Federatie Textielbeheer Nederland

Future Perspectives Textile Services

80% energy saving by 2030: feasible!

FTN Roadmap 2030 Update

Federatie Textielbeheer Nederland

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‘Future perspectives Textile Services The Netherlands’

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Preface

Nobody has a crystal ball. This makes it difficult to look into the future. And what about all the changes that supersede each other rapidly? That doesn't make it any easier. The previous is responsible for bringing the concept of 'strategic planning' nearby. In most cases looking 2-3 years ahead is the standard and scenarios are construed wider than used to be the standard. It has been a massive task to correctly design a roadmap from 2010 to 2030, this re-evaluation of the document offers the most recent insights on the direction of the industry.

These past 6 years a lot has happened. Large chain stores such as Aktiesport, Free Record Shop, Macintosh (o.a. Manfield, Dolcis, Scpapino) and V&D have had to close their doors. Digitisation of society and the 'platform era' emerged from nothing at fast pace. Start-ups such as Airbnb, Über and Alibaba were inconsequential. Snapchat didn't exist, WhatsApp was hardly used and Tesla's weren't seen on the road yet. Self-driving cars were a fantasy concept and 'crowdfunding' was an unknown term. Technology soars, drones... they did exist, but chances are you had never seen one! The past 6 years flew past.

In light of these changes, it is exceptional that the Roadmap 2030, drafted in 2010, still is surprisingly up-to-date. Compliments to all who have contributed to this document in 2010.

Nonetheless, expert groups were involved in the process, now have provided valuable additions and useful suggestions that will help to sharpen and add to the Roadmap. It will not be a big surprise when we conclude that sustainability; quality of service and products, mass-customisation, innovation of textiles and technology will be high on the Research Agenda 2030. Which is mainly enriched with new and complementary subjects such as digitisation, optimisation of logistics, robot technology and the development of big data applications.

On behalf of FTN, a genuine thanks to all 50 experts for contributing to the realisation of this updated publication, for a look behind the scenes, as well as time invested and their input. We trust this update will contribute to regeneration and innovation of services, provided within the professional textile service industry, in accordance with client wishes and expectations. May textile service companies, customers, end-users, consultants/industry experts and governments involved, consider this publication to be a useful guide when realising their plans for the coming years. A special thanks for the Ministry of Economic affairs and RVO (Netherlands Enterprise Agency) for making this publication possible.

Peter N. M. Wennekes
President/CEO FTN

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Management Resume

Motivation

In 2010 the Roadmap 2030 was drafted. In this publication, the vision on services and organisation within the professional textile care industry was formulated. Focussing on the most important market segments: Healthcare, Trade & Industry, and Hospitality & Recreation. Now, 6 years later, it is time to see to what extend the vision is still applicable and on which points revision is required. To answer this question, a number of sessions, outlining views on practical topics were organised, these were attended by representatives of customers, laundries, suppliers and industry experts. The most important goal was to come to an updated version of the FTN Roadmap 2030 for the coming years.

Primary conclusions

The general conclusion from the sessions is that the Roadmap 2030 is still largely accurate. The most important differences in the way we now view the future is that developments in the industry and market segments are moving slower than anticipated. In addition, emphasis on product innovation (in relation to process innovation), may be more accurately defined and researched concerning company activities. To sustain a relevant position in the coming years, a shift from 'asset-thinking' to 'putting the client in the central position', is crucial. What exactly is the need of each (individual) client and how can those need be fulfilled as efficiently as possible? In itself this isn't a new concept, however when executing it as a policy, it appears difficult. A classic example is the Kodak company. The former market leader in photography, with 150.000 employees and inventor of digital photography. In 2011 this company went bankrupt, around the same time; Instagram with 15 employees was sold for 1 billion dollars. Both companies had a completely different approach to the same product. These (im)possibilities in the world of textile services will be monitored closely these coming years.

In addition to the above, differences in means have been observed. The concept of 'Data' has been somewhat underappreciated, as well as the fast growing segment (and impact) of online applications.

Looking at the results of the sessions, it can be concluded that a complete revision of the Roadmap 2030 is unnecessary. However updating and adjusting the existing publication will lead to important additions.

Changes since 2010

Disruption and digitisation are changing the markets around us rapidly. Considering the importance and impact an addition to the publication is made. Especially within markets that are driven by data and technology, disruptors encounter a fertile environment. The importance and opportunities in the field of data are defined in this whitepaper. An aspect that was emphasised in most of the sessions, were logistic challenges. The number of logistic movements is increasing in is becoming more specific (as outlined in the original Roadmap 2030). From a regulatory standpoint (i.e. environmental zones), as well as due to environmental considerations and cost considerations, smart and innovative solutions need to be developed.

Textile service companies in 2030

Textile service companies are experiencing pressure on pricing. The growing trend of transparency towards customer, is offering opportunities for a shift from price driven motivation to a focus on 'Total Cost of Ownership' (TCO). In real life, the challenge is to persuade the purchase managers, however changes are eminent. In general, two major developments are identified; at one hand companies are pursuing volume maximisation, efficiency and 'cost leadership', at the other hand companies are entering niche markets where customer demands are at such a high level that they are willing to pay for these specialist services. In turn, products delivered are adding a certain dimension to services. Particularly in flatwork textile innovations seem promising, especially in comparison to piece goods, where in addition to textile innovations a number of innovations in services are being noticed. Technology supports the shift towards mass customisation (for production on customer- or even individual level) and optimisation of both internal company processes and processes at the customer. This is an absolute 'must' to retain and to provide customers with adequate service, now and when moving towards 2030.

In light of conversations about this update, a warning towards the textile service industry is issued, also supported by industry experts, such as Mr. Martin Kannegiesser who this past June,

during a speech in Frankfurt stated: 'if laundries do not develop and implement these developments, parties outside the industry will'. We have to conclude at this moment, that this is being done.

Healthcare in 2030

The elderly of today are not like the elderly in the past. Today the elderly are more fit than ever and the age of decease is going up. Care is more and more decentralised, when possible outside of the hospital and tailored to the individual needs of the patient. In addition to controlled costs, the 'quality of life' is becoming more important, also when technological innovations and robotics are concerned.
Inside of hospitals the phenomenon of the 'Guest Journey' is becoming increasingly important, which translates into service differentiation concerning convenience and comfort within hospitals. Textile service companies are able to play a major part, by offering differentiated textiles or to assist with one or more aspects of the 'Guest Journey'. The discrepancy between experience and focus on efficiency offers a challenge. Integration and cooperation within the chain offers interesting opportunities, but care institutions will want to remain in control.

Trade & Industry in 2030

Labour is used more flexible, that means the same for textiles. Especially within the industry it is noticed that textile service companies are up to speed with process innovations, however when product innovations are concerned, including the coinciding advisory role that is required, companies could be fulfilled more actively. Textiles will be tailored to an individual (end-user) level and will contain more and more technology to support the customers' activities, as well as to secure the sustainable allocation of employees. Functional (and 'smart') characteristics of textiles are considered extremely valuable within the trade & industry, due to the consequences of the added value of the product. The sector seems to be quite advanced with integration of digitisation, the circular economy, TCO-based decision making (total cost of ownership) and the usage of data for optimisation of employability of man forces. Data is mentioned as the key to directive capabilities (ergo: power) when chain integration is concerned. Sharing parts of the data concerned is at one hand essential to innovation; at the other hand privacy and distribution of this new form of power are in the way of innovations.

Hospitality & Recreation in 2030

Cooperation between suppliers appears to be (and continues to be) difficult, but will surely be necessary within the sector. If only because of the logistic movements that are subject to increasingly strict regulations, especially within big cities. The sector is dealing with pressure on prices, especially within the hotel sector. With the crisis at an end, this sector is slowly starting to recover, textile service companies however, will have to present strong value propositions to convince hospitality & recreation to innovate. Platforms such as booking.com are increasingly influential. In addition, disruptors such as Airbnb are profiting from the experience economy and are shaping up to be a new form of competition. For hotels, all of the above has a negative impact on innovation drive, considering the strain it puts on margins. The division between budget travellers (hotel accommodations) and experience travellers (the hotel as part of the experience) will continue to increase within the segment. Consequential, the high and low segments will drift apart more and more. To retain a livelihood in the future, standardisation of the back-end services and differentiation of the front-office services is an absolute must. Here, textile service companies are able to fulfil a clear role for the hospitality & recreation industry, services could/should be tailored to this concept.

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1. Introduction: Vision on 2030: Tailor-made services for each individual user!

Macroeconomic developments have a strong influence on the textile service industry. The market and market demands are changing. Use of textiles has increased enormously in the past decades and service provision and methods of treatment have to be adjusted. The rise of IT, atomisation and robotics are enabling new concepts for processes, products and operational management. In addition these systems present possibilities for new service concepts that are tailored to the individual end-users. New logistic concepts, enabling the tracking of each piece on article level and choosing the most optimal form of distribution, are necessary.

Methods

The Roadmap Textile Services 2030 was drafted in 2010 by FTN, articulating the vision for the future on the textile service industry. Now, six years later, the time has come to evaluate the articulated vision and on which aspects it should be revised. To answer this question, the original findings from 2010 have been analysed using two different research methods. Firstly, publications of other industry organisations, knowledge institutes and trend watchers, were reviewed through desk research. Secondly, to come to an updated version of the original vision articulated in the Roadmap, sessions attended by representatives of the industry were organised, with whom individual conversations have taken place as well.

Sessions with representatives are divided into several groups. Sessions were organised with FTN laundries; one session per market segment (Hospitality & Recreation, Health care and Trade & Industry) and two technical sessions (one for IT, data & logistic developments and the other for material developments & process technology). A list of participants for each session has been added to this whitepaper as an enclosure. During the sessions, the original formulation from the Roadmap was shared; subsequently the group was divided into subgroups for a brainstorm session. This was followed by a common closure of the meeting during which the results of the brainstorm sessions were shared. This initiative was followed by desk research, publications were collected and analysed, which are included in the resource list. Contents were coordinated with several authors, some of which have presented themselves to the industry at NST 2016 (Dutch National Symposium Textile Services).

Developments

For years logistics and data management have not been the major focus of developments in textile services. Focus was mostly placed on efficiency and sustainability of the cleaning processes, today attention is still in large part focussed on these subjects. Even when outside of these areas, there are many opportunities for the industry to become more sustainable, i.e. through optimisation and/or cooperation in logistics and creating value by means of data management. Logistics has become an increasingly important theme to FTN members in this past decade. Data management and digitisation is moving forward fast.

Smart mobility & Zero Emission city logistics
Customer demands in 2030 will need a flexible, fine-grained/ delicate, efficient and sustainable distribution system. Societal organisations such as municipalities are also working on this. The municipalities of Amsterdam and Rotterdam are stimulating the use of sustainable logistics in downtown areas, striving for Zero Emission city logistics. The Green Deal Zero Emission city logistics, dictates that in 2025 city centres should be supplied free of emissions, moving ahead of the European regulations that stipulates that in 2050 only emission free vehicles may enter the city. Effectively this means that this is an important factor in tenders issued by municipalities, companies are stimulated to follow the same course of action.

