Sincere support

The rise of the e-coach

Linda Kool, Jelte Timmer and Rinie van Est (ed.)

Rathenau Instituut

The Rathenau Instituut promotes the formation of political and public opinion on science and technology. To this end, the institute studies the organization and development of science systems, publishes about social impact of new technologies, and organizes debates on issues and dilemmas in science and technology.

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Foreword

When I recently got a new smartphone, I was surprised to find out after a few weeks that it had been tracking my activity. My new phone came with a pre-installed app. Apparently activity tracking has become so popular that companies pre-install such features. This books shows that indeed an increasing number of people use their phone to attain personal goals, such as weight loss or personal finance. Such coaching devices analyse data regarding our behaviour, communication and physical activity and learn new insights about us – sometimes in ways we don't know or don't notice.

With this book, the Rathenau Instituut reflects on the social and political significant of e-coaching, as part of our studies on intimate technology, as it is our task to foster dialogue and support decision-making on developments in science and technology. Can e-coach devices provide effective and reliable support for behavioural change? Can we compare e-coaches with human coaches? What standards do e-coaches need to meet?

We asked experts to contribute to this book. Sander Voerman, Harro Maas, Niels Compen, Jaap Ham, Andreas Spahn, Joris Janssen, Mark Neerincx, Marc van Lieshout, Noortje Wiezer, Elsbeth de Korte researched five case studies. Via literature study and interviews with experts and users they shed light on the new world of e-coaching. The results were discussed with our advisory committee. I would like to express our gratitude and appreciation to its members: Elly Plooij-van Gorsel (Dutch Association of Psychologists), Reinder Haakma (Philips), Leon Kenemans (National Initiative Brain & Cognition), Wouter Segeth (Technology Foundation STW) and Emile Aarts (Eindhoven University of Technology). Finally, science writer Gaston Dorren added scenarios to show future technological possibilities.

The results show that e-coaches can be very valuable to help individuals, but they also bring new challenges and dilemmas. Interestingly, we learned that existing codes for responsible human coaching can be an important guide in our interactions with e-coaches: expertise, respect for privacy and autonomy, integrity and responsibility. The Rathenau Instituut therefore advocates the introduction of criteria to ensure the quality of advice from e-coaching. I hope this book inspires the discussion about the development of responsible e-coaches. To me, that means no unobtrusive monitoring in the background: I asked the electronic store to help me switch off the activity tracker on my smartphone.

Dr. ir. Melanie Peters
Director, Rathenau Instituut

Content


Coaches everywhere

1 Coaches everywhere[1]

Jelte Timmer, Linda Kool, Rinie van Est

1.1 Technology as a helping hand

Modern life is demanding and complex. Keeping track of your finances can be difficult in a world of digitised money. Making healthy diet choices is also a challenge, given all the temptations that we face on a day-to-day basis. And showering for one minute less may be a sustainable choice, that doesn't make it an easy one. It's therefore not surprising that we sometimes need a bit of help. That help can come from a friend or from a professional coach, but it's increasingly being provided by technology.

At Microsoft's Faculty Summit in July 2013, Bill Gates argued that smart technology can help us tackle many of these problems: 'Software assistants could help solve global problems' (Simonite, 16 July 2013). The way behaviour can increasingly be tracked digitally makes it possible to analyse it with computers, which can then help us understand that behaviour and improve it. Beyond Verbal, an Israeli start-up, is working on software that identifies emotions by means of speech analysis. This may help men finally understand what their girlfriends are actually saying. 'It's time to understand emotions' – and Beyond Verbal can help.[2]

'Intelligent software assistants' sounds too abstract, so we usually just refer to 'apps'. The number of apps and devices on the market to help people change their behaviour is increasing enormously (Research2Guidance 2013). In the area of health and healthy living, there is now a flourishing market for wristbands, scales, and apps for computers and smartphones. The widespread adoption of smartphones (Conti et al. 2011), the falling cost of sensor technology, and the increasing sophistication of data analysis have facilitated the advent of a new kind of coach: the e-coach.

The use of e-coaches seems extremely promising. They can help us to lead a healthier and more environmentally aware life, to relax more, and to understand other people better. But the advent of the e-coach also raises questions. Can apps and devices provide effective and reliable support for changing our behaviour, and are they a possible solution to problems such as unhealthy lifestyles or wasting energy? If coaching is offered in digital form, what does that mean for access to coaching and how it is used? How does one deal with the data that is collected digitally? Who profits from that data? What standards

1 This section is based on Kool, Timmer & Van Est 2013
2 http://www.beyondverbal.com/

do e-coaches need to meet – are they the same as those for human coaches? How far can we permit technology to go in influencing and changing our behaviour and lifestyle? And finally, what do all these issues mean for regulation and policy in the area of electronic behavioural support?

The Rathenau Instituut's aim with this book is to clarify how e-coaching is developing, and to instigate public debate on the social and ethical issues involved. E-coaching is a relatively new technological development within a much older tradition of coaching and support. We discuss the rise of the e-coach within five domains: health, finances, sustainability, social behaviour, and work stress. In each chapter, the key question is: What new digital coaching practices are evolving, what changes and what social, political and governance issues do they entail, and what are the conditions that we should impose for these new practices? The purpose of this study is to make recommendations on the best way of dealing with the various questions and issues related to e-coaching so as to ensure that it is used in a socially responsible manner.

In section 2 of this chapter, we will define just what an e-coach actually is, and what technological advances play a role. Section 3 discusses trends in the actual practice of coaching. After all, when attempting to understand the development of e-coaches we need to consider not just the technology but also the social context within which that technology is developing. Section 4 outlines the approach taken in this book and provides a reader's guide to the whole volume.

1.2 What is an e-coach?

Digital coaches come in all shapes and sizes. It is difficult, for example, to keep up with the number of apps for tracking and improving one's health. In March 2013, there were estimated to be 97,000 different apps on the market meant to support healthy lifestyle choices (Research2Guidance 2013). Wristbands produced by such companies as Fitbit, Jawbone, or Nike+ have become popular with people who want to get more exercise. These track physical activity and sleep patterns, and they can be linked to a set of smart scales that are connected to the Internet and that calculate weight and body fat percentage. These devices can help people in their struggle against a sedentary lifestyle. The e-coach uses social game mechanics, scores, statistics, and right-on-time tips and suggestions – on your scales, wristband, or app – to encourage you to be more active.

But it is not just in the field of health that coaching apps are available. A number of banks offer an online housekeeping book to support financially healthy behaviour, and companies such as You Need a Budget and AFAS Personal deliver apps promising analysis, advice, and greater control of finances. Smart energy meters such as the Wattson are intended to help us reduce our energy consumption. In the field of social relationships and

interaction, the Time Out! app aims to prevent domestic conflicts from escalating. The wristband produced by the Italian company Empatica can relate stress to workplace activity, analysing which activities lead to stress and whether certain work rhythm patterns are unhealthy. Users then receive tips for tackling stress so that they can work more healthily and more productively.

1.2.1 Background to the e-coach

Although new technologies in the shape of smartphones, sensors, and smart apps are playing a major role in the rise of the e-coach, people's interest in tracking their behaviour has not just come out of the blue. Measuring, quantifying, and analysing our own behaviour and that of others is part of a long scientific tradition. Down through the centuries, researchers have conducted experiments in an attempt to understand their own behaviour and that of other people. In the sixteenth century, the Italian physician Santorio Santorio ('Sanctorius of Padua') kept track of his weight for thirty years, weighing himself before and after every meal. He also weighed his food and his faeces in an attempt to discover why they differed in weight. Early researchers such as Friedrich Sertürner, the German pharmacist who discovered morphine, also carried out experiments on themselves to determine the effects of certain substances (Neuringer 1981). The Victorian statistician and founder of eugenics, Francis Galton, made use of a little device that he called his 'pocket registrator', which allowed him to record anthropological statistics among crowds of people without calling attention to himself (Galton 1880).

Early in the twentieth century, scientific measurement and monitoring found their way into the workplace when Frederick William Taylor introduced 'scientific management'. In the spirit of a remark by the eminent physicist Lord Kelvin – 'If you cannot measure it, you cannot improve it' – work processes were quantified and analysed, with the data generated being used to see how they could be made more efficient. Taylor's scientific approach to management replaced the existing rules of thumb and intuitive knowledge by empirical methods. Precise measurements became the basis for decisions on how the work process should be designed. Although the way Taylor applied the concept of scientific management has been discredited, the underlying ideas are still very much apparent in modern management and elsewhere (Lepore 2009).

The legacy of these early attempts to measure, monitor and improve can currently be found in the 'Quantified Self' movement. Central to that movement is the aim of understanding ourselves better by using a wide range of measuring instruments, under the motto 'self-knowledge through numbers'. Since Galton introduced his pocket registrator, the technology has really taken off, fuelled in the first place by sensors that allow us to digitise and quantify behaviour and in the second place by powerful computers with which we can

analyse the data generated. In 2010, the technology journalist Gary Wolf – one of the driving forces behind the Quantified Self movement – explained the interest in self-quantifying and self-tracking on the basis of four trends:

1. Sensors are getting smaller and more powerful all the time;
2. Their integration into smartphones means that they have become ubiquitous;
3. Social media have made sharing personal information something that is broadly accepted and acceptable;
4. Cloud computing makes it possible to combine data on external servers and to analyse it (Wolf 2010).

According to Wolf, one of the great advantages of quantifying is that 'Numbering things allows tests, comparisons, experiments. Numbers make problems less resonant emotionally but more tractable intellectually.' Not only can one say that 'numbers don't lie' but the thinking behind scientific management is also clearly apparent again. Spreadsheets, software, and all kinds of gadgets make it possible to collect data ranging from emotions and social interaction to brain activity and physiological signals. Proponents of the Quantified Self use this data to analyse their own lives, discover new connections, and take better decisions. This may involve, for example, determining one's ideal personal diet, the ideal dose of coffee one needs to be most alert, or which books have produced the most positive emotions over the course of the past year.

The Quantified Self movement has generated interest in measuring and monitoring, but using some means of physical or behavioural self-surveillance is not reserved exclusively for technology freaks. The Pew Research Center has found that about seven out of ten American adults make use of some kind of self-surveillance, with a fifth of them utilising technologies such as apps (Fox & Duggan 2013). The business magazine Forbes (Clay, 1 June 2013) referred to the 2013 Consumer Electronics Show (CES 2013) as 'the Quantified Self edition' because of the emphasis on self-tracking in many of the products presented there, such as the Netatmo weather station, which measures air quality,[3] or the 'Withings Smart Body Analyzer', a set of smart scales.[4]

The increasing interest in self-tracking provides a significant social context for the rise of e-coaching. Collecting data on one's own behaviour is the first step towards analysis of that data and the provision of well-founded advice by the e-coach. Quantified Self has set itself the goal of using data collection to gain new insights into one's own behaviour; where the e-coach is concerned, the aim is to digitise the process of monitoring and analysing, with the e-coach

3 www.netatmo.com
4 http://www.withings.com/nl/smart-body-analyzer.html

applying digitised coaching strategies to encourage the user to change his behaviour. Quantifying and tracking have therefore had the coaching aspects added on. In practice, the distinction between e-coaches and Quantified Self gadgets will not always be clear. Some of the gadgets that are frequently used within the Quantified Self movement in fact contain motivational and coaching elements. The fitness trackers produced by Nike+, Jawbone, UP, and Fitbit track the user's activity but also provide personal feedback and tips to encourage him to take more exercise.

1.2.2 Technological development of the e-coach

The first generation of e-coaching apps is on the market, but there are already research projects aimed at producing the second generation of digital coaches. These will feature even better, smaller sensors that can register behaviour more precisely, more refined computerised data analysis, and more subtle ways of providing personalised feedback. In the Netherlands, 2011 saw the start of the Healthy Lifestyle Solutions partnership programme, in which Philips Research, the STW Technology Foundation, and the National Initiative Brain & Cognition (NIHC) are collaborating to promote research on the development of computer-supported lifestyle coaching applications. The aim of that programme is to create digital versions of proven coaching strategies that will coach and assist people in making long-term changes to their behaviour. Under the motto 'measure, monitor, and motivate', the parties involved are working on sensors that can track the user's behaviour, bodily functions, cognition, and emotions as unobtrusively as possible. An e-coaching device will then offer the user personalised feedback (Kool, Timmer & Van Est 2013).

The collaboration within the programme is indicative of the interaction between industry, technology research, and cognitive science in the development of e-coaches. Smart devices for quantifying and analysis are combined with knowledge of cognition, psychology, and coaching in order to encourage certain behaviour or the desired change in behaviour.[5] The e-coaches derived from this combination feature three processes:

1. Data is collected via sensors or from other digital sources;
2. This data is analysed and the coaching strategy is decided on;
3. Persuasive, motivating feedback is provided (Purpura et al. 2011).

We will take a brief look at this process of data acquisition, analysis, and persuasion (see Figure 1).

5 The evolution of e-coaching can be seen as part of a trend towards convergence between Nanotechnology, Biotechnology, Information Technology and Cognitive Science (NBIC). In the case of e-coaching, information technology converges with the cognitive and behavioural sciences (Van Est & Stemerding 2012).

Figure 1.1 Technical description of the e-coach (Kool, Timmer & Van Est 2013)

Source: Kool, Timmer & Van Est (2013)

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Data acquisition – measure

The data that the e-coach collects on the user's behaviour forms the basis for analysing that behaviour and for the advice that the e-coach then offers. The data is derived from self-reporting (for example filling in a questionnaire), monitoring by means of sensors (for example cameras, accelerometers, or the GPS receivers in most smartphones), or from other sources of data (such as social networks, calendars, or digital bank statements).

Although a lot of monitoring still involves manual input– for example diet apps that require one to enter meals manually – the aim is to automate data collection and monitoring and have them operate as unobtrusively as possible so that the user does not need to bother about them (Kool, Timmer & Van Est 2013). The use of sensor technology plays a key role in this, with an ongoing trend towards miniaturisation, minimisation of energy consumption, and continuous monitoring (Guardian Angels 2012). A smartphone such as the latest iPhone already contains no fewer than nine different sensors: an accelerometer, GPS, ambient light sensors, microphones, a proximity sensor, cameras, a compass, a gyroscope, and a fingerprint scanner. Network connectivity further increases the possibilities for using sensors (Apple 2014; Conti et al. 2011, p. 9).

Data analysis – monitor

The data produced by sensors and other data sources is generally unstructured and does not in itself help to understand the user's behaviour. In order to generate information from this raw data, it needs to be analysed.[6] Sensor input from accelerometers, for example, can be broken down into various kinds of exercise (walking, cycling, running). Data on heart rate variability and skin conductance can be combined to determine someone's stress level. Data mining techniques – combining IT and statistics – can be used to identify patterns automatically or semi-automatically (Kool, Timmer & Van Est 2013).

Data analysis can also help explain the behaviour itself, for example by clarifying someone's pattern of expenditure (YNAB 2014) or by identifying the calendar appointments associated with a high level of stress (Empatica 2014). The Active2Gether research project – part of the Healthy Lifestyle Solutions programme already referred to – incorporates data from social networks. Smart analysis of the data means that the programme can make use of the social context to encourage young people to participate in sports.[7]

Feedback – motivate

In the feedback, the motivational aspect of digital coaching comes to the fore, i.e. the way in which the e-coach suggests ways that the coachee can become more physically active and helps him achieve his intended goal. Psychological theories of behavioural change come together with computer science in what is referred to as 'persuasive technology' or 'captology', i.e. technology deliberately designed to alter the behaviour or attitudes of users (Fogg 2002). The purpose of persuasive technology is to develop systems that work on the basis of information about the user and his response to feedback in order to select precisely the right persuasive strategy for bringing about a change in behaviour (Kool, Timmer & Van Est 2013).

1.3 Coaching practice

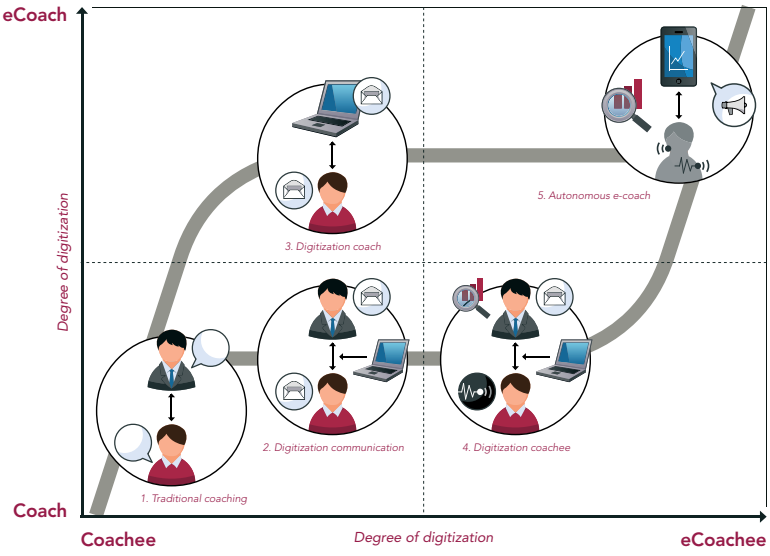
When attempting to understand the development of e-coaching, we need to consider not just the technology but also the social context within which that technology is developing. The e-coach is in fact becoming part of an existing practice of coaching, behavioural support, and self-help. The developers and providers of e-coaches, their relationship to the existing practice of coaching and support, and users' expectations all combine to create a social structure in which the technology evolves and is applied. The figure below shows how the e-coach is evolving. The coachee – i.e. the user – becomes digitised if his/her behaviour is automatically recorded by means of sensors. Coaching is also digitised if it can be provided by computers (in other words if they can analyse

6 This is based on Russel Ackoff's popular hierarchy (1989) of human knowledge, commencing with data that is analysed to produce information, which then forms the basis for knowledge and finally for wisdom.

7 http://active2gether.few.vu.nl/ ; https://www.hersenenencognitie.nl/contents/887?locale=en

user data and give him/her personalised feedback and advice based on that data). The endpoint in this development is an autonomous digitised coach. But that e-coach is not isolated from other forms of coaching; it is related to them and can complement them, or can in fact open up a new market that traditional coaches cannot serve. The role played by technology will not always be the same as that played by human coaches. The question is therefore: what changes take place within this process of digitisation, and what new practice of coaching comes into being?

Figure 1.2 Digitisation of coach and coachee (Kool, Timmer & Van Est 2013)



Source: Kool, Timmer & Van Est 2013

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1.3.1 Existing coaching practice

The existing practice of coaching is very diverse. Coaching is offered in many different forms – for example self-help books – and for a very wide range of purposes, from career coaching and fitness coaching to relationship coaching and debt relief counselling. Coaching can be used to help solve a particular problem – for example taking control of one's finances with the aid of a debt relief counsellor – or to improve certain behaviour, for example getting more exercise with the aid of a fitness coach. The methods that coaches use are also very varied, ranging from recognised, protocolised cognitive behavioural therapies to alternative therapies and methods of behaviour change. Although the title 'coach' is not a legally protected one, there are professional associations (such as the Dutch order of professional coaches NOBCO) that provide training, codes of conduct, accreditation, and seals of approval so as to monitor the quality of coaching (NOBCO 2013).

The element common to all these various kinds of coaching is that they all provide guidance in changing a particular aspect of the coachee's behaviour. This often involves several face-to-face sessions with the coach during which reflection, exercises, and advice are used to work towards the desired change in behaviour. Data on the coachee's behaviour is collected by means of self-reporting, assignments, and observation by the coach during the sessions. It is the coach who interprets the data and who determines the appropriate coaching strategy and feedback. The coach is consequently aware only to a limited extent of the coachee's behaviour outside the sessions, and feedback is provided only during the sessions.

1.3.2 Rise of e-coaching

Traditional coaching by a human coach is quite expensive and available only to a relatively limited extent. Digitisation means that coaching can be made scalable. Once developed, a digital coaching application can be replicated at virtually zero cost. As long as the user ensures that his smartphone battery doesn't run down, the app can provide continuous support without the intervention of a human coach (paid by the hour). This means that e-coaches can reduce the cost of coaching and greatly increase its availability (STW 2011). If all one needs for support is a smartphone and a coaching app, then coaching can become a mass-market product. Alexa von Tobel, CEO of the company that markets the LearnVest financial planning app, summarises this as follows: 'We are making access to unbiased financial advice as easy as getting a gym membership.'

The e-coach is also causing various fundamental shifts in the way coaching takes place, or in the approach and methods applied. The digital coach cannot match the wealth of personal interaction offered by a human coach, but it can fulfil a number of functions in a broadly accessible manner, enabling it to provide the user with support and advice. E-coaches offer a number of important new options for registering and modifying behaviour. Where the human coach has to work on the basis of observation and reports, the e-coach uses sensors to continuously monitor behaviour in the background. Responsibility for collecting data is therefore outsourced to the technology, and at the same time the e-coach can acquire real-time information about the coachee's behaviour in the context within which it occurs. The sensors can also be used to acquire data that self-reporting is unable to uncover, for example physiological data (Kool et al. 2013). The e-coach also has the necessary computing capacity to process large quantities of data and to discover connections within that data that would not be apparent to human observers. The software can search for patterns within the data and can generate projections regarding future situations. It can also discover relevant correlations with other user activities for which data is available. Finally, because it is actually worn by the user, the e-coach is ideally placed to provide support when it is most needed, for example when the user is about to break his diet resolution by going to eat at McDonald's.

The fact that coaching can be provided digitally by means of software and devices means that new parties are entering the market to provide it. As we have already seen in the section on Quantified Self gadgets, producers of consumer electronics play a role in this, not just established corporations such as Philips, Samsung, Sony, or Apple but also a large number of small new technology and software firms. Cheaper versions of sensors and tracking devices used in the medical field are now being offered on the consumer market. The development of the e-coach therefore fits in with the trend whereby the boundaries between the consumer and healthcare domains are becoming blurred (Asveld & Besters 2009). The market for coaching is changing due to the advent of e-coaches, with providers and their business models also changing as a result. The context in which an e-coach is offered can also play a role here. A third party can provide a coach because it has an interest in the outcome, for example a public authority that aims to tackle the problem of obesity, or an employer that wants its truck drivers to adopt fuel-efficient driving behaviour. The data collected using the e-coach can play a decisive role in the new business models thus created. These different interests are shaping the new coaching practices that are emerging.

1.3.3 Prospects for autonomous digital coaches

The aim in developing the e-coach is to produce an autonomous system that can take over as many tasks as possible from the human coach, and can provide personal support for a large number of people. This means that the processes of collecting and analysing data, and providing coaching feedback, are being digitised. The e-coach keeps close track of the user's situation in the relevant context. Data analysis makes it possible to identify patterns, for example that the user tends to eat unhealthily when stressed or after exercising. Based on this information, the e-coach can assist the user by offering tips and encouraging him to choose a healthier meal at just the right time. The e-coach assigns the user to a particular personal coaching category (a profile) with the most effective motivational strategies for that context.

Digitisation and self-empowerment are changing both the process and the practice of coaching. There is a shift from simply collecting data towards digital behaviour monitoring, and the coachee therefore has less control over the information collected and what is done with it. Smart analyses are carried out in real time, and coaching thus becomes a continuous process rather than something that takes place at regular intervals during coaching sessions. New parties are now providing coaching and new target groups are making use of it. These changes raise new questions about the new roles, protocols, and frameworks for the responsible deployment and use of e-coaches. This book looks at those questions in various different ways according to the domains within which e-coaching is applied.

1.4 Outline of the book

The Rathenau Instituut's aim with this book is to increase awareness of the rise of digital coaching and to investigate the significance of that trend for society in general. E-coaching is still in its infancy, and it is difficult to estimate the precise effects that it will have. This book therefore considers a number of specific cases in order to determine the changes that e-coaches are bringing about in certain coaching practices and the impact this is having on those practices. The various cases reveal what we might expect from the next generation of digital coaches, and what requirements we would like to see them meet. We look successively at e-coaches in the fields of health and body management, personal finance, sustainability, social behaviour, and work stress. We then bring together the insights gained from these various cases in a concluding chapter. That chapter discusses the main changes that can be identified in all these cases, and we make recommendations as to what is necessary in the development of e-coaching so as to ensure that digital coaching takes place responsibly.

The cases and applications discussed in this book do not constitute an exhaustive description of the evolution of e-coaching. There are in fact many more aspects of our lives in which the relationship with technology is becoming more intimate (Van Est 2014) and in which technology assists us by providing advice and feedback (Van 't Hof et al. 2012). E-coaches are just the start of a trend in which coaches and behaviour-changing technologies will become ubiquitous, with those technologies being interlinked and becoming smarter, subtler, and more regulating. The rise of the e-coach is therefore a phenomenon that extends beyond the five domains dealt with in this book. The examples we give are intended to clarify the dynamics within which e-coaching is evolving, and to outline the opportunities and risks involved. In order to give readers a glimpse of what e-coaching may come to mean in the future, the theme of each chapter is introduced by a brief scenario. The authors have projected situations that could arise in a few years' time, extrapolated from the current state of technology. The purpose of the scenarios is to get readers thinking and thus encourage a public discourse on the rise of the e-coach.

1.4.1 Reader's guide

It is in the field of exercise, health, and lifestyle that e-coaching is most advanced. This book therefore starts with a contribution by Sander Voerman (Eindhoven University of Technology) on the use of e-coaches in 'body management', which is how Voerman summarises the active alteration of one's eating behaviour and deliberate participation in a fitness programme so as to get enough exercise (Chapter 2). Voerman identifies not only the social issues that e-coaching raises but also the problems that body management practices faced before e-coaching came on the scene. Many existing ways of achieving a healthy lifestyle are unreliable, for example, and there are major differences of opinion between researchers on just what constitutes a healthy diet. What

significance does that have for the reliability of e-coaches, and how should users, developers, and policymakers deal with it? Voerman also considers the influence of e-coaching apps on our body image and body awareness, and discusses which conditions are required to ensure that e-coaches respect and promote user autonomy.

In Chapter 3, on financial e-coaches, Harro Maas (Utrecht University) looks at the historical evolution of the financial coach, from housekeeping books and 'moral algebra' in the eighteenth century to modern budgeting tools and apps that help users understand and control their expenditure. Modern electronic housekeeping books enable users to act prudently and to optimise their financial behaviour in various different ways. Maas examines to what extent the provider of the electronic coach looks over the shoulder of the users, which might raise questions about the neutrality of the financial e-coach.

In Chapter 4, Niels Compen, Jaap Ham, and Andreas Spahn (Eindhoven University of Technology) clarify the development of persuasive e-coaches aimed at influencing energy consumption and sustainability. Increasingly, persuasive technology can be tailored to the individual's needs. The authors show that the rise of these e-coaches is allowing a wide range of parties to exert influence. More and more parties are playing a role in influencing the user's behaviour, with each of them pursuing its own aims. The authors also discuss the conditions for responsible use of persuasive e-coaches, respecting the user's autonomy as much as possible.

The final two chapters concern e-coaching applications that are still evolving and have so far only been used in practice to a limited extent. In Chapter 5, Joris Janssen and Mark Neerincx (TNO) and Jelte Timmer (Rathenau Instituut) describe the rise of 'social e-coaches', which aim to improve the social relationships between people. They describe three social contexts within which social coaches are being introduced: (1) the clinical sector, for example for children with ADHD, with e-coaching by a health care professional within an existing treatment programme; (2) social work, for example aimed at preventing the escalation of domestic violence, with e-coaching taking place in consultation with the social worker and also being supported by a professional; and (3) applications in the personal domain, for example for assertiveness, dating and social interaction, with e-coaching focusing on self-help, without the supervision of a professional.

In Chapter 6, Marc van Lieshout, Noortje Wiezer, and Elsbeth de Korte (TNO) explore the social impact of the digital stress coach. They note that it is still very difficult to measure stress digitally. For now, only a combination of various different methods (physiological data, questionnaires, etc.) can produce reliable stress measurements. Using digital stress coaches in a work situation can also alter the relationship between employer and employee. There is a risk

of unwanted interference in the employee's private life and erosion of his/her autonomy. At the moment, Dutch legislation on data protection and working conditions offers a sufficient framework for using stress coaches responsibly in the workplace.

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Self-tracking

The Quantified Self movement has grown in recent years from a small group of geeks into a broad social trend. Popular apps like MyFitnessPal (50 million users[8]) or Runtastic (30 million users[9]) and new generations of smartphones with built-in tracking functions (Samsung S Health, Apple Health & HealthKit) show that more and more people are getting interested in self-quantifying and self-tracking. Besides the options offered via smartphones, there is also a flourishing market for all kinds of 'wearables' and other tracking peripherals.

An important component of the Quantified Self movement's philosophy is the n=1 experiment: tracking your own behaviour, considering the data collected, changing your behaviour, collecting new data, considering that data, etc. While I was writing this report (as a researcher at the Rathenau Instituut) I decided to try out a number of gadgets myself, including the popular Fitbit activity trackers. The Fitbit is a wristband that tracks how much you move around during the day and how you sleep at night. The data is automatically synchronised with your smartphone, and the Fitbit app allows you to add information about your calorie intake. You can also set personal goals for your weight or amount of exercise. The Fitbit then tries to help you achieve those goals.

The interesting thing about the results of this n=1-experiment wasn't the scores and figures or the exercise targets that I did or didn't achieve but how it felt to use a device that measures and also observes you. As soon as you put on the wristband, you become more aware of how active – or in fact, how inactive – you are. That is a well-known effect of having somebody 'looking over your shoulder'. Followers of the Quantified Self movement say that it is precisely this increased self-awareness that is such an important factor in changing your own behaviour: you are more aware of what you are doing and are therefore less likely to mindlessly reach for the biscuit tin, because you then immediately realise that you will need to record that in your app (at least, that's what you have promised yourself).

Using the Fitbit also led to a certain amount of interaction between me and the measuring device. The wristband attempts to track your behaviour in a particular way, but how does it view that behaviour?

Do you get more points, for example, if you take shorter steps? If you swing your arms vigorously, does that get registered? The Fitbit is also

8 Chapman (2014).
9 Pai (2014).

not a neutral observer; it has its own perspective on your behaviour. It understands perfectly well when you go for a bit of a walk, but it is less certain when you sprint up the stairs or go for a jog. After a while, though, you get to know one another and you know what the wristband does and doesn't see (and you sometimes make sneaky use of that knowledge).

'When I get up in the morning, the FitBit app shows me that I woke up fourteen times during the night. Fourteen times?!'

The movement sensor in the Fitbit can also measure your sleep pattern during the night. All you need do is tap the wristband a few times to indicate that you're going to bed and then in the morning the app shows you a graph of how deeply you slept and how often you woke up. In this case, the Fitbit acts as a kind of extra sense that can tell you something that you are only conscious of to a very limited extent. This is where I really see the potential of quantifying: it provides insights and information that I wouldn't otherwise have. The question is then what should be done with that information. I get up in the morning, for example, and the FitBit app shows me that I woke up fourteen times during the night. Fourteen times?! I have no idea whether that is normal, but it doesn't sound so great. The lack of contextual information – whether that is in fact normal, what constitutes a good sleep pattern – makes it difficult to assess the value of the information or to do something with it.

I also came up against a personal stumbling block as regards sleep pattern measurement. Because I forgot on a few occasions to put the wristband into sleep mode, data for those nights is missing from my graph. Although that wouldn't make much difference in the long run, I did notice my enthusiasm to continue tracking flag. After a few weeks, I decided to stop wearing the wristband. I didn't have any preconceived goal that I wanted to achieve, and the data was not in itself sufficient to sustain my interest.

The next generation of wristbands will attempt to strengthen the relationship with the user by adding new kinds of interaction and support. The Basis Band provides new kinds of rewards to encourage the user to create healthy routines. This means that the focus of the Quantified Self movement is gradually shifting towards coaching. A number of speakers at the Quantified Self Europe Conference (Amsterdam 2014) led sessions about motivation and behaviour

change, while MyFitnessPal recently purchased the Sessions company, which offers contact with human coaches via a smartphone app (Chapman 2014). Nevertheless, the current generation of apps and gadgets seems to focus mainly on making us more trackable and helping us know ourselves better. Actual digital coaching still has a long way to go.

Figure 2 The Fitbit activity tracker

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Health coaches

Scenario: Exercising more with MoreStuFit

By Gaston Dorren

2016. Four students in their early twenties are having a meal in their shared kitchen.

Jennifer: '... so I'm now finally getting into exercise. Or in any case I'm more physically active. I'd never have thought that an app could get me to do that. It's MoreStuFit.'
Caleb: 'MoreStuFit? How do you mean?'
Jennifer: 'That's what the app's called, MoreStuFit. It's an abbreviation for 'More Students Fit', I think.'
Reinier: 'Why do you want to exercise? You don't need to, do you?'
Jennifer: 'You mean I can still get into my bikini?'
Reinier: 'You fill up your bikini just right.'
Jennifer: 'Yes, you naughty boy. But if I don't exercise now and I keep eating as much as you – that's just a random example, of course! – then in ten or fifteen years I'll look like my mother.'
Reinier: 'In fifteen years? Wow, and you're already worried about it? Incredible. Are you also saving for your pension and stuff?'
Abby (ignores Reinier and addresses Jennifer): 'So you're more physically active now?'
Jennifer: 'Yes. I make sure that for at least half an hour a day I don't just sit around on my lazy butt. Well…almost every day. The activity meter tracks that and sends the info to my mobile phone. And I'm not eating as many sweets either.'
Abby: 'More active and fewer sweets too? So what kind of creepy thing is this app? How are you managing to behave so weirdly and unnaturally?
Jennifer: 'Well, I've been able to choose the weirdness for myself – that makes it different. Listen, I'll explain. The app first gives you a questionnaire to fill in so that it gets to know you. General stuff like your age, height, weight and so on – figures. But you also have to fill in the sports that you like, how active you are already, whether you're healthy, and various other things. After that I had to fill in my targets. I want to make sure I exercise for half an hour, five days a week. And I also want to move to music once a week.'
Reinier: 'I think that's called dancing!'
Jennifer: 'Dancing counts too, but I mean at the gym. And I don't want to eat sugary food more than twice a day.'
Caleb: 'But it's easy to cheat, isn't it?'
Jennifer: 'You can cheat almost anything. But this thing isn't like a boss who gives you orders, it's more like a coach who helps you.'

