date as part of the W.A.S.T.E process the following could be invited to play a key role:

¹⁰ http://www.wrap.org.uk/sites/files/wrap/Clothing%20Longevity%20Protocol_0.pdf

- designers: to input into discussions about raw material choices including yarns, fabrics and components;
- buyers: to input into discussions about the balance of fast fashion versus more durable fashion items;
- suppliers (specifically technologists): to input into the discussions about the brand's performance requirements and testing report requirements;
- manufacturing quality assurance managers: to participate in discussions about appropriate test standards and compliance, and assembly processes;
- marketing: to interpret messaging about long-lasting quality garments to customers and input into discussions about communication techniques that could be implemented to raise consumer awareness of garment quality, durability and care issues and to create emotional attachments to clothing;
- consumer assurance: to support the corporate market positioning and represent the reputation of the brand or retailer; and
- finance: to understand the economics and measurement and reporting metrics for success.

A typical agenda for such a workshop might include:

- a presentation to provide the background to the case for reviewing durability (see section 3.1);
- a presentation to introduce a summary of the findings of Step 2 of the business case process;
- a facilitated discussion about the appropriate solutions;
- agreement to provide leadership and to develop an action plan; and
- agreement to timelines and responsibilities.

During the facilitated discussion in the workshop use the skill sets and experience of each of the attendees to:

- identify interventions (actions/activities) for each hotspot identified;
- prioritise interventions to create a short list which will focus on high waste, low implementation time and costs (e.g. using the 80:20 Pareto Analysis rule); and
- agree the number of interventions that can realistically be delivered based on available time and resource.

Case Study: George at Asda

George arranged a successful workshop with a range of attendees who represented the quality department, the buyers, sourcing and the design team. The aim of workshop was to highlight the benefits of durability (which in George is part of the 'quality' perception) and to build connections between key stakeholders who could influence it while at the same time promoting existing initiatives and exploring new opportunities to enhance durability within their garment ranges.

[Find out more](#)

It is a common assumption that increasing garment durability will impact on commercial returns, however this is not necessarily the case and in this stage of the business case development process there should be a clear focus on identifying solutions that are fit for purpose. For example, using new production technology may result in economies of scale that can minimise the additional cost of moving to higher quality raw materials, and there may be fewer costs associated with returns or complaints as a result. Nonetheless, where increases are incurred it is normal for them to be passed on to the customer and fashion businesses can only charge consumers what the market will pay, economic modelling is therefore a key part of the process of generating solutions to durability failure. It may therefore be appropriate to establish a working group following the workshop which can address all aspects of identifying, costing and evaluating the potential solutions.

Many suppliers and retailers have created their own product quality manuals that set out specific requirements for the construction and testing of garments, which provide information for designers and manufacturers and which identify industry good practice. These manuals can be a useful source of information for solution generation, and should be referred to, if they are in existence, by the working group and/or individuals who are developing the solutions.

Before being trialled or implemented solutions should be shared with members of the workshop stakeholder group who will have responsibility for or an influence over action plan development and delivery for final sign off and approval.

3.3.3 Stage 2 of the W.A.S.T.E process: implementation and monitoring

3.3.3.1 Step 4: Development of an action plan

Action plans will vary according to the outcomes of all the preceding steps of the process. However, the process of developing an action plan to provide a robust change management model to enhance durability is fairly generic:

- set smart goals which include both financial and non-financial datasets e.g. durability failures, order processing time, cost of materials, etc.;
- develop an action plan or roadmap for change which has trial methodology, sign-off, responsibilities, timelines, costs and monitoring methodologies;
- communicate the plan to all engaged stakeholders, especially stakeholders who will be required to implement the actions; and

- create changes to Standard Operating Procedure (SOP) documents and sign-off as necessary before implementation of trials.

3.3.3.2 Step 5: trial, evaluate and measure

Example actions are included in section 1.2 and section 4 provides more information on trialling and evaluating durability measures.

During the trials liaise with the Quality Control and Finance Departments to supply and obtain monitoring information which will enable the evolution of the trials' successes. To get an understanding of the impact that the changes that have been trialled have made to garment durability compare trial results with the baseline information collected during stage 1 of the W.A.S.T.E process. This information will be crucial for finalising the business case for long term changes which enhance durability. Where real benefits can be demonstrated from the measurements and evaluations taken during the trials a business case for long term change can be made. To identify what defines benefit (and/or whether a trial was successful in achieving its objective); refer to the financial and non-financial KPIs that were developed during the action plan development in Step 4.

3.3.3.1 Step 6: Disseminating findings

The results of the trials which highlight positive outcomes (such as reduced product returns, increased customer satisfaction etc.) should be disseminated to key stakeholders in order to ascertain the opportunities to embed the lessons and roll out further changes to other products and garments and/or suppliers and processes.