Electric transportation and mobility were somewhat omitted, in relation to other developments in sustainability. Electric transportation is at a turning point, regarding city logistics; a swift break-through is expected. There are electric vans available and the first (smaller) electric vans are being used already. Driving electric is not the only solution; other alternative fuels are being evaluated and tested. In addition the concept of Smart Mobility is gaining popularity fast. Aiming at smart forms of cooperation and information streams to maximise the efficient use of the mobility network.

Data

Digitisation is a trend that is developing in all markets and sectors. Everywhere examples are to be found. Digitisation doesn't end at placing a digital order for a product, the trend is also apparent in the field of logistics, optimisation of services and in discovering new services. Especially in the next five years digitisation will develop further and be integrated in everyday processes.

The focus will mostly be on the information that can be extracted from data. The stream of data is growing and with it, the technological possibilities. More companies are accepting that a software solution helps to connect data and to enrich it, in order to get a better insight into processes and the entire chain. This leads to cost efficiency and better performances; for examples working with real-time information. It is likely this will develop faster than is expected by most at this moment. Real-time information should lead to a situation in which there is no planning, but rather, in which all takes place in reaction to real-time information. Resulting not only in energy reduction but also in financial benefits, creating massive added value for the customer.

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2. Vision: Textile services in 2030

2.1 Vision of the industry

In line with the direction put forth in the FTN book 'How it was, how it is and how it will be' it is obvious that textile companies have developed in a remarkable way through time. A shift has taken place from textile companies being smaller and from craftsmanship to industrial companies, with new technology and service concepts as the most important drivers for innovation. This translates into numbers: for many companies the cost price of doing the actual laundry might be only 25% of total costs. Moore's law (1965) states that computers double in power and capacity every two years. Even though, according to experts, this exponential growth will slow down somewhat, this theory is still accurate 50 years later, offering an indication of how incredibly fast developments are succeeding one another (Moerman, 2015).

This means that for example 90% of all data that is available today, is only 2 years old, according to Willem Peter de Ridder, speaker at the National Symposium Textile services (2016). When taking into account the accelerating speed of the adoption of new technologies, one can only conclude that many changes are in our future.

Despite the objective observation of this macro-economic trend, the crisis has left its marks. The Roadmap 2030 defined a set of developmental areas that are still relevant according to representatives of several market segments, but have not yet been put into practice. It appears that in the past 6 years, customers as well as (consequentially) textile service companies have been careful in applying their innovation budgets. That is the consequence of a strong focus on cost prices and price pressure. To enhance added value and to be able to escape the price pressure, a different attitude towards innovation should be developed. An increased focus on product-innovation (instead of process-innovation) is desired. Mass-customisation is the key to achieving growth, but still being able to individually serve customers.

Towards 2030 technology, innovation and data will play an increasingly bigger role. Everyone that googles, 'industry 4.0' will instantly agree. The outcome of technical sessions with industry experts was that the customer, in many cases the end-user, will become the focus of innovations. Company processes will consequently be adapted to the customers' demands, as opposed to 'asset-thinking' (optimal usage of Machine Park and resources) which today is still prevailing very much.

In several cases textile service companies are fulfilling the role of proactive partner of its customers, this should effectively be noticed. In these cases the customer-supplier relations have an added dimension. This 'upgrade' is in the development from supplier to partner, which contributes to the realisation of the customers' targets. The added value is increased by centralising the end-user, focussing on efficiency, comfort and sustainability. The starting point is to broaden and optimise the application of textiles, in addition to the optimisation of the cleaning processes and the maintenance of other functional assets. Laundries are moving towards advising customers and being a knowledge partner in order for their customers to perform better towards the end-user.

A leading and advisory role in the area of sustainability, which currently is that of the textile service industry, will contribute to the sustainability of the chain. Through supporting customers in accomplishing their sustainability goals, the potential will be increased. Sustainability is a 'moderately' popular topic with customers, especially when considering the financial ramifications. The expectation for 2030 is that sustainability will be a 'prerequisite', rather

than a 'buying argument'. The world is becoming increasingly transparent, in addition non-sustainable operations will, in the future, have direct financial consequences (if this is not applicable already).

2.2 General developments

The importance of customer knowledge is increasing, since textile service companies are focusing on offering products and services with a decidedly higher added value that are compliant with customer demands (more customer oriented and tailor-made). In this paragraph several general developments are described, which will become more relevant to the textile service industry in the coming years. More specific developments per market sector/ customer group will be addressed in the sub sequential chapters.

Population growth in the coming years will increase and starting in 2020 will level towards 2030, at which time it will stabilise. Especially the number of elderly will increase up to 2030:

- >65 Years with 40%
- >80 Years with 30 %

The ageing of the population in combination with an increasingly tighter job market is still an important development in the coming years. Not only will the pressure on the health care market increase, it also offers new opportunities for the leisure sector and the social services. Due to the declining job market, human capital is becoming increasingly important. An effective working environment is becoming more important for sustainable employment of human capital. Automation and application of technology are becoming a necessity for keeping production up to standards. Herewith also lie challenges and opportunities for textile service companies; to alleviate customers by offering labour saving services.

Textile service companies are experiencing price pressure. At the same time, transparency on pricing and services are becoming increasingly important. This is facilitating a turning point which will most likely be achieved some years from now. To escape the price pressure, the added-value of services must be emphasised, all participants in the laundry sessions agreed on this statement. An important challenge for textile service companies towards 2030 will be the search for distinction and added-value. In this search matters such as cooperation within the chain (with control function), broadening of services (concepts) and innovation in the areas of process and technology will play a key role. Transparency and the mapping of achievements will make it easier to bend price pressure into the broader concept of TCO (Total Cost of Ownership) and creating understanding with the customer. Creating understanding and support is proving to be a difficult task; even so, textile service companies will have to continuously pay attention to this subject. Effective communication and PR should receive due attention towards 2030, to advocate understanding and support amongst customers.

Data and information flows will become more important in the coming decades. In all likelihood this will be the deciding factor in the argument over the controlling role in chain integration. Understanding data in this context does not only apply to the usage and lifecycle of textiles, it is also applicable to functionality. The collection, analysis and report of data, at the moment (and in the form) in which it is valuable, is an important challenge in the textile service industry.

Disruption and platformisation are important trends. An important characteristic is the fast emersion (growth) of disruptors in several markets. Especially within sectors in which data

and technology are important drivers of innovation, disruption is right around the corner. Recognising, embracing, or even causing the disruption, is the challenge for the industry.

The amount of smaller households is increasing. According to the CBS (Central Bureau of Statistics) a Dutch household is comprised of 2,1 persons in 2030, compared to 2,8 persons in 1980.

The individualisation of society continues, with the need for personal development and personal branding ever increasing. Through transparency users have a better view on the possibilities. Consequently an increasing need emerges to adapt products to all individual wishes. Users can express themselves by choosing products that are in line with their personal requirements and needs in functionality and design. End-users can consider other aspects in their choices, like liability and service of the supplier and costs. Challenge for the textile service industry: to recognise and facilitate the incorporation of individual demands into the choice of textiles and the type of care.

Many companies that used to be active in the industry, decided to move production to countries with lower production costs. In close cooperation with the foreign production locations, the companies produce products to match the customers' demands. Employees of the Dutch locations are acting as advisors, in principle to the customers, but additionally also internally for the production locations. Challenges for the textile service sector: to direct and advise throughout the chain of textiles and textile services. Nowadays many initiatives emerge to move high-standard processes back to the native country.

In 2030 cooperation between companies within and outside of the chain will be common. By combining knowledge and experience, new and innovative products and concepts emerge which are essential for survival (especially to SMEs). Challenge for textile service companies: strengthening of the 'cooperative DNA' and sharing knowledge within and outside the chain. In 2030 sustainability and social responsibility is a prerequisite for cooperation in the chain. Social responsibility will be essential to be able to operate in a market revolving around personalised services and to be future proof. For all entrepreneurs it is an elemental part of choices made regarding products, processes and services. Challenge for textile service companies: extensively develop sustainability of services and the total concept concerning the end-user.

When communication is concerned, there is an additional opportunity. The textile service industry may count itself as one of the most sustainable industries (according to LTA-3 (Long Term Agreements 3)). The image, however, doesn't reflect this yet. Especially during times in which sustainability and social responsibility are becoming increasingly important, this should be communicated to customers and society more extensively.

2.3 Future models

Today most customers of textile service companies are operational in the health care, trade & industry and leisure & recreation sectors. It is expected that these segments will grow; additionally new markets will be developed. This growth in market potential is coming from growth in the segments themselves (more hotels, more hospitals etc.), as well as from innovations in textiles, for example in treatments and in IT/Logistics. These innovations enable textile service companies to enter new markets and offer a broader scale of services in current markets. Market sectors will look very different in 2030 as a result of the increasing speed of change in society. Expectations of customers towards textile service companies (market demands) are changing faster as well, which requires a dynamic organisation.

It is important to know how the three dominant sectors will develop autonomously (apart from textile services), in order to discover the

expectations of customers in 2030. To this end, market profiles have been developed for each sector: healthcare, trade & industry and leisure & recreation. In these market profiles, the following subjects will be considered per sector: the most important features and developments, a description of changing market demands and a description of the future service model of textile service companies (new textile service concepts).

The visions on the future are illustrated with examples from eight business cases (see diagram 1). The business cases are an example of the challenges of the sector and cover the most important product-market combinations, they are selected for:

1. Their economic meaning to the sector;
2. The extent to which developments can be added to a case in different situations (example/appearance);
3. The energy-efficiency potential which is to be realised in the chain (estimated by experts).

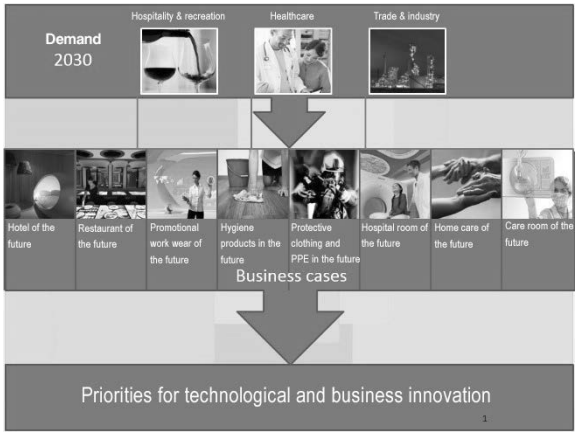

Diagram 1: Roadmap 2030 business cases

Please note! During the evaluation of 2016, product market combinations from 2011 have been applied. There was no renewed evaluation process in 2016.