Abby: 'But is it working? So you've set your goals, right. Then what?'
Jennifer: 'Well the app gradually gets to know me, my habits and so on. It knows that I've got a lecture on Monday morning, 'cos it keeps track of where I am. So it sends me a message, like: "Hey Jen, if you go by bike, you'll have met half your activity target for today." Or it tells me: "So-and-so is at the gym. Perhaps you can go with her next time?" And what's fantastic is that if it sees on the Weather Channel that it's going to rain, it sends me a warning.'
Reinier: 'Not that the Weather Channel's always so accurate….'
Jennifer: 'No, not always, you're right. Nowadays I also look up at the sky. Grey means rain, haha!'
Abby: 'Is that all it does?'
Jennifer: 'If it sees I'm in a lift, it sends me a message saying "Maybe take the stairs next time?"'
Caleb: 'So it's a real busybody! Can't I just get the stats? Like "cycled 12.38 kilometres today at an average speed of 22.3 kph", "total calories burned in past 24 hours: 1978" and so on?'
Jennifer: 'You're a sports fanatic and a statistics fetishist, mate! I just want to keep fit. And I'm studying French, not applied physics.'
Caleb: 'Boring! For me, performance and competition are the only way to keep up my interest in sport.'
Jennifer: 'I compete with myself – I get a bit better every week.'
Abby: 'But surely you don't need those tips, because you already know them, don't you? I mean, do you really need an uPhone 2 and an app to remember to climb the stairs instead of taking the lift?'
Jennifer: 'No, not to remember but to actually do it. Remember what they say: "The spirit is willing but...". How does that go again?'
Abby: 'But I do think Caleb has a point. There'll come a time when you'll get tired of the app. Or it'll be exam week and you'll get less exercise any way, so you'll get discouraged. You'll totally forget about the app, just you mark my words.'
Jennifer: 'Well thanks for being so encouraging. Ever heard of good habits? I just hope that exercising will become a habit, like cleaning my teeth or eating lots of veggies.'
Caleb: 'Listen to you preaching!'
Jennifer: 'As for you, you need to make sure you don't get another sports injury again. Last year it looked like you'd end up in a wheelchair. That's not gonna happen to me.'
Reinier: 'Did you lot know that there are already sensors that can track what you eat, drink, and smoke? They install one in your throat and it records everything. When you get smashed, you can check the next morning to see just how smashed you were. Pretty useful when you've been on a binge with your mates!'
Jennifer: 'Bloody hell, you're on your way to becoming an alcoholic.'
Reinier: 'OK, Miss Preachy, let's be serious. When I graduate and I'm a GP, it'll be very useful to be able to call up data from a patient's file and say "Well

Mr Jansen, I think there's a direct link between your liver problem and the fact that you drink 6 units of alcohol a day." Or if I want to make sure someone sticks to his diet, I can get in touch myself.'
Abby: 'Hang on a minute – the app doesn't send the data to your doctor, does it?!'
Jennifer: 'I don't think so... it won't, will it?'
Reinier: 'I don't think so, but technically it's perfectly possible. And it would be a pity not to make use of the possibility. People wouldn't need to visit the doctor so often, and I could monitor them remotely.'
Jennifer: 'Listen, I'm not one of those exhibitionist bimbos in a reality soap – I want a bit of privacy. Before I know it, the GP will be able to see how often I sleep with Jeroen.'
Reinier: 'But why not? If your GP asks you, you tell him anyway, don't you? As a matter of fact, I think the app should track who you go to bed with, and it should be able to check his data too. Then it can send you a warning if you're mucking around with somebody who has a nasty disease where it hurts most.'
Jennifer: 'You're disgusting!'
Reinier: 'Come on, I'm just thinking out loud.'
Abby: 'Well, I think that apps like this will soon be competing with GPs like you. The more we patients get to know ourselves, the less we'll need you doctors. You can find out all about your syndrome on the Internet, you can collect the personal data yourself... the patient will be able to treat herself. You know, Reinier, you med students are really just training to sign referral notes.'
The door opens and Noura looks in.
Noura: 'Hey Jen, it says on Facebook that you've done 2 hours and 23 minutes of sport this week. Impressive!'
Reinier, Caleb and Abby laugh, Noura looks puzzled, Jennifer blushes.
Reinier: 'So much for privacy, Jen! On Facebook, no less! Just the kind of discreet site where your information is absolutely secure!'
Jennifer: 'I only put the information on Facebook because me and some girlfriends want to keep track of how much we've exercised. It's so we can egg one another on a bit.'
Caleb: 'Performance and competition. The only way to keep up your interest in sport. Didn't I just say that?'
Abby: 'The guys have got a point, Jen. But I'd still like to try that app. After all, it'll soon be bikini weather again.'

With thanks to Saskia te Velde (VU University Medical Centre, Amsterdam), who is involved in the Active2Gether project. This research project is developing an app to encourage young people to get enough exercise. The above text does not necessarily represent her own views.

2 Tackling your lifestyle with the body coach[10]

Sander Voerman

2.1 Introduction

'Man is what he eats', wrote Ludwig Feuerbach (Feuerbach 1866, p. 5), and what we eat really does have a major effect on our physical and mental condition. Eating habits are also often typical of the culture or *zeitgeist* to which one belongs. Contemporary Western society is highly remarkable in that respect. In large parts of the world, famine and food scarcity are still among the most pressing problems, but the West is struggling with health risks because we eat *too much*. The make-up of our diet is also remarkable. Whereas in other parts of the world this may be restricted by insufficient availability, the choice of foods in the average Western shopping centre is overwhelming. Even so, we still eat too many high-sugar and high-fat products and not enough fruit and vegetables.

To some extent, this can be explained by evolution: our body and brain are simply not adapted to an abundant supply of food rich in saturated fats and artificially added sugars (Lieberman 2013; Heitmann et al. 2012; Bellisari 2008). But habits also play a role, and the way people in Western society deal with food. If we want to eat more healthily, or if we want to lose weight by eating differently, we also need to actively change our eating habits.

Something similar applies to physical activity. Various technological achievements – for example sewerage, water purification, and medication – have greatly increased our health and life expectancy (Colgrove 2002). On the other hand, technological progress has structured our activities in such a way that many of us spend most of the day *sitting down* (Capon 2007, McCrady & Levine 2009). The human body is not designed to be sedentary for long periods, however (Stamatakis, Hamer & Dunstan 2011; Van der Ploeg et al. 2012). Ideally, we ought to move around more while working but in practice, at least for the present, many people don't actually do that, or find it difficult to integrate physical activity into their work. So they end up needing to exercise simply for the sake of exercise, finding time in their busy schedule to take part in sport or go to the gym in order to get enough exercise. That's fine if you like that kind of thing, but otherwise you need to find the discipline to be consistent.

10 This chapter was written with the support of both the Rathenau Instituut and the Netherlands Organisation for Scientific Research (NWO) in the context of the Responsible Innovation (MVI) project 'Medical Trust Beyond Clinical Walls'.

Exercise has in fact become a goal in itself: we don't need to walk anywhere, and if it's raining we drive to the gym to spend time running on a treadmill.

In this chapter, I refer to both these practices – actively altering your own eating behaviour and deliberately engaging in fitness activities so as to get enough exercise – by the term *body management*. One can speak of body management as soon as the effect on your body plays a role in deciding on a particular diet or a particular sport. This does not, therefore, include nutritional choices based on ecological production methods, animal welfare, or fair pay for farmers; it does, however, include choices with an aesthetic rather than a health objective. In actual practice, the desire to lose weight involves both aesthetic and health reasons. The same applies to exercise: I do not categorise taking part in sport for purely recreational reasons as body management, but bodybuilding and jogging so as to fit into certain clothes, for example, can be categorised in that way.

An increasing number of Web applications, mobile apps, and portable devices have come on the market in recent years that are intended to help people improve their eating habits, get more exercise, or get fitter. The core question in this chapter is how the advent of such e-coaches is changing the practice of body management, and what normative challenges this is creating. I shall focus not only on the new societal issues that e-coaching may raise but above all on the significance that the e-coach can have for the problems associated with body management before e-coaching came on the scene. Many popular weight-loss methods, for example, are extremely unreliable, particularly in the long-term, and there are also major differences of opinion between university researchers on what constitutes a healthy diet. What does all this mean for the reliability of e-coaches, and what should users, developers, and policymakers do with this information? Current practice is also permeated by social and aesthetic norms that are problematic from a moral perspective. Partly for this reason, many people in the West have a difficult relationship with their own body. How could the advent of digital quantifying and tracking affect that relationship? Finally, the e-coach also brings with it entirely new challenges, for example guaranteeing privacy and the risk of improper use of large quantities of intimate and medical data.

This chapter is structured as follows. In section 2.2, I discuss the current practice of body management and how it is changing due to the advent of e-coaching. My analysis is partly based on a study of the literature and partly on personal experience of a number of the systems discussed, in some cases my own experience and in others that of a number of users whom I interviewed in the context of my study at Eindhoven University of Technology. In section 2.3, I then deal with the normative and societal issues raised by these changes and how one can take account of them, basing my discussion on philosophical and ethical work that focuses on trust, healthcare, and autonomy. I summarise

a number of conclusions as *design goals* for responsible e-coaching. These are rules of thumb, however; provided we have an understanding of the issues, they can serve as basic principles but not as full-scale specifications. Finally, in section 2.4, I discuss the implications that these issues may have for policy-makers. How can the authorities contribute to the responsible use of e-coaching in the field of body management?

2.2 Changes in actual practice

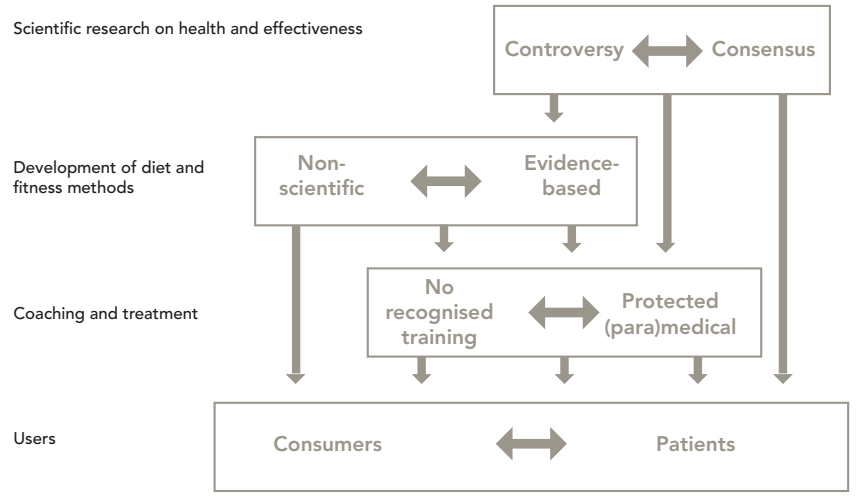
In section 2.2.1 I survey the practice of body management without the intervention of e-coaching. Although e-coaching is becoming popular, many of those who engage in some form of body management make little or no use of it. In section 2.2.2, I then explain just what e-coaching means in the field of body management, distinguishing between the various different functions or components of the coach. I give a number of practical examples for each component to show what applications are already available and how they are leading to changes in actual practice. In section 2.2.3, I discuss how the practice of body management continues to change as e-coaching creates new opportunities for other parties, such as health insurers and food producers.

2.2.1 The 'analogue' practice of body management[11]

The actual practice of body management – before the advent of e-coaching – is extremely varied. It may involve coaching, for example when people are being instructed by a dietician or a physiotherapist, but it can also involve 'do-it-yourself' body management without such instruction, for example dieting according to methods found in books and magazines. Some activities can be categorised as involving limited coaching. Group lessons in spinning or zumba do involve instruction and a form of motivation – both by the instructor and by the social aspect – but there is often less individual instruction (with a coach setting and evaluating personal goals together with the client).

11 For lack of a better term, I use the word 'analogue' here in a metaphorical sense for methods of coaching and body management that the present chapter does not categorise as 'e-coaching'. This is comparable to the way in which the 'e' in 'e-coaching' is also used metaphorically, without referring to everything that is 'electronic' (after all, watching a TV programme about dieting can also be called 'electronic' but it does not constitute 'e-coaching').

Figure 2.1 Levels of body management practice



To understand the practice of body management better, we can divide it into four levels (Figure 2.1).[12] At the top is the level of **scientific research** on the relationships between nutrition, exercise and health, in particular relating to mediating physical characteristics such as weight. We can also include research on the effectiveness of specific diet and exercise methods in this layer. However, our scientific understanding of the causes and effects of eating habits and physical activity varies enormously. There is consensus on some of the health risks of serious obesity, such as cardiovascular diseases, on the importance of various nutrients, and on the effect of exercise on people's physical fitness. But that consensus quickly breaks down when the composition of a healthy diet comes up for discussion. At the moment, for example, there is controversy as to whether a healthy diet should include a large quantity of cereal products or only a small quantity (Brouns, Van Buul & Shewry 2013; Haywood & Proietto 2012; Davis 2011; Mudde 2013; Verburgh 2012, 2013). More generally, researchers are still uncertain whether weight changes are almost exclusively associated with the difference between energy intake and energy output, or whether the effect of carbohydrates and hormones on our metabolism is also decisive (Delbridge et al. 2009; Claessens et al. 2009; Lejeune, Kovacs & Westerterp 2005; Bravata et al. 2003; Foster et al. 2003; Baba et al. 1999; Skov et al. 1999).

12 This does not an exhaustive survey, of course. The focus is on the path from theory to practice. It does, however, give us a fairly 'power-free' picture, in which, for example, the interests and influence of the health insurers and commercial companies (including the diet industry) are not made explicit. I return briefly to the role of health insurers in sections 2.2.3 and 2.4.

The biggest controversy concerns the effectiveness of specific weight-loss methods and whether it is feasible to achieve permanent weight loss at all. Various studies have shown that in the long term, many people's attempts to lose a substantial amount of weight are doomed to fail (Sumithran & Proietto 2013; Sumithran et al. 2011; Anderson et al. 2001; Leibel, Rosenbaum & Hirsch 1995). Various factors play a role in this, including genetic, hormonal, and emotional aspects. Both diet and exercise have been called into question as long-term weight-loss strategies (Thomas et al. 2012; Westerterp 2010; Westerterp & Plasqui 2009). The question, of course, is what most people can reasonably expect in the long term. No one denies that some people do in fact succeed. What remains unclear, however, is which factors play a decisive role in their success. Moreover, some studies show that people who have slimmed down find it much more difficult to maintain their new weight than those who were never overweight (Phelan et al. 2007, 2008; Hill et al. 2005). In the context of health risks, this might be a reason to shift the focus from losing weight to preventing weight gain.[13] Another development – which does focus specifically on treating obesity – involves combining normal dieting methods with cognitive behaviour therapy so as to tackle the emotional aspects of eating behaviour (Werrij et al. 2009).

The lack of scientific consensus on the above questions expresses itself in great diversity within the second level of the figure. This comprises the variety of **methods** that have been developed to ensure a healthy lifestyle, a stable weight, or weight loss. This level can also be taken to include advisory organisations that provide general nutritional recommendations, for example the version of the 'food pyramid' published by the Netherlands Nutrition Centre [*Voedingscentrum*]. One good example of the conflicting diversity of opinion is that the Nutrition Centre recommends eating a lot of cereal products, in particular bread, whereas in his current diet bestseller *The Food Hourglass*, the Belgian doctor Kris Verburgh asserts that we eat far too many cereal products and that this is extremely unhealthy. Moreover, it is questionable whether a lot of popular methods – such as those found in magazines, diet books, and TV programmes – have any scientific basis whatsoever. It is therefore difficult for lay people to decide, on the basis of correct information, what method is the most reliable.

The third level comprises **instructors** in the most general sense, ranging from medical or paramedical professionals with a degree in their subject to coaches who operate on a different basis. Organisations such as Weight Watchers also fall into this category.[14] Finally, the fourth level consists of the **users**. As the figure shows, users can receive instruction, follow a method by themselves, or

13 This would also mean that the users in question would shift from the patient end of the user spectrum to the consumer end.

14 As a developer or sponsor of weight-loss methods, Weight Watchers can also be categorised as belonging to the second layer.

– without adhering to any specific method – work loosely on the basis of their own knowledge of scientific findings. It is also important that users may be patients with a medical problem or consumers who wish to engage in body management without a medical indication, doing so for health or other reasons.

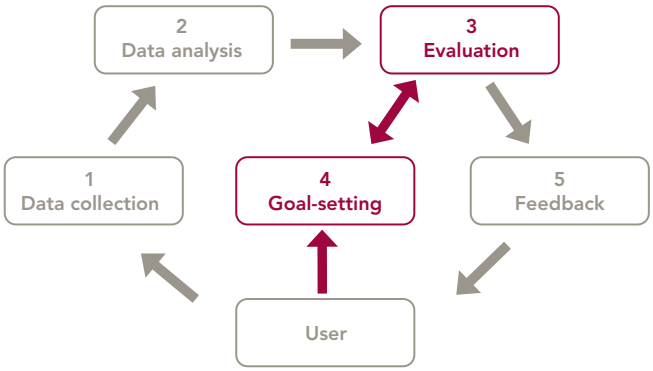
Strictly speaking, the extent to which a method has been substantiated scientifically or to which an instructor has had professional training is separate from the extent to which the approach to body management is medical: if somebody wants a more muscular body purely for aesthetic reasons, he or she can also attempt to achieve that on the basis of scientific findings; conversely, somebody with health problems due to obesity can also tackle matters unscientifically. Nevertheless, in actual practice the two variables are associated because medical institutions are subject to more stringent requirements as regards their scientific nature and the training involved, whereas producers in the consumer market have greater freedom to operate on the basis of their own ideas.

The diagram can also be extended by considering not only the method or practice of body management but also the reasons that people have for managing their body. One important factor is society's ideal of beauty and the image created by the media regarding success and attractiveness. Because this is directly associated with societal and normative questions regarding body management, I shall discuss these aspects in section 2.3.

2.2.2 The present functions of the e-coach

In a previous study by the Rathenau Instituut, e-coaching was analysed in terms of three connected processes, namely data collection, data analysis, and feedback (Kool, Timmer & Van Est 2013, p. 19). The first of these processes comprises, broadly speaking, the sensors or the data entry interface, the second the algorithms and thus the application of the knowledge assumed in those algorithms, and the third the reporting to the user, but in particular also any feedback intended to encourage the user to engage in the desired behaviour in the light of that analysis. Of course, this immediately raises the question of what behaviour is actually desired. Because that is a crucial issue specifically in the case of body management, I make use of an extended model here, one which also explicitly includes the processes of *evaluation* and *goal-setting* (Figure 2.2).

Figure 2.2 Five subprocesses within e-coaching



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An instrument that reports only neutral data – for example the number of calories someone consumes or burns, or the number of paces he takes – can omit the goal-setting and evaluation phases. But as soon as the feedback also has a motivational aspect, this presupposes that the monitored behaviour is evaluated, and therefore that there is a goal or standard against which the analysed data is evaluated. When this evaluation process applies an implicit or generic goal, then the system has not been personalised to any extent, and there is no question of fully fledged coaching. A fully fledged system enables the user to translate his personal wishes or values into a specific goal on the basis of which he can receive personalised feedback. Ideally, the goal reflects both an evaluation by the system of feasibility and health and the personal wishes, interests, and circumstances of the user.

Where **data collection** and **analysis** are concerned, the currently popular systems are largely comparable. The market for e-coaching in the field of exercise is dominated by 'wearable technology', for example wristbands and armbands, or meters that can be attached to clothing at hip height.[15] These systems are broadly similar in the way they collect and analyse data; they measure wrist or hip movements and analyse them in order to calculate the number of paces taken. In addition, some systems include altitude sensors so as to recognise when someone is going up stairs,[16] or they collect data on night-time movement in order to analyse the wearer's sleep rhythm.[17] Advanced armbands also measure heartbeat, temperature, and perspiration.[18]

15 Examples of armbands: Nike+ FuelBand, Jawbone UP, Fitbit Flex, Fitbit Force, Basis B1, BodyMedia Fit Link. Example of hip clip tracker: Fitbit Ultra.
16 Fitbit Ultra.
17 Fitbit Flex, Jawbone UP.
18 BodyMedia Fit Link and Basis B1.

There are apps for joggers that track the distance covered by using GPS.[19] In addition to these mobile devices and applications, the traditional set of bathroom scales has been upgraded electronically. Modern 'smart' scales utilise an electronic current to measure not only the user's weight but also his body fat percentage, and they can synchronise with apps on the mobile phone or in the cloud, using Bluetooth or WiFi.[20] Systems that focus on nutrition also use comparable methods, with a database listing products, from which the user, with an app, can select what he eats or drinks throughout the day.[21] Some systems make it possible to scan codes on packaging. Finally, there are integrated systems with which the data collected from various different sources or manufacturers can be synchronised in order to generate a more or less complete picture, for example by linking calories consumed and burned with changes in weight.[22]

For all these systems, it should be noted, however, that the margins of error can be very large and that they also differ greatly from one person to another depending on their pattern of behaviour. Pedometers may count the wrong kinds of movements as paces, sleep trackers may miss periods when the user is awake but hardly moves at all, and calculations for the number of calories consumed or burned actually provide only a rough estimate. The body fat percentage measured by smart scales can also be significantly incorrect because the margin of error differs from person to person and is also influenced by how much water he or she has drunk. When registering the amount of food consumed, there is a clear trade-off between precision and ease of use: if someone really wants to know how much energy he is taking in, it is not enough to just select a standard serving size from the database (a sandwich, a glassful, a plateful etc.); one in fact needs to estimate the weight of the serving each time or weigh it on a pair of kitchen scales. But estimates also involve margins of error, and they also introduce the risk of a bias towards small quantities. There are in fact users who consistently weigh *everything* that they eat, but such an approach is unlikely to conquer a large part of the market.

Besides generating information for the evaluation component, recording behaviour can in itself lead to the user becoming more aware of what he eats or of how much exercise he takes.[23] That effect also applies in the case of 'analogue' methods such as keeping a diet diary, but then the effort needed to remain aware is transferred to the effort required to keep proper track of everything. E-coaching attempts to reduce this problem by making recording as automatic as possible.

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19 One popular example is the RunKeeper.
20 Fitbit Aria, Withings Smart Body Analyzer, iHealth Wireless Body Analysis Scale, Tanita BC-545N Body Composition Analyzer.
21 Examples include the Netherlands Nutrition Centre's Eatmeter [Eetmeter], Foodzy, and the online applications of Fitbit and Jawbone.
22 For example via the online applications of Foodzy and Fitbit.
23 The users interviewed for this chapter in fact reported that effect.

There are major differences in the **evaluation** processes that are used in the current applications. Some systems assume fixed health standards in which only general personal features such as gender or age are included. Generally speaking, calorie intake and body mass index (BMI) are the health-related variables that are evaluated, although some nutrition coaches apply more detailed standards for the proportions of fats, proteins and carbohydrates in the user's diet, or even his intake of various vitamins and minerals.[24] Where the reliability of such evaluations is concerned, there are two relevant problems. First, there is again the question of whether the measurement is sufficiently precise to draw conclusions about too much or too little. Second, one also comes up against the problem referred to above, i.e. that there is little consensus among researchers about which diets are healthy and which are not. Someone who reads Verburgh's *The Food Hourglass* may perhaps conclude that they should eat less bread and more nuts, but on the basis of the Netherlands Nutrition Centre's Eatmeter the same person will decide that they are right to eat a lot of bread, and even that they should in fact eat more cereal products. Where books, magazines, and TV programmes are concerned, the user is exposed to so many contradictory theories and methods that it may well become clear to him that he needs to interpret what they say for himself and should arrive at his own decisions on what to actually do. In the case of the e-coach, however, the user may in fact choose a particular coaching app for other reasons, for example user-friendliness, compatibility, etc., and yet proceed to act as recommended by that app. The extent to which the nutritional theory underlying the app is controversial and differs from the theories incorporated into other apps may be less apparent to that user, however.

This brings us to the **goal-setting** component. I have argued above that a fully fledged, ideal e-coach helps the user to set the right goals. Those goals need to meet three conditions: they should be compatible with the user's wishes and values; they should be attainable given the dietary and exercise methods for which the e-coach was developed; and they should be achievable in the light of the particular user's physical condition and abilities. To what extent do the currently available systems approach that ideal?

For a start, some systems have less far-reaching pretensions: they have been designed to help achieve a specific kind of goal, for example increasing the number of paces one takes each day. If the goal is explicit and limited, then it is the user who sets it and who decides whether or not to use the system. However, many systems have been designed to help achieve goals that are of a much more generic nature, for example *healthy eating*, which requires much more flexible alignment with the user's needs and wishes. In actual practice,

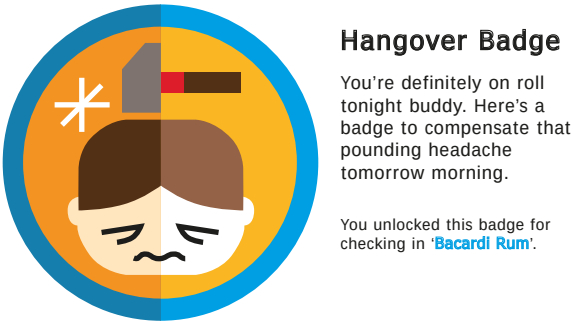
24 Foodzy makes use of ideal ratios of proteins, fats, and carbohydrates, whereas the Netherlands Nutrition Centre's Eatmeter reports, on request, whether the user is getting enough of a whole range of vitamins and minerals.

however, such systems hardly offer such flexibility at all.[25] In many cases, it is therefore up to the user himself to set his own goals without much help from the e-coach, and even to recognise possible implicit goals within the app as such, in order to determine whether they do not differ too much from his own goals. This is more difficult for consumers than for patients because patients can set a desirable and feasible goal in collaboration with the practitioner who is treating them. In addition, the practitioner can help the patient select a system that is suitable for his situation, and can also help him correctly interpret the analyses that it generates.

The process of providing **feedback** in fact comprises all the communication with the user, ranging from a simple report giving the data collected right up to personalised alerts intended to encourage the user to engage in specific behaviour. One important driver for a more healthy lifestyle is quite simply being aware or what one is doing. I just pointed out that simply recording and seeing our status can change our mindset, making us more likely to actually *do something* about it. However, e-coaching also introduces *new* drivers that were simply not possible on paper or with a spreadsheet. The first of these drivers is *gamification* and what I refer to as *gadgification*. A growing number of app developers are attempting to turn body management into an enjoyable game, and design both hardware and software to appeal to our love of gadgets. Users can earn 'badges' when they comply with certain criteria and a lot of effort is going into creating a user interface or 'dashboard' that is playful and sleek, and which allows the user to call up the information that has been analysed in as many ways as possible, in the form of splendid graphs, meters, and diagrams. As long as the design is sleek and shiny, a simple green button can make the user happy with his performance, whereas a button with a red cross makes him get up from his office chair in an attempt to turn it green after all. But the game element does not necessarily need to be normative. In the case of Foodzy, for example, the user doesn't only collect badges for eating healthy meals but also for consuming large quantities of pizza, alcohol, or barbecued food.

25 The Eatmeter, for example, assumes fixed calorie targets for men and women and fixed ideal ratios of proteins, carbohydrates, and fats.

Figure 2.3 Foodzy Badge for alcohol consumption



Bron: Foodzy App

A second element that can be added is that of social media, or a specific community associated with the particular e-coach. Results achieved using Nike+, for example, are recorded in a kind of competition with other Nike+ users, while badges earned when using Foodzy can be shared via Facebook. It is up to the user himself, of course, to decide to what extent he wishes to share that information. In any case, some people seem not to feel that their privacy is being infringed but are in fact encouraged by knowing that their friends and acquaintances are told how much or how little they have exercised, eaten, or had to drink.[26]

Another way in which the e-coach can help motivate people is by implementing specific therapeutic techniques. In the previous section, I mentioned the combination of dieting methods and cognitive behaviour therapy. In the future, the e-coach will probably be able to support this kind of therapy or automate certain aspects of therapeutic intervention (Maastricht University 2011).

Finally, feedback also plays an educational role: the more the user learns about nutrition, exercise and health, the more healthy his lifestyle can be. Apps such as the Eatmeter and Foodzy, for example, can make us more aware of what products are high in calories.

26 In an interview, Marjolijn Kamphuis (the developer of Foodzy) expressed surprise at the fact that the majority of users turned off the privacy settings after registering so that they could share their badges on Facebook (Blom, Stekelenburg & Kamphuis 2011).

2.2.3 Changing relationships between providers and users

We have now seen how the various user functions offered by the e-coach are changing the actual practice of body management. However, the e-coach also offers other parties in the realm of body management new options, thereby changing their relationship with the end user. Nutrition coaches, for example, can affect the relationship between **consumers and food producers**. The more influence such coaches have on people's food choices, the more important it will be for food producers to receive high ratings from those coaches. This can lead to healthier products, but also to marketing strategies in which inclusion in the databases of nutrition coaches becomes an important advertising objective. It is likely that a system of sponsorship will arise, with coaching app developers concluding contracts with producers, for example to award sponsored badges when their products are consumed. Such strategies can have a great deal of influence, certainly in the context of the social media.

The relationship between **health insurers and those insured** may also change. It is conceivable that – depending on the scope allowed by policy and legislation – health insurers will attempt to use e-coaching to encourage users to adopt a more healthy lifestyle – i.e. cheaper behaviour – in return for lower insurance premiums. This way of thinking has already gained ground even without e-coaching, as is shown by the 'Healthy Together' [*SamenGezond*] programme introduced by the Menzis health insurance company.[27] That programme grants a discount on the premium for supplementary insurance and on various health-related products if the insured person is prepared to provide information about his own behaviour and lifestyle. This may, for example, involve filling in questionnaires about exercise habits, taking part in sports events as part of the programme, or reporting whether one is a smoker or a caregiver. If this is already being done by means of questionnaires, then in the future it can obviously also be done by means of the e-coach.

The data that coaching devices collect about users is interesting not only for health insurers but also for other parties, for example **medical researchers** but also **market researchers**: if we all keep track of what and when we eat, analysing the data can be of inestimable value to businesses. The fact that the coaching applications store the data in the cloud means – again, depending on applicable legislation – that the developers of those applications can sell the data to third parties.

Finally, the technology will of course become more advanced. By constantly quantifying more and integrating more and more data, e-coaching will give users a new perspective on their own body. This not only creates opportunities but also poses risks, which I look at more closely in the following section.

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27 See http://www.menzis.nl/web/Zorgverzekeraar/Consumenten/Klantenservice/SamenGezond.htm

2.3 Societal and normative issues

We have now seen the impact that the e-coach can have on the practice of body management. That practice is already changing, but the change has only just begun. The question is now what normative issues we need to take into account if we want to design and offer the e-coach in such a way that the influence it has in actual practice is morally responsible and desirable. In the following subsections, I consider three such issues: a responsible e-coach is one that can be trusted (section 2.3.1, it must contribute to the user having a healthy relationship with his body (section 2.3.2), and it must respect the user's autonomy (section 2.3.3). I attempt here and there to summarise my recommendations by formulating design goals that designers can use as a basic principle. In section 2.4, I look at what policymakers need to consider if they want to encourage these basic principles of responsible e-coaching.

2.3.1 Trust and reliability

We have seen that the e-coach can have large margins of error, which differ from one user to another, without those margins being incorporated into the feedback process. This **lack of precision** has a number of implications. For one thing, it means that the user will always require knowledge from outside the system in order to properly interpret the analysis that it provides. In fact, the user already needs to know whether he eats too much, doesn't take enough exercise, or sleeps badly in order to assess whether he can trust the system. In many cases, for example, the body fat percentage measured by a set of smart scales is too unreliable to determine whether that percentage is too high or too low. It can, however, reveal trends over time with a certain reliability, as long as the user always stands on the scales at the same time (for example after going to the toilet and before drinking his first glass of tea or coffee in the morning). Nutrition trackers are currently more suitable for monitoring or implementing changes in one's own behaviour than for getting an accurate picture of how much one actually eats. The analyses that they provide are also extremely generic, and do not take account, for example, of individual differences in metabolism. Finally, the need for accurate data can itself have an effect on behaviour. One of the users interviewed for this study said, for example, that he based some of his food choices on whether he could effectively record the foods in the system that he used. Although nutrition coaches generally emphasise the importance of a varied diet, this effect can in fact reduce the level of variety. A similar effect can occur with systems that allow the user to predefine meals that can then be recorded simply by clicking on a button. This saves the user the trouble of entering all the ingredients separately, but it may also discourage him from varying those ingredients.

Another implication is that e-coaching creates a **semblance of precision**, for example by reporting the exact number of calories burned or by recording the user's sleep pattern from minute to minute. Manufacturers are trying in this way to achieve the ideal of the Quantified Self movement, namely to quantify

as many aspects of life as possible that have an effect on health and condition. However, a scientific interpretation of the measurements in terms of validity conditions and a probability interval is lacking. Many users are undoubtedly aware of this and, to quote one user who was interviewed, 'don't take the data all that seriously'. Some applications do, however, presuppose the suggested level of precision. There are systems, for example, that compare the calculated number of calories burned with the calculated number consumed to advise the user to get more exercise or in fact to eat something so as to maintain his target weight. The user must then have a good idea of the circumstances in which these analyses will differ from reality. In such cases, the system is in fact making a conditional prediction about the user: if you do not eat more, you will lose weight; if you do not take more exercise, you will gain weight; if you continue to consume the same number of calories, you will maintain your present weight. The question is how reliable these predictions actually are.

We have also seen that the evaluations provided by e-coaches depend on medical information on a healthy diet about which there is as yet **insufficient consensus**. In theory, one might therefore propose developing an e-coach that informs the user about the differences of opinion and the resulting scope for choice. The question, however, is whether this could be implemented in a simple and user-friendly manner. In actual practice, developers are quite simply divided into different camps that follow the recommendations or ideas of various different experts. One problem that can occur here is that the experts themselves do not sufficiently acknowledge views that differ from their own: they allow the public to think that their own ideas have been substantiated scientifically and that those of their rivals should be considered outdated. This means that it is entirely unclear to the consumer which ideas are actually undisputed and which are controversial. Nevertheless, there does not seem to be any crisis of trust as in the case of climate change or vaccination. One possible explanation for this is that users believe that they can decide for themselves whether or not something actually works: you try out a particular method for a while, and if you feel better and fitter, or if you lose weight, then it apparently works. If not, then you try something different. This approach is problematical where weight loss is concerned, but it is reasonable enough when someone wants to boost his energy level or feel generally better about himself.