How to build a business case for your business: Key questions

- 1) What is the scope of the durability project?
- 2) Where are the key stages and processes for information collection about current durability performance?
- 3) What are the key information sources (e.g. financials, specifications etc.) needed?
- 4) Who are the best sources of information (e.g. buyers, technicians etc.)?
- 5) What is the timeline for influencing durability within the products/garments that are in scope?
- 6) How can a process flow and hot spot analysis be mapped out to demonstrate focus areas?
- 7) Who are the best stakeholders to include in a solution generation workshop?
- 8) How can the economic impacts of the solutions be calculated?
- 9) Who will sign off the solutions and the action plan for change?
- 10) How will trials be implemented and monitored?
- 11) Who do the results of the trial need to be disseminated to and what is the best way to present them to this audience?
- 12) What WRAP resources are available to support the process?

4.0 Operational considerations – implementing durability

4.1 Design

Garment life expectancy is affected by a range of decisions: choice of fibre and yarn; fabric construction and finishing; trimmings; garment design and make-up. Because these decisions are typically made at the design stage, product design has been identified as pivotal to determining the durability of the garment. Designers are able to specify many relevant characteristics of the final garment. Some of these characteristics are physical and can be tested for compliance; others, such as 'fashionability' or styling, are subjective and cannot be objectively tested. They are nonetheless crucial in determining garment durability.

Case study: Cath Kidston

Cath Kidston created a template for fabric and yarn specifications which could be shared with their suppliers. The objective of the template was to provide greater visibility in relation to the match between the raw material specification and the resulting product. By generating this transparency Cath Kidston hopes to be able to work with their suppliers to identify and implement changes to the specifications in order to enhance durability, and plans to record the specific aspects of the specification which were changed in order to map and learn from the experiences to enable them to replicate the improvements in other products where appropriate.

4.1.1 Style and cut

SCAP members agree that the single most important design factor in extending a garment's life expectancy is its cut, and there are several cuts which are identified as having the potential to increase lifespan. Tailored and semi-tailored pieces are highlighted as longer-lasting because they aesthetically frame the form. Oversized knits and kimono shapes that can be worn with a belt are described as versatile and 'comfortable', therefore potentially wearable for longer. From a fashion perspective, 'classic' styles (i.e. the little black dress, tailored shirts, pencil skirts, chino-style trousers, v-neck jumpers etc.) will tend to be longer lasting, especially if core colours are used (i.e. black, white, navy, grey and red). Classic or simple styling can also aid the production quality and reduce cost, as there is an established body of technical knowledge and production expertise in these classic items.

Example: Uniqlo

Uniqlo collaborated with designer brand Jil Sander to create the +J collection which aims to produce styles that are timeless pieces of outerwear, shirts and jumpers, which utilise advanced materials and reflect Uniqlo's desire to produce innovative products, which can be worn for a long-time to come.

4.1.2 Fit

There are, of course, some fixed measurements to influence size and fit, such as bust size or waist measurement. However, human shapes do not come in standard sizes, nor do consumers all have the same preferences in terms of comfort and how fitted a garment should look. One way to circumvent this and maximise durability is to design clothes to include some capabilities that facilitate size adjustment to allow for reasonable variations in an individual's shape (and preferences). This could involve the use of strategic fastenings, for example, to increase/decrease size/length on side seams or hems.

4.2 Raw material

4.2.1 Specification

Many designers and buyers will rightly focus much of their attention on selecting and specifying the main fabric for their products. However, in many cases the mode of failure that leads to the return or disposal of the product may not be related to the

fabric, but rather to a low cost component or poorly specified aspect of the product construction or manufacturing. The technical durability of a product is ultimately determined by the weakest component or aspect of the product and, therefore, the use of specifications for all aspects of the product can not only improve durability but potentially reduce costs.

4.2.2 Fibre selection

As a general principle, better quality fabrics will give longer-lasting garments and this applies to all clothing categories. However, the situation is complex and fabric quality depends on many variables, such as fibre type, yarn blends, yarn structure, fabric construction, fabric dyeing and finishing. As a consequence, fabrics with the same description (e.g. '100% cotton') can vary greatly in performance and durability.

Wool is often perceived as 'hard-wearing': yet while the raw material is perhaps more robust than some, the way it is processed has a significant impact on its durability, as does the way it is used and cared for. Fine knits are easily damaged; incorrect washing can lead to shrinkage.

What's more, durability may not be a relevant attribute for all end products: in some cases, 'better quality' does not mean hard-wearing but instead refers to excellent drape, lustre or softness to the touch. These qualitative attributes may mean the item is worn more frequently and kept for longer.

Therefore, selection of fibre and fabric types is based on the end product and its expected use, rather than any general principles. One way that design teams can influence the durability of the items therefore is to identify key standards the fabric must meet – and then task buyers to source fabrics that have been tested to meet these standards.