3. Textile services through the eyes or the customer

3.1 Healthcare

As described in the original Roadmap, an increase in the elderly population of The Netherlands is causing an increase in the demand for domestic care of possibly 10% per year, up to 2020 (FTN, 2011). According to these numbers, domestic care is the fastest growing market within healthcare. Of all elderly that are receiving care, over 75% is receiving this care at home. Rehabilitation is more often taking place outside the hospital. This decentralisation is inspiring a multitude of care applications. The purpose is to not only make care available, but affordable as well. Textile service companies are affected by this trend too, (re)distributing the focus to costs on one hand and the living-quality on the other. As much as possible, basic care is delivered at home and by people themselves; caregivers and volunteers. This leads to a distinct growth of the domestic care sector.

Expenses for care will increase from 14% of GDP in 2010, to 27% of GDP in 2030 and even to 30% in 2040. This is related to increased care intensity due to the rising number of elderly, mostly with multiple care needs. To ensure affordable care, people will only receive reimbursement for their necessary basic care needs. Additionally people can get extra insurance for additional care and hospitals are offering admissions with extra luxury and comfort.

The NFU, the Dutch Federation of University Medical Centres, describes a threesome of focus points that will be targeted the coming years, in the paper (2016): 'Added Value for the Patient, NFU Quality vision 2017-2020'. The first focus point concerns 'value for the patient', divided into complex care, treatment outcome, clarity about goals concerning treatments, liberty of choices and joint decision making. The second point concerns a change of culture in healthcare. Healthcare professionals should be acting more and more as a patient's advisor and the goal is to improve healthcare from an internal motivation of the professional. The third and final focus point concerns cooperation regarding in- and outpatient care as well as regional care. All phases of treatment are reviewed, emphasising the transitional moments. In addition the paper attempts to define chain quality further, in order to enable medical centres to act accordingly.

As a result of the increasing amount of patients, the demand for labour in healthcare is rising exponentially. In combination with the aging of the workforce, this has led to a shortage of personnel in healthcare. In 2010 it was expected that without additional repercussions the shortage in 2025 would amount to 450,000 employees (see diagram 2). This is especially the case for registered nurses (nurse practitioners) and professional care givers (health care attendants). The government is aiming to guide and redesign the job market in accordance with the changing demand. Minister Schippers has a plan to grow the number of jobs from 35,000 to 126,000 in 2020 (Rijksoverheid, 2016). In addition companies are aiming to develop innovations that will organise labour more efficiently. Robotics and remote operations are only some of the possibilities that are being successfully tested nowadays.

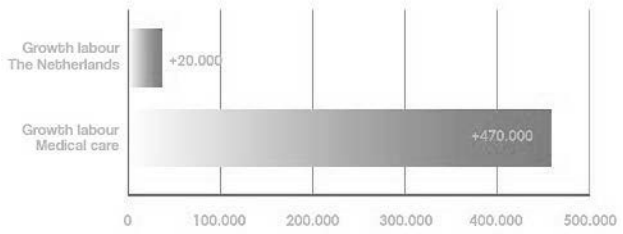

Diagram 2: labour shortage in 2025 (FTN Roadmap 2030)

In 2010/2011 the Roadmap 2030 outlined a visible trend, a decline of 30% in the average time patients remain admitted to the hospital (RIVM, 2008). The average time of being admitted, will most likely stabilise at the current level of around 5 days. The most thorough changes in efficiency have been made, which does not make further strides in this area any easier. A development that perhaps will play a part is the shift to preventive care prior to admittance in order to make sure there are no preventable barriers that will stop the scheduled treatment from happening. In more and more cases clients rehabilitate outside of the hospital, through partnerships of in- and outpatient care organisations, in their region, which the NFU points out. It is expected that this trend will continue. Only patients that are unable to live at home, will be admitted to hospitals and other care facilities, therefore the intensity of outpatient care is increasing rapidly.

The wetcleaning facilities are renting and distributing clean textiles (bedding) to 95% of companies in the Dutch healthcare industry. (Year report

Citizens are taking more responsibility for their health and health care. They are being helped by more societal attention to preventive care, predictive care (health maintenance and early detection), home testing and objective online information. An increase in responsibility and knowledge causes patients to want to take part in their own care process. Patients want to make their own choices (the need for differentiation in the offered care packages). This means that in addition to facilities for basic care, patients can also choose to be treated at one of many commercial treatment centres (differentiation/specialisation). The health care sector is, in the future even more than today, an important economical factor, in which advanced partnerships are formed between the sector and industry as well as knowledge centres.

Market demand

Developments in the health care sector are responsible for a changing market demand for textile service companies. In the original FTN Roadmap 2030, the choice was made to define the market demand with 3 business cases; 'the hospital room of the future', 'the nursing home room of the future' and 'care giving in the neighbourhood and at home'. These three business cases describe the most important factors in health care in 2030. Below the market demand is described at sector level. The market demand is supported by typical examples from the business cases, which are outlined in the frames.

The health care sector is facing major challenges in the future, to maintain the provision of accessible, affordable and high quality care. Because of increasing labour productivity, employees want to focus on their core task; which is providing high quality care. Employees want other peripheral tasks to be taken care of by business partners, with whom long term contracts on corporate level are in place. Business partners guarantee a complete package of products and services, in which individual client demands (service and comfort) and the Guest Journey play important roles. The Guest Journey is a reference to the total experience of a patient in a hospital, from first contact (telephone/website) up to and including the moment of departure (and the optional patient review). The most important benchmarks are quality, cost effectivity, transparency and sustainability. To regulate on the basis of cost efficiency (which calls for standardisation at the back-end) and the care for an optimal Guest Journey results in a tension field and effectively forces the health care institution to provide differentiated care (service levels). This is demonstrated by the publication of the AD (a Dutch newspaper published daily) containing the top 100 hospitals in The Netherlands (published November 5th 2016) (AD, 2016).

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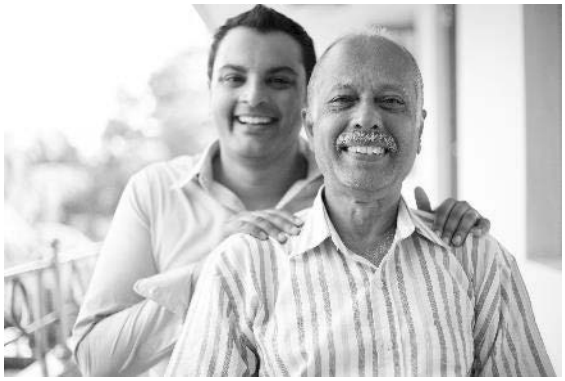


The hospital room of the future:

Hospitals of the future will have to deal with an increase in the amount of patients, a more complex demand in care, less financial capacity, a shortage of staff and a more empowered patient. As a result hospitals - now and in the future - will have the important task of maintaining quality of care and affordability for all patients. To achieve this task, hospitals require support of facility partners.

For non-care related activities, hospitals require a full-service solution for the lowest possible price (unless the service significantly adds to the Guest Journey). To constrain costs, hospitals aim to enter into contracts with a small selection of partners, for a longer period of time, without losing control.

Profits in efficiency will have to come from technology, for example by the smart application of sensors, which will relieve the staff of part of the daily chores by being part of the operational daily routine.

The nursing home room of the future:

Employees of nursing homes need a solution to monitor the safety and health of the clients more effectively, also when not being physically present.

By increasing labour productivity, employees will have less time per client. This increases the need for support that will allow the care giver to perform their duties more efficient. Elderly homes want to offer their clients the possibility to (as paid services) customise the accommodation, multimedia & communication services and to offer 'room service'.

Smart technological applications could further benefit and unburden employees. By providing 'alerts' when a client is about to fall out of bed or by options that allow to visually check body temperature, heartrate etc.

Care giving in the neighbourhood and at home in the future:

The wish of outpatient care organisations is that their employees will be maximally supported in efficiently, effectively and responsibly performing their tasks. Therefore an accurate communication with the clients, their family and medical specialists is required.

When employees can perform their tasks more efficiently, more people will be helped and more time will be left for personal contact with the client.

Clients want to be able to live at home independently longer. They wish to stay mobile and require the possibility to buy additional services, if necessary. Communication will become more and more digitised.

Future service model textile service companies

Textile service companies will have to adapt to the changing market demand. In the future the textile service company will provide the complete (textile) services for a health care institution and/or groups of clients. As a result, care institutions, their employees and clients will have the possibility to choose from different levels of service, ranging from the basic level of textile services, to provision of complete functional concepts (such as provision and maintenance of furnishings), including proactive support and advise, tailored to the wishes of the client. In addition the textile service company can play an important role in internal logistics or even in the complete upholstering of the rooms, incl. the renewal/replacement of textiles.

Future services in the health care sector can be defined by:

1. Offering integral services (development towards 'facility director') concerning linens and other forms of textiles;
2. More segmentation in the products/services (service packages at different quality levels for different customer segments) and decentralisation of services that connect to the specialism of the care institution;
3. A verifiable contribution of the total services to the efficiency of business operations, amongst others, by implementing data and smart textiles;
4. Transparency in product information;
5. (verifiable) sustainability in products, processes and service concepts.

For many textile service companies this means a big shift in the market. Models, tasks and responsibilities are changing due to the start of decentralisation, when transparency and verifiability become 'musts' in the market, this image will change even further. In addition a strong decentralisation of services will have a significant influence on logistic processes, delicate solutions are required, perhaps in cooperation with other parties. In this search for different forms of innovation, it is important to identify the stakeholder(s) that benefit from these innovations; in health care especially insurance companies are important, because they negotiate the prices for care with hospitals.

Hospital room of the future: the service

Concerning support for care related activities, control remains at the hospital. Some examples of this are supplying beds that are equipped with sensors that register patient data and warn when parameters are being exceeded, textiles that will adapt easily to a body(part) or beds that reduce the need for labour etc.

Unburdening with regards to supportive services: a hospital can choose a package 'room upholstery' which entails the collection, cleaning and provision of all textiles like materials in a hospital room and the frequency with which textiles are being renewed during the 'Guest Journey'.

This package can be extended with advisory services (i.a. regarding flexible room lay-out, look and feel of the room, material usage, hygiene, comfort/service for the patient), facilities (providing the complete furnishings) and maintenance.

Nursing room of the future: the service

Textile service companies are responsible for the functional operation of all textiles used in a home for the elderly. An example of a textile function is that a sensor is embedded in a patient's garments, that signals when a patient is about to develop decubitus. At that moment the composition of the textile changes and an alarm signal will be sent to the staff.

The bed has a massage option to stimulate blood circulation and decubitus will be prevented. Also the bed can change shape, which allows the nursing staff to easily reposition or turn the patient over.

Textile service companies offer clients of nursing facilities the opportunity to personally order and arrange service requests online (regarding personal hygiene, relaxation and comfort). Some examples are ordering a hairdresser, manicurist/pedicurist, products, groceries and gifts. A good example of this is 'Compaan' recently introduced by Clean Lease .