2.3.2 Body image and body consciousness

Human physicality has always been a problem in the Western world. The distinction we make between body and mind plays a key role in this, with virtuous qualities frequently being associated with mental abilities while the body is often viewed as a necessary evil: 'the flesh' is weak, lazy, and easily enticed into immoral conduct. It is the source of desire, which in Christian thought – and still in contemporary thought – is often seen as a morally problematic driver. That culture has changed in part, but it also persists to

some extent. This is true both of *appearance* and of what I refer to as the *somatics* of the body. In this section, I discuss each of these aspects separately and indicate for each how it may be influenced by the advent of e-coaching.

Where **appearance** is concerned, one might of course say that physicality has in fact become a prominent value nowadays, given the way the media bombard us on a daily basis with society's ideal of beauty (Wykes & Gunter 2005; Thompson & Heinberg 1999). That ideal, however, is not very realistic or aesthetically interesting, considering how the human body is shaped and how much that shape varies from person to person. Nevertheless, many people for whom that ideal is unattainable still measure themselves against it, meaning that they no longer view their own body as something beautiful or aesthetic but merely as a source of concern and irritation (Shusterman 2008, p. 6; Bordo 1993). We think we are too fat or too wrinkly, men think they aren't muscular enough, while women think their breasts are too small, too big, too flabby, etc. We are uncertain whether our body is good enough, and we observe the effects of ageing on our appearance with dismay. Moreover, we do not even have a good idea of what we actually look like.[28]

How does the advent of e-coaching relate to these problems? I distinguish between two possible implications, one of which is undesirable while the other is highly desirable. First, e-coaching could become part of the problem, or could even make it worse. It may make people even more obsessive about their appearance, weight, or diet. The fact that the e-coach follows, monitors and motivates us throughout the day, constantly requesting input, may make people even more concerned about their appearance than is already the case. If the e-coach becomes well established and all one's friends share their progress via the social media, the beauty ideal and uncertainty about one's own body may come to play an even greater role in social interaction. And if, in the context of the goals programmed within the system, the e-coach provides us with highly detailed information about our body across a wide range of parameters, we will perhaps come to view the body even more as a source of concern. We may fail to notice just how beautiful and wonderful our body is because we are fixated on all its imperfect details.

However, there is possibly a second, opposite implication. I have already pointed out that some nutrition apps do not have an intrinsic focus on losing weight. More generally, many apps adopt a much more cheerful and positive approach, focusing more on the user's body as something interesting and

28 When asked about the size of their own body, people's estimates are less accurate than when asked about that of someone else, and they see themselves as deviating further from the social and aesthetic norm than is actually the case. This effect is a key factor in the development of eating disorders (Benninghoven et al. 2007; Grogan 2006; Thompson et al. 1999; Cash & Deagle 1997) but it has also been observed in people who are not suffering from such a disorder (Dolan, Birtschnell & Lacey 1987).

fascinating. Instead of just being a pale imitation of the cover of Cosmopolitan magazine, the app becomes a source of interesting information, graphs, meters, and counters. This aspect is open to improvement, of course, but the focus is now much more on the body as something interesting to work with. This could counteract our fixation on appearance. There is nothing wrong with appreciating good looks or wanting to change one's own appearance, but the nerdy or hacker-like attitude to our bodies – which the e-coach encourages – may help us see our appearance more in the context of our functioning body. Responsible e-coach design might therefore emphasise and encourage that cheerful, fascinated attitude to the body. Rather than measuring ourselves against external ideals that we will never achieve, we will work on ourselves because we simply can't stop tinkering. The body becomes a software project that we are constantly developing, or an engine that we are continually tuning up.

But as obsessed as our culture is with the body's appearance, we pay only scant attention to the **somatics** of the body while we are using it. By 'somatics' I mean the living and feeling functioning of the body. When working, we view our body primarily as a means to an end, one that we can ideally ignore because it simply gets on with the work. This applies more to intellectual work than to physical work, of course, but it is not merely by chance that the former enjoys a higher status in our society than the latter. Sitting at the computer and developing mouse arm and back problems, we are so unaware of what is going on in our body that we only start to notice it when it's actually much too late. We need software to remind us that it is time to stop typing or to get up and stretch our legs.

In philosophy, Richard Shusterman has recently drawn attention to this problem with his theory of 'body consciousness' (Shusterman 2008). Poor body consciousness is thought to be a typically Western problem, as evidenced by the popularity of methods to improve it that are inspired by Eastern traditions, for example yoga, tai chi, or mindfulness. But practitioners of occupational, Cesar or Mensendieck therapy or the Feldenkrais method also point out that we are insufficiently aware of how we move on a day-to-day basis (for example when bending, lifting, sitting, walking, or using a computer). However, the effectiveness of such methods depends largely on the extent to which we actually put what we have learned at a training session on a Tuesday evening into practice during the rest of the week, when we are thinking about something else.

It would be interesting to discover whether e-coaching can contribute to tackling this problem. The positive, fascinated focus on our body that the e-coach can encourage could also encourage body consciousness. This is as yet speculative, but it is worth exploring. The question is naturally whether the above-mentioned geeky or hacker-like attitude to the body will appeal to everyone or will only be welcomed by the Quantified Self fanatics. Another

possible objection is that the quantified view of one's body as measured by instruments could in fact have an alienating effect, i.e. preventing us from having a somatic, phenomenological experience of the body from within. What happens if I feel fine but my e-coach tells me that I'm not doing well?

A concern such as this assumes, however, that experiencing things oneself from within and gathering data with technology from outside must be viewed as two separate ways of collecting information. That is too simplistic. We have already seen that the data generated by the measuring instruments requires constant interpretation. Ultimately, one's own experience is always a crucial element in that interpretation. On the other hand, it is *also* an illusion to think that the feelings that we experience from within our body are a non-interpreted or direct source of information. How we experience our body is strongly coloured, shaped, and calibrated by how we interact with the world around us. In fact, that interaction and that world around us have for centuries been so permeated by technology that we can now understand the technology more effectively as integrated with our physicality than as a purely external circumstance. That is not to say that alienation is not possible. Quite the contrary, the problem of poor physical self-awareness is in actual fact a kind of self-alienation due to information that influences us from the outside. However, e-coaching does not introduce that alienation, nor can that alienation be resolved by attempting to restore some kind of purely phenomenological self-awareness. Internal and external information will always assume one another's existence, and the challenge is to *calibrate* that interplay in the right manner. The e-coach offers new methods for achieving this.

Moreover, in offering those new methods, the e-coach is constantly present and can focus our attention on our body even when we are working or engaged in other activities. Currently, fitness devices focus mainly on exercise and physical fitness, but it would be interesting, for example, if the e-coach were to also include mobility exercises from the field of physio-fitness or exercises derived from Cesar therapy or occupational therapy. That should not only be in a medical context when complaints have already been identified but also in a non-medical context when the aim is mainly to ensure greater mobility or simply to prevent future complaints. The e-coach could also become a way of focusing attention on the processes involved in tension and relaxation. If the coach records that the user has been working at the computer for several hours, it might be time for an exercise to relax his muscles, after which he will of course be awarded a badge. There are already trackers that can warn the user that he has been inactive for a lengthy period and that it is time to get some exercise.[29] This approach also clearly overlaps with the digital stress coach that will be discussed in detail in Chapter 6 of this book.

29 Jawbone UP.

One design goal for the e-coach might also be to integrate fitness aims with *existing activities* as far as possible rather than only scheduling exercise activities for which the user needs to interrupt his work. The nice thing about pedometers is that they already do this for paces: the user is encouraged to take the stairs *instead of* the lift or to walk to work *instead of* taking the bus. Perhaps *making work healthy* by means of e-coaching can contribute to better body consciousness rather than having the user alternate between unhealthy 'useful' work and healthy 'exercise for the sake of exercise'.

2.3.3 Respecting and promoting autonomy

Discussions of online and mobile coaching and monitoring technology for health objectives often hinge on the promise that they can increase the patient's or user's autonomy and self-reliance (Voerman, Kraemer & Nickel 2013). Users will gain more hands-on involvement in their own treatment, will require fewer appointments at the clinic, and will have more control over their own behaviour. At the same time, many people are concerned that this kind of technology can in fact infringe the user's autonomy, for example because practitioners or the designers and providers of the technology have a great deal of influence on how the patient structures and schedules his life. After all, the technology can be present in the user's home, in all private situations, or wherever the user happens to be.

It is important – precisely when the intention of the e-coach is to encourage more healthy behaviour – for the user to be able to decide for himself on the health targets for which he requires encouragement. We saw in section 2.2.2. that a fully fledged e-coach includes a goal-setting component that is filled in by the user. An e-coach that assumes merely implicit or generic health targets is often poorly adapted to the personal features and circumstances of the user. And if the user is also poorly informed about the generic goals of his e-coach, then his autonomy is not guaranteed because his health goals have already been identified for him.

Designing a responsible e-coach therefore requires the user's wishes to be incorporated properly into the way the system functions. Apart from the technological question of how the system can make the user's freedom of choice as wide and flexible as possible, there also two normative questions requiring close attention. First, there is the potential difference between the *interests* of the user and those of the provider. Second, the provider also needs to bear in mind potential discrepancies between the user's various *modes of will*.

The possibility of **conflicts of interest** between the patient and the carer is the topic of a great deal of discussion in the field of medical ethics (Beauchamp & Childress 2009, pp. 288-331). Healthcare institutions and health insurers have different interests that may deviate from those of an individual patient, for example research objectives, cost reduction, and productivity standards

applied and rewarded by government. These interests are not unreasonable but they must not become entangled with the *medical advice* on which the individual patient wishes to base his *own* choices. A similar principle needs to be observed when developing an e-coach that advises the user on health matters. If, for example, a certain monitoring function generates data for research purposes, then it needs to be clear to the user whether he can expect that function to contribute to his own health or whether it is intended solely for scientific or commercial research.

The challenge in this situation, however, is not merely to weigh up those interests against the interests of the e-coaching provider and other parties. Determining what the user's interests actually are is at least as big a challenge. In the field of medical ethics, this problem is often discussed in terms of the contrast between paternalism and libertarianism (Beauchamp & Childress 2009, pp. 99-148). Extreme paternalism assumes that the healthcare provider knows what is good for the patient better than the patient himself. Such an approach offers little scope for autonomy on the part of the patient, and cannot easily be defended where e-coaching is concerned. Conversely, extreme libertarianism assumes that the patient's interest always coincides with the choices that the patient makes. This assumes that the will of the patient is clear and transparent. This position is also difficult to reconcile with e-coaching, which is precisely intended, after all, to encourage users to make better choices. And even if an e-coach gives the user a great deal of scope for setting goals himself, there are always external influences that can lead to him failing to really work towards his own goals. This may, for example, involve the issues discussed in section 2.3.2 regarding people's body image and the prevailing ideals of beauty in our society.

I propose considering these matters by making a distinction between the user's various **modes of will**. The model that I use identifies three ways in which one can say about an adult that he wants something himself. I refer to these as *executive, cognitive, and normative will* (Voerman 2012, pp. 2, 226-232). One can speak of an **executive will** when someone decides himself, without coercion, to do something.[30] This also includes making choices that are ill considered, hasty or undisciplined, for example when we take the lift even though we actually want to take the stairs more frequently, or when we are tempted into buying a bag of chips as we pass a fast-food outlet although we had actually decided not to do that anymore. I refer to the intentions that we deviate from in such cases as the **cognitive will**. This mode of will comprises

30 The executive will in this sense corresponds roughly to what is sometimes referred to in the philosophical literature as 'guidance control' (Fischer & Ravizza 1998). That term intuitively comprises the kind of will that normally guides our day-to-day actions, and which is also compatible with a deterministic or naturalistic worldview. Philosophers differ as to whether this kind of will can also be called 'free', and whether it is sufficient to indicate moral responsibility; these issues are not, however, relevant to the way I apply the concept to e-coaching here (Voerman 2012, pp. 208-209 and 228-232; Fischer et al. 2007).

the entirety of plans, intentions, values, standards, and goals that we set for ourselves and which we think are correct.[31] But our own views are naturally subject to all kinds of influences whose validity can be questioned. Why do we actually think that we want X, and are our moral objections to Y in fact justified? The cognitive will is a kind of will with which we can *be mistaken*: we sometimes don't really know what we want. This therefore presupposes a third mode of will that I refer to as the **normative will**: this is what we *would* want if we could determine, on the basis of full and correct information, what our standards, values, and objectives should be.[32]

The problem for the e-coach is therefore: if these various modes of will differ from one another, which of them should the coach take as the basis for respecting the autonomy of the user? Should it be the executive, the cognitive, or the normative will? I shall argue that focusing solely on one of the three is inadequate. Let me begin with the executive will. If we attempt to respect solely this mode of will, we are in effect saying that everyone is entitled to make his own mistakes, but at the same time we are saying that everyone is himself responsible for the consequences of those mistakes. But although, as an individual, I want to have the scope to make my own choices and do things in my own way, I also want to be protected against manipulation and deception if psychological mechanisms are employed of which I am not properly aware, or cannot be aware. Where manipulation and deception are concerned, this is an obvious way of thinking because there is in fact another party that is knowingly and willingly manipulating me and, precisely by doing so, is therefore not respecting my autonomy. But given that in such a case I still act with my executive will, the executive will cannot explain this aspect of autonomy.

But once we accept that our autonomy also requires a certain integrity from the psychological mechanisms *underlying* our executive will, we must also ask ourselves whether the same protection or support of those mechanisms is not desirable when we are exposed to unwanted influences which are less explicitly intended to be manipulative or deceptive. Society's ideas, standards, and ideals regarding appearance and weight (as discussed in section 2.3.2) are to a large extent reiterated, both in the media and in social interaction, without any ill intent. Like many other problematical attitudes that are reiterated in this way – for example prejudices regarding gender, sexuality, or ethnicity – tackling the associated social problems requires a certain process of consciousness-raising

31 See Voerman (2012, p. 226). The idea that our executive will leads us to do things that are contrary to our own goals is sometimes referred to as 'weakness of will'. Philosophers differ in their analysis of the type of goals to which such a weak action runs precisely counter. Frequently cited terms that correspond roughly to what I call the 'cognitive will' are 'agential authority' (Bratman 2009, p. 430), 'self-adopted ends' (Watson 2004), and 'strong evaluations' (Taylor 1982).

32 I introduced this term in Voerman (2011) and gave a detailed defence of the distinction between the cognitive and normative wills in Voerman (2012). The insight that we may want something in a way about which we can ourselves be mistaken is recognised by a number of prominent authors in the philosophy of human action; comparable terms include Frankfurt's notion of a 'reality within ourselves' (Frankfurt 2006, p. 34) and Taylor's term 'articulation' (Taylor 1982).

that focuses on the underlying levels of the cognitive and normative will. This question can be illustrated by the account of a user who was interviewed for this study. She said that when she first used the smart Fitbit Aria scales and they calculated her body fat percentage, she was shocked, because the percentage indicated *felt* much too high. This was without her having found out what percentage was actually healthy in her situation, without the display giving any normative information about the reported value, and without the scales indicating what margin of error she needed to bear in mind. She also explained what the impact had been of the associated Fitbit website. She said that it was clear, after logging in with her personal account, that the intention was for her to formulate a target for her weight or body fat percentage. That was, after all, the only way to earn badges.

It should be noted that the possibility of setting one's own weight target is less personalised than one might initially think. It means, in fact, that one has to set a target *in respect of weight*, that one has to select a value that is fixed and does not vary with other parameters, and that – even when the aim is to maintain one's current weight – one ends up in a new mindset in which weight is something for which one can *succeed or fail.* One can of course set very broad boundaries for weight, but then there is no longer a target to aim for, although the whole structure of the system suggests that that is precisely the point. The smart scales in this example therefore offer scope for the user's executive will to select certain goals, but this takes place in such a way that the un-considered societal influences on the user's cognitive will will only be confirmed or stimulated. The scales and the associated online service do not help the user to formulate a cognitive will, by means of reflection, that corresponds better with his normative will.

Based on this example, we can formulate the following design goal. A responsible e-coach offers scope for the user's executive will to select his own goals, but presents this freedom of choice in such a way that the user is encouraged to think hard about those goals. The developer of the e-coach needs to be aware of the societal problems that make it difficult for users to align their cognitive will with their normative will. The balancing act between paternalism and libertarianism once more plays a role here. If the developer goes too far in assuming that the user is at the mercy of undesirable societal influences, then he has too little respect for the cognitive will that the user has already formed. If, however, the developer does not dare to make any assumptions about the extent to which the user may be mistaken in his normative will, then he is ignoring the societal problems discussed above. A responsible e-coach attempts to be sensitive not only to the executive will of the user but also to his cognitive and normative wills.

2.4 Implications for politics and policy

Formulating specific policy proposals in response to the issues discussed in this chapter requires a fully elaborated political view of how government should relate to citizens, businesses, and cultural and societal trends and processes. That view will depend in part on one's position within the political spectrum. It is beyond the remit of this section to make specific proposals in this manner. Instead, I shall broadly articulate a number of problems or challenges that policymakers need to bear in mind, and will explain what political aspects are involved.

2.4.1 The distinction between the clinical and consumer sectors

In section 2.2.1, we saw that the current 'analogue' practice can be divided into a number of different levels (Figure 2.1). At the user level, we saw a distinction between *consumers* and *patients*. That distinction must also remain a crucial basic principle when drawing up policy and regulations for e-coaching; this is because people may have different expectations in their role as a patient or a consumer. On the one hand, the institutional frameworks within which health-care is provided form part of government. Those frameworks must comply with scientific standards and standards of medical ethics. The government must strictly regulate clinical services and applications because it guarantees that the provision of healthcare is scientifically and morally responsible. On the other hand, it must be possible for the consumer – at the other end of the spectrum – to be more independent. The role of the government for consumers is above all to monitor: it sets standards of safety and honesty with which producers and service providers must comply in order to protect the consumer against deception and against those safety risks that the consumer cannot properly assess for himself.

Policy issues are more complicated when they concern a practice that is not clearly situated at one or the other end of the spectrum. A lot of coaching and e-coaching in the field of body management is located in this grey area. Even human coaches who do not have medical qualifications enter into a certain relationship of trust with their clients. And when e-coaching is deployed as part of a treatment plan, it is possible that the patient interacts directly with the tools or services provided by third parties, without the practitioner or health-care facility monitoring or supervising that interaction. Just what standards do these third parties need to comply with?

Within the current political spectrum, all the standard viewpoints make a relevant distinction between the right of the more independent consumer to make his own mistakes and the right of the more dependent patient to healthcare that is scientifically and morally responsible. However, it is precisely in the transition area between these scenarios that there will be more liberal and less liberal political approaches to a more 'hands-off' or a more regulatory policy. Beyond regulation, it is also obvious to focus as well on a policy of

incentives, including by subsidising R&D that can be guided by the design goals formulated in this chapter (for example in the context of the Netherlands' key economic sector of Life Sciences & Health), as well as by acknowledged certification of applications and tools that meet certain moral or scientific criteria (see Box 2 at the end of this chapter on certification of medical devices and software).

2.4.2 Scientific nature and reliability

Nevertheless, regulation is not a simple matter at the stricter clinical end of the spectrum either. In general, we expect clinical interventions and medical advice to be based on effects that have been demonstrated by scientific research. But as we have seen in sections 2.2.1and 2.2.2, the advice and effects regarding diet, health, and weight that are genuinely based on scientific consensus are few and far between. This leads us to the following political choice: government-recognised healthcare will either need to be restricted solely to advice and interventions that are *based on evidence* and consensus or more speculative advice and interventions will need to be permitted – including the advice provided by certain e-coaching applications, for example – but with the patient being given clear information as to what has been demonstrated and what is still speculative (comparable, for example, with the status of experimental medication).

We have already seen that clinicians can help the patient with a correct interpretation of the measurements generated by an e-coaching system. Nevertheless, reliability is also a problem with clinical applications. Standards should perhaps be introduced for systems recommended by clinicians as part of a treatment plan, for example concerning margins of error or the way measurement data is presented. The situation becomes more complex the more the system provides the user with evaluative feedback. Even though the algorithms may be based on scientific insights, they have not usually themselves been tested during clinical trials, nor are they the result of the kind of professional training and experience which form the basis for evaluation by a clinician. The challenge is therefore to come up with scientific standards for new medical treatments too, i.e. to apply medical insights in evaluative software. It is also important that caregivers can satisfy themselves that the scientific insights underpinning an e-coach are still current, given the rapid advances in the field.

As regards the consumer market, it is primarily important for people to look critically at the reliability of commercially available products. The authorities can help in this respect, for example by ensuring certification and independent supervision.[33] Beside certification, a significant role might also be played by informed critical reviews on websites or in periodicals, by the Dutch Consumers'

33 An example of a review database for medical apps is the 'Artsennet' [doctors' network] medical portal (http://www.artsennet.nl/Kennisbank/Medische-apps.htm). The Dutch Christian Democrat MP Hanke Bruins Slot recently proposed that the government set up a quality institute to create a database that would allow users to check the reliability of medical apps (Haverkort 2013).

Association [*Consumentenbond*] concerning itself with e-coaching, etc. This would ensure that businesses can continue to develop their e-coaches as they see fit, while consumers would have more realistic expectations regarding the various options.

2.4.3 Privacy and the exchange of big data

As we have already seen in the present chapter, the quantity of data about the user that is collected, stored, and exchanged by means of e-coaching is increasing continuously. This raises a number of questions for politicians and policymakers. The first question does not specifically concern health or body management but applies more generally to the collection of personal data. More and more of our behaviour, both on the Internet and elsewhere, takes place in the context of a user account with which the provider can maintain a history of our actions, preferences, travel destinations, or search terms. Where and how that information is stored, for what purposes it will be used, and who it can be shared with or sold to are all often unclear to the end-user. The advance of e-coaching is in line with that trend.

Here too, the graded distinction between more and less clinical applications is relevant. Regulations on the storage of medical information apply for the more clinical applications. Those regulations also reflect the political consensus that medical information should be subject to the strictest privacy requirements. This does not mean, however, that effective policy is a matter of course because it is becoming increasingly unclear who is storing medical information and where. E-coaching applications deployed in the context of outpatient treatment currently often make use of third parties which, for example, store and protect measurement data or symptom reports uploaded by patients, doing so on their own servers. Moreover, for both third parties and health care institutions – and for the authorities themselves – effective protection of personal data is becoming increasingly complex because the ways in which that data is communicated are becoming more complex and varied.

Where the less clinical applications are concerned, a more extensive and robust public debate is needed about exactly what we want as regards the rights and obligations of commercial organisations that collect our personal data. Companies often make it appear as if it is only natural that such information should be centrally accessible. After all, everything now happens 'in the cloud.' So if you want to keep track of what you eat via an app and via your PC, then the provider needs to be able to access your data. But this is not in fact true: given that you have already used a password to log in to prevent other people from accessing your account, an app can also use that password to encrypt your data *locally* and only store the encrypted data in the cloud. Even the password itself does not then need to be sent to the server. Companies often do not want this because they consider it less user friendly and because it does not line up with their own interests: they specifically want

to be able to access the data in order to analyse it. In general, Internet activists are the only ones calling for cryptography in order to give users greater control of their data, but current commercial practice – with service providers basically being able to access the data generated by their services – is much less self-evident than it appears to be at the moment. This is an issue that demands a conscious decision on the part of politicians and society in general.

There are also the policy implications of health-related e-coaching. We have already seen that health insurers may in future become increasingly interested in the possibility of using financial incentives to encourage their customers to adopt a more healthy lifestyle. However, the extent to which health insurers should be permitted to access data with which health risks can be predicted is again a subject for political decision-making. We have also seen that the data collected by means of e-coaching can be interesting for (medical) research purposes. The potential advantages of this are enormous, but it is important that the user should know which data will be used in research and in what way, for example to what extent it will be anonymized.

In general, the value of the data collected may lead to a discrepancy between the interests of the consumer and those of the provider. Is the main intention of the e-coach to help the user or to collect data? If the data can be sold, just how much is it worth and how do we ensure that the consumer knows how much he is actually worth for the provider?

2.5 Conclusions

In this chapter, I have argued that the practice of body management is facing a variety of problems, from both a scientific and a moral point of view. Digital coaching applications can, on the one hand, be part of the problem, but, on the other, they can also create opportunities to break away from existing practice. I shall briefly outline the main findings of this chapter once more.

Many of the recommendations and methods are unreliable.
There is little scientific consensus on the composition of a healthy diet or the feasibility of achieving long-term weight loss. Many popular weight loss methods have no scientific basis and may even be counterproductive. That also applies, unfortunately, to the digital nutrition coaches that are currently popular: it is not easy for the consumer to decide which e-coach is actually sensible and responsible to use. In the case of digital fitness coaches, the main problem is that the measurement data is presented as being more precise than it actually is. It may be difficult for the consumer to interpret this data correctly. Moreover, online synchronisation of exercise, diet, and weight data presupposes a calibration of the measurement data that is not actually provided. A more responsible digital coach would make the unreliability element of its analysis clearer when reporting to the user. For the consumer, critical journalism or a database with reviews of the available e-coaches would be an effective way of finding out about the reliability of e-coaching systems.

Our ideas about our body and appearance are harmful for our mental and physical well-being.
It is extremely important that we become aware of this problem and it must not be ignored by the developers of digital body coaches. One possible design goal for improving people's attitude to their own bodies is to stop them comparing themselves to an external ideal imposed by society by having the e-coach inform them about the fascinating parameters of their own somatics.

Different standards apply to the healthcare sector and to the consumer market.
Healthcare is required to observe scientific standards and standards of medical ethics for which the government is responsible. In the case of the consumer market, however, consumers and producers must have a great deal of freedom to select a particular approach according to their own views and opinion. The problem with e-coaching is that in many cases it is located in the grey area between these extremes.

Autonomy demands reflection.
E-coaching is intended to encourage people to adopt certain behaviour. This already shows that the relationship between influence and autonomy is a complex one because the user acquires an e-coach in order to influence *himself*. The way in which the coach allows the user to set targets is crucial. Options that at first sight appear to leave the user free may on close inspection turn out to be extremely controlling in a way that is undesirable. Conversely, a design intended to give the user greater insight and to consequently alter his goals may in fact be highly responsible.

The relationship between functions and interests must be transparent.
The advent of digital coaching and monitoring offers various interested parties new ways of promoting their interests. For researchers, all kinds of personal and medical data can be collected in new ways. With a view to cutting costs, health insurers can use e-coaches to influence patients and users. Commercial companies may find it extremely lucrative to be able to track users and find out all about them for marketing purposes. In all these cases, it must be clear to the user to what extent the provider is offering or recommending a particular service or functionality because it may serve such interests on the part of the provider.

I do not claim that the issues discussed in this chapter together paint a complete picture of the moral conditions that a responsible system should meet. Body management is a topic that brings together various cultural, moral, philosophical, and scientific problems. I have attempted primarily to clarify this complex system of relationships in order to give developers and policymakers a framework for thinking about this topic. I hope that this essay will encourage further reflection.

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Certification of medical software

Many body management e-coaches function in the grey area between the medical and consumer domains. This has consequences for the requirements that they must meet and the testing that they have to undergo. In the Netherlands, software that is considered to be a 'medical device' is subject to a number of requirements in accordance with EU Directive 93/42/EEC. An app is classed as a medical device if it is used for diagnosis or treatment, or if it has a measurement function. In order to guarantee that a medical device complies with the legal requirements, it must go through the CE certification process. The CE marking (*Conformité Européenne)* indicates that the software complies with the EU's requirements for safety, health, environmental protection and consumer protection, and that it has been subject to the procedures to check this. A medical device that does not bear the CE marking may not be placed on the market or used. The penalties for not having the required CE marking can be as high as EUR 900,000 in the Netherlands (Dutch Decree on Medical Devices [*Besluit op de Medische Hulpmiddelen, BMH*]).

The intensity of the certification process depends on the risk category into which the software falls. Purely diagnostic apps are placed in a lower risk category than those that monitor vital body functions, as measurement errors are then potentially dangerous for the user. To gain certification, the developer must compile a 'technical dossier'. This includes a risk assessment, a collection of clinical data, a clinical evaluation, and a quality system to show that the device complies with the requirements of the Medical Devices Directive. The cost of drawing up a technical dossier is an estimated EUR 10,000 minimum; on average, the costs come to EUR 7000.

It is not always clear when exactly software is considered to be a medical device and must therefore bear the CE marking. In order to be certain, developers state that their apps are not for diagnostic purposes but only for 'entertainment' (SmartHealth 2013). Healthcare professionals are therefore concerned about the reliability of many apps that are available on the market. According to the Dutch Healthcare Inspectorate [*Inspectie voor de Gezondheidszorg, IGZ*], in mid-2013 there were only five apps on the Dutch market with a CE certificate. In order to clarify matters, the National IT Institute for Healthcare in the Netherlands (Nictiz) came up with a seven-step method in 2013 for determining when certification is required. Since 1 January 2014, the Healthcare Inspectorate has been proactively

enforcing the CE certification requirements for medical apps. The EU's Medical Devices Directive is also being revised, with an attempt being made to clarify matters regarding medical software (EC 2012).

Although the CE marking guarantees compliance with EU product safety requirements, it does not guarantee the quality of the product or its clinical relevance for determining a particular diagnosis. The Royal Dutch Medical Association (KNMG) and the VvAA (an insurance association for medical/paramedical professionals) are therefore investigating the feasibility of introducing a seal of approval to guarantee the reliability and clinical functionality of medical apps for doctors (SmartHealth 2013).

The reliability of medical apps is also on the agenda of the Dutch House of Representatives. In a recent communication to the House, the Dutch Minister of Health, Edith Schippers, stated that 'products are being developed by other parties, such as health apps, without it being immediately apparent how reliable they are, for example because they are sponsored by companies that want to earn money from them' (*Parliamentary Proceedings [Kamerstukken*] II 2013/14, 29689, No. 483). A Christian Democrat MP, Hanke Bruins Slot, recently advocated setting up an 'app-othecary' for reliable medical apps (Nu.nl 2013). According to her party, the Netherlands Healthcare Institute (ZN) should join with doctors and patients to determine which apps are reliable and effective, and for which patients they are suitable. The approved apps would then be listed on the "Better Choice' website (www.kiesbeter.nl) that provides information about healthcare in the Netherlands. There would seem to be a strongly felt need for some kind of quality guarantee for medical apps. It is not yet clear what impact this will have on e-coaches that are outside the medical field but which nevertheless influence aspects of health and lifestyle.

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Financial coaches

Scenario: Banking at the community garden

By Gaston Dorren

A sunny day in spring 2019. Three women have been working at the communal vegetable patch and are taking a break.

Anne: 'Have I already paid my contribution?'
Monique (takes out her smartphone and opens the bank app): 'Yep, you were the second. Right on time, on 14 March.'
Anne (looking over her shoulder): 'Hey, it says the balance is zero. Are we out of cash again?'
Monique: 'No, don't worry. You surely don't think I leave the money in the current account? It'd just get eaten away, what with inflation like it is today.'
Anne: 'That's true, but you don't shift money around for just a few euros, do you?'
Monique: 'Well, I already use the OptiInterest app for my own household finances, so now I'm using it for our gardening club's account too. It keeps track of which bank offers the highest interest rate and then it transfers your money to that bank.'
Anne: 'That's pretty neat. But surely there's a catch…. Isn't it expensive?'
Monique: 'Not at all. I use the free version, with adverts. It does take a bit of time, but only when you first start using it. You need to open an account at a whole series of banks, otherwise you can't shift the money around. I've now got accounts at about twelve banks, but most of those accounts are empty.'
Anne: 'How much do you earn with it?'
Monique: 'Three or four hundred euros a year, I think. For the family, I mean.'
Anne: 'That's hardly high finance, is it.'
Monique: 'No, of course not, but it's money for nothing. If you're talking about the return, then I think my OptiBudget app earns me more.'
Anne: 'What's that exactly?'
Monique: 'It's a kind of electronic housekeeping book. It's really neat.'
Anne: 'If you like that kind of thing...'
Monique: 'True, you need to be someone who likes details. But it's not much work actually. It just takes a bit of time when you get started with it. The app first needs to check out your finances, and you have to help it a bit. You have to tell it which bank transfers are for what – groceries, the car, clothes, insurance premiums, and so on. After a while, it understands almost everything itself, and it takes over a lot of the calculation work. I only need to set a maximum for how much I want to spend at the supermarket each month, how much on clothes, how much in cafes and restaurants, and so on. When I get close to the limit, it gives me a warning. Bart's got the same warning function on his mobile too.'

Anne: 'What happens if you or Bart goes over the limit?'
Monique: 'We just go over. It's not as if the app puts a lock on your purse – it can't force you to do anything.'
Catherine: 'It sounds great.'
Monique: 'It is great!' Now and again I increase the limit a bit so that I have more money left over at the end of the month.'
Anne: 'But then you've had less fun! I mean, what you're actually doing is hoarding it. (Laughs) You're a threat to the Dutch economy!'
Monique: 'But it's great to still have money left over! It's a bit like financial jogging: you have to sweat a bit but the reward is that you get really fit – financially fit. And anyway, I'm not just hoarding my money. According to my financial adviser...
Anne: 'Let me guess – it's an app called OptiPlan.'
Monique: 'Very funny... no, he's an actual person. His advice was to pay off the interest-only part of the mortgage and make better arrangements for Bart's retirement – he's an own-account worker, so he has to do it all for himself. Mortgages, pensions and big stuff like that are too complicated for a computer app.'
Anne (sighing): 'But I know what I'm like. I can put an app like that on my mobile, or on my tablet, but I know I won't do anything with it. I don't have the discipline to make serious use of it. That's mainly because we always do make our paycheques stretch to the end of the month, give or take a hundred euros. Carol and I don't do anything crazy. The holiday allowance covers the cost of our holiday and if it's been an expensive month then we just go into the red for a bit.'
Monique: 'But an app like this can help a lot! It you turn on the advice function, for example, it can suggest that you don't fill up on the motorway but where it's cheaper. It can also tell you how much playing the lottery costs you overall each year, or being in the red now and again. And how much quicker you can reach your savings target if you fill up more cheaply or don't buy any lottery tickets.'
Anne: 'Does it think I'm stupid, then? Anyway, I haven't got a "savings target"! I don't want a savings target! I don't want to have to worry about that kind of thing at all!'
Catherine: 'It sounds great to me.'
Anne: 'What sounds great? Not thinking about money matters?'
Catherine: 'Yes.'
Anne: 'Well, don't then! Or rather, do don't think about it!'
Catherine: 'I...well I have to.'
Anne: 'How come? Are you hard up?'
Catherine: 'That's putting it mildly. They've put me on debt counselling. When my ex cleared off, almost everything was in his name, but the personal loan was in both our names. Crafty bastard! So now I still have to make payments every month, and since I moved I've also had to pay rent for the new place. On my little salary it's almost impossible. So I'm up to my neck in debt.'
Monique: 'And the bank app didn't warn you that you had more going out than coming in?'