Example: Uniqlo

Uniqlo's Men's Selvedge Denim, which utilises cotton thread that is spun and re-spun 64 times, is woven on vintage looms and these styles are less prone to fraying, which in combination with a dyeing process that is repeated 10 times to create a longer-lasting colour, contributes to the durability of these products.

4.3 Colouration & dye selection

Colour is one of the most important influences on consumers when they are considering the purchase of new clothes. Colour also plays a significant role in the consumers' decision making when deciding whether a garment has reached the end of its life. The fading of deep colours and the discolouration of light shades can make garments look old, even though they are still perfectly functional in terms of technical performance. Using techniques to minimise fading of colours can extend the technical and emotional durability of garments.

Dye selection can have a huge impact on colour fastness with a number of dye chemistries potentially having application on a particular fibre type, as demonstrated in

Table 5. As well as dye type, method of application and processing conditions, such as pH, temperature and use of levelling agents (i.e. to produce a consistent and even colour), can also impact on colourfastness, as well as other properties and cost.

Table 5 Dye types and fibre applications

Dye Type	Fibre
Acid dyes	silk, wool, nylon and modified acrylic fibres
Azo dyes	cotton (cellulose) fibres
Basic dyes	acrylic fibres, also wool and silk
Direct dyes	cotton and paper; also leather, wool, silk and nylon
Disperse dyes	cellulose acetate, also nylon, triacetate and polyester fibres
Reactive dyes	cotton and other cellulose fibres
Vat dyes e.g. indigo	cotton; also wool

Source: WRAP

The choice of a cheap or unsuitable dye, or cutting corners in dye application, can therefore have a significant impact upon the durability of a garment, and correctly specifying dye use and application is therefore a key part of a product specification.

Example: George at Asda

George garment designers decide on the colour for each George item based on research around key seasonal colour trends, fashion ranges, catwalk collections, or in the case of schoolwear, the colour requirements from schools. To improve the quality and durability of school knitwear, George uses a special dyeing and finishing process that maintains the colour of the garment, even after repeated washing and wearing.

This means it will look newer for longer.

4.4 Fabric finishing

In textile manufacturing, finishing processes are used to improve the look, performance, or "hand" (feel) of the finished textile or clothing. These can include mechanical and chemical treatments which produce a range of effects including:

- fabric stiffening or softening;
- scouring and bleaching, impacting on fabric quality and feel;
- hydrophobic treatments to produce water proofing or stain resistance;
- pre-shrinking or "sanforising";
- anti-pilling treatments such as bio-polishing; and
- plus treatments applied to non-garment textiles such as flame retardancy and anti-microbial treatments.

Many finishing treatments can have an impact on the performance and durability of garments manufactured from the treated fabric, and can also help extend the active use of a given garment. Therefore, understanding likely impacts and specifying finishing product use and application, needs to be an integral part of an overall product specification.

Example: Novozymes

Enzymes are being increasingly used for a number of processes in the textile industry and they have been proved to be very successful in reducing the 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 have developed bio-polishing technology based on enzyme finishes.

[Find out more](#)

4.5 Manufacturing

4.5.1 *Garment construction*

Garment construction is also a key aspect of garment durability. There are dozens of stitch types and many choices of sewing threads and other methods of construction, such as fusing and welding, in addition to different machine types and settings.

Each is suited to specific fabrics and garment categories and so need to be selected in agreement with the garment manufacturer and detailed in the garment specification. Seemingly small factors, such as trimmings or components, can also have an impact on overall longevity, both in terms of quality of the component and how it is attached to the garment. Clearly, these choices need to be aligned to expected usage of the garment.

Specification sheets typically contain information such as:

- make-up method sequence;
- machine types to be used for sewing;
- thread for stitching type and colour;
- stitches per inch required;
- courses and wales on the knit;
- details of any trims and how to attach them; and
- size requirements.