Image 1: The elderly are becoming more and more 'Tech-savvy'

Domestic care of the future: the service

Textile service companies provide and facilitate textiles that support body movements and automatically disperse medicines. Institutions for domestic care or clients that need domestic care will choose to have their textiles professionally cleaned, to maintain the required functions of the textiles and to keep them hygienically clean. The competition of domestic washers and locally organised textile cleaning companies will remain a threat, due to the low prices that are being offered. The challenge for professional textile service companies is to provide tailor made services against attractive prices (on the basis of TCO). If strict hygiene standards in textile services become a prerequisite in domestic care, it will strengthen the position of professional textile service companies immediately. New technologies are introducing platforms like Uber to the market. Also in domestic washing this technology will claim its stake (an Uber for the laundry basket). Professional textile service companies as well as domestic washers, can commit to this technology.

A domestic care giver can be present with a patient during a relatively short time. Functions are added to textiles, which enables the textiles to take over some of the tasks of the domestic care giver, such as signalling when extreme values in patient information are being measured, regulating body temperature and moisture, wake-up calls and automated dispersion of medications. Domestic care givers, family and specialists can at any time consult client data, making communication between family and medical specialists possible at any time. Communication and the collection and analysis of data will increasingly be taking place through digital channels.

Textile service companies will offer clients of domestic care institutions the possibility to treat their personal textiles, completely in line with the clients' demands. This requires a delicate distribution network to collect and deliver the garments at the clients' doorstep. Client demands regarding the (functional) characteristics of each individual garment will have to be registered at the textile service company. RFID technology will be standard.

3.2
Trade & Industry

The trade & industry sector is marked by the diversity of companies and institutions that it encompasses, which are active in both the public and private sector. Retail, construction, transport, business services (i.a. banks, insurance companies and temp agencies), government, utilities, public care facilities and public transportation.

From an economic standpoint, the services sector (i.e. financial and business services) is the largest group within the trade & industry sector, followed by government & health care, industry and finally trade & transportation. The simplification of communication and the improvement of the physical ability to span distances are leading towards increased worldwide cooperation between companies. In 2011 it was expected that in the subsequent years the services sector would grow further, in combination with a decline in the production sector. A recent column written by Mathijs Bouwman in the FD (Financial Newspaper) (2016), confirms this trend. The established industry in The Netherlands will extend its proposition with added services that are related to the production, i.e. service- and maintenance activities. This will result in the fading of industry boundaries. As a direct result of further aging of society and the decline of new additions to the work force, the total size of the work force will decline further. In 2015, 1 in 6 people was 65 years or older, in 2030 this number is expected to be 1 in 4. This makes it hard for companies to find and retain sufficiently qualified staff. Companies are working hard to create a good professional environment for employees, which causes staff to want to stay and enables companies to retain the employees longer (both physically and mentally). Opposed to the declining work-force, there is an increase in production (especially in IT-intensive sectors). This is best explained by ever increasing automation.

In light of sustainable employability, product innovation is essential in protecting and supporting employees in performing their jobs.

In effect this means sensors in textiles are able to register dangerous situations such as exposure to dangerous chemicals or circumstances. Sensors can also support employees in retaining good posture and many other applications can be thought of, that would make work easier and/or safer at an individual level. Product innovation can be implemented in many situations; an important role can be played by functional and smart textiles. Innovations in sports and space exploration are being monitored closely.

In line with the need to unburden, the focus of buyers will shift from acquisition costs to Total Costs of Ownership (TCO). The sustainability aspect makes intensive cooperation in the chain of production, usage, cleaning and recycling of textiles absolutely necessary. Cooperation, especially in execution, requires a clear directive function. This role will most likely go to the person that can acquire, connect and interpret the most extensive data.

Market demand

Developments in the trade & industry sector are responsible for a changing market demand for textile service companies. In the Roadmap 2030, the choice was made to define the market demand with 3 business cases; protective workwear and Personal Protective Equipment (PPE's), hygienic textile products in the service sector and promotional professional wear in business services.

These three business cases describe the most important characteristics in trade & industry in 2030.

Below the market demand is described per market sector. The demand is supported by some characteristic examples from the business cases. These are included in the textboxes.

> Trade & industry
>
> Of all textiles used in the sector trade and industry, 60% is rented and 40% is owned by the customer.

The scarcity on the job market leads to a better protection of employees, especially concerning safety and health. Customers from the sector trade & industry want textile service companies to support them in this endeavour. This is especially important in situations with an enlarged health risk, such as employees that are frequently exposed to environmental influences (i.e. weather and radiation).

Companies demand advice on both corporate and employee level, regarding material choices, design and functionalities for workwear; to safeguard that they are optimal for the tasks of employees and are compliant with all demands for personal safety and government regulations. Individual wishes and requirements of the end-user will become more and more important, while retaining the corporate image. Workwear can be fitted on an individual level with sensors and characteristics. If you don't lift anything, you do not need sensors that monitor if you are lifting correctly. In addition, on an individual level, needs regarding coating can differ (for example: anti-fouling, water-repellent or fire resistant). Also in the area of sizing, large improvements can be made, for example by usage of 3D-bodyscans.

The part of the companies that has employees in direct contact with the customers, needs to be advised in the area of corporate image (styling and choice of clothing) and in a broader sense the company needs advice about the way they can comply with different demands regarding hygiene and environment/sustainability.

Involvement of organisations in commissioning and regulating processes is a must, considering the practical experience. Organisations will want to focus as much as possible on core duties. From the perspective of data, TCO will have a much larger share than price, in the decision-making process of buying. By offering a total solution in the area of textile care, the role of textile service companies will change as well. The buying process and the logistic process will be an important challenge, within the framework of efficiency and sustainability (minimising logistic movements).

Federatie Textielbeheer Nederland

Hygienic textile products of the future:

For building managers cleaning is part of the wellbeing of the employees, reducing costs (l.a. as a result of absenteeism), increasing sustainability (saving water, additives and energy). Objective information and advice are required on this subject. Spaces have to be guaranteed clean, both in experience as actual hygiene. This to prevent users of the space to contract any kind of pathogens. Spaces must be hygienically clean for longer periods of time, they have to look and smell clean.

The building managers want to be unburdened. At one hand regarding cleaning washrooms and other spaces/surfaces where hygiene is important such as desks, hardware, supporting devices, furnishings, buttons, panels etcetera. At the other hand regarding provision of supplies for washrooms, such as toilet paper and cleaning and drying supplies for hand care.

The building manager does not want to have to think about this twice, and preferably discusses this with one party. Also costs will play an increasingly important role.

Protective workwear and PPE's of the future:

The increased attention for safety and health (especially in the working environment), is visible through the strict requirements companies have for workwear and PPE's. This is especially important in situations with increased (health) risks, such as in the industry and public care segments. Ambulances are a good example due to the requirements set for uniforms, PPE's and other textiles such as blankets, pillows and straps. Emergency Medical Services (EMS) want to be unburdened concerning ordering and re-functionalisation of the different necessary (textile) materials.

EMS are looking for a partner that can guarantee that requirements are met regarding safety, comfort and functionalities. In addition to safeguarding the quality of textile-like materials / clothing etcetera, the buyer needs the partner to think on the application of textile-like materials and adding functional aspects to improve safety in EMS.

Promotional workwear of the future:

In this framework, definition of promotional workwear is garments that are mainly worn in business services, such as retail (staff in shops), financial and legal services (advisors, lawyers and bank employees). The garments must support employees in an optimal manner, when performing their tasks, it must function as a extension of the company philosophy (image/appearance).

Companies want to be able to trust that garments fulfil the specifications of the company and are adequately available at the required time. In addition, it should not provide any trouble. Also companies wish to meet the wish of the employee to be able to adapt the garments to their personal circumstances and preferences. In light of protecting the corporate image, properties can be added to prevent, for example, odours.

Companies require a full service, regarding advice on corporate level about 'corporate image' and delivery specifications as well as advice on an individual level, for employees, regarding styling and garment choices.

Future service model textile service companies

Textile service companies must anticipate the changing market demand. Two indications for the market demand are the general economic developments and employment opportunities in The Netherlands (Böttger, 2016). The textile service company is responsible for the provision of overall textile services within business-, public- and industrial service companies and materials and services are completely tailored to the wishes of the company and increasingly on individual level. In the business cases, this is visible in different ways. In workwear the textile services are mainly aimed at safety of employees (for example protection against extreme circumstances, elevated visibility, and recognition of dangerous gasses). In hygienic textiles, labour reduction (effectivity/efficiency) is important, in addition to guaranteed hygiene. In promotional wear, heightened comfort, interpretation of current data, support in communication and image reinforcement, are important.

For the service provision in the future, this effectively means that textile service companies:

1. will provide integral services (development towards facility director and/or partner)
2. should play a broader role in the area of product and process innovations, which should be led by customer demands (on an individual level).
3. should, through their services, verifiably contribute to a more efficient company management.
4. must be more transparent concerning product information (amongst others regarding: quality, functionality, finances, sustainability).
5. should be (verifiably) sustainable in products, processes and service provision concepts.

Federatie Textielbeheer Nederland

Hygienic textile products of the future: the service

In washroom services textile service companies unburden building managers by providing an all-inclusive concept (on the basis of a service level agreement) that stipulates the required hygiene demands and experience demands. This means unburdening the building manager and facilitating him in meeting the hygiene requirements. This can be done by providing 'ready to use' cleaning cloths for multiple purposes (such as washroom, pantry, windows, appliances, floors, cabinets/desks and accessories) and the re-functionalisation of the used cloths. Through a monitoring system (for example with sensors) textile service companies can prove that the hygiene requirements are met (this is of increasing importance because of liability). In addition through smart usage of data, the lifecycle of textiles can be monitored.

Textile service companies provide insight in the added value of textile-like products for realising other company goals, amongst others regarding productivity, finances, hygiene and sustainability, with the help of transparent information and solid advice. Textile service companies take care of meeting governmental requirements by developing and offering cleaning agents and techniques that minimise the physical strain of tasks.

Protective workwear and PPE's of the future: the service

Textile service companies can unburden emergency services for example by offering total tailor-made packages for designing, providing, collecting and re-functionalisation of textile like materials. The textile service company will provide more and more guarantees concerning safety, comfort and the usability of functionalities. Especially guarantees regarding safety market demand exists, however there is room for development. In addition to securing the quality of textile like materials, textile service companies, as partners of emergency medical services, debate with them about possible applications of textile like materials and technological solutions for EMS.

To unburden the client, the advisory role exceeds the bounds of functionalities of textiles. Examples of other areas in which advice can be provided are: corporate identity (image enhancement and recognisability), smart financing of corporate wear and representation, law and regulations (e.g. safety and hygiene) and sustainability(e.g. savings on energy, accessories and water). This requires close cooperation with other partners in the chain and in particular with the end-user.

Promotional workwear of the future: the service

Textile service companies advise companies in a proactive way on how textile service products can be a valuable addition to emanating the company philosophy.