Catherine: 'To be honest, I'd turned it off. I was doing everything with cash and I was overdrawn to the maximum – including on the credit card that I still had from when I was well off. I chucked every letter that looked even halfway financial in a drawer, without opening it.'
Anne: 'How awful for you. So what happens now?'
Catherine: 'I try to rustle up as much as possible for free. My vegetables come from the vegetable patch here and I get yesterday's bread from the baker at the shopping centre – he knows about my situation. My mum's given me her old TV. And the people from the debt counselling service gave me a mobile from 2014 so I could...'
Monique: 'Jesus, 2014! Back then they still had glass doors that you couldn't roll up! Oh... sorry to interrupt.'
Catherine: '...so I could in any case use the debt counselling app and the special offers app.'
(The other two look at her quizzically.)
Catherine: 'Ah, well, the debt counselling app is a bit like that app of yours, **Monique**, the... what was it called?... "OptiBudget". But it's more of a MiniBudget app, for just bloody small amounts – 25 euros a week for food, 10 euros a month for clothes.'
Monique: 'You're kidding!'
Catherine: 'Yes, really. So it means stuff from the charity shop. And my purse does have a kind of lock on it. Once I've spent the 25 euros on food, I can choose between eating only free vegetables and bread for the rest of the week or using up some of my clothes money. That's because my bank card is linked directly to the app, and it simply doesn't work if I look like I'm going to go over my budget limit.'
Anne: 'What about that other app that you mentioned? Does it tell you where you can find special offers?'
Catherine: 'Yes. So twice a week after work I get on my bike and do my regular tour of the supermarkets. I've become a kind of "bargains hunter-gatherer". What's annoying is that I'm not allowed to buy a whole lot of stuff all at once while its cheap because the budget app stops me. The two apps don't communicate. But my brother gives me some cash now and again.'
(A silence falls.)
Catherine: 'But it's not all just misery and woe, you know. At least I don't need to worry about shifting my savings from one bank account to another like you do! And when my debt counselling scheme is finished in two years time, I'll make the biggest financial leap forward in my whole life. Shall we do some more weeding? I want to be able to harvest a whole lot of fruit and veg next summer!'

With thanks to Ryan Batelaan. The above fictitious conversation is partly based on Ryan's experience of introducing a financial app, but it does not necessarily reflect her own personal views.

3 E-housekeeping books. Moral economy in the digital age

Harro Maas[34]

3.1 Introduction

A symposium took place on 30 November 2009 at the Money Museum (now closed) in Utrecht to celebrate the 25th anniversary of the Dutch National Institute for Family Finance Information (Nibud). The topic of the symposium was the household budget. The then Minister of Education, Culture and Science, Ronald Plasterk, opened an exhibition on the history of the house-keeping book, organised by the museum in honour of the institute. Plasterk referred to his own childhood, when his parents had very little money and had to keep careful track of what they earned and what they spent. The symposium took place only a year after the start of the financial crisis that began in September 2008 with the collapse of the American investment bank Lehman Brothers. As we have seen, this turned into a period of economic stagnation that will simply not go away, and that has countries, banks, businesses, and families all over the world in a stranglehold of financial uncertainty.

In early April 2013, the Dutch Prime Minister, Mark Rutte, attempted to reverse the gloomy mood by calling on the country's population to 'outwit' the Netherlands Institute for Social Research (SCP) and to pull away the 'blanket of negativism'. 'Let's go ahead and buy cars,' he said, 'let's buy houses. We need to take a bit of a risk and have a bit of confidence' (*de Volkskrant*, 11 April 2013). These remarks were received – understandably enough – with a certain amount of scepticism. They seemed, first of all, to constitute a reckless appeal at a time when apparently unavoidable austerity measures are having a profound impact on the financial position of many Dutch households. Rutte's exhortation collided, moreover, with the now widely accepted view that the financial obligations that individual citizens had taken on were at least one of the causes of the economic malaise in which the world economy had ended up.

The Prime Minister's appeal was not merely in stark contrast to the diligence with which Plasterk's parents had attempted to keep their finances in order, but also to recent recommendations by behavioural economists and social psy-chologists that individuals should be made more aware of the consequences of

34 I would like to thank the following persons for the conversations I had with them in the context of this study: Tamara Madern and Marion Weijers (both Nibud), Natali Helberger (Professor of Information Law at the University of Amsterdam), Frans van Winden (Professor of Experimental Economics at CREED, University of Amsterdam), and Maarten van Rooij (senior economist at the Dutch central bank, DNB).

their financial decisions (for example Tiemeijer et al. 2009; Van Rooij 2008). In line with those recommendations, bodies such as Nibud have advised families to start filling in the good old housekeeping book once more as a means not only of keeping track of their income and expenditure but also of relearning how to manage them (Madern & Van der Schors 2012b; Nibud 2012). After all, research has shown that households that do fill in a housekeeping book have a significantly lower risk of defaulting on payments (Nibud 2008; NIBUD 2012). A housekeeping book is not just interesting for people who want to avoid problematic behaviour but also for 'optimisers', people like Monique in *Banking at the community garden*, who uses her 'OptiBudget app' to get the highest possible return on her savings.

It is incorrect to think that the demand for aids to help in making and managing complex financial decisions is something new. As far back as the early eighteenth century, Richard Steele wrote in *The Guardian* that someone was not 'a very fine gentleman' because of his after-dinner conversation, but because he was able to keep good track of his profit and loss account. In the aftermath of the South Sea Bubble of 1720 – perhaps the first really big international financial crisis – the British businessman Archibald Hutcheson wrote that people had finally come to their senses and were able 'to reason and compute'.[35] The term used back then for the system of someone's behaviour was his 'moral economy', a concept that nicely expresses the economic-financial and moral significance of someone's behaviour, while leaving open the question of whether that system represents a quality of the individual or of the tools he uses.

Benjamin Franklin described the same system in 1772 in a letter to the chemist Joseph Priestley to explain how he took decisions in matters of major moral importance. Franklin took a sheet of paper and divided it up, like a page from a ledger, into a debit and a credit side. Over a period of several days, he then noted the arguments for and against a decision and looked at which way the balance tilted. The advantage of this way of proceeding was that the balance sheet helped delay, objectivise, and – as it were – automate the difficult decision. A good half century later, Charles Darwin used the same method to decide whether or not he should marry his cousin Emma Wedgwood (which he in fact did, incidentally). Nineteenth-century political economists made use of Franklin's 'moral algebra' to analyse how individuals took market decisions. Franklin's system developed from a tool into a theory of cognition rooted in economics.

In recent decades, behavioural research has shown that people are only able 'to reason and compute' to a limited extent, and that they require aids in order to take decisions responsibly (for example Kahneman 2011; Tiemeijer, Thomas & Prast 2009; Thaler 2004). This kind of research has also made clear that it is

35 Both these quotations are taken from William Derringer (2012).

possible to guide an individual's behaviour in a particular direction, sometimes just with simple interventions, by means of a 'nudge' (for example Antonides, De Groot & Van Raaij 2011; Gigerenzer & Todd 1999, Thaler & Sunstein 2008). Tools such as e-coaches (including financial e-coaches) and in earlier days Franklin's moral algebra are and were an answer to this. The market is clearly responding and there is now a proliferation of electronic housekeeping books, financial comparison sites, and e-budgeting tools to help people gain an overview and take decisions which they do not seem to be able to take by themselves. But what do these new tools do and how do they differ from their predecessors?

If we look back in history, we see that the housekeeping book developed from a means of encouraging prudent financial behaviour into one serving optimisation goals. One can also distinguish between these two goals in the case of today's e-housekeeping books and budgeting tools. But unlike traditional housekeeping books, which were filled in by the user (generally a woman), today's versions sometimes introduce a third party and seat him permanently alongside the user at the kitchen table, namely the provider of the product.

It is this development that I would like to consider. After briefly outlining what is currently available in the way of e-housekeeping books, I describe its historical evolution up to the point when it disappeared back into the drawer (i.e. during the period of increasing prosperity after the Second World War). The current financial crisis has created a renewed need for tools to help keep our finances in order. E-housekeeping books key into that need. Based on two examples of financial e-coaches, AFAS Personal and You Need a Budget (YNAB), I show how prudency and optimisation are presented differently in these two apps. The parties that provide the app are able to track the user's behaviour. They don't necessarily do so, but as it is difficult for users to determine if they do, and to what extent, the neutrality of the financial e-coaches is open to question. In the concluding section, I deal briefly with the consequences that this has for policy.

3.2 What e-housekeeping books are available?

The housekeeping book celebrated by the Money Museum in its 2009 exhibition seems to be enjoying a comeback, but in a more modern guise. In early 2010, the ING Bank launched its online housekeeping book 'Tim'.[36] The ABN AMRO bank followed six months later with its 'Financial Diary' [*Financieel Dagboek*] and in late 2011, Rabobank followed with its 'Rabobank Online' housekeeping book. Every Dutch bank now has an online service of this kind. Housekeeping books are provided not only by banks but also by other commercial organisations, in particular software companies. In the Netherlands, AFAS Personal (including AFAS Personal Plus) has some 500,000 unique

36 In April 2014, ING announced that it would no longer be providing Tim. Accountholders could switch to the 'Cashflow Assistant' provided by the BankingTools software company.

users[37]. Other Dutch examples are Penningmeester, eyeWally, Online Kasboek, and WinBank. Besides e-housekeeping books, there are also specific costing and/or budgeting tools that can be used online or offline. These are not just to be found in the Netherlands, of course, but elsewhere as well. One example is YNAB (You Need A Budget), a budgeting tool for which the user pays a one-off fee for the software, which must then be used offline. The popular e-housekeeping programme Mint.com is only available as online tool. Some of these tools come in versions designed not only for a laptop or PC but also for a smartphone or tablet. It is sometimes possible to scan sales receipts, which can then be categorised, in some cases automatically. The good old housekeeping book would indeed seem to have undergone a miraculous resurrection.[38]

Making payments on time is not a significant problem for most households, although the number of those struggling to do so has been rising since the start of the financial crisis, in both absolute and percentage terms; the past two years have in fact seen a sharp increase in their numbers (Jungmann & Van Iperen 2011; Jungmann 2012, NVVK annual report 2012). It is clear, however, that households that do have payment problems can benefit from tools that help them to improve an undesirable or even untenable situation (or at least get it under control). One might expect it to be lower-income households that would have systematic arrears of payment, but since the crisis payment problems have also been affecting higher income groups (Jungmann 2012; Madern & Van der Schors 2012a; Nibud 2012).

In a financial coaching programme, a housekeeping book is a practical tool that the coach goes through with the client in order to analyse the latter's spending pattern and to decide where the client can economise or how the spending pattern can be phased more effectively so as to bridge the gaps between income and expenditure more easily.[39] The question is whether this relationship between coach and client is different in an Internet environment. In such an environment, does the tool that has so long been used to manage and control family spending take over functions from the coach, and does it perhaps also alter the relationship between the tool and the user? Are there interests associated with an Internet housekeeping book that in fact work against those of the user rather than for them?

Before dealing with these questions, I will first look at how control, responsibilities, and interests were allocated in the past. I'll focus on two periods, namely

37 http://www.afaspersonal.nl/over-afas-personal
38 In 2010 and 2011, there were a number of reports in Het *Financieele Dagblad* and other national and regional Dutch newspapers remarking on the spectacular growth in the number of online housekeeping books.
39 A traditional coaching programme involves a flesh-and-blood coach and the client, i.e. the person whom the coach is assisting. Nibud refers to coaching when there is a coaching programme, in other words repeated assistance aimed at changing behaviour. Madern and Weijers, interview 15 August 2013; see also Jungmann & Van Iperen 2011.

Victorian England and the United States at the beginning of the twentieth century.

3.3 Financial and moral bookkeeping

The emergence of a well-off middle class in Victorian England led to the publication of a large number of manuals and etiquette books: how to organise the house and household, how to tackle the family's bookkeeping, what to serve to guests, and how to use income and expenditure statements to plan for the future. In manuals such as these, which were targeted primarily at newly married women, 'Mrs Lavish' – who indulged in conspicuous consumption – or 'Mrs Liberal' – who failed to supervise her servants – were presented as examples of women who led their family to rack and ruin (Kitchiner 1825). A woman stood a better chance on the marriage market if she was good at bookkeeping (Walker 1998).

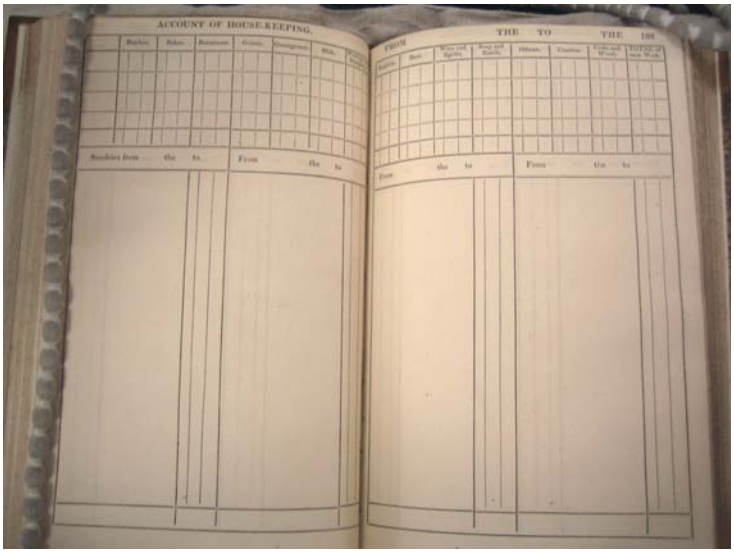
Housekeeping books came in all shapes and sizes, in many cases published by the churches and with more or less detailed categories of expenditure. The format of these publications varied, but it was usually derived from the book-keeping system used by small businesses. Figure 3.1 shows a typical pair of pages from a Victorian housekeeping book. The boxes at the top are intended for recording weekly payments to the butcher, baker, grocer, greengrocer, etc. They are filled in and added up, with the total being inserted in the far right column. The five rows provide the user with an overview for the month and at the same time show how spending differs from week to week. This system enabled the prudent housewife to identify exceptional peaks in spending and thus attempt to prevent them. The columns serve as a ledger, i.e. for recording payments in the order in which they were made. The usefulness of such a housekeeping book depended entirely on whether the user was consistently diligent and accurate about filling it in.

One of the main advantages of consistent bookkeeping was that it overcame the limitations of one's memory, enabling one to look both back and forward. The instructions in 1856 for how to make proper use of a financial diary stated:

> ***'An appointment, a notice or any other circumstance of promise or expectancy should be committed in its pages with equal fidelity. Nay, even your Thoughts upon very many incidents, that are passing; for a valuable suggestion will often occur to the mind once, and be for ever lost if not then secured.'***[40]

40 Instructions for Lett's Diary, 1856.

Figure 3.1 A Victorian housekeeping book



A typical page from a family housekeeping book. From *The Housekeeper's Ledger: A Plain and Easy Plan of keeping Accurate Accounts on the Expenses of Housekeeping and the Elements of Domestic Economy* by William Kitchiner, 1823.

Accurate, permanent recording of information was a *conditio sine qua non* for planning and for responsible decision-making.

Proper bookkeeping in fact made someone a better person. In his book *The Emotions and the Will* (original edition 1859), the Scot Alexander Bain, one of the founders of psychology, recommended using calendars, ledgers, and diaries in order to regulate one's moral housekeeping:

> ***'The mind may be untrustworthy in recording the successive impressions, and may thus leave us at the mercy of those occurring last; it is to counteract such a danger that the method of recording and summing up the separate decisions is here recommended'*** *(1875, p. 415).*

In other words, keeping up one's calendar, diary, or housekeeping book served not only to understand and control one's personal and household finances but also to prevent mistakes. In this way, the user could become someone who acted responsibly, and who was swayed neither too much nor too little by his most recent memories. As is clearly shown by the letter (see above) from Benjamin Franklin to Joseph Priestley, bookkeeping ability implied that one as prudent, able to calculate rationally, and emotionally balanced.[41]

41 Letter dated 19 September 1772 from Benjamin Franklin to Joseph Priestley. See for example http://www.procon.org/view.background-resource.php?resourceID=1474, accessed 6 January 2014.

At the end of the nineteenth century, Max Weber interpreted the close relationship between financial reporting and moral behaviour in a theory of human action in which mental bookkeeping rules come to dominate action itself. According to Weber, with the rise of capitalism individuals were increasingly embodying the 'soul' of the merchant. In the same way as a merchant is able to order assets and demands, the growth of capitalism had made everybody better able to harmonise his behaviour with the 'principles of commercial bookkeeping', thus learning to act 'in this sense, rationally' (1975, pp. 32-33). The theory of mental accounting developed by the financial economist Richard Thaler presents a similar theory in a modern guise. Unlike Weber, Thaler views mental accounting not as the outcome of an historical process in which bookkeeping rules were internalised but as an inherent feature of human decision-making, with Thaler also wishing to show the *limitations* of our ability to act rationally (Thaler 2004). Familiar examples are our inability to properly assess the value of long-term and short-term decisions and our tendency to overbid at auctions ('the winner's curse').

Scientific management

In the early twentieth century, the religious context of housekeeping books faded, but without the moral connotations disappearing. The church was replaced by scientific management, the first wave of feminism, and, in the Netherlands, social democracy. Particularly in the United States, the housewife was profiled as the *manager* of an interesting enterprise – one perhaps even more interesting than her husband's – namely the family (Walker 2003). In the Netherlands, there was above all the radical-liberal movement in the early part of the twentieth century and the interwar years, to which Jeltje de Bosch Kemper and Jeannette Polak-Kiek belonged (Borst 2005; 2011). It became important to run one's household in a rational manner, according to the rules of scientific management. Efficiency and optimisation became the guiding principles: what was the most efficient way to boil an egg or bake an apple pie? …and so on for every aspect of the household 'business' (Walker 2003).

Manuals were produced advising women to time their activities so as to increase efficiency. In order to do this, it was essential to have an administration system and to update it accurately and precisely. But where the emphasis had previously been on relieving and correcting one's memory, the focus now shifted to the future. The dominant theme became not so much *control* but *planning* of family expenditure. However, the rules of behaviour that scientific management prescribed for women missed their target entirely. After all, what is the point of going to a lot of trouble to time how long it takes to bake an apple pie if the only 'member of staff' in the household is the housewife herself? It is no wonder that this approach to housekeeping was only short-lived.

Increasing prosperity after the Second World War meant that for large parts of society, the need to 'look after the pennies' disappeared, and with it the need

to keep precise, accurate track of household finances. The housekeeping book, the separate jam jars on the kitchen counter for day-to-day groceries, coal or clothes, and the (obligatory) savings systems – all of them disappeared from the private domain. British prudence and American efficiency were replaced by a quick and careless glance at one's bank statements. Responsibility for an overview of one's finances was consequently shifted implicitly to the bank or giro service. And when the bank statements also ceased coming through the letterbox automatically, the link between shopping and spending disappeared from our financial memory and we lost track entirely of our financial behaviour.

From a 'push' model of information in which the bank periodically notified clients of their financial doings, we have ended up with a 'pull' model whereby users themselves need to go in search of this information *proactively*. Responsibility for the financial overview has consequently shifted back to the individual user. It is in the context of that shift that we should view the rise of the digital housekeeping book. Whereas Richard Thaler sees individuals making use of defective internal mental bookkeeping, there is, rather, a state of financial amnesia; we have forgotten how to deal with our bookkeeping properly and we need assistance to regain control and understanding of our financial behaviour. The market for e-housekeeping books is responding to that need.

3.4 A closer look at two financial e-tools

In this section, I take a closer look at two examples of such programs, namely AFAS Personal and YNAB (You Need a Budget). Both these tools respond to the insufficient explicit attention that the average person pays to his or her pattern of expenditure, and emphasise the possibility of improving that pattern by acting systematically. What they are in fact doing is putting a modern twist on improving the user's moral housekeeping or moral economy.

AFAS Personal

AFAS Personal (and AFAS Personal Plus) is an online administration system for private users, derived in 2008 from a graduation assignment by four students at Utrecht University. One of the four founders has emphasised that their own frustration with their lack of a financial overview was an important reason for designing the program. A derived goal was to use the overview to deal with money more efficiently, and to make savings where possible.
After two years spent experimenting within a small group, and an injection of some venture capital, the students began marketing their housekeeping book in 2010 as 'Yunoo', which was immediately voted website of the year. Yunoo was nominated again in 2011, consequently becoming an increasingly interesting proposition for established software companies. Within just a short time, the number of account holders leaped to 200,000. Yunoo has since been bought by the AFAS software company and the housekeeping book is now available as a free online version (AFAS Personal) and a paid version (AFAS Personal Plus). There are currently about 500,000 registered

users[42]. The banks responded to the success of Yunoo by developing their own online housekeeping books. Rabobank based its own version on the AFAS platform.

At first, AFAS Personal consisted primarily of a housekeeping book in which information from various different bank accounts could be combined, thus giving the user a more coherent picture of his total income and expenditure. The options have gradually been increased. Currently, AFAS Personal combines the housekeeping book with options for costing and budgeting. There is also an archive in which contracts can be kept track of, a function for calculating pensions, and the option of inputting salary statements. Receipts can be scanned by means of an app and categorised automatically.

How different kinds of expenditure are categorised is of course important. Income derived from the user's salary and payments for gas and electricity are categorised automatically. The same goes for debit card payments at the supermarket, which are categorised as grocery shopping. However, there remain a large number of amounts that still need to be categorised. In the free online version, subcategories (labels) can be added to the main categories, but the user will of his own accord change the label or category under which specific expenditure should be filed. The program may also categorise payments incorrectly, so that they need to be re-categorised manually. All in all, a new user will need to devote a certain amount of time to getting the housekeeping book 'in order'. This investment of time is basically not any different to the good old paper housekeeping book with pre-printed categories, but it is more extensive because today's pattern of consumption is more diverse and complex.

Moreover, just when an overview is 'in order' is open to question. Is it in order if the user himself is satisfied with the labels and categories used – with the housekeeping book expressing the most purely individual purchasing experience – or is it only in order if a comparison can be made with households with a similar profile? Such normative comparisons are basically not new, but the extensive collections of data available for online housekeeping books mean that they can be produced at a much greater level of detail. What is new is that the user himself can make such detailed comparisons on the spot, consequently living permanently – as it were – in a quantified space in which comparison with other people is possible.

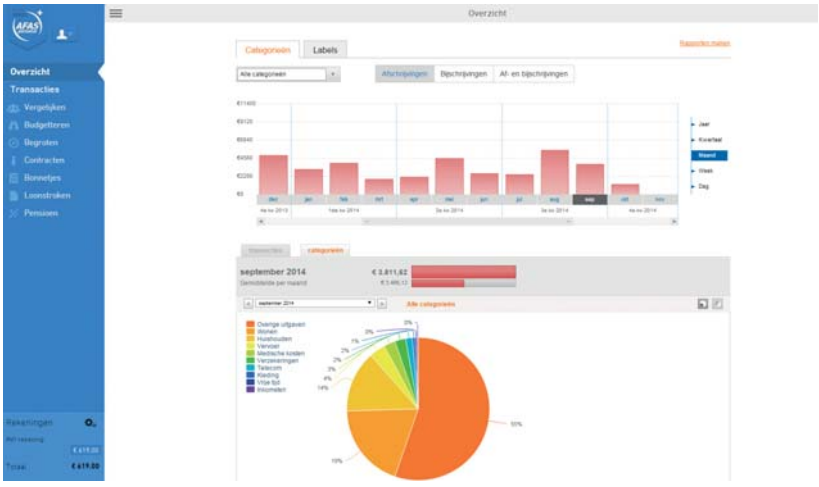
This unavoidably creates tension between standardisation and personalisation. There is no such thing as an average user, and every user will therefore need to personalise the labels and categories provided. That, however, does not foster comparability. Optimum comparison between individuals becomes possible when every user applies precisely the same categories and labels. For compari-

42 http://www.afaspersonal.nl/over-afas-personal

sons between individuals, AFAS Personal makes use of the average patterns of expenditure provided by Nibud. Nibud in turn derives this information from Statistics Netherlands (CBS) and its own research. Nibud emphasises that it does not issue standards for expenditure but benchmarks, making it up to the individual user to judge whether specific expenditure is too high or too low. Nevertheless, such benchmarks can – and will – be interpreted as normative.

Figure 3.2 shows how AFAS Personal presents the user with an overview of his income and expenditure. The introduction on the Internet says that it is 'more fun' to look at bar charts and pie charts than at figures, but the question is then of course who – which type of user – will find this 'more fun' and what purpose does it serve. In an interview, Kevin Voges (one of the founders) raised the possibility of adding game elements to the program in order to make it 'more fun' to use. These ideas seem not to have been followed up, however, because they would in fact only distract from the original purpose, namely of gaining an understanding and control of one's finances.

Figure 3.2 AFAS personal



A screenshot showing the various functions of AFAS Personal (blue tabs), the accounts linked to the overview (bottom of left-hand column), the expenditure categories (lower left-hand column), a bar chart of expenditure (red) over various months, and a pie chart specifying spending for a month in percentages by category. For an informative overview, this user would need to devote much more time to breaking down the 'other expenditure' '[*overige uitgaven*]' category into more specific categories.

In the same way as a nineteenth-century housekeeping book addressed the user as if she were the responsible owner of a small business, today's AFAS Personal talks to the user as if to a manager who acquires his information by interpreting bar charts and pie charts. This requires, at the least, that users have enough training to be able to read and evaluate such visual information. Does this kind of presentation actually give users a better understanding and

greater control of their expenditure? The bar charts show income and expenditure per unit of time (week, month, year), but it is not clear what criterion for action can be derived from this. The same applies to the pie charts. What if a user's expenditure differs from that of his reference group? Is that a problem or not? And what action guidelines can then be based on it?

One unmistakable advantage of programs such as AFAS Personal is that they bring together various different accounts in a single overview. However, if the point is to develop financial awareness, then automating the categorisation of expenditure can also be seen as a disadvantage. If it is an important objective for clients to once more become aware of their expenditure and their pattern of expenditure, then it is unhelpful for them to work with a program that updates data automatically, as they no longer need to give such categorisation the necessary level of attention. To compensate for this, the program could incorporate warning signals to draw the user's attention. ING Bank's housekeeping book, Tim, had an 'alert signal' that sent a text message if the user threatened to exceed a budget that he had set for himself. AFAS Personal and YNAB display budget overruns in red, and the YNAB instructions then ask the user to reallocate the budget.[43]

YNAB

You Need a Budget (YNAB) is an entirely different program to AFAS Personal and operates according to a different philosophy. The emphasis is not on providing a financial overview but on changing the user's behaviour. It teaches users to think in terms of component budgets. YNAB is an American offline program and its manner of presentation is also friendly in an American style. As with AFAS Personal, it is possible to download information from various different accounts and, also like YNAB, it works with a pre-programmed classification of expenditure. Unlike AFAS Personal, however, these categories can be fully personalised. YNAB emphasises that everyone's situation can be different, and that it is therefore a good thing to adjust the categories in line with personal circumstances as much as possible.

The corporate story presents the founders as an average middle-class family who were fed up with always being in the red and who wanted to learn how to plan for the future – in other words, a family that potential users can easily identify with. The founders developed four rules that users need to follow to achieve successful financial management:

1. 'Give every dollar a job';
2. 'Save for a rainy day';

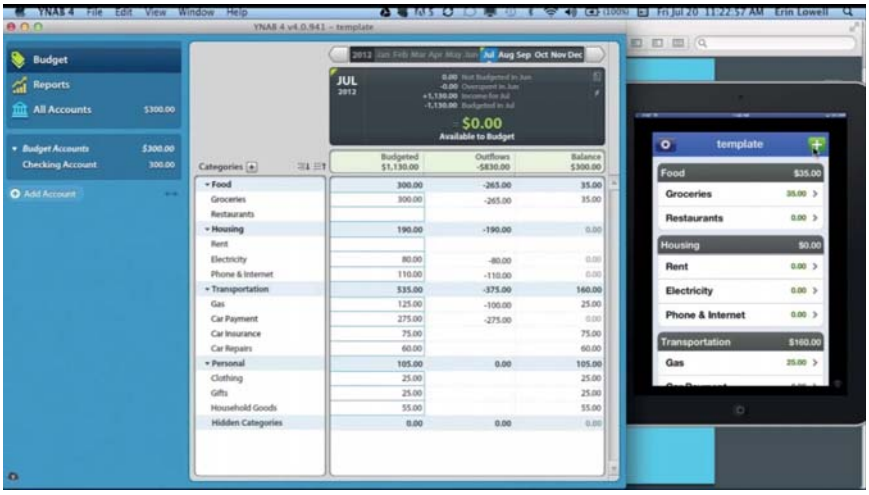
43 It should be noted that, according to economic theory, setting budgets does not mean that one then acts more rationally. As Richard Thaler and others have shown, setting up barriers between different kinds of (planned) expenditure can lead precisely to suboptimal decisions being taken.

3. 'Roll with the punches' (i.e. be flexible in how you handle your budget);
4. 'Live on last month's income'.

The aim of these rules is to teach users how to plan and so build up a reserve to cover unexpected expenditure. The focus is on budgeting, i.e. allocating funds for a set goal. YNAB strongly emphasises that a budget must not be a straitjacket but should in fact be liberating (because the user is more 'in control' and consequently 'freer' than without a budget).[44] Online housekeeping books like AFAS Personal and Tim also offer a budgeting option. Unlike with YNAB, however, this involves creating a budget for a specific goal rather than systematically allocating *all* the available funds for different goals, meaning that the user is forced to also align those goals with one another.

Acquiring the YNAB software is like joining a family. In its early years, AFAS Personal – like Yunoo – maintained a 'community' within which users made suggestions for improvements, or gave one another tips about using the program. The current AFAS Personal, however, is primarily a platform that the user must find his way around for himself. If he has a problem, he contacts a helpdesk rather than other users. By contrast, YNAB attempts to create and maintain a community feel in its manner of presentation and with follow-up e-mails. Someone who participates belongs to a community of responsible citizens. YNAB provides free online courses to learn how to produce an integrated budget. These courses or webinars answer users' questions in real time.

Figure 3.3 You Need a Budget



Screenshot showing the functionality and layout of YNAB 4, and also that one's laptop and iPhone can be synchronised. The screenshot comes from an introductory webinar about using YNAB 4.

44 The screenshot is taken from the introductory course for YNAB 4, presented by Erin Lowell. YNAB employees are portrayed as people who got into financial problems because of credit card payments and who got those problems under control by learning how to budget.

Figure 3.3 shows a screenshot from one of these online courses. As one can see, the financial information is displayed on a laptop or PC and is synchronised with the user's smartphone or tablet. Synchronising expenditure with a tablet or mobile phone ensures that the user makes payments as far as possible by bank transfer (or credit card), because that ensures that the link with the expenditure category is retained. The program gradually learns (like AFAS Personal) how types of expenditure need to be labelled, meaning that budgeting gets ever faster (but does not become automatic). One striking aspect of the design is that the information is not displayed in aggregated form as with AFAS Personal, but as simple ledger items for each expenditure category. YNAB's 'thought unit' is therefore closer to the old-fashioned housekeeping book than AFAS Personal.

Support e-mails (that are sent out as regularly as clockwork) address users in a personal tone. They do not appear to come from an automatic sender but from a person called Jesse. 'Jesse' presents himself as the father of the community to which the user belongs and outlines a situation that everyone is familiar with: a bill in one's letterbox. This situation is taken as the starting point for teaching the recipient of the e-mail how he can change himself by dealing with such a bill differently to what he has (presumably) done up to now, in this case by arranging automatic transfers. The fictitious internal monologue tries to get close to the user – to identify, as it were, with what he is thinking. The e-mails are not just restricted to financial management but can also concern dietary and investment behaviour, exercise, and participation in sport, in other words all the spheres of life in which personal control plays a role. AFAS Personal, has no such attempts to 'break in' to the user's private domain.

In YNAB, the underlying theme is 'control of your finances through budgeting'. However, it gives seemingly contradictory signals. On the one hand, the user is encouraged to automate his payments (so that he doesn't need to pay attention to them), while on the other he is called on to keep track of them if possible simply with pen and paper. Where AFAS Personal underscores the benefits of automation and promises to take work off the user's hands, YNAB emphasises that responsible financial behaviour – when push comes to shove – is a matter of paying attention.

AFAS Personal and YNAB therefore address their users in entirely different ways. AFAS Personal sees the user as someone with enough experience of financial and graphic information to be able to interpret the data presented for himself, unaided. It sees the user as someone who wishes to be 'better' than average, and therefore as someone who wants to excel. The program addresses the user not so much as a person acting morally but as someone who wishes to bring about an improvement in efficiency.

YNAB addresses users first and foremost using a moral vocabulary. It is concerned

with attention, regularity, self-control, awareness, etc. And this is not restricted to the financial domain but also extends to the user's health and social wellbeing. The suggestion is that someone who follows YNAB's guidelines will reduce his day-to-day stress, thus becoming a person who lives a more open and accessible life than someone who is permanently lagging behind (financially). Budgeting serves to get the user's moral housekeeping in order.

Revenue models

It goes without saying that online housekeeping books like AFAS Personal or budgeting programs like YNAB also have a revenue model. In the case of an American program such as YNAB, determining the exact revenue model is no easy matter. The first – but probably not the main source of income – is from sales of the software. YNAB then also has earnings from the usual adverts in the website banners, and probably also from commission if its users also download weight-loss or investment programs. For the more highly featured version of AFAS Personal, AFAS Personal Plus, AFAS requires the user to pay a monthly amount that is about the same as a comparable program such as Tim. Yunnoo, the predecessor of AFAS Personal, also had a functionality which offered tailored advice to users to save money (for example to switch to a cheaper energy provider) (Spelier 2011; ZDNet 2011). After AFAS Personal took over Yunnoo this functionality was discontinued, mainly due to the perception of users that the advice would not be independent. AFAS currently indicates that it doesn't use personal data of its users because of the importance of trust of users in AFAS. AFAS considers the e-housekeeping app as a way to increase brand awareness. AFAS Personal mentions in its terms of use that they are 'not in any way involved at a potential agreement or contract between third parties and its users', for example by offering advice.