Example : FLINT AND TINDER

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

4.5.2 Risk assessment for garment failure

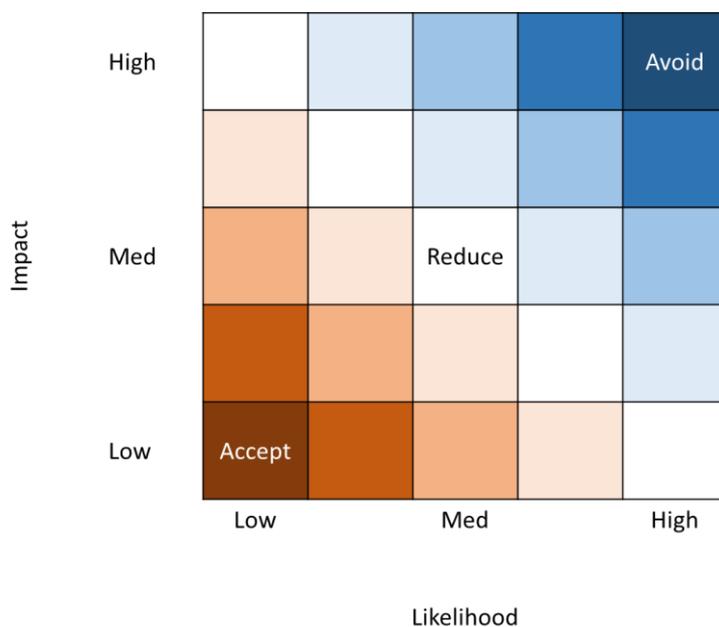
To identify potential failure points which could impact on the durability of the garment being manufactured, it is recommended that the following assessments are carried out:

- a risk assessment to identify any possible failings and weak areas within the manufacture of the garment prior to the specification being sent to the factory;
- fully test fabric using the relevant physical performance tests for that product (e.g. pilling, dimensional stability and spirality for knitwear); and
- a care label wash with visual assessment and, if appropriate for the product, extended wash cycle tests.

This 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, consumer use and results from performance and durability tests, washing trials and consumer wearer trials, following a structure such as:

- identify and define failure risks which could impact the longevity of the garment;
- determine risk tolerance i.e. what level of variation is acceptable;
- determine relative likelihood and impact of these risks occurring (as high, medium, low);
- evaluate risks and determine responses (using a matrix such as Figure 5 Risk response strategies helps this process); and
- assess residual risk likelihood and impact.

Figure 5 Risk response strategies¹¹



Identifying and mitigating risks allows decisions to be made in manufacturing processes, raw material qualities and other manufacturing factors which will allow the development of more robust specifications and in turn increased longevity, if financial viability allows, of the manufactured garment.

¹¹ ["A practical guide to risk assessment" PWC](#)

4.5.3 Pre-production product testing

Testing for physical failure, decolourisation, fraying, pilling or other problems which can shorten the useful life of a manufactured garment, gives the opportunity to review fibre choice, manufacturing requirements and finishing techniques to improve the overall quality and durability of the product, and optimise the manufacturing specification before the garment goes into full production.

A number of industry standard tests now exist for fabrics and garments, covering physical testing, colour-fastness, chemical testing and flammability and can form part of a product specification. The latter two relate to safety and legal requirements and are not referred to below unless they impact upon the durability of the garment.

Physical tests include:

- seam rupture;
- tear strength;
- burst strength;
- pilling, abrasion;
- elasticity; and
- seam slippage.

Colour-fastness is assessed on a grey scale of 1 (poor) to 5 (excellent) and a criterion might be '4-5 after 20 washes'. Tests include:

- subjecting garments to 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.

Not all tests are appropriate for all garments, and durability quality levels will be dependent on product type plus expected use (to determine, for instance, how many cycles in an abrasion test are required).

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 the product and its expected use. For example, a ball gown would be expected to be commercially cleaned occasionally, whereas a swimsuit needs to be colourfast to a variety of water conditions with multiple uses. Standards may be British (BSI), European (CEN) or international (ISO), and even retailer-specific (e.g. Marks & Spencer led the development of clothing technology standards).

Example: George at Asda

George products are inspected for quality in seven inspection centres within their in-country Consolidation Freight Stations. This is done by specialist quality inspectors, working to George quality standards. They check to make sure that there are no faults in the fabric, that the seams are sewn correctly, that there are no loose threads and that the garments are pressed properly. The packaging and presentation are also checked.

This ensures that only goods that meet George at Asda's quality standards are shipped. If a quality problem is discovered, this gives the supplier the opportunity to rework the product in country. This is much quicker and cheaper than shipping potentially faulty goods to the UK and then back to the manufacturing country for alteration. Based on inspection results suppliers are rated according to their quality performance which helps George to help them improve standards in the future.

4.5.3.1 *Wearer trials*

A good way to find out the suitability of a fabric in relation to its end use is through the use of wearer trials pre-production. This method can assess a range of issues that can directly affect the durability of the garment such as:

- how well it withstands washing;
- susceptibility to staining;
- ensuring seams don't rub during wear;
- durability of fabric; and
- understanding of care instructions.

By conducting such trials over a reasonable time period, manufacturers can identify any issues and take appropriate steps to resolve them, such as changing fabric quality.

Case study: Cath Kidston

Cath Kidston carried out two week wearer trials on core products including a cardigan, jumper and baby grow. The objective was to understand the impacts of wear on the garments in order to better understand product lifecycles. Over the duration of the two weeks, 12 wearers were engaged and each individual wore the garment for 200 hours. The results were used to better understand where knitwear experienced pilling and under what circumstances the baby grow experienced colour fade. To support the learnings wearer trials were also undertaken on key competitors' equivalent clothing items to understand how the quality and durability compared.