To achieve this, they work together with (amongst others) scientific institutes, textile production companies, advertisement agencies and companies in fashion, to be able to advise their customers on the latest information with regards to materials, functional assets and fashion. In mutual agreement with the client, the specifications are drafted by the textile service company. This allows textile service companies to optimise and adapt services to customer demands and guarantee functional qualities of the material (amongst others in the area of quality, comfort, hygiene and safety).

Textile service companies can proactively support customers, by functioning as a 'personal coach' and helping to realise their goals (for example in the area of sustainability). Textile service companies can advise staff as well, with regards to usage of textiles (e.g. concerning hygiene and safety, but also with regards to garment choices and styling). It is important for all personal advice, that it fits with the company's image.

Because of this development, the role and tasks of the textile service company changes. Due to these changes, cooperation within the chain is becoming more important.

3.3 Hospitality & Recreation

In the next 20 years, the demand for recreation will change in nature and size. This will cause an increase of the number of elderly, foreigners, ever expanding individualisation and an even more dynamic lifestyle of younger consumers than existent in 2011. This means that in 2030 almost a quarter of the population is over the age of 65 and the demand for recreation is rising. An important part of this group (the so called 'baby boomers') is affluent and thus responsible for the increase in demand of luxury and comfort. Mixed formulas and sector desegregation will increase further. Hospitality venues are combined with other venues/services. A library with hospitality facilities (restaurant/pub), a gym with a restaurant... these are formulas that no one will consider extraordinary in 2030.

In addition a quarter of the country's population will be of foreign descent and the number of foreign visitors will increase by 30%, instigating an increase in the demand for cultural specific hospitality and recreational venues. Also the increased individualisation is leading towards an increase in the diversity of personal wishes.

Personal preferences concerning tailor-made services, hygiene, health and comfort in combination with transparency of the offered products/services will cause the fickle consumer to be serviced. This will more and more be the client of platform services such as booking.com and Airbnb which causes an increase in price pressure. Upscaling, adding real added value or standardisation of processes at the back-end and differentiation at the front-end are scarce opportunities to emerge from under the price pressure. Efficiency in processes, automation and cooperation in the chain are essential in this.

Market demand

Now that the crisis is over (or it appears to be), positive developments are being perceived in the hospitality & recreation sector. The sector may expect a growth of 2.4% in 2017, according to a publication of the Rabobank (Rabobank, 2016). Tourism is increasing, The Dutch are working, eating and recreating outside of the home more often, especially in the big cities. A visible trend in hospitality is that of quality, hospitality and experience. The internet is responsible for transparency and companies are exerting themselves to create added value through experience. At the one hand an increase in upscaling and chain formation is perceived and at the other hand (as a

reaction), the smaller scale concepts are proving successful. Attention to sustainability is increasing; the goal is to operate energy neutral.

In line with the trends from the Rabobank, the KHN (Royal Hospitality Netherlands) presented a number of immersive, relevant trends at the NST (National symposium textile services) (2016):

- Purity; in line with the trend of 'the experience', textile service companies are focusing on a pure, authentic product, taking into account the origin of the product and the waste it produces.
- Personal; personal needs of the client are more and more taken into account, fulfilling these is worth money. The feeling guests have, is leading.
- Peer to peer; the 'DIY (do it yourself) economy', people are doing more and more themselves, supported by digital technology (e.g. Airbnb, the biggest hotel without owning any rooms, or thuisbezorgd.nl, the biggest restaurant without their own kitchen).
- Comfort & hyperactive lifestyle; people have less and less time available, but are always connected through smartphones and/or tablets.
- Combining and cooperating; the fading of traditional moments in the time perception of guests. Living, working, shopping, traveling and hospitality are more often combined nowadays.
- Health & balance, guests are becoming more aware of their health, certain lifestyle concepts are being adhered to and people are looking to relax & decompress.

In the Roadmap 2030, the choice was made to define the market demand in hospitality with 2 business cases; The hotel room of the future in the middle and higher segments and the restaurant of the future in the high, middle and budget segments.

These two business cases describe the most important characteristics in hospitality & recreation in 2030. Below the market demand is described per market sector. The demand is supported by some characteristic examples from the business cases. These are included in the textboxes.

In the future, the hospitality- and recreation sector is facing the big challenge of providing tailor-made services, great service, and continuity and - especially in the budget sector - sharp prices. In addition to providing and cleaning textiles, companies in hospitality- and recreation more and more expect advice concerning decoration & styling of hotel rooms and restaurants, sustainability, hygiene and finance models. Costs and benefits of investments in sustainable alternatives must be made transparent and measurable. The difference between the high and lower segments is increasing, in terms of solutions and types of textile.

An important aspect of the hotel room of the future is that this is better tailored to individual needs than hotel rooms are nowadays. Textiles can play a role through the choice of material and the deployment of smart technology that works comfort enhancing. A balance must be found between cost control and efficiency, generally requiring more standardisation. Companies from the sector (mostly large hotels) want to concentrate on the key tasks of the company and want to be unburdened for tasks that do not belong to these core tasks. For these non-core tasks, companies want to be able to rely on business partners. These business partners guarantee a complete package of products and services. Clients´ individual wishes (service and comfort) play an important role, as well as quality, cost effectivity, transparency and sustainability, which are important indicators. Through advice, the textile service company can play an important role in saving costs for the customer. Within hospitality, a reasonable pressure on prices is present, causing certainty to be an important market demand.

Now that the crisis is passing by slowly, it seems that enthusiasm is returning and entrepreneurs are able to pay attention to innovation and investments. It was clear from the presentation of the KHN at the NST (Kooij, 2016) that hoteliers are increasingly prepared to pay, if textiles are able to enhance the comfort level (and thus the experience). Finally the logistic process, especially in cities, is becoming a greater

challenge. The search for synergetic solutions that should be developed through efficient cooperation in the chain is moving forward, but has a limited amount of success stories. The expectation is that the government will impose more and more guiding regulations to direct the problem or that efficient constructions are emerging through start-ups.

Hotel room of the future (middle and high segment):

Especially in the higher segment, hoteliers are facing critical guests, that have high standards for comfort, luxury (experience) and personal attention. People are prepared to pay more for this. Despite the linens being a closing entry, the hotelier (in the higher segment) is open to propositions that lead to more comfort and/or enhance the experience. Considering that the personal wishes differ per guest, the service in the hotel room should be responsive to these differences. It concerns complying with personal preferences, such as the firmness of the matrass and the pillow, colour, scent and comfort of the bedlinens and other elements within the hotel room.

Hoteliers want to be unburdened for the daily management of hotel rooms and its compliance with the guests' preferences. The cleaning of the entire hotel room, including bathroom and the changing of the bed and bath linens will be provided by one partner (this includes logistics and stock management). With this partner a clear and set price agreement is made. The hotelier sets minimum standards for the quality of services and the service provider will guarantee these standards.

Restaurant of the future (from the budget through the high segment) :

Clean and well-groomed table linens are a prerequisite and should be guaranteed. This is what guests expect to find, restaurateurs do not want to think about the daily care for and cleaning of table linens and other textiles within the restaurant, such as wall textiles, furniture fabrics, napkins and the clothing of staff. Textiles should be provided clean, ironed and if desired, pre-folded (napkins) in a timely fashion. Workwear for cooks could require extra attention due to HACCP regulations. The restaurateur will set minimum standards for the quality of the services and the service provider will guarantee these standards.

Future service model textile service companies

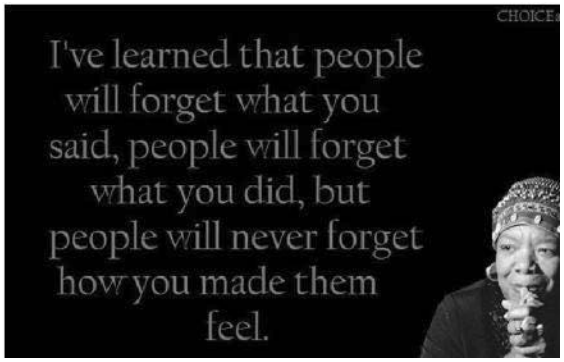
Textile service companies will have to anticipate with regards to the changing market demands. The textile service company provides all textile services for companies in the hospitality and recreation sector and its materials and services are completely tailored to the demands of the client and its customers. In the business cases this is apparent for the customer groups (and segmentation) in different ways. Hotels and restaurants in the higher segment, aim to create added value through tailor-made services for the end-user (for example comfort is regulated at an individual level), while textile care at budget hotels and restaurants is standardised, encompassing smart solutions to save costs with clients (focussing on acceptable quality against low total charges). The differences in the market between the higher and lower segments will continue to grow, textile service companies will have to incorporate this in their textile assortment.

For services in the future, this effectively means that textile service companies in the future:

1. have to offer integral services and assistance (development to facility director);
2. will have to segment their services even more (offer service packages on different pricing and quality levels for different customer segments);

3. have to verifiably contribute to efficient company management through their services;
4. have to be transparent regarding product information (amongst others about functionalities, finances and sustainability);
5. have to be verifiably and visibly sustainable in products, processes and service concepts across the chain.

For many textile service companies this means a significant expansion of their 'traditional' tasks. In certain areas, cooperation must be sought with facility partners that will function as sub-contractors of the textile service company. Or as main contractor with the textile service company in the role of sub-contractor. To take the initiative or not, this will make the difference.



The hotel room of the future (middle- and high segment): the service

To be able to incorporate personal wishes of the hotel guests into the services provided, matrasses and bedlinens are provided that are customisable to personal comfort preferences (firmness of the matrass and the support it provides), temperature, colour and scent and that are outfitted with electronic functions if necessary.

To unburden hoteliers, a 'stay-experience concept' is offered, which is a partnership between textile service companies (for textile rent and cleaning), general cleaning companies and interior designers, for the styling of especially middle class hotels, which makes the daily maintenance of hotel rooms easier. The service provider is taking responsibility for the integral maintenance of the hotel rooms, naturally in conformation with the laws and regulations concerning working conditions, sustainability and hygiene, as well as the quality levels set by the hotelier. The excellent logistics network at the disposal of most textile service companies is used in the provision of products and services, also in this area partnerships are possible.

Restaurant of the future (low through high segment): the service

In the restaurant of the future, table linens are used that are easy to cleanse, especially the most frequent stains (such as wine stains) are easy to remove. Clothing the staff wears is dirt-repellent and neutralises scents (food and body odours). The chairs are adjustable in different comfort settings and are upholstered with self-rinsing textiles. In the textile of the staffs' clothing and the table linen electronic applications are incorporated for placing orders, information on stock, time to service, allergy information and wine advice.