Paper housekeeping books were not neutral as regards the pre-printed classifications for income and expenditure, but e-tools such as AFAS Personal and YNAB may much further. E-tools may act as if there were an adviser sitting at the table with the user. The fact that financial e-coaches may offer targeted recommendations, implies that the software – unlike a traditional housekeeping book – wishes to promote behaviour by the user that may not always actually be in the interest of that user. Just like mortgage advisers or price comparison sites for consumers, it should be clear to the user if, and if so what commission underpins the advice he is being given.

3.5 Analysis

All of this has brought about clear changes in the relationship between the user and the program. How can those changes be summarised?

Financial transactions are automated

Digital aids such as AFAS Personal automate financial transactions by their users. After an initial period during which the user is in fact required to put in

some extra work, his expenditure is then recorded automatically in pre-programmed (or updated) categories. This gives the user a simple overview of various accounts simultaneously, whereas he previously used to have to create such an overview for himself. It is not entirely clear what the added value for the user is of aggregated methods of presenting data, for example in the form of diagrams and graphs. Easier does not necessarily mean better, nor does a comparison generate a goal for action that fits in with someone's specific situation. What, for example, is someone to conclude from the fact that he spends more than average on 'housing' or 'entertainment'? Is it a change for the better if he alters his behaviour so that it is more in line with the average?

The YNAB program 'learns' that it should place particular kinds of spending in pre-inputted categories, so that YNAB gradually automates the recording of expenditure. In both cases, there is a risk that the user will ultimately devote less and less attention to his finances. For most users, that will not be a problem. But this raises the question what purpose such programs actually serve.

Automated payment also means paying by bank transfer

In all electronic financial housekeeping books and budget programs, the software finds it easiest to process payments that are made by means of a bank transfer (or credit card). The need to scan in receipts – not possible with all programs – is after all rather troublesome, and can be avoided by paying with a debit card or credit card. If these programs come to be widely used, we can expect a further increase in payments made by bank transfer. That, however, is a trend that is already fully underway even without such programs. It will be clear that this not only gives the user better control of his expenditure but also allows third parties to keep track of his financial transactions, whether or not he wants this.

The digital coach looks over your shoulder

Alerts if he overruns his budget and automatic, repeated e-mails remind the user that he should or could do something to benefit his financial (or general) wellbeing. The user can of course ignore these alerts and messages, but that misses much of the point of such programs. Someone who logs in, installs an app, and then receives e-mails has created an external voice that advises or corrects him – whether or not requested to do.

In the case of YNAB, this is repeatedly the case. Have you thought about this? Are you following the four rules properly? What about your health? And what about your investments? As far as I can see, YNAB does not have access to the financial data of individual users because that data is only uploaded to a local computer. Nevertheless, by constantly bombarding the user with e-mails, YNAB interferes all the more in his behaviour. AFAS Personal does not bombard the user with e-mails in this way. On the other hand, its predescssorwas able to see the details of the individual user's payments to provide tailored

advice. This information is clearly worth money. In a posting on the 'MetaFilter' web forum, Andrew Lewis wrote: 'If you are not paying for it, you're not the customer; you're the product being sold.'[45] Having the digital coach looking over your shoulder requires transparency about the revenue models that providers of digital coaches have choses, so consumers have a choice if they want to use a particular digital coach. Consumers have a right to independent advice.

How independent is the digital coach?
We have seen that the housekeeping books of the past were also marketed by a variety of parties, ranging from the churches to organisations associated with the rationalisation movement (in the late nineteenth and early twentieth century).[46]

Once these paper housekeeping books entered the private domain, no third party was involved in their use. With electronic housekeeping books, however, the situation is different. Information can be shared with third parties, to the extent that that does not conflict with the applicable legislation. Information about average patterns of expenditure is worth money, something that is underlined by the ING Bank's original plans – withdrawn immediately after negative reactions – to use anonymised payment data for marketing purposes (*de Volkskrant*, 17 March 2014). Recommending that the user switch to a different energy provider or otherwise proactively asking him to change his behaviour is of course a very clear way of attempting to influence his decisions. One can therefore question whether a commercial organisation is the most appropriate party to exercise such influence, even if that commercial organisation presents itself as a kind of 'self-help group', as in the case of YNAB. There seems to be a need, at the very least, for transparency regarding the financial interests behind the advice given.

3.6 Conclusions

Online housekeeping books have a history. Based on two historical snapshots, we have seen how housekeeping books not only served administration purposes but also intervened in the moral housekeeping of individuals and families. Someone who had his financial housekeeping in order had himself in order or, in the case of America, was in a position to optimise his future. Having gradually disappeared from the private domain, the housekeeping book made a comeback in a modern online guise after the financial crisis of 2008. Families who use a traditional housekeeping book are less likely to end up in financial difficulty, and online housekeeping books – with a certain amount of justification – promise the same. Certainly budgeting programs like YNAB can help

45 https://twitter.com/andlewis/status/24380177712
46 The Dutch Nibud can be seen as today's heir to that movement; despite its portrayal as a public and therefore objective provider of information, Nibud too generates some of its revenue from sales, for example of housekeeping books.

families to think systematically about their financial behaviour and then change that behaviour. What is perhaps contributing to the success of e-housekeeping books is that individuals are no longer seen as completely rational, but rather as people who occasionally need help in order to take better decisions. E-housekeeping books do a good job of supplying that help.

A bigger problem is that when someone uses an e-housekeeping book, there is a third party – one with commercial interests – looking over his shoulder. What use these commercial parties make of users' very detailed data is not transparent. Transparency becomes even more important when financial e-coaches start to offer (commissioned) targeted recommendations. 'Good advice is expensive' says the proverb, and for users it needs to be clear how expensive. The issue is similar to mortgage intermediaries or price comparison sites on the Internet. In 2012, the Netherlands Authority for the Financial Markets (AFM) investigated the transparency and objectivity of the advice given on price comparison sites; only one such site passed the AFM's test. It seems obvious to carry out a similar test for e-housekeeping books.

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Revenue models

Various different revenue models are possible for e-coaches. Many of the e-coaches that are currently appearing on the consumer market in the form of apps follow what has become the usual model on the Internet, namely the 'exchange model'. People can make use of the service 'free of charge' or for a small fee; in exchange, they give the provider of the service their personal details. They therefore 'pay' indirectly with their personal information, for example about their exercise or diet pattern, or their energy consumption. The provider can use this information to draw up detailed profiles, dividing users into segments, for example 'big energy consumer' or 'interested in vegetarian food'.

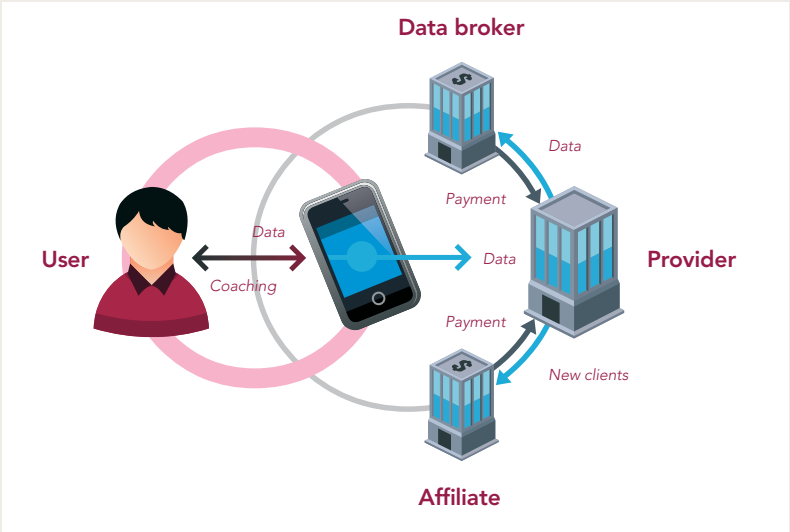
The provider can then earn money with this information in various ways. One of the most common of these involves advertising. The provider is paid by advertisers, for example, to display a specific advert for specific target groups. The provider can also decide to sell the profile information on a data market, where the profiles can be linked to other information that enhances them, or can be sold to advertisers so that they can use this information themselves.

Other versions of the exchange model are also possible. In an *affiliate* model, the provider of the e-coach receives financial remuneration from an advertiser in return for recruiting new customers. In the case of the e-coach, this might mean advising the user to acquire a specified advertiser product – advice that the e-coach provider earns money on. In our discussion of financial e-coaches, for example, we saw that AFAS Personal predecessor Yunoo advised users to switch to a different energy provider, receiving a certain amount for every user who did so. Another version of the affiliate model is the *sponsorship* model, in which providers of e-coaches conclude contracts with producers, for example to distribute badges or points when their products are consumed. Having an e-coach in a database can be a significant marketing strategy. One example would be a food producer that benefits from its inclusion in the database from which an app derives its suggestions for a 'healthy diet'.

The underlying revenue models of the emerging e-coaches make clear that the traditional coaching relationship between a client and a coach is being replaced by one between the 'client' or 'user' and a network of various parties: the provider of the e-coach, advertisers, and intermediaries. A distinction can also be made between the clients of the e-coaching service and the users of the e-coach. The clients are

parties such as advertisers and other intermediaries that pay for data or adverts and that are the primary source of income. The users of the e-coach supply the information that is interesting for these clients.

Figure 1 The network behind e-coaches



Rathenau Instituut

In 2013, the web analytics company Evidon was commissioned by the *Financial Times* to investigate data sharing by the 20 most popular health apps, including RunKeeper and Fitbit. Evidon analysed the presence of 'third-party' data collection technology, i.e. technology that shares data from the app with other parties. The results differed from one app to another, but data-sharing turned out to be the rule rather than the exception. In the top 20, a total of more than 70 third parties were identified that collected data on users of the apps. The data collected is used primarily to allow these parties to display targeted advertising.

Figure 2: Data sharing by RunKeeper

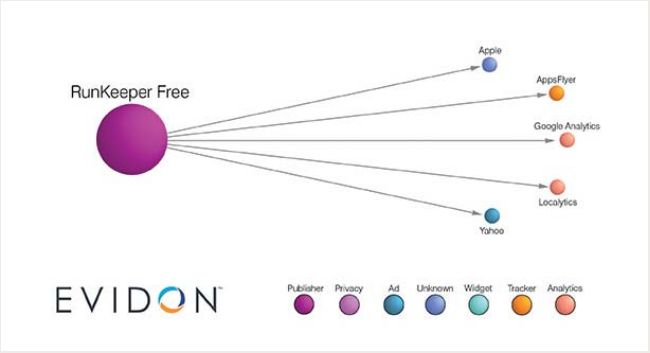
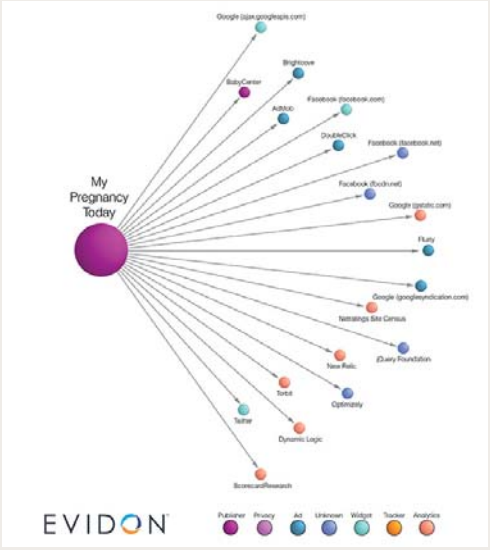


Figure 3: Data sharing by My Pregnancy Today



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Sustainability coaches

Scenario The energy dashboard

By Gaston Dorren

2017. Grace is in the car with her brother Alain. It's their mother's birthday and they are on their way to visit their parents.

Grace: 'Aren't you supposed to be big on saving energy? So why are you doing 130? You're the one who always says that the speed limit needs to be reduced to 100 rather than raised to 130!'
Alain: 'I suppose you're right. But it's just so bloody difficult if you have to choose between doing 130 in the outside lane or staying in among the trucks in the nearside lane. But I don't have the air-conditioning on, and during the day I do usually drive with my lights off.'
Grace: 'But it all adds up.'
She presses a button on the dashboard a couple of times.
Grace: 'Here you go – your current fuel consumption! Now you can see what you're doing to the poor little bunnies.'
Alain: 'What poor little bunnies?
Grace: 'I mean nature: the environment, the climate – that sort of stuff. I thought that was your religion.'
Alain: 'Thanks for explaining, my little eco-heathen! But as far as that indicator is concerned, I have actually used it a few times, but it doesn't really work for me. If I keep my eye on it, I don't pay as much attention to my driving. And if I focus on my driving, I forget to watch it.'
They arrive at their parents' house, go round the back, and enter through the utility room, where they find their parents looking at their new washing machine.
Grace: 'So you're in here then? Happy birthday, Mum!'
Mother: 'Thanks, love. Look what I've just got.'
Grace: 'A washing machine?! For your birthday?'
Mother: 'Well, we bought it together – it's for both our birthdays at once. Look, see what happens when I turn the temperature dial.'
A long row of LEDs changes to green, then orange, then red and back again.
Grace: 'It's like Christmas illuminations!'
Mother: 'It's not just because it looks nice – it's about energy consumption. If you set a low temperature, it shows green, because that's economical. If you wash at 95°, it turns red.'
Grace: 'I'd be most concerned about getting the wash clean. But do you really let yourself be bullied by those coloured lights? I mean, you already know that a hot wash uses up more energy than a cool wash.'
Mother: 'According to your Dad, psychologists have shown that the colours really do influence what people do.'

Grace: 'I find that a bit hard to believe.'
Mother: 'Well, if you don't believe it, I can show you something else new. Hang on and I'll turn on the machine.'
Grace: 'It's not doing anything.'
Mother: 'No, because it's waiting for the cheaper electricity. It normally starts just after eleven, because then demand drops. Or it waits until it's both windy and sunny, because then there's a big supply of green electricity.'
They go into the living room, where there's a palm-sized little screen on the wall.
Grace: 'Is that some new energy-guzzling device?'
Mother: 'No, it's our new energy dashboard. Almost everyone in the neighbourhood has got one. It shows you how much gas and electricity you're using. Either right now or over a certain period. It means we can compare our consumption with other local households.'
Alain: 'See how you compare with the Miller family! They won't score very high with that tropical aquarium of theirs.'
Mother: 'It's not like that. You can't see how much energy someone else is using. It only compares your own consumption with the average for the neighbourhood.'
Alain: 'So the more people who have a waterbed, a tumble drier and air-conditioning, the better you two score?'
Mother: 'Try and be a bit positive! Your Dad has already been talking to some of the neighbours about buying solar panels. Having the information right in the living room is a big help – especially this function. Just watch!'
She presses a button and a – fairly realistic – woman's face appears.
Mother: 'That's our Juliet, but you can have a Romeo instead if you want. If Juliet is smiling, it means that you're not consuming much energy. But if you're wasting energy, she starts to frown. She's never really happy for very long – she wants you to keep trying to save energy.'
Grace: 'So she's a right little ray of sunshine, then.'
Mother: 'The thing is to keep her happy. Or him – I find Romeo more effective, myself. It's surprising just how effective Romeo and Juliet actually are. Do you remember those tamagotchis that you had when you were little – those virtual pets? Remember how sad you were, Grace, when one of yours died? Well Romeo and Juliet look a lot more realistic, so they soon become like real family members. Yes, they're rather critical, but that keeps you on your toes. You can always save more energy than you actually think! I bet you that in a few years' time half the street will be wearing a pullover in the house in the winter because they will have turned down the thermostat a few degrees.'
Grace: 'It'll be a fashion disaster area! Don't expect me to show myself here!'
Alain: 'Mum, how about you and Dad buying an electric car? You'd use a lot more electricity but less petrol. And Juliet wouldn't know about it!'
Mother: 'That's a good one! Hey, Jack! What'll Juliet think if you buy an electric car? Will she be grumbling all the time?'
Father: 'I think you can tell the system how many kilometres you've driven in

the past few years. Then you can estimate your fuel consumption and compare it with what the electric car consumes.'
Grace: 'But that's comparing apples with oranges, isn't it? Comparing electricity with petrol?'
Father: You can convert both of them into CO_2.'
Grace: 'Oh dear, it's the C word. Forget it.'
Alain: 'Listen, Dad, if you save so much energy with that thing and you have a bit of cash to spare...'
Father: '…then we'll buy solar panels.'
Alain: 'OK, fine. But what about the neighbours? If they save a lot…
Father: '... you're probably going to say they'll just buy a sauna, or a waterbed. Maybe they will. But then Juliet will tell them off about it. She'll be in a bad mood for weeks.'
Alain: 'Maybe they'll fly to the Canaries even more often.'
Father: 'That's true – as long as airline travel is cheap, people will keep flying. There's no supermeter that can change that.'
Alain: 'Even though the meter in their living room gives them to believe that they're being terrifically sustainable.'
Father: 'Sustainable? That meter is only about energy. Sustainability's about a lot more. It's about biodiversity, depletion of natural resources, ...
Grace: 'Hey, come on you two! I'm here for Mum's birthday. Can you put off saving the world until I'm not here? I'd like a cup of coffee. Fair Trade, organic, recyclable coffee, if you like. Just as long as it's nice and strong and tasty.'

With thanks to Jaap Ham (Eindhoven University of Technology), who is researching the use of persuasive technology to encourage sustainable behaviour. The above text does not necessarily represent his own views.

4 Sustainability coaches. A better environment starts with your coach

Niels Compen, Jaap Ham, and Andreas Spahn

4.1 Sustainability e-coaching in actual practice

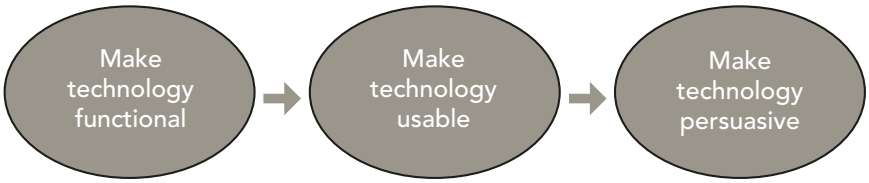
E-coaching is a relatively new phenomenon in the field of sustainability. Nevertheless, e-coaching is part of a fairly long tradition of attempts to get people to behave in a more environmentally conscious manner. One well-known Dutch example was the public information campaign in the 1970s which showed the globe as a candle that was slowly but surely burning down, and that called on people to deal more sensibly with energy. Watching that public service ad nowadays is like looking back into a different world. The didactic tone shows that the government was trying to act as a kind of moral compass for the public. The idea was that after being given the necessary information, people would voluntarily change their behaviour for the better.

People nowadays are unlikely to accept that kind of didactic tone. The government now tries to promote environmental awareness in a more light-hearted manner. One example was the campaign in 2004 that parodied the American TV series 'The Dukes of Hazard', in which two rather silly fellows encouraged people to drive more economically. The message was that one could easily save fuel with just a few changes in one's driving style. That would be good for the environment and for the driver's wallet too – a win-win situation.

But despite all these well-intentioned attempts, it has become clear over the past few decades that – whatever tone they adopt – mass-media public information campaigns are not enough to make us more sustainable. From the psychological perspective, they lack the necessary precision to change the behaviour of individuals (Maan et al. 2011, p. 176). Now that everyone is aware of the need for sustainability, the problem has become how to make society more sustainable without restricting the freedom of its citizens.

This is where e-coaching can perhaps provide a solution. Technological innovations are increasingly being deployed to change people's attitudes or behaviour. B.J. Fogg refers to these as 'persuasive technologies' (Fogg 2002, p. 1), the characteristic feature of which is that they are interactive. The technology informs, evaluates, and motivates the user on the basis of his individual behaviour. Persuasive technologies are therefore able to adapt to individual situations (Fogg 2002, p. 6). That is a clear advantage compared to mass-media campaigns.

Figure 4.1 Persuasive technology



Source: B.J. Fogg (2002)

E-coaches in the field of sustainability also have other advantages compared to 'human persuaders'. they are more persistent, allow for greater anonymity, can process large quantities of data, are multi-medial, can quickly alter the 'scale' of influence, and can go almost anywhere (Fogg 2002, p. 7). Partly because of these advantages, the future would seem to belong to e-coaches.[47] Clearly enough, persuasive technologies can also be used to encourage people to act more sustainably. They could in fact help bring about major progress towards achieving a sustainable society (Abrahamse et al. 2005; Midden, Kaiser & McCalley 2007).

Technology, it would appear, can take over the task of 'moral compass' from the government (and other human persuaders). It is no exaggeration for Hans Achterhuis (1998) to have referred to the 'moralisation of technology': using a feedback mechanism, persuasive technology tells us what is good and what is bad, and simultaneously helps us to act according to these moral standards. Persuasive technologies can therefore be a great help to consumers, producers, and the authorities in putting sustainable behaviour into practice. It seemingly becomes possible to create a sustainable society in this way, without restricting the freedom of its citizens. But that is not the whole story: the advent of e-coaching raises moral questions regarding the freedom, autonomy, and privacy of the user.

The transition from mass-media campaigns to persuasive technologies means that information – and persuasion – is finding its way into the hands of more – and more diverse – parties. People no longer depend on the government, intellectuals, or other authorities to convince themselves of how to act; the 'right' action to take is (implicitly) promoted by a whole range of parties, of which people are often unaware. This trend makes it possible for the influence to be increasingly tailored to the individual.

We can therefore say that two broader trends are apparent in sustainability

47 Fogg (2002): 'With the emergence of embedded computing, the forms of persuasive technology will likely become more diverse, "invisible", and better integrated into everyday life.' (p. 3).

e-coaching. First, there is a trend whereby the technology is being made ever more persuasive. It is being 'moralised', as it were. Second, there is a trend towards diversification: persuasive technology is able to tailor itself to the individual in order to bring about the desired change in behaviour. Each individual is therefore given unique advice, at any desired moment. Diversification is also taking place in a different way: because technology is placing the power to influence in more and more hands, more and more parties are able to influence the user's behaviour. Diversification thus applies to both parties and objectives.

The user comes into contact with persuasive technology in various different ways. First, there are 'nomadic' products which the user himself introduces into the desired context, for example ScanGauge, the Wattson Energy Meter, and all kinds of apps for smartphones. Second, there are products in which the e-coach becomes part of existing products or situations, with the user being offered new options. These include 'smart meters', for example,[48] or the Daimler FleetBoard. In this case, we refer to 'centralised e-coaching'. This distinction shows that persuasive technology finds its way to the user in various different ways, which raises a number of moral questions.

Table 4.1 Persuasive technology

E-coaching Sustainability	Mobility (examples)[1]	Housekeeping (examples)
Centralised	*Daimler FleetBoard, Volvo Dynafleet, Renault Optifuel, Kia Eco Driving System, Honda Eco Assist.*	*'Smart meters' rolled out centrally.*
Nomadic	*ScanGauge, Kiwi MPG, Torque (app), REV (app).*	*Wattson Energy Meter, UFO Power Center, ERCOT Energy Saver (app), Kill-Ur-Watts (app).*

In this chapter, we will examine these developments by looking at a number of examples, primarily the Wattson Energy Meter and the Daimler FleetBoard. These two products do not provide an exhaustive picture of recent developments in e-coaching in the field of sustainability, but they do help to illustrate the advantages and disadvantages. We will also look at the policy implications. The first example of e-coaching in the field of sustainability – one that we will look at in some detail – is the Wattson Energy Meter. The idea behind the Wattson Energy Meter is a simple one: the fact that the meter gives the user more information about his energy consumption, and evaluates that consumption, motivates the user to consume less energy. To a large extent, the user can decide for himself what kind of information the Wattson provides, and how much. The display shows the user immediately how much energy his home is consuming. The Wattson also changes colour, as a simple means of providing

48 A 'smart meter' is an advanced energy meter that measures the user's energy consumption and sends additional information to the utility company (Depuru et al. 2011, p. 2736).

feedback. Red indicates that a high amount of energy is being used. The meter therefore gives the user a helping hand. According to its producer, the saving achieved can amount to as much as 25% of the user's energy consumption.[49]

The second example of sustainability e-coaching that we consider in this chapter is the Daimler FleetBoard, which involves a GPS transmitter being installed in a vehicle (a truck). This transmits a signal to a satellite, which in turn transmits it to a server, which then processes the incoming data. FleetBoard administrator can then use his computer to find information about every vehicle in the company's fleet. This shows him the number of kilometres driven, the operational status, the fuel consumption, and the driving style of each driver. It therefore makes it possible for him to establish the reason for high fuel consumption and to adapt his policy accordingly.

FleetBoard makes clear that sustainability coaches can also be used in a group context; as we have already seen, the great thing about e-coaches is that they can adjust the scale of influence precisely to the user or users. This means, however, that a conflict may arise between the driver and the administrator of the e-coaching system. It is conceivable, for example, that the administrator will use data on the driver to improve labour discipline, whereas the driver tolerates the system in order to make his driving behaviour 'more sustainable'. The e-coaching is therefore embedded in the user's work situation. This is also an example of how e-coaching is increasingly finding its way into the hands of all kinds of different market players, which may have conflicting interests. After all, profit maximisation and sustainable behaviour are not always compatible. The Wattson Energy Meter raises similar moral questions.

The moralisation and diversification of the technology are leading to regulatory issues in this way. For example, how we can monitor such products if they are freely available on the market? What interests are involved? Up to what point can feedback still be considered information provision? How can we ensure that the privacy and autonomy of the user are guaranteed? How can we take account of the user's interests? These are the kinds of moral questions that we discuss below in the light of our examples.

49 Scientific research would seem to support the producer's claim: a clear positive link has been found between the use of smart meters and sustainable behaviour (Maan et al. 2011). The large-scale introduction of such meters can therefore be expected to bring about major savings in both energy and money.

4.2 Moral issues

Nomadic persuasion: the Wattson Energy Meter

Let us start with the Wattson Energy Meter. This is a new concept in the field of household e-coaching. The Wattson collects an enormous amount of information about the user's energy consumption, which he can then use to evaluate that consumption and alter it if necessary. Consumers purchase the product precisely because they want to bring about a desired change in behaviour. Here, the purpose of the product and the purpose of the consumer are the same. The persuasive technology must in this case be seen primarily as a helping hand for the user: it ensures that he acts in accordance with an objective that he has selected himself. In that respect, it would seem that persuasive technologies as applied in the Wattson Energy Meter are not really problematical. After all, the user voluntarily decides to have his behaviour manipulated by the technology (Verbeek 2009, p. 235; Spahn 2013, p. 8).

Figure 4.2 The Wattson Energy Meter

Source: http://www.diykyoto.com/nl

We need, however, to think about the context within which the Wattson Energy Meter presents the information. One of its most striking features is that it gives the user 'simple' feedback, so that he can see at a glance whether he is saving energy. If the user is consuming less energy than the average that he has submitted, the Wattson turns blue. If he is using more energy than the average, it turns red. This approach leaves out an important part of the context, however, and it is conceivable that the user will primarily spread his energy consumption over the day rather than reducing it.

The user may therefore get the wrong idea about what sustainable behaviour actually means (Brynjarsdóttir et al. 2012). The 'morality' seems after all to be indicated by the device, something that – if the user does not think about it any further – can lead to 'moral lethargy' (Spahn 2013, p. 8). The information presented may affect the user's freedom of choice because he will no longer be in a position to make a well-considered decision regarding sustainability. It is important to realise that devices such as the Wattson Energy Meter cannot provide a moral guideline for determining correct energy consumption; that requires more thought.

In addition to the risk of moral lethargy, there are other objections to the use of products such as the Wattson Energy Meter. Specifically when we consider the user's privacy, it becomes clear that these products involve risks. The fact that data is constantly being transmitted and stored means that it may become accessible to third parties, which can then use that information for their own purposes, unasked (Depuru et al. 2011, p. 2739).

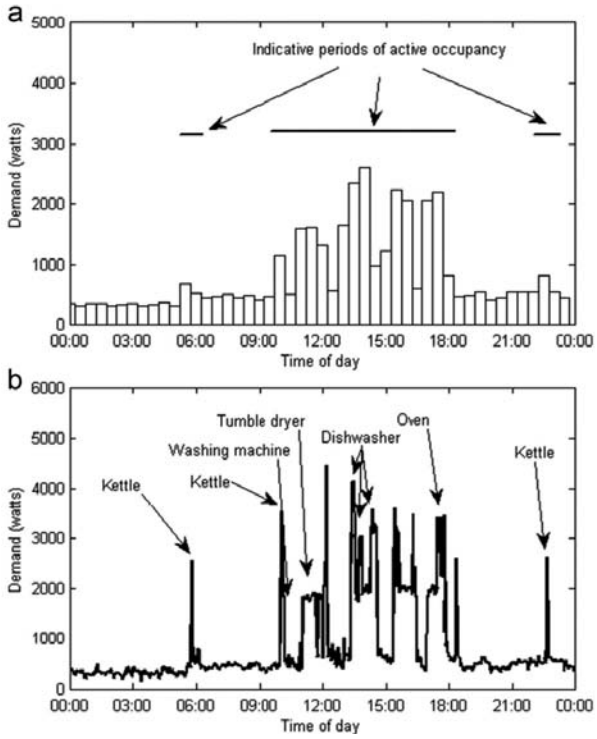
It is conceivable, for example, that the producer will sell information collected by the Wattson to third parties. After all, the producer of such meters has valuable information about the market and the behaviour of consumers (and potential consumers) (McKenna, Richardson & Thomson 2012, p. 807). It is also conceivable that a landlord, or a public authority, will use the data to check whether premises are being occupied illegally or whether energy consumption is deviating suspiciously from the norm. These risks become even greater if the use of such meters is made obligatory.[50]

Another aspect – one often forgotten – concerns privacy within the household, i.e. 'internal privacy' (ibid.; Depuru et al. 2011, p. 2739). An authoritarian head of household, for example, might use the information collected by the Wattson Energy Meter to keep track of his family's behaviour. After all, someone with access to that information can see from the energy consumption how many people are at home, and what they have been doing. Meters such as the Wattson can therefore be used to scrutinise domestic activities that an individual normally expects to be private (McKenna, Richardson & Thomson 2012, p. 808). It is therefore clear that this is sensitive information that can be interesting for businesses, hackers, and suspicious family members (ibid.).[51]

50 The EU's Directive 2009/72/EC provides, for example, that 80% of traditional meters should be replaced by 'smart' meters by 2020. There is therefore good reason to look more closely at such meters, and to consider the pros and cons of their large-scale introduction.

51 In principle, this information is protected by Article 8 of the European Convention on Human Rights (ECHR): 'Everyone has the right to respect for his private and family life, his home and his correspondence.'

Figure 4.3 Energy consumption and activities in the home.



Source: McKenna, E., I. Richardson. & M. Thomson (2012)

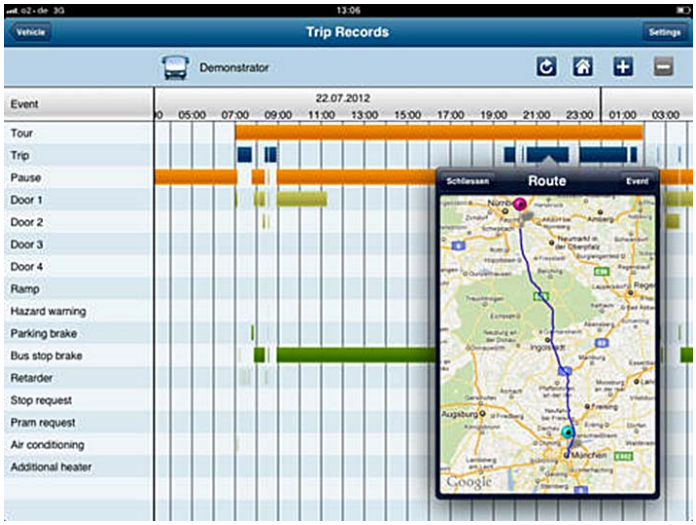
Common to all the above examples is the fact that the information collected is used for a purpose different to that for which the device in question was first acquired. This may lead to conflicts between different values, for example profitability, sustainability, and security. The user can use the Wattson Energy Meter for a variety of purposes, even though the purpose of the product would seem at first glance to be obvious. Vigilance is therefore also necessary even in the case of products whose explicit purpose is to save energy.

Centralised influence: FleetBoard

The second example, FleetBoard¸ also raises moral dilemmas. Here, an additional party is involved, namely the administrator. The information is therefore used by three different parties: the producer (Daimler), the administrator, and the driver. The information collected by FleetBoard is evaluated so as to encourage the driver to alter his driving behaviour. This can supposedly produce a saving of up to 10% on fuel, which represents an enormous saving in absolute terms. It would therefore seem clear that FleetBoard can be useful for creating a more sustainable world.

Here too, however, there is a potential conflict between various different values. The administrator, for example, has an enormous quantity of information at his disposal, giving a detailed idea of the driving behaviour of the individual drivers. He can see, for example, when a truck is stationary, what route it is taking, and how often the driver uses the brakes. It is not clear to what extent the values of the driver in question and those of the administrator correspond. The driver may consider, after all, that the saving generated by FleetBoard is not in proportion to the infringement of his privacy. In such a case, it is necessary to find a balance between these different values.

Figure 4.4 The FleetBoard app[52]



Source: https://encrypted-tbn3.gstatic.com

The privacy issue in the case of FleetBoard is therefore different to that raised by the Wattson Energy Meter: in the case of FleetBoard, the information is in fact always shared with a third party, which evaluates that information (unasked). The information collected is therefore not used immediately for persuasive purposes, and in that sense we can refer to it as 'Big Brother' technology. If the information were in fact used directly for persuasive purposes, we would refer to it as 'Little Sister' technology (Berdichevsky & Neuenschwander 1999, p. 56).

The FleetBoard user is therefore aware that his behaviour is always being recorded in detail, and that the administrator can use this information for

52 https://encrypted-tbn3.gstatic.com/imagesq=tbn:ANd9GcQbil_zqTmL0GOJ7OZ9X5XR-zFyqFwDN_mKoRXBRCX9EG_RY1ZJGrg)

various purposes. Knowing this can drastically alter the driver's behaviour and attitude. He is aware, after all, that Big Brother is watching him.