[Find out more](#)

4.5.3.2 *Performance and durability testing*

Detailed performance and durability testing of textiles, fabrics and manufactured garments can identify durability issues as well as potential liability and contract performance issues, and demonstrate compliance with, for instance, government regulatory requirements for labelling and flammability. A range of physical and chemical tests are available which can test the construction and performance of garments, colourfastness of dyes, special performance features such as stain repellency, water resistance, and trim and component testing (such as zips, buttons and embellishments). Typical tests, used internationally by companies such as Intertek, SGS, HSTTS and Bureau Veritas, include:

- chemical properties including restricted substances, quantitative fibre analysis, pH;
- clothing tensile strength;
- clothing tear strength;
- clothing abrasion resistance;

- clothing appearance durability (pilling and snag resistance, colour fastness to light, heat, water and other factors);
- colourfastness to light, rubbing, washing, bleaching;
- dimensional stability to washing and dry cleaning;
- flammability and ignition properties;
- jewellery and accessories strength, durability and resistance to tarnishing; and
- thermal and water vapour resistance testing.

Such testing regimes can also be used to identify garment fail factors and manufacturing standards. Core test performance standards that can be reasonably expected of some basic product types to deliver 'good practice' performance are identified in Table 6.

Table 6 Core test performance standards

Core test	Knitwear	Shirt	Jeans	Socks	T-shirt
Number of washes to conduct before testing	30	40	30	62	56
Dimensional stability to washing/dry clean	+or- 5%	+or- 3%	+or- 3%	to fit sock boards or volumetric legs	+or- 5%
Pilling	4	n.a.	n.a.	4	4
Care label wash with visual assessment	expert judgement	expert judgement	expert judgement	expert judgement	expert judgement
Colour fastness to:					
• Washing* / dry clean	4	4	4	4	4
• Water or perspiration*	4	4	n.a.	n.a.	4
• Light Rubbing (on scale 1-5) (*includes shade change and staining)	4	4	4	4	4
Spirality	3%	n.a.	n.a.	n.a.	3%
Seam slippage	n.a.	80N for 6mm opening	n.a.	n.a.	n.a.
Seam strength	n.a.	100N at breakdown	n.a.	n.a.	n.a.
Fusible lamination	n.a.	appearance after wash	n.a.	n.a.	n.a.

Source: WRAP¹²

In order to achieve longer-lasting garments it is appropriate to use a testing regime that is more representative of lifetime wear. As actual usage environments and behaviour by individual consumers may vary considerably, companies may prefer to specify and communicate lifetimes in terms of 'wear and wash' cycles rather than years. More detail is given in the publication "Clothing Longevity Protocol" WRAP, January 2014 (Appendix 2: Test and Performance Guidelines).

¹² ["Clothing Longevity Protocol" WRAP, January 2014](#)

Case Study: Tesco F&F

Tesco F&F tested three garment types for durability using a durability wash test (called a durawash): men's black trousers, women's black trousers, men's white shirts. A durawash is a garment test method that, in this instance, has a single cycle that equates to 15 washes in a normal household washing machine. The benefit of this process is that feedback on the performance of garments can be achieved in a short time frame, therefore any opportunities for improvement can be identified early in the production process. The tests showed that only after 3 durawashes (equivalent 45 household washes) were slight issues found with some of the construction elements of each of the garments. The quality of the main fabric in each garment was therefore judged to be satisfactory for the product. Tesco will now take these insights forward to work with suppliers to amend specifications to improve the construction elements thereby extending the life of the garments.

[Find out more](#)

4.5.4 Prototyping via 3D production development

3D printing and rapid prototyping technologies, utilised for products such as footwear, produce 3D prototypes good enough for design verification in the early stages of the design process. These also have additional benefits of saving time and material, while reducing travel miles and creating virtually no waste during sampling.

Example: Adidas

Adidas have successfully been utilising various types of 3-D printers to produce prototypes, resulting in shortened development times, increased prototype capacity, while enabling greater control over the sampling process. Main advantages of 3D technology to Adidas were:

- Major time savings due to one-step, multi-material printing and large build tray size;
- Identify errors in the early stages of the design process;
- High-quality models provide high levels of accuracy and finish;
- Designers can explore creative ideas, resulting in more innovative products.

In the past, all Adidas prototypes were hand-made by 12 technicians using special tools to model every single joint and crease according to 3D specifications. With 3D printer technology only two people are required to produce 3D models.