To unburden restaurateurs with regards to (daily) textile care, a concept is provided that in addition to textile maintenance and provision (incl. pre-folding of materials, provision of table linens, corporate wear for service staff and kitchen staff and washroom materials) also offers cleaning of the restaurant, maintenance and design. This is realised through a partnership between textile service companies (provision and cleaning of textiles), cleaning companies and if necessary interior decorators/stylists to advise on the décor of especially middle class hotels. Specifically for wall dressing and upholstery a special, on the spot cleaning service is offered.

4. Shaping the future: FTN Research Agenda 2030 Update

4.1 Updated research themes

In 2011 a research agenda was included in the Roadmap 2030, which outlines the road to the vision on the future and that should enable this vision. The research agenda is comprised of

innovation themes that are supposed to be of the utmost importance to support the development of the textile service industry leading up to 2030. Of course it is difficult to predict technological developments, and specifically the speed of the advancements. The research agenda is therefore dynamic in character and will be in constant development, regarding the operation and execution. Now, 6 years later, the research agenda has been re-evaluated and updated, with today's knowledge. Which themes were not foreseen at the time, which developments have progressed faster or slower than expected and what has been executed these past years? It appears that especially the importance and speed of developments in IT, robotics and process integration were underestimated in the first version of the research agenda. This has led to defining new themes in these areas. Below the updated and new research themes are described.

Distribution and mobility

These past years, much research has been performed on several themes. The developments of electrical transport in the past period have been actively monitored by the industry and pilot projects in electrical transport have been instigated. In the summer of 2017 the results of these projects are expected.

Textile identification

In the field of textile identification, identification systems that can register product and process properties have been developed and marketed these past years. Textile identification systems on the basis of RFID are now commercially available, causing the purpose of this research theme to be realised for the largest part. The new purpose is defined to enhance the reliability ratio of available identification technologies. If the reliability ratio of reading an RFID chip is 99%, this sounds impressive, but it still means that out of every 100 cleaning actions, on average one action does not go perfect.

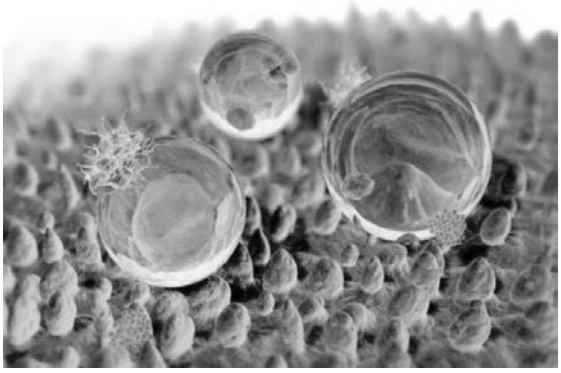
Sustainability

Companies in the industry are more and more aware of the importance of sustainability and CSR. The industry has developed a Lifecycle Analysis instrument, the FTN Ecotool, with which the sustainability of materials and products can be made apparent and reviewed. With the Ecotool the research goal to develop an LCA-instrument, has been fulfilled. However, the Ecotool must be kept up to date, regarding new developments in materials and cleaning techniques.

In addition a project has been executed that explored the possibilities for water re-usage with membrane technology. This technology is not (economically) profitable yet; further developments in this area should be monitored.

Textile and electronics

With help from electronics, material can change its properties and functions and textiles can be used in communication with other products and people. In a pilot project that is executed in cooperation with TNO-Holst, the washability of coated electronics on textiles is reviewed. The goal of this theme is to research how electronics can be made suitable for the industrial cleaning processes and vice versa. The developments within this theme are moving forward slower than expected in 2011; the first milestone will be accomplished at a later time than originally expected.



Functionalisation

Due to different materials with specific functional properties, less standardisation of cleaning processes is possible. Textile service companies can recognise materials and functions during the cleaning process and re-functionalise these materials for usage over and over again. Lately there have been major developments in this field. During the European project Wash & Load, a modular process has been developed for re-functionalising the properties of textiles as an integral part of the washing process. This process is applicable during the entire lifecycle of the product, to revive the properties each time and to be able to guarantee the quality of the product. The re-functionalisation process can be incorporated into existing cleaning processes.

Synthetic polymers

While the production of cotton has reached its maximum capacity, the worlds' population is growing. This requires alternatives. The development of new synthetic polymers and synthetic polymers with improved properties are actively followed by the industry and because of the FTN Ecotool it is possible to analyse the ecological footprint of a synthetic polymer and compare this to alternatives.

Biopolymers

A biopolymer is a polymer that is comprised of materials with a natural origin. Also the development of biopolymers is closely monitored by the industry. The FTN Ecotool, which is developed by the industry, provides insight into the sustainability of different materials, including biopolymers.

New cleaning processes

Together with EFSM, a group within the University of Twente, research has been performed in soil-release technology. Now, cleaning processes are available that use soil-release technology. Developments in this area will be monitored further.

Low temperature cleaning

During the past period, a lot has happened in the area of low temperature cleaning. In the FTN project: 'Environmentally conscious Hygienic Washing', low temperature cleaning- and bleaching processes, that are compliant with the set standards for hygiene, have been reviewed. This technology is now widely commercially available and is often applied in the industry, better yet; it is in the top 5 of the most mentioned energy saving measures for the EEP of 2017-2023! This means that this research goal has been met.

Drying processes

During the Project 'Green deal Solar collectors', the possibilities for drying with direct solar energy were reviewed. By warming thermal oils with solar power, warming the drying process was attempted. This proved impossible because of

the Dutch climate. This research goal has therefore been abandoned.

Product engineering

Due to current techniques in the area of digital textile production, it is possible to produce mass-customised textiles. Mass customisation means that it is possible to produce customised textiles per client at appealing prices (for example specific designs and functions). The industry is

aiming to collect knowledge and experience in the area of mass customised textiles and the appropriate dedicated cleaning techniques.

Process integration

Because of the updating of the FTN Roadmap 2030, new research themes have also been defined. The first of which is process integration. Internal and external processes in the cleaning process are more often adapted to one another in order to enhance efficiency. The industry aims to initiate the integration of the different cleaning processes, process monitoring and optimisation of internal and external logistics. Finally the industry will initiate research processes in the area of integration of textile identification and process monitoring and regulation.

(Big) Data

Big Data is added as a new research theme, because this subject influences all processes within the cleaning process. More and more data is available because of extensive digitisation of processes; this could be used to optimise the cleaning process and to develop new business cases. An example is the use of algorithms to be able to better estimate the occupancy rate of hotels, but the data from the process can lead to new insights and further optimisation as well. The industry will participate in developing data collection and –analysis systems as well as in pilot projects.

Laundry on Demand

Customers require textile service companies to have a flexible, service orientated attitude. By using advanced IT and logistic models, customers can receive textiles whenever they require. IT enables companies to provide customers with textiles that have received dedicated treatment and adhere to the clients specifications (functionalisation, folding

specifications). Laundry on Demand has been awarded its own research theme because it is such a substantial development. Due to the changes in approaching a theme, new ways of providing services and new revenue models arise, aimed at direct access to a service (such as clean textiles) instead of ownership of a product (such as a washing machine).

Robotics

Robotics is the fourth industrial revolution, after mechanisation, mass production and automation. The developments are moving faster than expected and deserve a distinct place on the research agenda. Robotics are able to (partly) replace the largest expense of the cleaning process, manpower, and also can improve the process by increasing the efficiency.

4.2 Agenda per theme

Innovation themes, which are supposed to be the most important for the development of the textile cleaning industry in 2030, are discussed in this paragraph. Per theme the following will be elaborated on: the final vision on the theme in 2030, as well as the relevance of each theme to the textile service industry, the research goal, the agenda and time schedule for the upcoming years, the actions already taken, the updates that will be made, which role the industry and its stakeholders are fulfilling in the execution and

which developmental milestones lie in the future. In addition the choice has been made for Dutch stakeholders, but international cooperations with partners of equal competence is inevitable. Of course we will monitor national and international developments. When necessary, FTN will act and inform. The research agenda is dynamic in character and will in effect be in constant state of progression.

Distribution and mobility

Final vision in 2030

In 2030 the transportation intensity and the circumvention of logistic processes will have increased further, especially in cultivated areas with much activity. Civilians and companies are choosing strategic locations for better accessibility. Smart-mobility, truck platooning and cross chain control centres are developments in logistics that will have to be monitored. In addition alternative fuels require attention, the transportation in city centres will be emission free in 2030.

Relevance for textile services

Textile service companies provide their products and services on the doorstep and inside buildings. To increase accessibility, flexible (combinations of) transportation methods, advanced planning systems, flexible supply times and cooperation with other logistic partners are being adopted.

Update research goals

The industry has followed the developments in electrical transport, packaging, goods delivery systems and transport and storage systems this past time. Also pilot projects have been executed in the area of electrical transport.

Research goals

1 The development of knowledge and experience with regards to internal and external logistic processes and transport to be able to adhere to the required standards of service, within the framework of IT-developments, market developments and accessibility problems.

Agenda

1a in the period of 2012 until 2017, the industry, in cooperation with the logistics sector, government and knowledge institutes, are initiating research in logistic co-operations within the textile service sector and developments regarding the integration of chains (Cross Chain) are being followed.

1b between 2012 and 2017 the industry follows developments in electrical agents and between 2018 and 2030 the industry will participate in the development of applications for it.

Developmental milestones

- In 2023 the amount of energy per kilogram cleaned textiles will have decreased by 20% relative to 2011
- In 2025 textile service companies will produce 50% less CO2-emmissions relative to 2011.

Textile identification

Final vision in 2030

In 2030 a large number of textile products will be equipped with identification that can contain product- and process characteristics.

Relevance for textile services

With the assistance of identification, relevant product information can be accessed and recorded. This information is useful for textile service companies with optimising the cleaning process, logistics and the improvement of service provision.

Update research goals

In line with textile identification, identification systems have been developed that can register product and process characteristics. Pilot projects have been started and concluded successfully by the industry. Textile identification systems on the basis of RFID are now commercially available. The new goal is to improve the dependability of the available identification-technology.

Research goals

2 Optimise the reliability ratio of the developed textile identification systems.

Agenda

2a between 2017 and 2023 the sector will, in cooperation with suppliers of identification technologies, take initiative to optimise the reliability ratio of identification techniques for cleansable textiles.

Developmental milestones

- In 2016 it is technically and economically responsible to equip textile products with cleansable identification that can retain product- and process characteristics.
- In 2025, 100% of all textiles which are cleaned by textile service companies will have this possibility.

Sustainability

Final vision in 2030

In 2030 sustainability and CSR are commonplace and will be a part of all decisions made by entrepreneurs.

Relevance for textile services

Due to their position in the chain, their customer and end-user knowledge, the knowledge of textiles and cleaning and their excellent logistic network, textile service companies are capable of contributing to the sustainability of their customers.

Update research goals

A part of the sustainability theme is creating insight in the sustainability of textile materials, during the entire lifecycle, including cleaning. The industry has developed the Ecotool, as an LCA-instrument, with which the sustainability can be made visible and assessed. The Ecotool will have to be kept up to date with new developments and materials. With the development of the LCA-tool, this research goal is fulfilled. In addition a project was executed that researched the possibilities for recycling water using membrane technology. This technology is not yet economically profitable and further developments in this area will have to be watched.