The above examples show that there is a danger of 'function creep' with both the Wattson Energy Meter and FleetBoard. Function creep occurs when a product is justified by invoking value A (in this case sustainability) but is ultimately used to achieve value B. In the case of FleetBoard, for example, it is conceivable that the administrator justifies the introduction of this system by explicitly making sustainability a goal, whereas the device is in fact primarily used to increase productivity.[53] In the example of the Wattson Energy Meter, one can imagine that the producer deliberately positions itself within the market as 'sustainable', whereas it simply wants to make money from the information collected. Both examples therefore make clear that there needs to be agreement on the purpose of the persuasion so as to prevent conflicts between the administrator, the user, and the producer.

In addition to agreement regarding the purpose, there also needs to be as much transparency as possible about the methods with which the intended purpose is to be achieved. The autonomy of the individual may be jeopardised, for example if there is agreement on the purpose but not on the method of persuasion. In such a case, the producer can, after all, decide to mislead the user so as to reduce the time needed to achieve the intended goal (Berdichevsky & Neuenschwander 1999, p. 55). With FleetBoard, the producer could decide, for example, to exaggerate the amount of pollution that the driver causes, so as to urge the driver to alter his driving style.

Moreover, research shows that there can also be effective unconscious persuasion. The subconscious can be so influenced by images, for example, that they bring about the desired change in behaviour.[54] The user no longer has any idea that he is being influenced (Ham, Midden & Beute 2009, p. 4). The question is to whether the user still be held responsible for his behaviour (Verbeek 2009, p. 232). Is he still acting morally in that case (Verbeek 2009, p. 236)? Doesn't at least part of the responsibility lie with the developer? Be that as it may, it is clear that when there is uncertainty about the method and purpose of persuasive technology, the user is being manipulated in such a way that he can no longer reach an informed decision. His freedom of choice is consequently jeopardised.

53 Daimler states, for example, that the information that FleetBoard generates can be used to compare the performance of each of the different drivers, and to adjust their pay accordingly.

54 The research concerned showed that a group that received subconscious feedback about its energy consumption and a group that received conscious feedback both scored 'better' than a group that received no feedback (Ham, Midden & Beute 2009, p. 4).

Producers of persuasive technologies such as FleetBoard and the Wattson Energy Meter should in fact give the user the information on which the evaluation is based, provide as much context as possible for this information, and clarify the method and purpose of the persuasion. This will protect the user's freedom of choice is as effectively as possible. The end does not always justify the means, in other words. It is also advisable for developers to observe the golden rule of persuasive technology: developers of a technology should never attempt to persuade other people of something that they would not want to be persuaded of themselves (Berdichevsky & Neuenschwander 1999, p. 58).

That is easier said than done, however; after all, complete transparency can negate the effectiveness of the persuasive technology (Berdichevsky & Neuenschwander 1999, p. 57). Research has shown, for example, that a user of persuasive technology will resist the moral message if he sees that technology as a threat to his autonomy. In such a case, the user may in fact adopt behaviour that is the opposite of that intended (Roubroeks, Ham & Midden 2011, pp. 155-6). Persuasion and transparency, then, do not always go together.

All the above considerations illustrate the ambivalent relationship between products like the Wattson Energy Meter and FleetBoard and the freedom of the user. On the one hand, such technologies create a measure of freedom; after all, they take over various difficult tasks from us, meaning that we can focus on other matters. On the other hand, they can also be a threat to our freedom if they manipulate us (Verbeek 2009, p. 236). In such a case, the user is no longer in fact able to take well-considered moral decisions. The important thing is to strike the right balance with respect to persuasive technologies. They can be a valuable way of making society more sustainable, but they can also lead to technological paternalism that restricts the user's freedom of choice.

To find the right balance, we offer a number of moral guidelines in this section for evaluating various persuasive technologies from the ethical perspective. Regulation is necessary, because diversification is leading persuasion into the hands of all kinds of different parties with different objectives. As a result, the way persuasive technology is actually used is threatening to become non-transparent. In the following section, we will look at this problem in greater detail so as to make some specific regulatory and policy recommendations.

4.3 Regulation and policy

The examples of persuasive technology discussed in the previous sections were intended to encourage their users to adopt more sustainable behaviour. The technology guides the user but does not force him to adopt the 'correct' behaviour. It is important to understand that the examples discussed in this chapter represent not only a broader technological trend but also a broader societal one. As a matter of fact, the manipulation of behaviour by means of technology is characteristic of a society that seems to be embracing

'libertarian paternalism'. The aim of libertarian paternalism is to maintain citizens' freedom of choice but at the same time to guide it so that it has a positive effect on the individual and on society as a whole (John, Smith & Stoker 2009, p. 361; Spahn 2013, p. 108). Policymakers can do this by structuring choice situations – environmental factors that necessarily affect the free choice of the citizen – in such a way that a certain outcome is more likely. This assumes that there are always factors in the environment that influence citizens' free choice, and that it is therefore correct to programme this environment in such a way that citizens make the right choices (Thaler & Sunstein 2008). Persuasive technology can therefore be positioned within the broader social context of libertarian paternalism. A steady stream of scholarly literature has been published on this political and philosophy doctrine.[55]

The previous sections have combined findings from the literature with recent trends in the field of persuasive technology. This has raised a number of important issues, for example: when is it permissible to guide people's actions (via persuasive technologies)? How can we protect the user's freedom of choice? How can the user's privacy be guaranteed if this technology appears to be at odds with that privacy? In the present section, we attempt to answer these questions and to offer some recommendations for policy.

Let us begin with the first question. When is it permissible to guide people's actions? Can we oblige truck drivers to use the Daimler FleetBoard in order to make society more sustainable? Can we oblige consumers to install a smart meter in their homes? In such cases, policymakers will need to weigh such values as sustainability, freedom, and autonomy against one another. Viewing matters from the generally accepted liberal perspective, we can say that the freedom and autonomy of the user may only be restricted in the event of harm to third parties.[56] In such a case, the government can justify restricting the user's freedom on the basis that non-sustainable behaviour has an unreasonable negative impact on the environment. From the political-philosophical perspective, the government might therefore decide to accelerate the spread of 'sustainable' persuasive technologies by making them mandatory. The EU's Directive 2009/72/EC would seem to be the first step on the way to such a policy in this connection, requiring as it does that 80% of traditional meters should be replaced by 'smart' meters by 2020.

Mandatory introduction of sustainable technologies would of course have consequences for the user's autonomy. In this case, he is not, after all, able to make the necessary change in behaviour for himself. One needs to realise, however, that the spread of persuasive technologies already has an effect, in

55 See for example: Anderson 2010; Hausman & Welch 2010; John et al. 2011; Thaler & Sunstein 2008.
56 This is one of the main ideas in John Stuart Mill's famous work On Liberty (1859).

itself, on the autonomy of the user, as we have shown in the previous section. It is therefore necessary to devise ways of guaranteeing that autonomy as much as possible.

How can we do that? First of all, developers would be wise to give the user a greater say in the development and use of new persuasive technologies. They could do so by determining who the various interested parties are, prior to launching the new technologies. If the values of those various parties conflict, the developer should make this the topic of open discussion so as to arrive at agreement (Davis 2012; Karppinen & Oinas-Kukkonen 2012). Making the development process more transparent will prevent a 'moralised' technological environment from emerging that influences people throughout the day without their wanting it (Davis 2010; Davis 2012; Schot 2001). Users can also be given greater influence as regards the use of the product. Advanced technologies could enable the user to determine the purpose and method of persuasion largely for himself. In this way, complex information systems such as the Wattson Energy Meter and FleetBoard can be better adapted to the wishes of the user, thus preventing a situation in which the user resists the moral message of new technologies.

Giving the user a greater say ensures that power does not fall solely into the hands of the developers of the persuasive technology. The widespread perception that the developers of new persuasive technologies are better able to make decisions about sustainability than the user is an assumption rather than a view supported by empirical evidence (Brynjarsdóttir et al. 2012, p. 953). Nevertheless, developers and persuasive technologies seem to be playing an ever-increasing role in our lives.

One simple way of boosting the position of the user vis-à-vis persuasive technologies is to strive for the greatest possible transparency in the market for these technologies. In the previous section, we saw that diversification of persuasion is leading to an enormous proliferation of persuaders, each with its own interests. It would therefore be logical for the government to set clear conditions for the new persuasive technologies. This has already been done for other markets. Nowadays, for example, the consumer can see at a glance how much energy is consumed by various household appliances. Measures have also been imposed for the financial markets, with financial products now coming with a 'information leaflet' similar to that enclosed with medication. These measures have produced greater transparency, enabling the consumer to make a free and informed choice.

It is advisable for the government to issue such an information leaflet for persuasive technologies, or to make the relevant information available to the user in some other way. This would give the user a better idea of the method, purpose, advantages, and disadvantages of the persuasion, thus enabling him

to make an informed choice about using such technologies. Greater democracy and transparency in persuasive technologies will ensure that there is informed consent, with the technology 'only' ensuring that the user acts in accordance with the purpose chosen by the user himself (Smids 2012; Spahn 2013, p. 8; Verbeek 2009, p. 235). It goes without saying that extra caution is required in the case of 'centralised e-coaching' because the external influence is introduced into an existing context, which further restricts the user's freedom of choice.

To answer the final question – how to protect the user's privacy – it is a good idea to review the examples given in the previous section. These have shown, after all, that persuasive technologies are further complicating our understanding of privacy. We can in fact safely say that the old 'spatial' conception of privacy – one's body, one's home – is incomplete: this is not about crossing spatial (physical) barriers but primarily 'digital barriers'. The Wattson Energy Meter, for example, shows that it is necessary to determine those digital boundaries in order to guarantee the user's privacy. The old barriers that served to protect the individual's 'private sphere' are in fact no longer enough to confront the potential problems discussed in the previous section. After all, how can we protect the integrity of a person's home if meters such as the Wattson Energy Meter need to share the information about the household in order to function properly?

So just how can we protect the user's privacy? As already noted, our observations on the influence of the Wattson Energy Meter on privacy have one thing in common: in all cases, the information collected is used for a purpose different to that for which the device was initially brought onto the market. An important new boundary for persuasive technologies should therefore be that the information collected should not be used for purposes other than those that the user can reasonably expect. A user of the Wattson Energy Meter will rightly be angry, for example, if he discovers that the manufacturer is using the product to collect data that it can sell to other companies, whereas the user purchased the product in order to save energy.

In other words, in all cases there must be what Helen Nissenbaum has referred to as 'contextual integrity'. Personal information collected within a certain context retains that context, and may only be utilised within that context (Nissenbaum 2004, p. 143; Nissenbaum 2009). In the case of the Wattson Energy Meter, the user's privacy is violated if the information collected in context A (saving energy) is subsequently used in context B (security). And the driver in the FleetBoard example could also defend his privacy by invoking 'contextual integrity'. This would prevent the product collecting information in context A (saving energy) in order to use it in context B (labour discipline). This new conception of privacy can limit the possible adverse effects of persuasive technologies to some extent.

At the same time, this conception of privacy still leaves scope for information flows. There is no question, for example, of the user's privacy being violated if the information is passed on to other parties operating within the same context. The manufacturer of the Wattson Energy Meter, for instance, could share the information with other manufacturers of smart meters so as to provide better feedback to the user, which would allow the user to save more energy. It goes without saying that the advent of persuasive technologies requires us to reconsider our traditional views regarding privacy.

These technologies not only represent a technological revolution but they will also bring about drastic changes in society. Of course, the hope is that the user will adopt the 'correct' behaviour of his own free will. But although that hope is not entirely unfounded, there is as yet no hard empirical evidence to support it. Given that everyone is now aware of the need for sustainability, policymakers need to give serious consideration to all the available options. It is conceivable that it will not always be possible to guarantee freedom of choice for the user, in which case the government will need to adopt a more 'paternalistic' rather than 'libertarian' position. Nevertheless, it is important to weigh up the desired changes against the user's autonomy and privacy. E-coaching should ideally be based on informed consent and compatible with the user's free will (Smids 2012), as we have already seen.

Policymakers are therefore facing the huge challenge of not only achieving a more sustainable society but also protecting autonomy and privacy to the maximum extent possible. E-coaching does not need to be paternalistic if the technology does not manipulate the user unnecessarily, is in accordance with his intentions, and protects sensitive data from improper use. Policies will therefore need to focus first of all on creating a legal framework within which e-coaching can operate. Given the enormous scale of the interests involved, they would do well to begin doing so as soon as possible. As always, technology brings with it both opportunities and dangers.

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Privacy

One question that comes up at several points in this book is how collecting digital data impacts the user's privacy. But what do we actually mean by privacy? There is in fact not one single definition; it varies from period to period, from place to place, from culture to culture, and from person to person. It is a concept with a long history that goes back to Greek Antiquity, the first civilisation to distinguish between public life (which was highly esteemed) and private life. The West's interpretation of privacy began with a renowned law review article by Samuel Warren & Louis Brandeis (1890), two lawyers who argued in favour of 'the right to be let alone' after the invention of the 'mobile' camera. Since then, many different interpretations and works on privacy have appeared. Some definitions follow the line set by Warren & Brandeis and focus on the individual's right to control whether personal information is shared with others (Westin 1967). Others emphasise the importance of privacy as a necessary condition for human dignity, intimacy, personal integrity, and autonomy (to be free from the influence of others) (DeCew 2006).

In addition to its value for individuals, privacy is also a public and social value. Gutwirth (1998) and Bennet & Raab (2006) point to the relationship between privacy and other fundamental values in Western democracies, such as freedom of speech, freedom of association, and the balance of power.

In Europe, the legal frameworks concerning privacy and data protection can be found in the European Union's Charter of Fundamental Rights, which sets out the right to privacy (Article 7, '…the right to respect for private and family life, home and communications') and the right to protection of personal data (Article 8, '…the right to the protection of personal data concerning him or her') (European Community 2000). The right to protection of personal data is laid down separately in Directive 95/46/EC (European Commission 1995), which is now under review (European Parliament 2013).

The fundamental right to privacy is substantive in nature and offers protection against excessive interference in people's private lives and against restrictions on the freedom and autonomy of individuals (Gutwirth & Gellert 2011).The more procedural data protection legislation defines the rules governing the use of personal data. Some of the key principles of this legislation are:

- Data minimisation: no more data may be collected than is necessary.
- Purpose specification: data may only be collected for a predetermined purpose.
- Subsidiarity: are there alternatives that do not involve the use of personal data, or for which a smaller amount of data is sufficient?
- Proportionality: does the purpose of collecting data justify the means? In other words, is the purpose proportional to the risks that data processing poses for individuals?
- Protective measures: for example requirements concerning the quality, accuracy and security of data processing.
- The rights of the 'data subjects': such as permission and the opportunity to inspect and correct data.

In data protection law, the focus is increasingly shifting to early detection of privacy risks for the users of an information system. That may already happen while a product or service is being designed, using such methods as Privacy by Design or Privacy Impact Assessments. The new EU draft regulation makes Data Protection by Design and Data Protection Impact Assessment mandatory for data processors when 'processing operations present specific risks to the rights and freedoms of data subjects' (European Parliament 2013, Article 33). These risks may include automatic data processing that performs systematic and detailed evaluation of personal aspects (such as an analysis or prediction of an individual's location, personal preferences, behaviour, or state of health). E-coaches do in fact automatically process this kind of information.

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Social coaches

Scenario: The info lunch at XSU

By Gaston Dorren

It's 2019. Barbara, head of Human Resources at XSU, a firm of consulting engineers with a few dozen employees, addresses the assembled staff in the company cafeteria.

'Welcome to our info lunch. It's nice to see so many people here. As I said in the invitation, I'll be telling you about various applications that XSU would like to offer all employees. These are apps that support interaction, both amongst ourselves and with our clients.

As you know, digital support for interaction is not a completely new concept. For several years now, our e-mail software has had a ToneCheck function, which shields us from sending out the sort of e-mails that we regret later on because they sound too angry, or – in particular – too informal. Our impression is that it works pretty well, although we know that ToneCheck is more effective on English-language e-mails than on Dutch ones. The producer is working on this, and that's why the software regularly asks you to evaluate a short text on a number of criteria, for example aggressiveness and formality. So once again, please don't simply delete the message but take the time to answer the question. In the end, everyone at XSU will benefit.

Anyway, we already have that functionality, but I now have something new for you. We have four interaction applications that the management team feels are very promising. They're called Attitune, LoosenUp, OpenBook, and Speech-Balance. Bear in mind, incidentally, that you'll need to have smartglasses[57] to use some of these new apps. You'll have to acquire them at your own expense. Yes, *Anne*, do you have a question?'

'Have you also considered AlphaMail? It analyses who exercises power and influence in an organisation, based on internal email traffic. I think that could be a very interesting interaction app for us.'

'Yes, the management team use…uh, has heard of that tool, but I don't think it's really necessary for employees to study that kind of thing. In fact, I think it will only lead to anxiety. The four that I'm going to tell you about now seem more useful to us.

57 A smartphone in the shape of a pair of glasses, or a general term for Google Glass, launched in late 2013, and its imitators.

Let's start with Attitune. It's a very clever app for those times when you might feel a bit uncertain. Users wear a belt with sensors under their clothing that measure whether they are holding their upper body erect or whether they're slumped over. Slumped shoulders may indicate that they've lost confidence in themselves, and the person they're talking to will often unconsciously pick up on that. Attitune issues a discreet signal that tells the user to sit up straight. And the great thing is that by sitting up straight, people gain self-confidence, because the body has a strong influence on the mind in this sort of situation. It can also help people with back trouble.

I like LoosenUp too. It also works with a sensor, but in this case it measures muscle tension. If the sensor detects that your muscles are tenser than usual, especially if the tension has jumped up a notch in a short space of time, then LoosenUp will emit a discreet signal. *Daniel*, do you have a question?'

'Yes. You've referred to "a discreet signal" twice now. I don't suppose you hear some kind of bell, but what precisely is it?'

'Good question. There are various options. If you wear smartglasses, then you hear a brief sound that no one else around you can hear. But you can also set the sensor to vibrate.'

'Thank you.'

'Where was I? Oh yes, LoosenUp. So the app emits a signal that tells the user it's time to relax his or her muscles. And once again, physical tension can cause you to cramp up mentally too. If your body tends to carry a lot of tension in stressful situations, this is the right app for you.

So that was LoosenUp. Next is…uh… OpenBook. This one really only works with smartglasses. You video the person you're talking to with the glasses and the app analyses his or her facial expressions to detect emotions, whether happy, doubtful, angry, joyous, whatever. The marketing world has been using it for years to test how effective advertisements are. If this consumer version is as good as the professional software, then it may be quite useful, especially during negotiations and sales pitches. It's rumoured that there's a new version on the way that interprets emotions by also analysing a person's voice, but it isn't available yet. I want to warn you right now, however: if you decide to use OpenBook, you mustn't do so internally. Only when talking to clients. We work with one another here on the basis of trust, and XSU would like to keep it that way. Yes, *Leon*?'

'Won't clients mind having us, well, see right through them?'

'Some of them might. That's why it would be better to use these apps discreetly.'

'But isn't that kind of discretion just another word for sneaky? And isn't it contrary to our code of ethics?'

'Hmmm. I'll have our lawyer take a look at that. I'm pretty sure it's legal, and for me that's good enough.

I'm going to move on now, because I'd like to tell you about SpeechBalance. It monitors the voices of people you're talking to. It can measure how much each person is saying and how loud and how quickly each one is speaking. It analyses intonation and even word choice, although I don't know how well that actually works in Dutch yet. It then calculates the extent to which people adapt to one another during the course of the conversation, which is a good indicator for the quality of the exchange. It's useful for meetings with clients as well as for internal meetings.

Finally, I'd like to draw your attention to B-Well.[58] As you know, the works council has rejected the proposal to implement this application XSU-wide. But we're still offering it to each of you individually. If you'd like to know more about it, ask the users what they think. They are *Martin* and *Helen* and *Harvey* and... who else? *Renée* and, oh yes, *Andrzej*.
That's it. Are there any questions? Yes, *Harvey*?'

'To be honest, I'm a little disappointed in the apps. If I compare them to B-Well or to a fitness coaching app that I use privately, I find them all a bit limited.'

'I understand what you're saying. And I have to admit that I heard the same remark at a Human Resources conference I recently attended. The speaker there explained that their limitations lie mainly in the difficulty of measuring interaction. A lot of interaction is about emotion, and it's just not possible to measure emotions very accurately yet. After all, consumer products simply don't have miniature fMRI scanners. OpenBook comes closest, especially if the new voice function lives up to its promise. And even when we can measure something, like the amount of time someone speaks or some emotional factor, it's still very hard to couple that to useful advice. So, I agree with you that the options are somewhat limited. But that's as far as technology has come in 2019. Yes, *Anne*? You have one more critical question for us?'

'Yes I do, *Barbara* – sorry to be a bother. The way I see it, it's great that you're offering us those apps, but will this replace real coaching, by a real person? No one's said anything about that recently.'

'No, you mustn't see it that way. It's true that the economic downturn has put pressure on our training budget, however. And that's why the management

58 See the chapter 'Lisa and Marten go on a date'.

team wants to find the most cost-efficient way of meeting the staff's learning wishes and requirements.

Okay, our time is almost up. You can register for one of these four apps on our intranet. And if you want personal advice, just ask your supervisor or me. Thanks for listening!'

With thanks to Carina Wiekens of the Quantified Self Institute, part of Hanze University of Applied Sciences in Groningen. The above text does not necessarily represent her own views.

5 Social signals. E-coaches for social interactions

Joris Janssen, Mark Neerincx, Jelte Timmer[59]

5.1 Introduction

As Aristotle noted, man is a social animal.[60] The ability to enter into, develop, and maintain social relationships has a positive effect on our wellbeing and promotes the public's participation in society (Berscheid & Peplau 1983). But although it is in our nature to be social, human social behaviour is a complex matter, even for us. We hit the send button and then realise that the wording of our e-mail wasn't very friendly; we worry about the impression we make on others; or we dominate conversations and forget to let others talk. People who have trouble with social interactions may find themselves in unpleasant situations; for example, poor communication skills could cost someone his job; an inability to control anger can lead to domestic violence. Some people have so much trouble displaying socially acceptable behaviour that they are regarded as having a psychological disorder, for example a social anxiety disorder (also known as social phobia). More than nine percent of the Dutch population suffer from a social anxiety disorder at some point during their lives (De Graaf et al. 2011). Such people are afraid of one or more everyday social situations, for example public speaking, attending meetings, or grocery shopping.

There are ways to tackle all these different forms of problematic social behaviour, for example through coaching. Coaching can range from assertiveness training or learning to flirt to intensive behavioural therapy for people with a social anxiety or autistic spectrum disorder (ASD).[61] The context in which someone seeks and is offered help with these problems naturally also varies. At one end of the spectrum are people who turn to self-help books, magazines and training courses to improve their social skills. At the other end are people who seek help within the healthcare system from professionals such as clinical psychologists.[62]

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59 All three authors have contributed equally to this chapter. Joris Janssen works for TNO. Mark Neerincx works for TNO and Delft University of Technology. Jelte Timmer works for the Rathenau Instituut.

60 Zoön politikon: 'a living organism which exists in society'/'a social animal' or 'a being which lives in the polis'.

61 Cognitive behavioural therapy is an effective method for altering a person's thought patterns and, as a result, his or her physical response to situations that provoke phobias (Pilling et al. 2013; Hofmann & Smits 2008).

62 The clinical psychologist is an 'Article 14' profession in the Individual Healthcare Professions Act [*Wet BIG*]; this is the article that covers medical specialists, such as psychiatrists.

Such variation in coaching practices gives rise to new opportunities owing to our growing ability to measure social behaviour digitally. Social interactions, nonverbal communication, and emotions are often portrayed as difficult to measure and interpret with computers. However, research and technology have made various advances in recent years, giving rise to new opportunities to analyse social behaviour digitally. For example, a research team at the Massachusetts Institute of Technology (MIT) has developed the Sociometer, which tracks social behaviour in face-to-face interactions (Choudhury & Pentland 2002). The EmoSpark Home Console interacts with the user, measures his emotional state, and plays his favourite song to cheer him up when he feels sad.[63] The US+ app, which was developed by two young artists, employs voice and face recognition software during video calls to help users improve their social behaviour.[64] The app, which was developed to demonstrate the potential of current technology, alerts users when their conversation partner looks sad, or provides feedback if they have spoken too long without a break.

This means that, in addition to human coaches, digital coaches can now play a role in social relationships. This chapter explores the development of e-coaches for social behaviour and how they are influencing existing coaching practices in this area. How are coaching practices changing and what criteria should e-coaches designed for social interaction meet? To find out, we begin by describing the technological possibilities. What new monitoring and feedback options have arisen through digitising our behaviour, and how reliable are they? Once we have surveyed the technologies, we describe how they are changing coaching practices (Section 5.3). What digital coaching practices are emerging? How are patterns of monitoring and feedback shifting in these practices? How are the situations in which coaching is used changing? We go on in Section 5.4 to consider the questions arising from these changes. How do we deal with sensitive data about social behaviour? To what extent can a user trust an e-coach? Finally, in the concluding section we survey what this means for the requirements that a digital coach in the social domain should meet.

5.2 Digitising behaviour

Social interaction is not confined to the physical domain. A significant proportion of our social interactions now take place in the digital world. We meet and communicate with others on social networks and dating sites, and through other forms of technology. At the same time, a growing body of research is improving how we quantify and track social behaviour, and the results of that research are also being channelled into commercial applications. These two trends form the basis for the rise of a new e-coach for social behaviour, a 'social e-coach'.

63 http://emospark.com/
64 http://lauren-mccarthy.com/usplus/

Behaviour in the digital environment of social networks is ideal for tracking and analysis. After all, every mouse click, search or 'like' and every profile view or friend request can be recorded and analysed in the digital domain. Data about interactions on social networks can be used to predict love relationships between two individuals (Backstrom & Kleinberg 2013) or someone's sexual orientation (Kosinski, Stillwell & Graepel 2013); the type of language we use on social media also says something about our personalities (Schwartz et al. 2013). The digital domain also provides the first examples of how social behaviour can be coached and managed. Dating sites can help their users set up their profile page to be appealing and to invite responses. They also advise on the type of message that fellow users value most (Schouten & Antheunis 2012). That is because all interaction that takes place on the site can be quantified and used to identify successful patterns of interaction. Another example is the ToneCheck software, which 'reads' e-mails and analyses them for aggressive language. The software warns the user if he is about to send an e-mail that might be taken in the wrong way.[65]

Besides our behaviour in the digital world, however, it is also becoming increasingly possible to quantify our social behaviour in the physical world. Sensors can quantify and track location, facial expression, vocal intonation, body movements, and all sorts of physiological signals. The growing power of computers gives us the tools to process all these signals, and we are developing better models for analysing and interpreting behaviour. Face recognition technology allows us to analyse emotions more accurately.[66] Vocal intonation can also be analysed for subtle cues.[67] MIT's Affective Computing department has developed a virtual assistant that can measure an array of different properties of human speech, for example volume, pauses between words, intonation, speed, use of filler words, facial expressions and head movements (Hoque et al. 2013). Firms such as MIT-founded Affectiva adapt this type of technology for commercial purposes. In the world of marketing, the ability to read facial expressions is used to measure emotional responses to products or advertisements (Lewinski, Fransen & Tan 2014).

Finally, the rise of the smartphone and other wearables like fitness trackers and smartwatches is bringing this technology closer to us in the physical sense as well. The smartphone appears to be an ideal platform for collecting data on our behaviour. Many people have their smartphones with them virtually all the time and wear them close to their bodies, putting the device in an ideal position to track its owner and give him or her instant feedback. In addition, the smartphone can be connected to all sorts of sensors, such as wristbands, that

65 http://tonecheck.com/
66 http://www.technologyreview.com/news/519656/startup-gets-computers-to-read-faces-seeks-purpose-beyond-ads/
67 http://www.technologyreview.com/news/514856/technology-that-knows-when-to-hand-you-a-hankie/

measure physical activity and physiological signals. Taken together, these devices play a key role in making it acceptable to track one's behaviour with sensors or self-reporting, and in making easy options for doing so widely available.

Rise of digital coaching practices

The digitisation of our social behaviour also opens new doors for coaching social skills. It should be noted, however, that so far only limited use is being made of digital coaches or of tools that quantify and track social behaviour. Research projects are making important advances, but the technology has to prove itself in practice before it can be commercialised. Nevertheless, researchers and the business world acknowledge its potential, for example so as to offer autistic people smartglasses that help them recognise their emotions.[68] We can therefore use current research and the first practical examples to explore potential applications and the impact of e-coaches in the context of social interaction.

To explore the rise of the e-coach in the social domain, we will start by looking at current coaching practices. As we indicated in the introduction, coaching can take on many different forms when applied to social behaviour. On the one hand are consumers who take a networking or flirting course for their personal improvement; on the other are people who feel hampered in their everyday lives by a social anxiety disorder and seek professional help from a clinical psychologist. Somewhere in between are parents who are being coached by a social worker because they have a difficult child or a domestic violence problem. The dividing lines between these various contexts is naturally not as clear-cut in real life as we have described it here. After all, a professional psychotherapist may also offer assertiveness training, and someone may see a social worker as part of his or her clinical treatment plan. The role that technology plays will differ depending on the context, however. We see various different forms of e-coaching emerging in these varying contexts.

In a clinical setting, for example, data management is subject to strict rules and treatment must be shown to be effective. E-coaching can then be used under the supervision of a medical professional in order to tackle a certain problem with a client according to a specific treatment protocol. In this case, the e-coach is embedded in a context of healthcare expertise and existing processes, and it is the care provider who takes the initiative. At the other end of the spectrum, in the commercial context of consumers who are interested in personal improvement, the initiative lies with the user. The means and methods available to consumers vary widely and there are fewer rules, evaluation procedures, and protocols. Support by a social worker is embedded in the existing context of healthcare and welfare institutions and their protocols, but such support does not have the same properties as treatment for an anxiety

68 See for instance the Sension app for Google Glass.

disorder, for example. Social work focuses on helping the individual to be self-reliant and function independently. In this chapter, we describe the rise of e-coaches in three situations: (1) e-coaches in the context of clinical treatment, (2) e-coaches that support behaviour in the societal domain, and (3) e-coaches for people who wish to improve their behaviour because they themselves feel a need to do so.

Tabel 5.1

Context	Clinical domain (1)	Societal domain (2)	Personal domain (3)
Aim	Treatment	Support	Personal improvement
Example	ADHD, social anxiety disorder	Childrearing, domestic violence	Assertiveness, flirting, dating, etiquette
Assistance by	Clinical professionals	Social worker	Coach – self-help
E-coach	Used in treatment under professional supervision	Used for support in consultation with social worker	Used at the consumer's initiative without human supervision

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Coaching in the clinical domain

Digital coaching offers people who are being treated for social phobias or trained in social skills new opportunities to practise what they have learned in virtual social situations. Delft University of Technology recently joined forces with therapists in developing a Virtual Reality Exposure Therapy (VRET) system for treating patients (Brinkman et al. 2012). Research projects such as the European TARDIS (Anderson et al. 2013) or MIT's MACH project (Hoque et al. 2013) are developing virtual systems for practising social skills. These systems make it possible for people to practise social skills in a wide variety of situations and changing circumstances (job interview, blind date, shopping) while never leaving their homes. In the case of VRET, the practitioner monitors the session remotely and can adjust the level of difficulty of the interaction between the patient and his virtual counterpart by modifying the dialogue. The TARDIS and MACH projects involve detecting the emotions and social attitudes of the person who is practising by analysing his speech and facial expressions and providing him with feedback. He can monitor his individual progress in this way and try again on his own based on the feedback he is given. Although they are still in development, these projects show how e-coaching might be used in treatment, under the supervision of a human professional.

Tracking and feedback offer another form of everyday support that is making increasingly effective use of extensive, computerised registration technologies. One example is the Pubercoach (Otten et al. 2013) for teenagers with ADHD. It is being developed by TNO in collaboration with the Yulius Academie (a research centre) and technology firms Cofely and Inmote. The project is still in the research phase, but several demonstrations have shown its potential. The

Pubercoach is a smartwatch that gives personalised feedback to teenagers about certain types of behaviour, for example being on time, something that many adolescents find difficult. The e-coach is designed flexibly so that it can be tailored to the individual and his or her goals, which the practitioner and the adolescent identify and set together. The e-coach then helps by telling the teenager when he needs to leave in order to arrive on time for his next appointment. To do this, the e-coach has access to the teenager's calendar, which not only lists his appointments and activities but also travel times between locations. Using the link to the calendar, the e-coach can then track the teenager's actual behaviour and estimate whether he takes as long to walk to school as had been scheduled. The coach can provide immediate feedback on behaviour, and if the teenager meets one of his goals, the e-coach can be set to reward him straight away. It will do this even if none of his family or friends are around, for example by passing on a compliment from his mother. If the teenager is having trouble with his behaviour in social settings, the e-coach can be programmed to ask him how he is feeling at regular intervals. This reveals patterns (for example a deterioration in the teenager's mood whenever he forgets to take his medication), so that the e-coach's feedback can be streamlined.[69]

Figure 5.1 The Pubercoach

Source: TNO

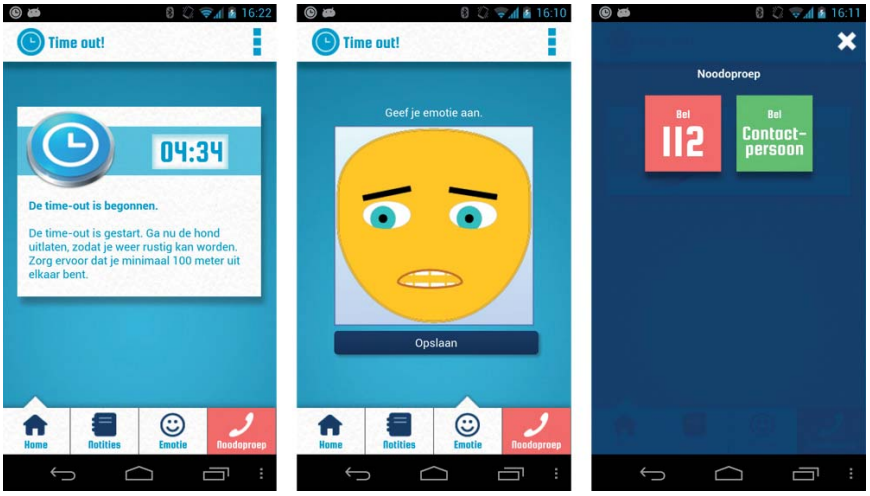
Coaching in the social work domain

In addition to clinical practice, there is also the practice of social work. Social workers offer support and assistance in a variety of socially sensitive situations that are unrelated to clinical treatment. For example, there are various coaching and intervention methods available to help people become involved in, appreciate, and maintain relationships with others. Some of these are provided

69 http://www.youtube.com/watch?v=lsseWW8DmPU

by civil society organisations (e.g. De Sociale Coach[70]). Another app, known as Time Out!, demonstrates how an e-coach can help users by offering them direct support.[71] It was developed by Lumens Groep, a welfare organisation, and tech firm Sense OS, and is useful for families struggling with domestic violence issues. The app offers technical support by using the 'time-out' method. In this method, partners can propose a 'time-out' when tempers begin to flare. During the time-out, the partners remove themselves from each other's presence in order to cool off and prevent their argument from escalating (Veenstra & Scott 1993). If a couple argues a lot, the social worker can advise both partners to download the Time Out! app to their smartphones. The next time they get into a row, one of the partners can launch the app and press the Time Out! Button to propose a time-out. The app can also use the phone's microphone to monitor the level of noise, and if it detects shouting it will itself propose a time-out. The app then explains that the partners would be wise to put some distance between themselves and have a cooling-off period, and it suggests activities that each partner can do during the time-out, for example taking the dog for a walk. The e-coach plays the role of observer and offers both parties an escape by removing themselves from each other's presence temporarily. The smartphone, which knows each partner's location, checks whether both have in fact gone to different places. During the time-out, the app also asks each partner how he or she feels. If the app registers that both partners have settled down sufficiently, the time-out can be discontinued and the partners can talk things over themselves.