[Find out more](#)

4.5.5 Pre-production quality standards

Using the outcomes of pre-production performance and durability testing, along with the results of wearer trials, gives the opportunity to develop a final standard and specifications upon which "approval for manufacture" can be based. This process includes:

- confirmation that testing at the development stages has assured quality and all garments and fabrics/yarns meet the required pass criteria;

- undertaking additional longevity testing if production fabric and trims are available (e.g. extended care label washes, durability wash tests and extended wearer trials). Final product testing should simulate washing/wear for the anticipated life-expectancy of the garment;
- addressing potential bulk colour fastness issues (review dye stuff selection, dye recipe evaluation tests);
- identifying instructions for care labelling recommendations to encourage good consumer practice; and
- identifying end-of-use guidelines for returns and possible reuse of products.

4.6 Customer use

4.6.1 Wash and wear guidance

Durability is directly affected by how garments are cared for. Cleaning approaches used by consumers at home to wash and dry garments have the potential to impact both fibre and fabric characteristics and product durability. Frequency of clothes washing, colour sorting items (i.e. into dark and white washes) and wash temperature are some of the key factors which influence durability.

In wear garments are, naturally, susceptible to stains and soiling to varying degrees depending on the circumstances of use, and certain types of clothing will obviously need to be cleaned more frequently than others. However, the way in which a garment is washed and dried will affect its lifetime, and laundering at the wrong temperature is particularly liable to shorten product life.

Recent WRAP evidence from the Clothing Longevity and Measuring Active Use report¹³ suggests that many people do not sort their washing (hence increasing the risk of colours running), and wash more delicate fabrics at the wrong temperature. People also wash their clothes frequently, out of habit rather than necessity. The research shows that many consumers are unaware of material properties, and therefore do not care for their clothes as effectively as they could.

Certain areas of consumer behaviour are more open to change than others and washing temperatures and processes have been the subject of marketing campaigns in recent years to start to drive real changes in attitude and conduct.

Clearly, improving care information on product care labels, packaging and through other supporting materials provided at the point of purchase or via online information portals has played a crucial role in ensuring that garments are washed, dried and/or dry cleaned appropriately and is therefore an obvious and low cost way to increase durability.

¹³ <http://www.wrap.org.uk/content/clothing-longevity-measuring-active-use>

Figure 6 Sample care labels

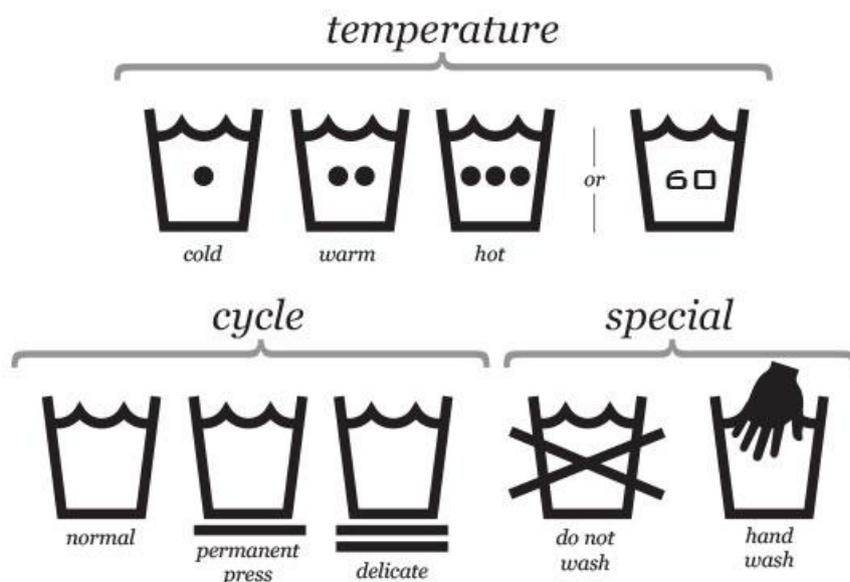


Figure 7 illustrates some of the common washing symbols which are used on care labels in garments, however research suggests that consumers don't always understand all the information which is contained in these instructions. Providing more detailed advice, for example in swing tickets or on a supporting website, could help customers obtain a better understanding of how to care for their products. This information could include details of how the dyes used in a garment are likely to be affected by different care practices as well as details for: machine/hand washing, dry cleaning, drying, bleaching, and ironing.

More detailed advice on care labels or swing tickets, packaging, supporting information and/or websites could also include advice on:

- washing coordinating products (for example suits, twin-sets or lingerie) together, and remove accessories before washing;
- dry cleaning garments when necessary;
- steam cleaning options;
- washing when necessary rather than after each wear;
- airing as a means of freshening garments;
- avoiding rubbing stains and marks to avoid causing damage the fabric;
- avoiding 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;
- using of a specialist laundry bag for delicate items; and
- ironing garments at the right temperature and those with motifs on the reverse to avoid damage.