Research goals

3. Stimulating the initiatives and developments for the recycling of textiles, water and surfactants.
4. Research new possibilities for heat usage and the application of alternative and green energy in the industry.

Agenda

3a In the period between 2017 and 2023, the industry, in cooperation with academies and companies in recycling and logistics, will participate in research of systems to better use the residue of textiles. The industry will initiate a project, in cooperation with companies in recycling and logistics, to enhance the logistical process around textile recycling and will test this at a small scale in real life at textile service companies.

3b In the period between 2017 and 2023 the industry follows research into the possibilities of recycling water and energy, for example by filtration systems and membrane technology. 3c In the period between 2017 and 2030 the industry will follow the developments around recycling surfactants through separation techniques and colloid chemistry.

4a Until 2023 the industry participates in researching the possibilities to utilise the residual heat of other companies and utilising its own residual heat for other applications and the purchase of alternative and green energy.

Developmental milestones

- In 2016, the Ecotool (LCA-instrument) enables determining whether or not the textiles and the cleaning of an individual textile product are sustainable.
- In 2023 a substantial part of the textiles are re-used in new textiles.

Intelligent textiles

Final vision in 2030

In 2030 a textile is available that is able to change properties on its own, when a (physical or chemical) change is noticed in its surroundings.

Relevance for textile services

In 2030 textile service companies are able to treat the textiles in a manner which guarantees that the textile is able to detect changes in its environment and to change properties. This enables the industry to provide important (social) added value.

Research goals

5. The development of new techniques for textile service companies, that enables them to clean textiles that are outfitted with electronics and sensors.
6. Developing (bio)sensors that are capable of identifying the level of bacterial contamination on textiles.

Agenda

5a In the period between 2018 and 2023, the industry will, in cooperation with knowledge institutes, participate in projects in the area of cleansable electronics and sensors.

6a In the period between 2018 and 2023 the industry will take the initiative to cooperate with universities, colleges, knowledge institutes, chemical suppliers, textile producers and machinery suppliers in developing indications for the recognition of process- and product properties (cleanliness, functionalities, recognition of dirt).

6b Between 2017 and 2023 the industry will participate in the development of biosensors and the industry will initiate a project, in cooperation with knowledge institutes and universities, which will connect (bio)sensors and the cleaning needs of textiles. This will be tested in some model projects.

Developmental milestones

- In 2023 indicators are, or will be developed for process or product properties (cleanliness, functionality).
- In 2023 treatment processes are developed for cleaning textiles outfitted with electronics and sensors.

Textiles and electronics

Final vision in 2030

In 2030 there will be textile products in which textiles and electronics can be integrated, for example textiles made of cleansable, conductive fibres.

Relevance for textile services

With the assistance of electronics, materials can change properties and functions and textiles can be used to communicate with other products and people. Textile services can re-functionalise these materials in a professional way.

Update research goals

In 2016-2017 a research project to test the washabilty of coated electronics in textiles, is being conducted in cooperation with TNO-Holst. The developments are progressing at a lesser speed than expected, the first milestone will be realised later than foreseen.

Research goals

7. Developing knowledge and experience in the area of coating textile fibres with conducting materials and conductive polymers and the cleanability of these materials.

Agenda

7a In the period between 2017 and 2023 the industry aims to take the initiative in the development of dedicated cleaning processes, in cooperation with universities, colleges, chemical suppliers and appliances producers.

7b Between 2017 and 2023 the industry, in cooperation with international textile research groups, universities, colleges and industrial enterprises, aims to participate in research into the coating of textile products with conductive materials and polymers.

7c In the period between 2018 and 2023 the industry aims to participate in a number of pilot projects for cleaning coated textile fibres.

Developmental milestones

- In 2020 there are examples of dedicated cleaning processes for textiles outfitted with conducting materials of polymers.
- In 2023 there are operational examples of cleaning and adaptation processes for textiles with integrated electronics.
- In 2030 approximately 5% of the total amount of textiles (in weight) that are outfitted with electronics, is cleansable.

Functionalisation

Final vision in 2030
In 2030 there is a large diversity of textile products with (a combination of) specific functional properties.

Relevance for textile services
Because of differing materials with specific functional properties, there isn't as much standardisation of the cleaning processes. Textile service companies are able to recognise these materials during the cleaning processes and re-functionalise the materials for usage repeatedly.

Update research goals
In the European project Wash & Load a new modular process is developed for re-functionalising (reloading) the functional properties of textiles. This process is applicable during the entire lifecycle of the product, to keep the functionalities of the textiles up-to-date during the entire lifecycle. Matching quality procedures have been developed as well. This development, amongst others has been responsible for the fact that some steps in the research theme functionalising have already been taken.

Research goals
8. The development of a multifunctional re-functionalisation process which is built-up from different modules that can be integrated in the general cleaning process.
9. The development of functional textiles, focussing on cleansability.

Agenda
8a In the period between 2017 and 2023, the industry will monitor developments of reloadable and colour changing systems.
8b Between 2018 and 2023 the industry, in cooperation with universities, colleges and chemical suppliers, aims to instigate research into the development of additional functionalities of textiles that can be re-functionalised and aims to test these textiles in pilot projects.
8c During 2023-2030 the industry wants to participate in the development of reset methods for indicators during cleaning of finishing, in cooperation with: universities, colleges, knowledge- and research institutes and chemical-, textile and machinery suppliers.

9a Between 2017 and 2023 the industry will participate in the development of functionalities in cleansable textiles, focussing on cleanability.

Developmental milestones
- In 2016 the usage of antimicrobial and reloadable textiles is realised.
- In 2023 there will be modular, multifunctional, re-functionalisation systems.
- In 2023 pilot projects will have been executed for re-functionalisation of the yet to be developed additional functionalities.

Controlled release

Final vision in 2030
In 2030 techniques that enable the controlled release of substances like scent or grooming products, are being frequently used.

Relevance for textile services
The cleaning process of textiles with incorporated 'controlled release' techniques will at one hand have to be suited for these techniques and not damage them. At the other hand the treatment should be aimed at reloading the textiles with the required substances.

Research goals
10. Developing knowledge and experience in the area of the development of reloadable, controlled and/or slow release systems in textile like materials.

Agenda
10a In the period of 2017-2023 the industry monitors the development of controlled/slow release systems for textiles in cooperation with universities and chemical suppliers.
10b Between 2017 and 2023 the industry initiates the development of reloading processes for textiles outfitted with slow/controlled release systems in cooperation with universities and chemical suppliers.
10c During the period of 2018-2030 the industry participates in the development of controlled release systems for grooming products, in cooperation with universities and chemical suppliers.

Developmental milestones

- In 2023 examples of controlled/slow release systems in textiles are available.
- In 2030 examples of reloading processes for textiles with incorporated controlled/slow release systems are available.

Synthetic polymers

Final vision in 2030

In 2030 there is a larger variation in fibre types. There are synthetic polymers that are equal to natural polymers, in comfort and experience.

Relevance for textile services

Textile service companies in 2030 are making an important contribution to the sustainability of their customers (in the chain). Synthetic polymers with the positive attributes of natural polymers can contribute substantially to this.

Update research goals

Due to developments of the Ecotool, it is possible to analyse the ecological footprint of synthetic polymers and to compare it with alternatives. The footprint is based on the entire lifecycle of the product.

Research goals

11. The development of knowledge in the application and cleaning of modified synthetic polymers with a high user comfort.

Agenda

11a In the period between 2017 and 2030 the industry follows the material developments regarding synthetic polymers.

11b From 2012 until 2023 the industry participates in projects that are aimed at the cleaning of synthetic polymers, this in cooperation with universities, colleges, the textile industry and textile suppliers.

Developmental milestones

- In 2030 50% of all textile products is comprised of cleansable (if necessary modified) synthetic polymers.

Biopolymers

Final vision in 2030

In 2030 there is more variation in fibre types. Amongst others, fibres made of biopolymers are available, on the basis of plant based materials.

Relevance for textile services

Textile service companies in 2030 are making an important contribution to the sustainability of their customers (in the chain). Renewable biopolymers can contribute substantially to this.

Update research goals

The Ecotool, developed by the industry, provides insight into the sustainability of different materials, including biopolymers. With the

Ecotool an analysis is made of the ecological footprint during the entire lifecycle of the product.

Research goals

12. The development of knowledge in the application of industrial cleansable biopolymers with a high comfort level in textiles.

Agenda

12a In the period between 2017 and 2030 the industry will monitor the developments in material around synthetic polymers.

12b In the period of 2017 up to 2023 the industry will participate, in cooperation with universities, colleges, the textile industry and textile and fibre suppliers, in projects that are aimed at cleaning biopolymers.

Developmental milestones

- In 2023 and 2030, respectively 10% and 80% of textile service companies is able to clean textiles made of biopolymers.

Customised cleaning techniques

Final vision in 2030

In 2030 textile products with many different and partly unique functionalities will be available.

Relevance for textile services

Substantial diversity in functionalities requires many different cleaning techniques. Textile service companies are expected to be able to offer diverse cleaning techniques, as well as an effective internal logistics system.

Research goals

13. The development of new cleaning and finishing techniques to clean new materials and products.
14. The development of knowledge and experience in the industry with regards to (internal) distribution and logistics systems to enable dedicated cleaning. Textile identification is a prerequisite.

Agenda

13a In the period between 2018 and 2030 the industry takes the initiative in research to new cleaning and finishing techniques, in cooperation with chemical and machinery suppliers and knowledge institutes.

14a During the period of 2017 and 2030 the industry participates in research into (internal) distribution and logistical systems, in cooperation with knowledge institutes, suppliers of internal logistic systems and developers of identification technology.

Developmental milestones

- Between 2018 and 2030 new cleaning and finishing techniques will be developed, that reflect developments in new materials and products.
- Coinciding with the development of textile identification systems, research into the possibilities of distribution- and logistical systems on that basis, will take place.

New cleaning processes

Final vision in 2030

In 2030 fibres are used that can change properties, according to the influence of their surroundings (temperature, moisture etc.).

Relevance for textile services

Textiles with fibre techniques that react to circumstances in their surroundings will have to be able to be reset during a cleaning or finishing process.

Update research goals

Together with the EFSM group of the University of Twente research has been conducted into soil-release technology. Nowadays there are processes available that use this technology. The

developments in this area will be monitored further.

Research goals

15. The development of textiles with soil-release polymers and a technique for shape- and creasing recovery of textiles as a result of the cleaning and finishing process.
16. The development of a new laundry technology, a new concept for cleaning flatwork (washing during the flatwork ironing process).

Agenda

15a Between 2018 and 2030 the industry will follow the application of soil release polymers in cooperation with universities, colleges and chemical suppliers.