Figure 5.2 The Time Out! app



Source: Lumens Groep, www.time-outapp.nl

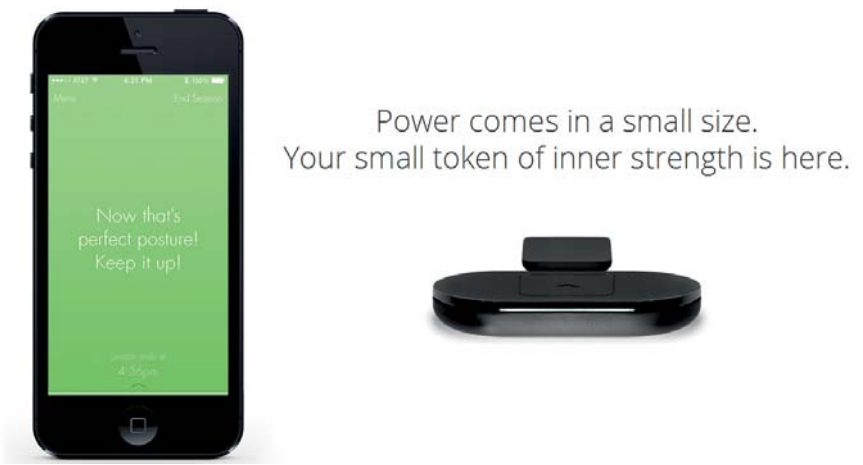
70 http://www.desocialecoach.nl
71 http://www.time-outapp.nl/

Coaching for personal improvement

People can use e-coaching applications to tackle a specific problem but also to support them in their personal improvement. There are many different courses, coaching pathways, and self-help books meant to support people as they work on a certain aspect of their behaviour. They can be work-related, such as training or coaching in networking, effective interviewing or assertiveness, but they can also focus on improving one's private life, for example a flirting course. Within this broad spectrum of practices, there is also a wide variety of digital coaching initiatives on offer, for example the ToneCheck software described previously, which scans e-mail messages for language that could give the recipient the wrong impression. The XSU info lunch scenario at the start of this chapter describes a number of potential future e-coaching applications related to social behaviour. Although it is set in the future, some of the elements of the scenario can already be found in commercial applications.

One recent device is Lumo Lift, a sensor that can be clipped to or worn under clothing. The sensor records the wearer's carriage and physical activity and vibrates faintly when his posture has slumped. This encourages him to straighten his back and square his shoulders, holding himself in a way that – according the app makers – promotes self-confidence: '…when you hold yourself in an open and upright position you actually get a surge of hormones that make you feel and become more powerful.' The promise is that Lumo Lift can help wearers improve their posture and make a better impression in social situations. 'Lift brings out the best in you, to be the more attractive, more confident you.'

Figure 5.3 Lumo Lift



Source: Lumo Body Tech, www.lumobodytech.com

The technologies discussed earlier for analysing facial expressions and speech are also used in e-coaching applications in the consumer domain. The XSU scenario describes how such technology could be incorporated into smart-glasses so that wearers would have greater insight into the client's attitude during business meetings. Google Glass, currently the best-known example of smartglasses, is still only available to a small group of first-test users, but there are plans to make the product available to the general public later this year (2014).[72] Developers such as Sension have already built test applications that will add emotion recognition to Google Glass, based on facial expressions.[73] That will bring the fantasy world described in the scenario a step closer. The US+ project described earlier shows how the same facial expression analysis technology can be combined with speech analysis technology and integrated into video call software. This smart software will then be able to track real-time interactions during video calls and coach the parties on improving their social behaviour, for example by emitting a signal when it is time to let the other party talk. *Sight*, a futuristic short film by Eran May-raz and Daniel Lazo, shows how these technologies can be combined in the future to create an app that offers users dating tips (e.g. how to seduce his date, who is entirely unaware of the app).[74]

The 'social e-coaches' that are currently available in the consumer market focus mainly on quantifying behaviour. Their feedback function is less highly developed. Users receive statistical information or reports on their behaviour or environment, but very little coaching in terms of what to do with that information; they are not supported in their attempts to change their behaviour. Nevertheless, future generations of social e-coaches are set to play a role in a large and diverse number of situations. One type of application that both researchers (Arroyo et al. 2009) and firms such as Affectiva[75] foresee can be classified as *educational assistance*: analysing students' facial expressions to determine whether or not they understand a lesson or explanation. Current apps such as Understoodit use live polling to enable students to indicate that they are losing interest because the instructor's lesson is too difficult – or too easy – for them. Instructors can use this information (which is plotted on a chart in real time) to tailor their explanations and lessons more closely to their class. The idea is that analysing facial expressions – for example a look of confusion (or in fact comprehension) – can digitise and refine this process so that instructors gain a better understanding of their interaction with the class as a whole.

72 http://www.idigitaltimes.com/articles/21720/20140131/google-glass-release-date-consumer-launch-2014.htm
73 http://www.wired.com/wiredenterprise/2013/08/catalin-voss/http://www.sfgate.com/technology/dotcommentary/article/ Google-Glass-app-being-designed-to-read-emotions-4758728.php
74 *Sight*, by Eran May-raz and Daniel Lazio (2011), http://vimeo.com/46304267
75 http://www.technologyreview.com/news/519656/startup-gets-computers-to-read-faces-seeks-purpose-beyond-ads/

5.3 Changes in coaching

The examples discussed above illustrate a number of changes that e-coaching has introduced: sensors and data collection allow us to quantify social behaviour; digitisation and computers make coaching widely accessible and available; users can have an e-coach with them at all times and receive coaching in real time in a specific context; and new parties are offering coaching thanks to the rise of the e-coach.

The fact that we can quantify social behaviour digitally implies a huge change in the way coaching is provided. Digital monitoring makes it possible to track variables for a particular period of time. In the case of anxiety disorders, for example, it becomes possible to take and keep track of the user's pulse. This may well improve the quality of the coaching, for example because the approach can be tailored to the context and personalised (more objective data, some of it collected between sessions, with the coaching process being adapted accordingly). At the same time, there are still concerns about the reliability of this data. It turns out to be especially difficult to collect reliable and valid measures of emotions, stress, workload, and other matters in realistic circumstances (Grootjen et al. 2007; Truong, Neerincx & Van Leeuwen 2008). Section 5.4 will look at this in greater detail.

In every situation, we see that digitisation changes the availability and accessibility of coaching. Digitisation makes coaching scalable and continuously available, giving users access to it in many more situations than before. Virtual exercises make remote training possible (Brinkman et al. 2012).[76] Certain types of exercises can also be carried out under the supervision of virtual coaches, as the MACH and TARDIS projects show (Anderson et al. 2013; Hoque et al. 2013). The virtual environment also makes it possible to monitor the laboratory social situations closely and to adjust them to the desired level, giving the user a safe environment in which to practise behaviour repeatedly. The Pubercoach app also makes coaching more readily available. The user's smartwatch gives him access to a coach at moments when a traditional coach would not be available. The same is true of Time Out!, which offers low-threshold support in the shape of an app that can be used on any smartphone. In the personal domain, scalability and accessibility make it possible to turn coaching into a mass-market product (packaged as a gadget, like Lumo Lift). The technical infrastructure for e-coaching is already present in many situations, with cameras, sensors, and powerful processors integrated into smartphones and, in the near future, into smartglasses such as Google Glass. That means that, potentially, it will be possible to offer coaching and assistance in every social interaction in which this technology is present.

76 Support by intelligent computer systems can also reduce the practitioner's workload during treatment, so that it may be possible to treat multiple patients simultaneously (Paping, Brinkman & Van der Mast 2010).

Another key feature of the e-coach is that it can quantify and provide real-time feedback on behaviour in specific contexts. We see this feature in all our examples. The e-coach analyses social behaviour while it is taking place in a 'natural' context, it gives the user real-time feedback on his behaviour, and helps him modify that behaviour. The e-coach can help the user when and wherever he needs it – for example a teenager with ADHD who is at risk of forgetting an appointment. That gives the e-coach a significant advantage over human coaches, who cannot always be present. Because they are always present, e-coaches also become part of the social situation in a certain sense (for example: 'Could the person I'm talking to be angry at me? I'll see what my social coach thinks.'). The Pubercoach shows that it is not only the adolescent user who interacts with the e-coach; his parents are also part of the network linked to this app. And the parent can provide the right kind of supervision because he or she is also being coached (for example, on what to do when the teenager displays appropriate behaviour). The e-coach plays its own role in the interaction between parent and child. The Pubercoach can remind the adolescent to leave the house on time and to remember to take his bag; the e-coach can tell the boy's mother when he has acted appropriately and she can reward him. The Pubercoach shows that e-coaching does not need to focus on the individual alone, but can form part of and work in interaction with a social network.

Figure 5.4 Both parent and child are involved in the Pubercoach

Source: TNO

Finally, the rise of the e-coach is also changing the way that coaching is provided. Besides coaches and healthcare providers, the makers and developers of the technology also have a role to play. The Time Out! app was developed by a welfare institution in cooperation with an IT firm. The Pubercoach is

also the result of a partnership between healthcare providers and technology developers. E-coaching is being marketed to consumers by all sorts of parties, from small-scale app developers to major IT companies and producers of consumer technology. Users are thus dealing with other parties and, possibly, other interests and business models to those customary in the healthcare system. The following section will discuss the implications of these changes.

5.4 Issues

The advent of e-coaching is changing the way social coaching is offered and sought. These changes are giving rise to issues that we will look at in detail in this section.

Reliability of the e-coach

In the current situation, coaching and supervision are based mainly on the coach's observations and on how the coachee and his family, friends, or colleagues experience the coaching. Introducing an e-coach creates opportunities to quantify and record data continuously (for example the location of a teenager with ADHD or the emotional state of a person with a social anxiety disorder). Generally speaking, the data that is being recorded is increasingly detailed. This can help the coaches, the coachees and their family, friends, or colleagues understand the problems and the treatment practice better. At the moment, however, we lack rigorous empirical evidence that supports the way data is collected and that demonstrates the reliability of the working methods and recommendations of social e-coaches.

Although computers are increasingly being used to track social behaviour, building technologies to recognise patterns of social behaviour is a major challenge (Salah et al. 2010). It is also difficult to correctly interpret social signals such as emotions outside the laboratory. The algorithms used to read facial expressions have improved enormously in recent years, but they are not perfect and will probably never become so, says Tadas Baltrusaitis of the University of Cambridge in an interview with *The New York Times*.[77] Reliable measurement requires multimodal input, for example the combined analysis of audio and visual signals (Zeng et al. 2009). Even then, however, there are challenges, for instance because the input is less than optimal (too dark for the camera, rustling when people move about, background noise, and so on). A considerable amount of data has been collected in recent years on emotions that are relatively easy to evoke in the laboratory. That is more difficult with complex emotions, and that is why it is harder to compile reliable databases about them that computers can use for facial analysis (Zeng et al. 2009). In addition, it is quite a challenge to interpret social behaviour in context; the same smile may mean one thing in one situation, and something entirely

77 http://www.nytimes.com/2013/12/01/technology/when-algorithms-grow-accustomed-to-your-face.html

different in another. A reliable social e-coach meant to assist in situations of domestic violence would have to understand the difference between shouting during a football match and shouting during an argument.

By digitising social behaviour, we run the risk of error and inconsistency. That has consequences not only for how the e-coach interprets the user's behaviour, but also for the advice (or lack thereof) that is based on this incorrect data. Undesirable situations may unfold as a result, for example the wrong advice or having a user practise in a social environment that is too difficult for him. E-coach users also frequently have trouble assessing the capabilities and limitations of a digital coach. How the e-coach works depends on software algorithms about which the user usually has no understanding. His expectations concerning the quality of coaching may therefore differ from the e-coach's actual capacities. If the user thinks that the e-coach can do more than it actually can, he may end up disappointed because he has not met his goals, or he may follow erroneous advice or mistakenly decide not to seek professional help. This problem can be avoided by designing the e-coach in such a way that it can explain to users how it has arrived at its advice. Researchers are exploring how to design intelligent systems as 'explaining agents'. This way they will no longer function as a 'black box' that makes suggestions, but as a system that can explain itself to the user and, for example, to a practitioner (Harbers et al. 2014).

The demands made on an e-coach's functions differ depending on the context in which it is being used. The requirements set in the clinical sector differ from those in the consumer sector. E-coaches that are used in treatment must first have their methods and effectiveness evaluated in randomised controlled trials. Before such a study, which involves patients, can be carried out, it must have the approval of a Medical Ethics Committee (METC). Once the e-coach's effectiveness has been demonstrated, it can be used in treatment (and may, for example, qualify for coverage under health insurance). E-coaches such as the Pubercoach must satisfy these requirements and pass the tests before they can be used in real life.

Furthermore, the producer is obliged to assess whether his app should be considered as a medical device, thus requiring CE certification. An app is considered a medical device when it is used for diagnosis or treatment, or if it is used for measurement purposes. The certification process involves assembling a technical file showing whether a product complies with EU safety, environmental, and consumer protection legislation (Nictiz 2013). Finally, e-coaches in the clinical domain are part of a support trajectory that also includes a human coach. The e-coach supplements the human coach's support. In addition, the human coach can monitor whether the e-coach is making a positive contribution to meeting the goals that he has set with the coachee. As we indicated in section 5.2, the initiative lies with the practitioner, who can

check that the e-coach is being used responsibly to tackle a particular problem. This helps ensure the quality of e-coaches used in treatment. These requirements do not apply in the consumer market; there, e-coaching is not subject to mandatory testing for effectiveness and reliability. The initiative to purchase and use an e-coach lies with the user, and product quality is ensured mainly by means of market mechanisms (a poorly functioning app will not sell very well). There is more scope for commercial parties to develop apps, but also a greater risk of ineffective 'quack remedy apps'.

Accessibility and the need for self-help

The e-coach can be an advantage because it lowers the threshold for seeking help. The threshold to go to a healthcare institution may be particularly high for people who have a social anxiety disorder, for example because they fear being rejected or judged negatively by the medical staff. An e-coach may be less intimidating in that case, and may encourage people to try coaching who would otherwise never seek out a coach themselves. The Time Out! app shows that an e-coach can supplement existing care systems. The app also offers a low-threshold form of assistance. When people are grappling with domestic violence issues, for example, fear of stigmatisation can play an important role in their deciding whether or not to get help (Taket et al. 2003). When that fear prevents them from contacting a psychologist or social worker, an app that they can download themselves may be a godsend.[78] There is also the risk, however, that people with serious problems will think that they can solve them with an app instead of with professional counselling. The best approach would be to show the user the effects and limitations of an e-coach (for example by having the e-coach, in the role of explaining agent, explain its actions to the user) and to build in a safety net (calling in human coaching when the problems exceed the e-coach's abilities). Ideally, that would lead to a situation in which the e-coach supplements existing practices: low-threshold access for people who need help with social interaction, with a referral to a human professional when necessary.

One question of particular relevance in the consumer domain is how the accessibility of coaching will affect the demand for self-help. In the healthcare domain, the e-coach is used mainly to support an existing process of help and support, but something else is happening in the personal domain: the social e-coach is becoming a mass-market product. There are stand-alone gadgets such as Lumo Lift, but also technology that can be used in existing methods of communication, for example text-based messages such as e-mail (ToneCheck), video calls on laptops and smartphones (US+), and face-to-face conversations (Google Glass with an app for recognising emotions). What will it mean if all our communication is analysed digitally and we can get coaching for it? On the

78 Research into Internet-based therapy has revealed that people make use of it because there is less risk of stigmatisation (Townsend, Gearing & Polyanskaya 2012).

one hand, it can make us more empathic and help us understand others better. On the other, it can lead to de-skilling because we have outsourced our ability to pick up on social signals to technology. Just as in-car navigation systems have come to provide essential support for our sense of direction, we run the risk of making Google Glass an essential booster for our emotional antennae. The possibility that we can improve could also lead to a whole new set of standards and expectations for social behaviour. We still accept that miscommunication can happen or that we can fail to pick up on subtle social cues, but we may not be so forgiving if that can be avoided with e-coaches. In the personal domain, the e-coach may therefore supplement and improve our own skills, but it can also give rise to new uncertainties and generate new demands for technological support.

Relationship between e-coach, user, and social environment

The fact that the social e-coach is used in social environments that include other people means that coaching can also have indirect consequences for them. If an e-coach collects data on the interaction between a user and his social environment, the data also pertains to that social environment. This becomes clear if we recall the example of Google Glass and emotion recognition software. This combination could be useful in the future for someone with an autism spectrum disorder because it will help him recognise the emotions of his conversation partners. At the same time, however, it will also be collecting data on that other person's emotional state. The question is whether the user's social contacts will agree to this. They may see it as a violation of their privacy. Various newspapers have reported that a Google Glass wearer in San Francisco was attacked by a group of people who did not appreciate being filmed with the device without their consent.[79]

At the moment that data is collected on people in the user's social environment, they have an interest in what happens to that data, even though they were not involved in the decision to use the e-coach and did not agree to any terms and conditions of use possibly stating that the producer of the service may use the data collected for other purposes. In the case of Google Glass, the glasses are there for all to see. But what about a social coaching app that operates as a plug-in for video-call software? The person on the other end of the line may not even see that his facial expressions and speech are being analysed. Do people have the right to know whether you are using a dating coach app in your interaction with them, for example? Philosopher Peter-Paul Verbeek (2012) thinks that devices such as Google Glass are problematic precisely because of this lack of transparency. The person with whom you are communicating cannot see whether you are collecting data on him through the glasses, and if so, what data that is. It seems logical, then, that transparency

79 http://sanfrancisco.cbslocal.com/2014/02/25/woman-wearing-google-glass-says-she-was-attacked-in-san-francisco-bar/

about e-coach use and about looking up information on someone should be set as a standard for e-coaches in the social domain. But there is another side to this issue where e-coach use is concerned: the user's own right to protection of his privacy. Users may not want their social contacts to know that they are being coached. Someone who is seeing a human coach or therapist can decide not to tell his friends, family or colleagues. The risk of stigmatisation or incomprehension may play an important role in such a decision. In the case of an e-coach, the user has the coach with him at all times – the Pubercoach described earlier is a good example. If people can tell from someone's watch that he has ADHD, then the user's privacy has been infringed. After all, he no longer gets to decide that he wants to keep that information quiet. This may have negative consequences, for example the e-coach user might be stigmatised. To protect the user, for example the adolescent who has an ADHD e-coach, it may therefore be better to hide the fact that he is using an e-coach.

Besides weighing up the need for transparency in social interactions against the need to protect the user's privacy, there are other indirect consequences for the user's social environment. While coaching may benefit one person, it may have indirect negative consequences for another person in the same social context. A pupil who uses an e-coach to learn to be more assertive in class may subsequently demand and receive more attention from his teacher. But the extra attention that he is getting will affect how much attention his classmates get. To help us address this sort of social issue, Verbeek feels that we need new standards and socio-technical etiquette, similar to the standards that have emerged in recent years concerning the use of mobile phones in public places (Verbeek 2012). He cites Google Glass as an example, but we can also imagine the same sort of thing for e-coaches in the social domain. Some of the new standards associated with this technology will be a question of social etiquette, for example people switching or taking a pair of smartglasses off during a conversation. Other standards can be incorporated in the technology itself. Value Sensitive Design methods focus on identifying and making explicit the relevant values of the people and organisations that will be affected by an application, and turning those values into standards for systems design (Friedman, Kahn & Borning 2006). For example, the design for a pair of smartglasses may have a built-in lock that prohibits wearers from looking up information on someone until they have had several seconds of eye contact with them, to prevent them from simply looking up information on total strangers walking down the street. Finally, certain standards can also be embodied in legislation, for example specifying the situations in which wearing Google Glass is prohibited or concerning certain information that may not be accessed by such devices (Verbeek 2012).

New coaches, new parties

IT is the driving force behind the development of e-coaching. As the examples given in previous sections show, this means that tech developers are starting to

play a role in the coaching process as well. So a new party has sat down at the negotiating table, and the question is what that party's interests are. The interests involved and the way in which we pay for e-coaches differ depending on the context (healthcare or consumer). Social e-coaches such as Pubercoach are not yet available commercially, but their developers are working to create systems that can be used in treatment and that may be covered under health-care insurance. As we mentioned earlier, that requires their effectiveness to be demonstrated in clinical research. The producer's interest and his revenue model are based on the fact that he receives direct payment when his e-coach is used in treatment.

The Time Out! app is also still under development and the developers are currently deciding whether it would be useful to market it (see also the box about Time Out! at the end of this chapter). If the app were to be commercialised, any welfare institution that wished to use it would have to pay for it. The monthly costs associated with using the app are estimated at EUR 20 per couple. If the app's support means that people are better able to cope with their problems themselves, and if they consequently have less need for a social worker's support, then it would be financially advantageous for the welfare institution to offer clients Time Out! as an e-coach.

In the consumer domain, the e-coach is a product or service that consumers pay for directly. There are various ways of doing this. The consumer can purchase an e-coach app or physical product, for example Lumo Lift or ToneCheck software. They can also pay a monthly fee for coaching as a service. But the producer might also be interested in collecting data on the user's behaviour. The data can be used for marketing purposes, as seen in the chapter on the financial e-coach, or sold on to third parties.

The rules for sharing and storing data in the case of consumer e-coaches differ from those that apply for e-coaches used in healthcare or social work. In the healthcare domain, the collected data is covered by legislation governing medical information. The Individual Healthcare Professions Act [*Wet op de beroepen in de individuele gezondheidszorg* or *Wet BIG*] states that specific occupational groups (physicians, healthcare psychologists, and psychotherapists) must adhere to the concept of physician-patient privilege. The rules pertaining to medical confidentiality are set out in the Medical Treatment Contracts Act [*Wet op de geneeskundige behandelingsovereenkomst* or WGBO]. For social workers, the duty to treat data confidentially has been laid down in a professional code of conduct (*CPB Informatieblad*, 2011).[80] In the

80 In addition to professional codes and legislation, there are standards and guidelines for providers and developers that describe how the design process for an interactive system should be:
- NEN 7512:2005: Health informatics – Information security in the healthcare sector – Basis for trust for the exchange of data.
- NEN-EN-ISO 9241-210:2010: Ergonomics of human-system interaction - Part 210: Human-centred design for interactive systems.

case of e-coaches used to support professionals in the healthcare or social work domain, the expectation is that data will be dealt with according to these rules. There is no similar duty to observe confidentiality for e-coaches in the consumer domain; personal data is protected under the Personal Data Protection Act [*Wet bescherming persoonsgegevens*, WBP], but producers have much more leeway to decide for themselves what they will do with the data they have collected. Whereas the e-coach's integrity with regard to data is guaranteed in the healthcare domain, consumers who purchase an e-coach may not know to what extent they can rely on their data being dealt with scrupulously. In a study of twelve fitness and health apps, the US Federal Trade Commission found that user data collected by the apps had been shared with a total of 76 different parties.[81]

5.5 Conclusions

This chapter has shown that the social e-coach is emerging in different forms in different contexts, giving rise to various issues. Within the context of health-care and social work, the e-coach is part of an existing support process in which it supplements or takes over certain tasks. The e-coach fits into a more or less stable set of practices in this context, with an existing regulatory framework to ensure quality and with human professionals to supervise the e-coach's use. Nevertheless, a number of issues have emerged concerning the development of e-coaches. It remains quite challenging to develop reliable quantifying systems and behavioural models that the e-coach can use to offer users personalised support. In addition, a good e-coach should offer built-in transparency about its capacities and working methods, as well as have the ability to explain its methods to the user or human coach.

The situation is quite different in the consumer domain. Here, the social e-coach is not incorporated into existing practices, and the standards that it should meet are less clear. At the moment, the social e-coach is still in its infancy and questions are emerging about the rules and standards that it should meet. What is the e-coach 'permitted' to do in terms of collecting and sharing data on social behaviour? What social standards concerning transparency apply when e-coaches are used in social interaction? In which situations is it acceptable or desirable to use e-coaching and to quantify and track social behaviour? Is it okay in an educational context to help teachers and pupils understand one another better, but not during job interviews or sales pitches? The issue of reliability also plays a role in the consumer domain. E-coaches are not subject to as much supervision when it comes to their quality and reliability, and fewer demands are made on them. That gives producers the leeway to innovate and develop new e-coaching applications, but how do consumers know whether the e-coach's advice can be trusted? There is also a greater risk

81 http://www.ftc.gov/system/files/documents/public_events/195411/consumer-health-data-webcast-slides.pdf

of apps being marketed that are advantageous for the provider – because they earn money for it or provide it with data – but of little use to users. Some of the challenges associated with e-coach development are technical in nature. Responsible design solutions can be employed to improve reliability and to develop satisfactory and transparent feedback systems. But development also requires a clear-cut framework that clarifies what a user can expect from an e-coach and how it will deal with the growing volume of data that is being collected and shared. In the end, using e-coaches in the social context also means thinking about the influence that they have on behaviour, not only the user's but also that of his social contacts.

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Integrating e-coaching into an existing practice

An experiment was set up in Eindhoven that used an app to prevent conflicts from escalating into domestic violence. The app Time Out! offers technical support for the 'time-out' method, in which partners can propose taking a time-out when tempers begin to flare. During the time-out, the partners remove themselves from each other's presence in order to cool off and prevent their argument from escalating (Veenstra & Scott 1993).

After consulting a social worker, a couple can download the Time Out! app to their smartphones. The next time they get into a row, one of the partners can launch the app and press the Time Out! button. The app also monitors the level of noise and can itself propose that the partners take a time-out. In other words, it recommends a cooling-off period and suggests an activity that each partner can do during the time-out, for example taking the dog for a walk. The smartphone's GPS tracks whether the partners have in fact gone to different locations.

The Time Out! app was developed by the welfare institution Lumens Groep, technology firms Sense OS and ASK Community Services, and a local domestic violence hotline (*Steunpunt Huiselijk Geweld Eindhoven*). Sense OS initiated the partnership, says Maria Spijkers of Lumens Groep. Sense OS specialises in applications that use sensor technology, for example for the healthcare sector. The firm asked Lumens Groep whether its applications might be useful in their field of work.

This led to the idea of developing an app based on the time-out method. The time-out method is easy to convert into software because it consists of a procedure broken down into clearly defined phases. According to Spijkers, staff at Lumens Groep and Sense OS worked together on programming and testing the app for a full year. It took considerable time and energy to fine-tune the app (to ensure that it would deliver the right alerts in the right way). Lumens Groep won the Marie Kamphuis Prize for the app in 2012. The prize is awarded for innovations in social work (Marie Kamphuis Stichting 2013).

Users and social workers have tested the app to determine whether Lumens Groep clients would benefit from the support that the digital coach can offer them. It is made available to couples who are having problems, but not in the case of severe domestic violence. Practical experience in an earlier phase of the project showed that the app is

not effective then. ‘People start throwing their phones around, or fight about whether one or the other should actually have requested a time-out,’ says Spijkers.

‘The Time Out! app is made available to couples who are having problems, but not in the case of severe domestic violence. The app is not effective then. ‘People start throwing their phones around, or fight about whether one or the other should actually have requested a time-out.’

It’s up to the client to express interest in using the Time Out! app, says Spijkers. Social workers offer it in a face-to-face meeting concerning the kind of support the couple can use. They can opt for traditional methods but also for the app. The case manager then activates the app for them, and can also check that they are using it correctly.

Extensive testing in the design and pilot phases will guarantee the quality of the app. CE certification or research validation is not required because the app is not regarded as part of a therapeutic process. Aside from that, certification is expensive and difficult for an app such as Time-Out! To clarify what clients can expect of the app, they are given clear instructions and information. They are told that the app is an aid, but that it does not guarantee success. It is up to them to decide whether or not to use the app, and in that way it differs very little from the old ‘time-out’ method. ‘Before we had the app, we explained the time-out method on a sheet of paper. We then gave that sheet of paper to the client and they did with it what they wanted,’ says Spijkers.

The Time Out! app is now in its third pilot phase, i.e. the evaluation phase. The provisional conclusion is that development will be discontinued for now. Despite all the testing, it has proved difficult to make the app as user friendly as it needs to be. In addition, the revenue model remained shaky in the final phase. In the model, the app was to be sold to welfare institutions. By using the app, people would be empowered to solve problems themselves and the welfare institutions would be able to save considerably on staff man-hours. Although the Time Out! app will not be available commercially anytime soon, its development shows how an e-coach can be incorporated into existing coaching and support practices.

This box is based on an interview with Maria Spijkers of Lumens Groep.

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Stress coaches at work

Scenario: Lisa and Matt go on a date

By Gaston Dorren

2018. Lisa and Matt, who are both around thirty, are on their first date.

Lisa: 'Okay, that's enough chitchat. Tell me what makes you happy.'
Matt: 'Having a lot of energy. When I get to work in the morning feeling energetic, when I can concentrate at the office, and when I still feel lively enough in the evening to read a trade magazine and answer a few e-mails.'
Lisa: 'Or to relax?'
Matt: 'Of course, when necessary. But my philosophy is: if I sleep well, don't hurt anywhere and look forward to going to the office, then my work is my hobby and vice versa. I do go cycling twice a week, because my body needs it.'
Lisa: 'So you've really got your life under control, then.'
Matt: 'Yes I do, now that I'm using B-Well.'
Lisa: 'I hear a commercial coming. But tell me about it.'
Matt: 'B-Well is an app that helps me do the things that make me feel good. Or, to put it better, it helps me make sure that I keep feeling good in the long term. It tracks how I sleep, how I'm feeling, what I'm doing, and much more. And it gives me practical tips.'
Lisa: 'How does it know all this?'
Matt: 'When I first started using it, I had to fill in a whole questionnaire about myself, what I do and what I want.'
Lisa: 'Kind of like a first date.'
Matt: "Yeah, kind of like that. But B-Well is more efficient at dating than people are, because it already knew me pretty well after only fifteen minutes.'
Lisa: 'You'd be surprised.'
Matt: 'I love surprises. Anyway, the app then sets about tracking all sorts of things. The sensors in my phone let it know when I sleep and how I'm sleeping, it detects if I'm engaged in strenuous physical activity, and it knows where I am. My computer remembers most of my keystrokes and mouse movements and sends a summary to the app. If I want to focus on my work, I put the app in concentration mode so that it prevents any phone calls, e-mails, or text messages from interrupting me. But it also knows that after two hours I'll probably want to switch to something less intensive. It also asks me how I'm feeling several times a day.'
Lisa: 'But you already know all that yourself, don't you?'
Matt: 'Of course, or a lot of it. But the app helps me be sensible. If it's my cycling night and I'm not in the mood, it will urge me to go anyway. For example, it might say "You'll feel so much better later if you go!" And if I don't

go, then it will urge me to get the bike out the next day.'
Lisa: 'So it's a substitute superego. Superego, that's what Freud called the part of your personality that tells you what you ought to do. Sort of a better version of ourselves.'
Matt: 'My father always called my mother his "better half".' That's just what I'm looking for, a "better half".'
Lisa: 'So you're still looking for a woman, even though you have B-Well? Well that's reassuring.'
Matt: 'But B-Well can do even more. I don't mean more than a woman, I mean it does more than encourage me to be sensible. Because it stores all sorts of data about me, it can discover patterns. Patterns that I don't notice myself. For example, the fact that I don't sleep as well if I answer e-mails after ten at night. Or that I only do things on my to-do list if I give myself a deadline. It alerts me to these things. At ten minutes to ten, it says: "After you finish this e-mail, you'd better stop if you want a good night's sleep". I have to admit, it sounds a bit like my mother. And if I put something on my to-do list, it insists that I set a deadline.'
Lisa: 'I'm impressed. Where did you find this app?'
Matt: 'My company gave it to me for free.'
Lisa: 'Clever of them. They'd rather have a fit Matt who can keep going than a tired Matt who's heading for a burnout.'
Matt: 'It's a win-win situation, isn't it? A couple of my older co-workers use it too. They know that they have a ways to go before retirement and realise that they need to take good care of themselves.'
Lisa: 'A way to go. Not "ways". Uh, forget it.'
Matt: 'Oh, so you have a thing about correct language? Should I download a TalkWell app?'
Lisa: 'No, don't. I'm sorry. Just talk the way you normally would.'
Matt: 'Okay. What I mean is: I only see benefits to this app.'
Lisa: 'I dunno. Doesn't it bother you that it interferes with everything and always tells you what you should be doing?'
Matt: 'In fact, I find it soothing. I don't have to keep track of everything myself now. I feel like a CEO with his own personal assistant.'
Lisa: 'You could also say that it's living your life for you.'
Matt: 'But I can always switch it off.'
Lisa: 'You can now, but what if your boss insists that all employees use B-Well?'
Matt: 'No, it's got to remain voluntary of course.'
Lisa: 'Why? I thought it was a win-win situation?'
Matt: 'Well, you're right, it is. But I still don't think it's a good idea.'
Lisa: 'I agree with you completely, and I'll tell you why. Say you want to have a really wild weekend. Dancing, drinking – partying till the crack of dawn. Can you do that?'
Matt: 'Uh... I'm better at drinking than dancing.'
Lisa: 'Uh huh. And on Monday you...
Matt: '...don't have much energy.'