In addition, the cleanliness of the washing machine itself can have an impact on clothing durability, with risks of detergent residues, mould and bacteria build up contaminating clothing, as a result of most people in the UK washing at 40°C or less. Most manufacturers recommend the regular (monthly) running of a high temperature service

wash, with potentially an additional cleaning agent, to deal with this problem. Manufacturers usually recommend the use of a certain cycle to do this or provide a special drum-cleaning programme.

WRAP research suggests that consumers are often receptive to warnings about the potential impact of not following care instructions, such as the risk of shrinkage if garments are washed at too high a temperature, or the risk of discolouration resulting from unsorted washing loads.

Case study: Stella McCartney Ltd

Stella McCartney Ltd has relationships with key tailors and dry cleaners in the locality of their stores to help customers to care for their clothes appropriately. To understand the environmental impacts of dry cleaning before developing partnerships and undertaking customer communications campaigns they commissioned research to establish what solvents chains of dry cleaners use and how these are managed.

[Find out more](#)

4.6.2 Repair, reimagine, reuse and recycle

Consumers have a number of options for how to extend the life of their clothing items:

- repair; by fixing broken elements of the garment;
- reimagine; by tailoring, patching or re-designing elements of the garment;
- reuse; by either selling or passing garments on to someone who needs them; and
- recycle; by providing clothing to a remanufacturer who can recycle the yarn back into new products.

4.6.2.1 Repair

Research suggests that clothing repair skills have been lost in recent years and people often lack confidence in their ability to mend or alter clothes. Most can sew buttons on, but fewer are able to alter a hem or darn a hole. Younger people in particular are less likely to have these skills. As a result, many people simply store or discard items in disrepair or in need of alteration.

However WRAP research for the Clothing Longevity and Measuring Active Use report¹⁴ has indicated that there is growing evidence of interest in learning how to repair clothing. Surveys show that more people want these opportunities, and a number of community initiatives have emerged such as thezipyard.com¹⁵ and Cordial and Grace¹⁶. At a national level, TV shows such as The Great British Sewing Bee have also helped promote clothing repair and alteration as a hobby activity and a life-style choice.

This trend for repair could be supported through the provision of basic repair kits, including threads or yarn, buttons and instructions, in garment packaging and/or on

¹⁴ <http://www.wrap.org.uk/content/clothing-longevity-measuring-active-use>

¹⁵ <http://thezipyard.com/>

¹⁶ <http://cafesewciety.co.uk/>

product labels. It can also be supported by factsheets offered in-store, online or in packaging.

Example: Patagonia

Patagonia believes in offering their customers the opportunity to have their Patagonia items repaired to extend product life and their repair department has mended 65,000 items since 2012. Taking the idea of repair one step further, Patagonia is also empowering consumers to repair their clothing themselves, as they have launched their new repair programme in collaboration with iFixit, which enables the consumer to download free, easy-to-follow online repair guides for Patagonia clothing and are also offering an Expedition Sewing Kit for on the spot emergency repairs.

[Find out more - Patagonia](#)

[Find our more - ifixit](#)

Repair is most likely to be considered by consumers in certain clothing categories including:

- children's clothing;
- occasional wear; and
- denim.

4.6.2.2 *Reimagine*

Reimagining garments falls into two classifications: changes that can be relatively easily made at home with minimum skills required (such as patching an item); and changes which require a greater skill level and, in the main, are carried out by a professional tailor. Reimagining incorporates re-sizing and re-styling. WRAP's Clothing Longevity and Measuring Active use¹⁷ survey identified that a change in consumer weight was a common reason for garments to be removed from active use. Providing garments which have the flexibility to accommodate size changes, for example through adjustable waist bands and or hems, could be a productive way to extend durability. This could be most appropriate in certain clothing categories such as:

- children's clothing;
- maternity clothing; and
- casual wear.

Some luxury brands have developed relationships with chains of national tailors to promote resizing and repair opportunities to their customers.

Providing inspirational ideas for how to reimagine clothes through information contained on website information portals could help customers to:

- reconfigure items such as jeans into skirts and dresses, or jackets into waistcoats;
- shorten clothes when hems have frayed to create cropped styles or shorts;
- create a more fitted silhouette by re-seaming to reduce leg width; and
- create a fuller or looser silhouette by adding inserts on side seams to increase leg width.

¹⁷ <http://www.wrap.org.uk/content/clothing-longevity-measuring-active-use>

4.6.2.3 Reuse

The Textile Recycling Association (TRA) reports that around 700,000 tonnes is collected annually through charitable collections, shops and local authorities and in addition there is an increasing volume of clothing being passed on via on line exchanges such as Ebay, Freecycle and Freegle.