15b In the period between 2017-2030 the industry will participate in developing a technique for shape- and creasing recovery of textiles as a result of the cleaning and finishing process in cooperation with textile-, fibre- and chemical suppliers.

16a In the period of 2024-2030 the industry participates in the development of the new laundry technology, in cooperation with universities, machine- and chemical suppliers.

Developmental milestones

- In the period of 2018-2030 there are operational examples of the application of soil-release systems and techniques for shape- and creasing recovery of textiles.
- In 2030 there is a design for the new laundry technology.

Low temperature cleaning

Final vision in 2030

In 2030, low-temperature cleaning and bleaching processes are being used almost exclusively.

Relevance for textile services

Low-temperature cleaning of textiles is accompanied by energy savings. In order to clean textile like materials and realise optimal hygienics as well as a product that is clean to the eye, new techniques are required.

Update research goals

The industry has, in the previous period, participated in the development of low-temperature cleaning- and bleaching processes, that meet the set requirements for hygiene. During the FTN project: 'Environmentally Responsible Hygienic Laundry', these processes have been evaluated and the knowledge has been made available to the industry. These low-temperature processes are available and are being used in the industry.

Research goals

17. The development of a sensor system that will enable hygienic cleaning possible at low temperature cleaning.

Agenda

17a In the period between 2017 and 2023 the industry will take the initiative, in cooperation with universities, knowledge institutes, the electronics industry and chemical suppliers, to develop a sensor system in the cleaning machine to be able to verify hygienic cleaning.

Developmental milestones

- In 2016 low-temperature cleaning and bleaching processes, as well as industrial enzymatic washing processes have been implemented.
- In 2020 there will be a sensor system available for machines to verify hygienic cleaning.

Drying processes

Final vision in 2030

In 2030 there are more effective and efficient ways of drying available. Also in 2030 checks during the washing process will take place to determine whether the textiles meet the quality standards for cleaning, using electronics and cameras.

Relevance for textile services

By checking the quality in an earlier stage of the cleaning process (i.e. with sensors or camera's) the process can be optimised per textile

product. In combination with the development of new (crease free) textile types, energy and costs can be cut.

Update research goals
During the project Greendeal Solar collectors, it was determined that because of the Dutch climate it is not profitable to dry on solar energy. Therefore this goal was cancelled.

Research goals
18. The development of new drying processes, with regards to new (ironing free) textile materials, that are able to dry the cleaned textiles more efficiently and effectively.
19. Development of cameras and monitoring systems, to enable moisture determination, stain recognition and automatic sorting to realise more efficient processes.

Agenda
18a In the period of 2018-2030 the industry will take the initiative, in cooperation with universities, colleges, knowledge institutes, textile producers, fibre suppliers and the textile industry, to develop ironing free flatwork and will participate in the development of new drying systems for new ironing free materials.
19a In the period between 2017 and 2023 the industry will participate, in cooperation with universities, colleges, knowledge institutes and machinery suppliers, in projects to develop camera and monitoring systems for the detection of stains, measuring moist and the automatic sorting of textile products.

Developmental milestones
- In 2023 there are camera and monitoring systems to detect stains, measure moist and the automated sorting of textile products.
- In 2030 there is ironing free flatwork and specific drying processes have been developed for it.

Finishing processes

Final vision in 2030
In 2030 many textiles are equipped with different functionalities, such as adaptable colour, scent and shape.

Relevance for textile services
Textiles outfitted with different functionalities will have to be re-functionalised at set times. Textile service companies can take on the re-functionalising of textiles and incorporate it into the finishing process.

Research goals
20. The development of knowledge and experience in (new) techniques for re-functionalisation during finishing (drying and finalising).

Agenda
20a In the period of 2018-2030 the industry participates in research into techniques for re-application of functionalities during the finishing process, in cooperation with textile service companies, universities, colleges, knowledge institutes, chemical suppliers, textile producers, fibre suppliers, machinery builders and the textile industry.

Developmental milestones
- In 2030 there are examples of techniques for re-application of functionalities during finishing (drying and finalising).

Product engineering

Final vision in 2030
The developments around 3D products will continue, for example the already available 3D printer. It is expected that 3D shaping techniques in textiles, will develop further.

Relevance for textile services
If developments in 3D shaping techniques develop further, the textile service industry will have to respond by developing dedicated cleaning processes.

Update research goals
In addition to this research theme, a new goal has been defined specifically: participating in the development of mass customised textiles with dedicated properties. The industry will build knowledge and experience in the area of mass customised textiles and the corresponding dedicated cleaning techniques.

Research goals
21. The development of knowledge and experience in the area of 3D shaping techniques and the development of the appropriate cleaning and finishing techniques.
22. The development of knowledge and experience in the area of mass customised textiles and the developments of dedicated treatment techniques.

Agenda
21a In the period between 2017 and 2030 the industry will follow developments around 3D shaping techniques in cooperation with knowledge institutes and the textile service industry.
21b In the period between 2017 and 2030 the industry expects to participate in the development of dedicated cleaning technology for 3D textile products, in cooperation with knowledge institutes and chemicals, textiles and machine suppliers.
22a In the period between 2017 and 2030 the industry wants to participate, in cooperation with textile suppliers, machinery suppliers and research groups, in the development of customised textiles with dedicated properties.

Developmental milestones
- In 2030, 3D textiles will be used, for which cleaning techniques will have been developed by the industry.

Shape memory

Final vision in 2030
In 2030 a part of the textile products will be equipped with properties that can program the shape of the textiles (shape memory in 3D).

Relevance for textile services
To clean such products and retain the memory properties for the shape, suitable treatment techniques will have to be developed.

Research goals
23. The development of knowledge in the area of shape memory textiles and, if this technique appears to promising, the development of suitable cleaning techniques.

Agenda
23a In the period of 2023-2030, the industry will follow developments in the area of shape memory textiles, while monitoring, associations like universities, research institutes and material suppliers will possibly play an important role.

Developmental milestones
- If the technique has been developed in the period of 2023-2030, the industry will define follow up steps to develop suitable cleaning techniques.

Process integration

Final vision in 2030
In 2030 all processes in laundries have been adapted to one another. Not just the elements of the cleaning process are in tune, but the textile identification and process monitoring systems have been fully integrated as well.

Relevance for textile services
Because of processes being more and more in tune, a very efficient cleaning process is in place. This is added value for the industry.

Update research goals
This new research theme is added to the research agenda because developments in the area of integration of cleaning processes,

internal processes and logistic processes are moving faster than expected. The industry wants to initiate the integration of different cleaning processes, process monitoring and optimisation of internal logistics. In addition the industry will participate in the integration of the cleaning processes as well as logistics. Finally the industry will initiate the integration of textile identification and process monitoring and control.

Research goals

24. The initiation of developments to enable and promote the integration of several components of the internal process (like: cleaning, drying, finishing and quality control).
25. Participation in the integration of internal and logistic processes.

Agenda

24a. In the period of 2017 to 2030 the industry will initiate integration of components in the cleaning process, process monitoring and the optimisation of internal logistics. This will be done in cooperation with chemicals and machinery suppliers and knowledge institutes. To achieve this pilot projects will be initiated.

25a. In the period of 2017-2023 the industry will initiate research into the integration of textile identification, process monitoring and control. This will be done in cooperation with chemicals and machinery suppliers and knowledge institutes.

25b. In the period of 2017-2030 the industry will participate in the integration of internal and logistic processes, during which associations such as chemicals and machinery suppliers as well as knowledge institutes will probably play an important role.

(Big) Data

Final vision in 2030

Cleaning processes are fully integrated in 2030. Textile will be identified with identification technology and subsequently cleaned in the most appropriate and efficient way. Hotel reservations, weather forecasts and other relevant data will be considered in the calculation of the amount of incoming laundry and will be automatically processed in a data driven process.

Relevance for textile services

The amount of data that is available will have to be converted to applicable knowledge for the industry. Due to previous, processes could be arranged and applied more efficiently.

Update research goals

(Big) Data is a new research theme and added because this subject influences all components in the cleaning process. By using the available data the process can be optimised and new business cases can be developed.

Research goals

26. To integrate the use of electronics, sensors and textile identification technology to collect data.
27. To assimilate big data and additional information to added value for the customer.

Agenda

26a. In the period between 2017 and 2030 the industry will participate in research into the integration of sensors, textile identification and other electronic components in textiles, to collect usable data, in cooperation with universities, research institutes and textile material suppliers.

27a. The industry participates in the development of data collection and processing systems in order to develop new service concepts for customers, in cooperation with universities, research institutes and textile material suppliers in the period of 2017-2030.

27b. The industry initiates pilot projects in the period of 2017-2023, with universities, research institutes and textile material suppliers

Laundry on Demand

Final vision in 2030

Customers ask a flexible, service oriented treatment of textile service companies. By using advanced IT and logistic models, customers can receive textiles where and when they require. In addition IT enables that textiles will be treated and provided according to customer specific requirements (functionalisation, manner of folding). Laundry-on-demand opens new markets, like domestic care and private persons.

Relevance for textile services

Customer requirements are centralised through Laundry-on-demand, better service can be provided to the end-user. Laundry-on-demand will, in that context, open markets that couldn't be (efficiently) served previously.

Update research goals

Laundry on Demand has its own research theme in the agenda because it is an apparent development. Due to changes in the approach, new ways of service provision and profit models, aimed at direct access to a functionality (like clean textiles), instead of owning a product (like a washing machine).

Research goals

28. Initiation of development of Laundry-on-demand systems to develop customer oriented service models.

Agenda

28a. In the period of 2017-2023 the industry will initiate the development of laundry-on-demand systems in cooperation with application designers and laundries.

Robotics

Final vision in 2030

The revolution of robotics has made the cleaning process more efficient by further automation and process optimisation.

Relevance for textile services

Robots can replace manpower in the textile cleaning process by taking over actions. The insertion of laundry, sorting materials and the hanging of laundry can be done by machines. But robots can also enhance the process by for example an increase in efficiency.

Update research goals

Robotics is the fourth industrial revolution, after mechanisation, mass production and automation. The development is going faster than expected and has earned its own place on the research agenda.

Research goals

29. Participation in the development of action-replacing robotics and setting up pilot projects to inform the industry.
30. Participation in the development of process-enhancing robotics and setting up pilot projects to inform the industry.

Agenda

29a. In the period of 2017-2023 the industry will monitor the developments in action-replacing robotics, in cooperation with machinery suppliers and knowledge institutes.

30a. In the period between 2017 and 2023 the industry will monitor developments in process-enhancing robotics, in cooperation with machinery suppliers and knowledge institutes.

30b. The industry will initiate pilot projects in the period of 2017-2023, for process-enhancing and action-replacing robotics in cooperation with machinery suppliers and knowledge institutes.

Federatie Textielbeheer Nederland

Resource list

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Federatie Textielbeheer Nederland

Enclosure 1: participation list “Future perspectives Textile Services The Nederlands”

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