In recent years a number of brands and retailers have formed partnerships with charity organisations to support and encourage consumer reuse by:

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

Raising awareness of a number of reuse options increases collections of textiles across the board, rather than moving clothes from one reuse outlet (such as a charity shop) to another (such as a textile bring-bank). Therefore promoting one or more reuse channels can enhance the durability of the clothing.

About 61% of clothes recovered for second-hand use are exported according to the Bureau of International Recycling¹⁸. In some African countries, over 80% of the population dress themselves in second-hand clothing. UK based second hand clothing exporters (such as members of the Textile Recycling Association) report that UK clothing is highly desirable in overseas markets because of its quality, variety and range of colours and can fetch higher prices than clothing exported from other European markets.

4.6.3 Customer education and messaging

There are a number of messages that can be communicated to customers to enable them to gauge the quality and potential durability of garments at the point of sale. These include:

- evaluating seams, including advice on looking for loose threads and broken stitches and making consumers aware that a higher density of stitches per inch is generally better, and stitching should be relatively tight and that serged seams or double straight seams are generally stronger and, therefore, may mean that the garment lasts longer than an equivalent with single straight seams;
- looking at 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 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 and garments are dry cleaned when necessary, cold washed and/or dried flat if appropriate etc.; and
- looking for stains, rips, and other damage caused in store or in transit before sale.

¹⁸ <http://www.bir.org/industry/textiles/>

Case study: John Lewis Partnership (JLP)

The Selling Partner Learning Guide provides JLP Selling Partners with information which they can communicate to customers on the shop floor. The business has updated the manual to include messaging from the Love Your Clothes Campaign, which is used to assist the Selling Partners to share three key messages to support clothing durability:

- the connection between clothing that is more durable and higher quality and the environmental impact of those garments in comparison to disposable fashion;
- how the use of the right detergent and lower washing temperatures can benefit the life expectancy of clothes and reduce their wash, wear and disposal impacts on the environment; and
- the opportunity to extend the life of clothes (particularly linking to the in-store haberdashery departments to demonstrate how simple changes to garments can extend their lifecycles).

[Find out more](#)

Key considerations to implement durability: Key questions

- 1) How do choices about the design and cut of the garment impact on its durability?
- 2) Can fit adjustments be incorporated into garment design?
- 3) How are non-fabric components contributing to product failures which reduce durability and how can they be addressed?
- 4) How are choices about fibres, colouration, dye selections, fabric finishes and construction impacting on product failures which reduce durability and how can they be addressed?
- 5) What can be learned about the garments from the wearer trials?
- 6) What can be learned about the garments from the product tests?
- 7) What wash and wear information is available to customers and is it widely understood?
- 8) What information and supporting material is available to support repair, reimagining, reuse and recycling?
- 9) What partnerships would support reuse and recycling of garments?
- 10) What additional education could be provided to consumers to educate them on how to extend product durability?

5.0 WRAP tools and guidance

The following tools and guidance are available on the WRAP website:

Clothing Longevity Protocol

The Clothing Longevity Protocol offers guidelines for good practice in order to aid moves towards garments that will last longer and thus to help protect brand value, screen out

garments which fail prematurely and reduce the environmental impact of the clothing sector http://www.wrap.org.uk/sites/files/wrap/Clothing%20Longevity%20Protocol_0.pdf

Guidance on increasing the active life of clothing

How to use the SCAP Clothing Longevity Protocol

A guide on how to integrate the Clothing Longevity Protocol into your business <http://www.wrap.org.uk/sites/files/wrap/How%20to%20use%20the%20Clothing%20Longevity%20Protocol.pdf>

Design for Longevity

http://www.wrap.org.uk/sites/files/wrap/Design%20for%20Longevity%20Report_0.pdf

Clothing Longevity: Measuring active use

Improving our understanding of how long people keep and regularly wear their clothes for.

<http://www.wrap.org.uk/content/clothing-longevity-measuring-active-use>

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

<http://ckh.wrap.org.uk/>

“Valuing Our Clothes”

WRAP’s ground breaking report provides the first big picture look at the financial and environmental impacts of clothing. 'Valuing our clothes' is a summary of the key findings of a major technical report, plus evidence from a new survey of consumer behaviour.

<http://www.wrap.org.uk/content/valuing-our-clothes>

The Sustainable Clothing Action Plan

WRAP leads the Sustainable Clothing Action Plan (SCAP). SCAP’s ambition is to improve the sustainability of clothing across its lifecycle. By bringing together industry, government and the third sector we aim to reduce resource use and secure recognition for corporate performance by developing sector-wide targets.

<http://www.wrap.org.uk/content/sustainable-clothing-action-plan-1>

SCAP 2020 Commitment

The SCAP 2020 Commitment sees leading organisations from across clothing sector – supply, re-use and recycling – working together to reduce the environmental footprint of clothing.

<http://www.wrap.org.uk/content/scap-2020-commitment>

www.wrap.org.uk/textiles