Lisa: 'You're totally hung over. But it was probably good for you to go out and get crazy. The only problem is that B-Well doesn't understand, at all.'
Matt: 'Not yet. But when it's known me longer, it will recognise a pattern there too.'
Lisa: 'I'll believe it when I see it. But there's another problem. Do you agree that there are fewer and fewer permanent jobs about and more and more temporary contracts?'
Matt: 'Yes…'
Lisa: 'And if employers make B-Well compulsory...'
Matt: 'But I'm against that, remember?'
Lisa: 'Okay, but then the employer won't hire you. It will hire someone who accepts its conditions. And because that employee's contract will end after three years or so anyway, the company can wear him down completely. I mean, it can use him up until he's completely exhausted and then toss him aside, burnout and all.'
Matt: 'That sounds like exploitation.'
Lisa: 'That word is a bit old-fashioned, but yes, that's precisely what I mean. Maybe B-Well isn't precisely the right tool for that – it's too soft, too human – but it's easy enough to develop a similar app with other settings. ExploitWell or something like that. So in other words, I'm not a big fan of that sort of app.'
Matt: 'But you can't just reject B-Well because evil people might misuse the technology! You don't reject knives because you could kill someone with them?'
Lisa: 'No, and you're right. But if there were another tool that cut just as well but was less risky, then I'd definitely be against knives.'
Matt: 'But what B-Well does really adds something to my life. Something good, something, uh, wonderful!'
Lisa: 'I haven't heard you say a single thing about B-Well that would really add something to my own approach. I meditate.'
Matt falls silent, and then says: 'You meditate. Can you tell me something about that? And can you tell me something about yourself, while you're at it?'
Lisa: 'I'd love to. I thought you'd never ask.'

Thanks to Wessel Kraaij of TNO, project coordinator of SWELL, Smart reasoning systems for well-being at work and at home. The above text does not necessarily represent his own views.

6 The digital stress coach. Total control over your mental health, or 'Big Brother is watching you'?

Marc van Lieshout, Noortje Wiezer, Elsbeth de Korte

6.1 Introduction

It's an appealing idea to have a digital coach that helps you reduce work-related stress and get more energy from your work. We all feel stress. And we all want to do work that energises us. Stress is also something we'd like to avoid. It's a societal problem and a digital stress coach might offer a solution that fits in with the 'future world of work'. The development of digital stress coaches is still in its infancy. That means that this is the right time to think about how we can guide their introduction in a responsible manner. This chapter describes current developments regarding stress coaches and discusses various issues related to their introduction.

Work-related stress

When we talk about stress, we often mean that we have a heavy workload or that we're feeling the strain of a poor relationship with one of our colleagues. Strictly speaking these are not examples of stress, but of *stress factors* that lead to stress. Stress is the body's natural response to an external stress factor, resulting in the 'fight or flight response'. Stress is not necessarily unhealthy, but it will become so if it goes on for too long, is too intense, or if we do not have enough time to recover from it. Unhealthy stress can lead to a variety of complaints. Minor complaints include forgetfulness, insomnia, worrying, irritation, or tension. Most people suffer from these every now and then. But the complaints can also become so serious that it is impossible to work or carry out normal everyday activities like grocery shopping. In that case, the person in question is suffering from burn-out. Fortunately, serious complaints such as these are uncommon, but the number of employees who indicate that they have symptoms of burn-out has risen sharply in recent years. More than thirteen percent of Dutch employees reported burn-out symptoms in 2012 (Koppes et al. 2013). What is most worrying is the growing number of young employees in this group.

Work-related stress is stress caused by someone's work situation. If an employee is unable to change a stressful situation at work, then that stress is likely to go on for a long time, making it unhealthy. Various factors can lead to

work-related stress. Work pressure is one very important stress factor. This happens when an employee is unable to meet the demands made on him in the time available to him. Other stress factors include bullying in the workplace, conflicts with one's boss, aggressive customers or clients, job insecurity, boring or unchallenging work, and difficulty combining work and private life. A recent study (Koppes et al. 2013) shows that almost 30 percent of Dutch employees regularly work under enormous time pressure. Somewhat more than 15 percent of employees are occasionally harassed by colleagues, and almost 24 percent by external parties (customers, clients). Almost 50 percent of young employees (24 and younger) find their work monotonous, 8.5 percent of employees neglect family duties because of their work, and slightly more than 2 percent neglect their work occasionally owing to family obligations. In other words, the number of employees encountering stress factors at work is considerable.

Present-day social, economic and technological trends are only adding to work-related stress. Work is becoming more complex, flexible and individualised, and the boundary between our work and our private lives is blurring (Allvin et al. 2011; Houtman et al. 2012; Manyika et al. 2013). More complex work can be challenging, but it can also lead to stress. Flexible working practices can lead to job insecurity. They are also leading to a situation in which employees work for companies that increasingly operate in networks, in which they increasingly have to work in a variety of different business environments, with work becoming more individualised as a result (Wevers & Bongers 2013). Today, it is possible to work whenever and wherever we like (e.g. by means of telecommuting, 'The New Way of Working'; Pot et al. 2012). Because such flexibility makes it easier to strike a good work-life balance, it opens up the possibility of reducing work-related stress. It also blurs the boundaries between work and private life, however, with people running the risk of working all the time and everywhere – even on holiday. Some employees are unable to set and maintain such boundaries for themselves. Another risk is that flexible working practices eliminate one of the main buffers against work-related stress, namely the support of one's social network at work. All these changes can increase the risk of work-related stress (Houtman et al. 2012), and, what is more, they are making traditional interventions meant to improve working conditions increasingly irrelevant, since many of these are tailored to groups, departments, or entire organisations.

A role for a coach

Not everyone responds to stress factors in the same way. Some people cope with them better than others, and in fact the same person may have more trouble handling stress one day than the next. Whether stress leads to health complaints depends largely on whether the person concerned has the chance to recover from the stressful experience or situation. Does he have time to let his body return to its normal state, now that the 'fight or flight response' is no

longer necessary? Employees who suffer stress symptoms often call in a coach for help. There are various forms of coaching for work-related stress. Mainstream coaching often concentrates on *coping with stress factors*. Examples include coaching that teaches people to deal with 'energy takers' or with disruptions and problems in the workplace, or that trains them in time management. Another form of coaching concentrates on *promoting recovery*, for example coaching combined with training in relaxation techniques or yoga. Less customary is coaching to learn to *remove or reduce stress factors*. That may not be possible in some extreme cases, but in many work situations the best way to prevent stress is to tackle it at the source. In this type of coaching, the idea is to find a solution to reduce or eliminate the stress factors rather than try to cope with them or their effects. At the moment, methods that address the sources of stress tend to focus on the circumstances affecting *groups* of employees (a team, department or organisation).

It is our observation that the risk of stress is increasing and as a result, there is a greater demand for stress-reduction support. Technology makes it possible to digitise such support, and digital support fits in well with the changing landscape of work, as it can be used whenever and wherever a person requires it. The development of the digital stress coach is still in its infancy, but that gives us time to think about how we can guide the introduction of such coaches in a responsible manner.

6.2 Digitising coaching

Technology is making major changes possible in traditional coaching practices. A decade ago we had never heard of a smartphone; today, we are surrounded by them. Technology is integrated, both visibly and invisibly, into the products that we use and the environments we inhabit. Technology recognises us as users and monitors and influences our behaviour, preferably in a personalised and intuitive manner, and sometimes without us even noticing it (Aarts & De Ruyter 2009).

The technological advances underpinning these changes are mobile Internet (the Internet made available on mobile devices like the smartphone), the 'Internet of Things' (data collected by sensors on devices or persons made accessible on the Internet) and cloud technology (applications and data that can be accessed and stored remotely). Mobile Internet makes it possible to track and influence all of a person's everyday routines. Mobile Internet technology is advancing rapidly, with intuitive interfaces and new formats emerging such as wearables, i.e. microchips that are worn on, underneath, or integrated into clothing. The Internet of Things makes it possible to collect data on a continuous basis, to track and link it to other data, and to produce increasingly reliable measurements. Those measurements might concern the user's bodily functions, feelings or behaviour, or his physical or social environment. Cloud technology, which makes it possible to request access to hardware, software

and data online, allows us to store and process huge volumes of data and, for example, to use that data in mobile Internet applications (Manyika et al. 2013).

Coaching providers in the Netherlands are discovering the advantages – and the necessity – of a web presence and of the *digitisation of communication with the coach.* The advantages of digital interaction lie in its lower cost, its greater speed, and the possibility of leaving a message or filling in a form even when the other party is absent. Clients are growing more accustomed to digital forms of communication (e-mail, Skype and WhatsApp) to supplement their appointments or telephone consultations. Web-based counselling and support are also helping to digitise the coach. One important form of support is e-health software in which feedback is provided by a flesh-and-blood coach, but communication between the coach and the coachee is exclusively digital (for example the *Kleur je leven* [Colour your life] course by the Trimbos Institute[82]). That means that support is basically anonymous and is provided online when the client wants it and at his or her own pace. The digitisation of communication between coach and coachee is the first step along the road to digital coaching (Kool, Timmer and Van Est 2013).

There are numerous online stress tests or questionnaires that help visitors determine whether they are suffering from the symptoms of stress and whether they are expending more energy on their work than they get back from it. The results, which are often accompanied by suggestions or recommendations for improvement, are delivered immediately and are most likely pre-programmed and standardised.[83] Some of these tests are simply teasers for more elaborate programs (that users then have to pay for). Another version of such self-help tests are support apps that offer standard advice or coaching programmes. They supplement all the self-help tools. They can be used on a mobile platform and range from mindfulness exercises to breathing techniques and exercises to promote sleep.[84]

Another trend involves exploring the extent to which physiological signals can be used to indicate higher stress levels and to monitor stress. Sensors are constantly improving; they are getting smaller, have a much longer shelf life than before, can record much more data than in the past, and are easier to connect to storage devices. All these improvements make it easier to track physiological signals and link them to one another. In terms of stress, sensors can be used, for example, to measure heart rate variability (HRV) or galvanic skin response. Sensors such as eSense Skin Response make suggestions for improvement based on the temperature of the skin.[85] Tiny sensors coupled to a smartphone measure the skin's temperature. The data is fed into an app that

82 http://www.trimbos.nl/onderwerpen/preventie/depressie/kleur-je-leven
83 https://www.sterkopjewerk.nl/Zelftest
84 See, for example, www.digitalezorggids.nl, which offers and reviews the five best stress apps.
85 http://www.mindfield.de/en/products/eSense/eSense-Skin-Response.html

makes standard recommendations based on the information it has received. We must be careful when interpreting the results of this kind of physiological measurements, however, since people often differ considerably in their physiological response to stress.

Research on stress and the role that technology can play in alerting us to stress and tackling it early on investigates not only stress factors but also focuses on people's wellbeing. Work is one of the areas being explored. For example, Technology Foundation STW, the National Initiative Brain & Cognition (NIHC) and Philips Research will be investing three million euros over the next few years in the Healthy Lifestyle Solutions programme, with five research projects set up to digitise methods to help people get 'a good night's sleep, a balance between stress and relaxation, a healthy diet and sufficient exercise'.[86] The SWELL research programme (Smart Reasoning Systems for Well-being at Work and at Home, a COMMIT project[87]) focuses explicitly on the relationship between the work and home environments. SWELL aims to measure physical fitness, workload, and stress using advanced sensors that can provide individualised advice.[88] That makes it one of the few research programmes to specifically examine the work environment and to attempt to combine physiological features and perceived stress.

We can detect a number of trends from the forgoing. Coaching is becoming digitised. At first it was simply the style of communication that was digitised, but now new tools are being added, such as interactive questionnaires. The research instruments will grow more refined as time passes, and will combine physiological, situational, and personal features. Recommendations for improvement will be more personalised and responsive to the individual's changing circumstances. Finally, the instruments will collect aggregate data that is not necessarily traceable to any one person. This data can be used to generate information on groups of people, differentiated by a variety of different features.

The following sections discuss the possible effects that these trends may have on relevant individuals and, for example, on existing relationships between employers and employees. We explore how the advent of the stress coach fits into current regulatory frameworks and where problems may arise. In the concluding section, we recommend responsible ways of guiding the introduction of stress coaches in the workplace.

86 http://www.newscenter.philips.com/main/research/news/press/2011/20111019-stw-nihc-research.wpd#.VGtu9zTF98E##
87 COMMIT is a Dutch public private research programme focusing on ICT in the area of health and well-being, e-science, public safety and information processing. http://www.commit-nl.nl
88 http://www.commit-nl.nl/projects/swell-smart-reasoning-systems-for-well-being-at-work-and-at-home

6.3 Exploring the societal impact of the digital stress coach

Immediate effects of digital stress coaches

Does the digital stress coach do what it claims to do? And does it do so effectively? Because there are as yet very few digital stress coaches, research into these questions is scarce. We simply do not know yet whether digital coaching produces better results than traditional coaching. To determine how effective and reliable digital coaches are, we need to know what they actually measure, what recommendations for improvement they give, and how good those recommendations are. These are methodological issues that apply equally in the case of non-digital coaching and, for example, with respect to the validity and reliability of questionnaires. A familiar problem is how to determine the boundary between two different recommendations: if the score is x, the user falls into one category; if the score is somewhat higher (or lower) than x, the user falls into the other category. Deciding on the dividing line is therefore crucial. The resulting categorisation is strict, but can be linked to minor variations in the measurement outcomes. Users will be inclined to look at the recommendations, and not at the underlying scores. Sloppy interpretation of the scores may worry users unnecessarily, or unadvisedly ease their minds.

There is another problem associated with using the physiological features of stress. Many studies have explored the relationship between *perceived* stress and *quantifiable* physiological stress, for example blood pressure and stress hormones. That relationship is exceptionally weak. If we were to divide people into one group that feels a lot of stress and another that feels little stress, we would discover that the two groups' stress hormone levels are by no means likely to differ as well (Van Doornen 2013). People vary considerably in their physiological stress response. One person may respond to stress with an altered heart rate, while the other produces more cortisol (the stress hormone). If an individual's data deviates from that of the overall mean in a population, that mainly says something about the extent to which the individual differs from the mean. It may not say anything about how he experiences stress. There are also too many steps between what is 'happening in the brain' and what can be observed with physiological measuring systems, and each and every step can influence observation. All of this makes it difficult to determine how much stress someone is feeling by taking physiological measurements. Caution is therefore advised when interpreting the results. Stress should preferably be measured in different ways (physiological and socio-psychological). Physiological measures reveal physiological responses that may constitute a health risk. They can function as a warning sign and encourage us to explore the causes of the physiological response, which may be work-related.

The problem of whether questionnaires and physiological data are reliable has consequences for the quality assurance of digital stress coaches. Medical devices must bear the CE marking. After all, a thermometer or blood pressure

monitor has to work properly. But there is no such seal of approval for questionnaires and data analyses. It is difficult to standardise treatment protocols and empirical research methods in the field of coaching. The quality of coaching methods can be improved by means of internal quality assessment, supervision and peer review. Evidence-based research basically provides a 'gold standard', but that standard is more difficult to achieve in the case of coaching activities.

It is obvious that the provider of a digital stress coach is *liable* for its quality. In the case of digital coaches, however, quality assurance is still in its infancy. Usually, a good system of quality assurance and control only emerges after a method or service has been available commercially for a while, long enough to solve any teething troubles and gain experience in normal use. None of this is terribly important when digitisation is confined to communication, but as soon as measurement and feedback are entirely digitised, then quality assurance must be properly arranged in advance. This is something that the professionals (coaches and health and safety services) and technology developers should tackle. Those working in coaching would do well to validate the questionnaires that they use (scientifically) and to draft guidelines and rules concerning the validation and use of questionnaires (for example in the form of a seal of approval).

Research on the effectiveness of digital stress coaches could assist in drafting a set of proper quality standards for providers and clients.

The stress coach and the employer-employee relationship

Work-related stress is a troublesome topic in discussions between employers and employees about working conditions. That is largely because the two sides hardly ever agree about the point at which work-related stress becomes a health issue or on the causes of such stress (see also Wiezer et al. 2012). The Dutch Working Conditions Act [*Arbowet*] obliges employers to pursue a policy focusing on prevention; where this is not possible, the employer must limit work-related psychosocial strain. An employee must follow the employer's instructions concerning health and safety at work and inform the employer if he observes anything that could put health and safety in the workplace at risk. Employers could introduce a digital stress coach as part of their policy and instruct employees to use the stress coach for company health and safety purposes. It is even possible to imagine the digital coach's recommendations being regarded as instructions. The stress coach also creates the impression that it can determine objectively that there is a health risk. An employee who uses a digital stress coach and finds that he is running a health risk can hold his employer accountable. An employee who feels stressed but does not see any evidence in the physiological measurements will face more difficulties convincing his boss, unless the digital coach also measures 'perceived stress'. An employee who does not feel stressed but has sky-high stress values according

to the digital coach will also have a difficult time. That in itself could be stressful!

A digital coach could be an interesting proposition for employers. The Dutch courts recently found in favour of an employer who wanted to fire an obese employee.[89] In the case concerned, there was in fact a specific reason that justified the dismissal (difficulty fitting the employee into work schedules). Employers might benefit from a digital coach that tracks whether employees stick to agreements that they have made (to lose weight, for example). At the moment, mandatory use of digital stress coaches in the workplace is still hypothetical. Serious objections can be raised (see below) and the commotion that might well ensue will prevent employers from introducing any such tool for the time being.

The foregoing raises a critical question: to what extent does the use of a digital stress coach constitute an unlawful violation of the coachee's privacy? Everyone – including employees – has a right to privacy. That right is laid out in the Universal Declaration of Human Rights and in the European Union's Charter of Fundamental Rights. The growing level of digitisation is putting pressure on this right, however, which manifests itself in two separate ways: the right to privacy on the one hand (no unlawful interference in one's communications, private life, family life or home) and the right to protection of personal data on the other. The Netherlands has exhaustive legislation concerning the protection of personal data that stipulates what is and is not permitted. The law takes sensitive personal data (such as information on race, religion, political and sexual preferences, medical data and so on) very seriously, with stricter guarantees applying.[90] In the case of the right to privacy, the law takes more of a case-by-case approach. There are no strict rules; whether or not someone's right to privacy has been violated depends on the situation.[91] Not every violation of privacy is unlawful. Work-related medical examinations are an example of an infringement of integrity that is permitted by law. The Working Conditions Act states that in highly specific cases, an employee can be ordered to undergo a medical examination in order to determine whether he is capable of doing his job or doing it safely (an example would be an eye test for airline pilots). Privacy guarantees fall into two categories covered by two different principles. The first is the principle of subsidiarity: are there other, less invasive ways that will achieve the same (or a satisfactory) result? The second is

89 See http://www.akd.nl/nl/kennis/publicaties/obesitas-een-reden-voor-ontslag

90 The Act indicates which data should be regarded as sensitive personal data. But personal data that is not defined as sensitive in the Act can still be perceived as such. For example, a woman who is in a safe house after fleeing domestic abuse will consider her address to be very sensitive data.

91 The Personal Data Protection Act mainly governs procedural matters. This is known as the procedural approach to protection. The fundamental right to privacy set out by the United Nations and in the European Charter is always about substance. This is known as a 'substantive' approach (Gutwirth, Gellert & Bellanova et al. 2011).

the principle of proportionality: is the intervention in proportion to the intended result? Each situation needs to be assessed in the light of these two principles.

Digital coaches may – unlawfully – violate both the right to privacy and the right to the protection of personal data. They enter our homes easily, while permanent monitoring by sensors placed on or in our bodies could constitute a violation of our physical integrity.

More data in employees' files

Another issue that will need to be considered carefully is that more data is available to add to employees' files. Data is collected on every employee that plays an important role in discussions concerning his or her career advancement and performance. With coaching being increasingly digitised, more data will also become available on employees' wellbeing, health, and physical and mental resilience. The growing number of sensors that attach to the body or to clothing will allow such data to be collected in real time (physiological signals via sensors, other information via apps), or much more often than is now the case. This information could also end up in the employee's file.

When a personnel file is set up, the employer must consider the employee's right to protection of his personal data as laid down in the Dutch Personal Data Protection Act [*Wet bescherming persoonsgegevens*]. According to this Act, the employer must meet a number of requirements when collecting personal data. We will not look at these requirements in detail here, but it is important to note that data collection must not be excessive and must be compatible with the designated aim of such collection (for example to assess the employee's performance and/or to satisfy certain statutory obligations). Imagine that an employer offers its employees a digital coach that allows the company to keep better track of their stress levels (in order to reduce work-related health risks). Certain data that is collected can be regarded as medical information (heart rate, blood pressure). Other data says something about the employee's state of mental health (perceived stress). This information may be relevant when assessing the employee's performance, but it is up to the employee to decide whether or not he wishes to share that information with his employer. An additional complication arises if the stress coach is used not only in the workplace (to monitor stress levels while someone is working) but also elsewhere, which is perfectly obvious. The employee could engage in activities intended to lower stress levels (e.g. digital therapy, sport, yoga, walking) in his private life as well, and those activities will also be monitored.

The pressure to deal responsibly with data provided by digital stress coaches is becoming more urgent for two reasons: first of all, it will be possible to collect much more data much more often than nowadays; second, a greater variety of data may become available. It is consequently important to ensure that this

data is only added to the employee's file if doing so is compliant with the relevant rules and practices. Medical and other sensitive data should not be added to the employee's personnel file. Data related to his physical wellbeing is undoubtedly just as sensitive as medical data, and if possible even more closely associated with a specific context. An employee who is recently divorced will carry this personal, stress-inducing problem with him to work as well. Data on his stress levels will be retained, but the context in which that data should be considered may be forgotten. It is still very rare for people to talk about psychological problems at work. That is not entirely surprising. Recent research has shown that such problems play a much bigger role in the selection of new employees or in the retention of employees during a reorganisation than age or other health complaints, for example (Houtman, Koppes & Dekker 2013). Employers, employees, health and safety services, and occupational physicians must address the problem of how to deal with these trends on both fronts. There is still time and space for to address these issues. Employers, employees and occupational physicians will need to make firm agreements, preferably before digital stress coaches find their way into the workplace.

Efforts to improve privacy protection are being supported by impending changes to EU legislation. The Dutch Personal Data Protection Act will be replaced by the European Union's new Data Protection Regulation. When this will take place is unknown, and neither is the precise wording of the regulation clear. One instrument referred to in the regulation and relevant to us here is the Data Protection Impact Assessment. The current intention is to make that assessment mandatory under the regulation in certain cases. One such case could very well be the addition of data from a digital coach to an employee's file. In that event, the organisation would be obliged to conduct a risk assessment prior to introducing the digital coach and to take steps to tackle any risks found. A privacy officer, who would have an autonomous position within the company, would then have to ensure that the Data Protection Impact Assessment and any measures arising from it were implemented. And if significant changes were proposed at a later time, the assessment would have to be repeated.

Infringement of employee autonomy

One general aspect of every form of coaching is that the coachee must commit – at least morally – to performing the designated activities according to the designated schedules. Those activities may consist of completing a questionnaire, allowing a certain bodily activity to be measured, or adhering to certain nutritional or exercise patterns (which are also monitored). Unlike a human coach, a digital coach may make a coachee feel subject to surveillance, even if he is using the stress coach voluntarily. After all, the digital stress coach is basically with him all the time and wherever he goes. It may cross the boundary between the person's working and private life because his private activities (for

example exercise) become visible in the work context. As indicated by the example of the obese employee who was dismissed, employers have the tools to force an employee to adopt different behaviour. A digital stress coach is yet another such tool, and in that sense it affects employee autonomy. The more the digital stress coach can do, the more employee autonomy may be undermined. Increasingly, employees' positive freedom ('Being free to…') may be restricted and their negative freedom ('Being free from…') may decrease. In addition, many projects exploring the role that technology can play in stress reduction go way beyond work-related stress. A project such as SWELL focuses on people's 'wellbeing' and on physical fitness and vitality. The recommendations that a stress coach makes on the basis of measurements will target not only behaviour in the workplace but also healthy nutrition, rest periods, and physical activity. For the most part, these are matters that form part of the stress coach user's private life. That means that the digital stress coach (or the employer through the channel of the stress coach) is influencing behaviour in the employee's home, and that the employee's right to privacy is consequently being violated.

6.4 Policy implications

The assumption is that using a digital coach can help an employee recover from stress and learn to recognise stress early on. The opposite side of the coin is that this does not necessarily mean action being taken to ameliorate the causes of stress. In addition, the digital coach makes the employee more transparent, something that may weaken or strengthen his position. The volume of sensitive data that is being stored is increasing, but that data does not necessarily produce an accurate picture of the situation. Employees may encounter problems if the data stored on them paints an incorrect picture, or if it is used for the wrong purposes.

The digitisation of coaching is not limited to working hours, but extends into the private domain in various ways. While that may be necessary for the digital coach to function properly, it also undermines the employee's autonomy in the sense that he loses control over the images and data that may circulate about him.

In principle the Dutch Personal Data Protection Act combined with the Working Conditions Act address the foregoing privacy issues. These two Acts offer a good point of departure for assessing and tackling the privacy risks posed by stress coaches. It is important, however, to consider these risks carefully when setting up digital coaching practices. There are various tools available for such purposes, but they too require further development. One is the Data Protection Impact Assessment described earlier. Others involve systems in which privacy is already included as a factor in systems design (Privacy by Design), and methods for allowing data subjects (the people about whom data is collected) to have greater control of their own data (Van Lieshout et al. 2011). External factors will determine the pace at which these tools and

methods are developed and whether they will be automatically included in systems design.[92] Such factors include the speed at which the new EU Data Protection Regulation is introduced, the obligations set out in that regulation, public pressure, the possibility of exploiting privacy commercially, and so on.

The idea behind stress coaches complies with the intentions of the Dutch Working Conditions Act. After all, stress coaches are meant to estimate risks as accurately as possible and to prevent harm (to an employee's health). Such coaches could be included in an organisation's health and safety policy, for example. Risk assessment is mandatory under the Act, but such assessments explicitly concern risks that arise in the workplace and during working hours. Recommendations to reduce the level of risk can only be work-related and implemented during working hours. Employees may ignore recommendations that extend into their private lives without suffering any negative consequences. Employees are thus also not obliged to use a stress coach if they do not wish to.

An employment court may deviate from the above in exceptional cases. An employer may make demands on an employee in connection with his performance on the job. If the employee's state of health negatively affects his performance, then the employer may require the employee to do something about his physical condition, even if that means taking action in the private domain (for example losing weight). If the employee fails and is unable to do his job as a result, and if it can be demonstrated that there is no other work for him in the organisation, then the employer may be justified in dissolving the employment contract.[93]

Based on the description of the issues addressed above, it appears that the present set of legal instruments (Working Conditions Act, Personal Data Protection Act) basically offer a satisfactory framework for the informed introduction of digital coaches in the workplace. If we work purely on the basis of the statutory framework, then there are certain guarantees against the misuse or improper use of data. Nevertheless, a recent study shows that three quarters of the employers surveyed did in fact have unlawful access to their employees' medical data.[94] New technologies undoubtedly give rise to new forms of improper use and misuse of data. Much will depend on the type of coach that is used, who uses it, and for what purpose. Digital coaches have options that will make existing forms of misuse easier. One example is a situation in which a supervisor uses data about an employee's health to build a case for the employee's dismissal. It is difficult to say how far such practices will go because they have not yet occurred. It is clear, however, that digital coaches

92 Various studies indicate that considerable efforts are being made to develop privacy-friendly solutions, but that the need for these solutions and their economic viability are a different matter (Cave et al. 2011).
93 See http://www.akd.nl/nl/kennis/publicaties/obesitas-een-reden-voor-ontslag
94 http://www.spitsnieuws.nl/archives/binnenland/2013/05/baas-schendt-privacy-werknemer

offer opportunities for monitoring that go way beyond those presently available. Employee representatives and occupational physicians can play a role in this respect. The latter play a pivotal role in the relationship between employees and employers in work-related stress issues. Occupational physicians should be supported in this, for example by the Netherlands Society of Occupational Medicine (NVAB) taking a firm position and issuing guidelines for dealing with data produced by digital coaches.[95] Before employees are offered stress coaches, the employer, employee representatives, and occupational physicians should make firm agreements about how digital coaches and the data that they produce will be used, and about informing the employees properly.

Employees can themselves use digital coaches to demonstrate which situations they experience as stress-inducing or burdening. As far as we are aware, this has not yet happened, but there is nothing to exclude the possibility of specific digital coaches being customised for this purpose. Here too, it will be necessary for employers and employees to consult and reach agreement on this specific use of digital coaches.

A final point to consider in a broader context is that employees might in fact find it beneficial to have stress factors at work linked to those in their private lives. They can derive enormous benefits from activities outside the work environment, for example sport, walking, socialising, eating healthily, getting enough rest, and so on. There is a direct connection between feeling good in one's private life and feeling good at work. Someone who is happy at home will be better able to cope in the workplace. Flexible working practices and working conditions are causing the two domains to merge, but this is not necessarily a bad thing. It may also offer more leeway to manage matters, with 'de-stressing' as part of the package. Private coaching firms are already keying into this trend, as one of the above sections has shown, and that could have positive consequences for those involved. Employers need do nothing to capitalise on these advantages, and they can also encourage positive behaviour by offering appropriate options in their package of employment terms.

6.5 Conclusions

Who wouldn't want to have a digital coach to help them reduce work-related stress? Given the rapid pace of technology, it will not be long before we all have access to a digital stress coach. Fortunately, there is still enough time to prepare ourselves for the risks associated with using a tool of this kind. Time enough to think carefully about the purpose of collecting data with a digital stress coach and to consider the conclusions that we can derive from that data.

95 In response to the news story on Spitsnieuws.nl (see previous footnote), Arbo Unie – a commercial firm that provides health & safety services to businesses – indicated that it had 'complied with the physician's duty to maintain confidentiality and with privacy legislation,' and that it had not been influenced by financial considerations.

Time enough to investigate all this and to determine whether we can achieve the goals we have set by using a digital stress coach. And there is still enough time for employers and employees to reach agreement on the use of such coaches and on data protection.

The risk of work-related stress remains high, and will only be exacerbated by changes in technology and society. Once we have studied the relationship between physiological measurements and perceived stress thoroughly, determined which conclusions we can and cannot draw from the data, and have firm agreements in place between employers, employees, and occupational physicians about the use of the stress coach and the data that it collects, then the digital stress coach can start making an important contribution to reducing that risk and improving employee wellbeing.

6.6 Recommendations

Research on the effectiveness of digital stress coaches and scientific validation of the methods used will help to draft a set of sound guidelines or quality standards, possibly in the form of a seal of approval, for providers and purchasers of stress coaches. The professionals (coaches and health and safety services) and technology developers ought to play a key role in this.

The Dutch Data Protection Act and the Working Conditions Act offer a satisfactory frame of reference for assessing the risks associated with the use of stress coaches. Before introducing stress coaches, a risk assessment should be performed and measures put into place to counteract the risks that are identified. Various tools offer guidelines in this respect, for example the Data Protection Impact Assessment, Privacy by Design, and giving data subjects more control over their data.

Digital stress coaches can violate a person's physical integrity. An assessment is needed as to whether a stress coach using sensors is necessary to collect data, and whether sensors are not collecting more data than strictly necessary. Employees should always be alerted to their right to privacy.

Employers, employees, health and safety services, and occupational physicians must address the problem of how to deal with the data provided by digital stress coaches. Before stress coaches are offered to employees, the employer, employee representatives, and occupational physicians must reach agreement on how the coaches are to be used, and the employees concerned must be properly informed.

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Codes of conduct for professional coaches

There are an estimated 40,000 coaches in the Netherlands (Schats 2011). 'Coach' is not a protected professional title, the way the title of civil-law notary or medical specialist is. This means that basically anyone can call themselves a coach. There are, however, a number of professional associations that coaches in the Netherlands can join. The most important of these are NOBCO [*Nederlandse orde voor beroepscoaches*], ST!R [*Stichting Registratie*], and the LVSC [*Landelijke Vereniging voor Supervisie en Coaching*]. These associations monitor the quality of the profession and act as a seal of approval for good quality and ethically responsible coaching.

They offer certified training courses, make specific quality demands and enforce codes of conduct, all in order to ensure that their members act professionally and responsibly. The codes of conduct define the basic principles by which coaches must abide in their relationship with clients. The key concepts are respect, integrity, trust, and expertise in coaching.

A coach must be respectful of the individual and must not discriminate. The autonomy and free choice of the individual are top priorities at all times, and the coach must always act in the client's interests. Integrity means that the coach maintains confidentiality and acts scrupulously when retaining confidential information collected during the coaching process. The various professional codes stipulate that coaches must never pass this information on to third parties unless the client has given his or her explicit permission to do so. Conflicts of interest are to be avoided. Should they nevertheless arise, then the coach must inform the client (and discontinue coaching if necessary). Finally, it is the coach's responsibility to main his level of skill and to be clear about his skills in his communication with clients. In other words, he must also identify the situations in which he cannot offer help.

The codes of conduct sketch an accurate picture of what responsible coaching is and of the standards that are applied in current coaching practice. There are no codes of behaviour or seals of approval for e-coaches yet, but the existing standards offer a good basis for considering what responsible e-coaching could entail.

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E-coaching: from possible to desirable

7 E-coaching: from possible to desirable

Linda Kool, Jelte Timmer, Rinie van Est and Frans Brom

7.1 The advent of the e-coach

This book alerts us to the advent of the e-coach, a widespread trend in which technology is being used to help us attain our personal goals. Digital technology is making behaviour, emotions, activity, mood, and bodily functions quantifiable. And not just quantifiable, smart software analyses all this data and discovers patterns in it that were invisible to us. The new digital personal assistant, now appearing in the shape of a wearable or a smartphone app, can offer a steady stream of advice about every aspect of our lives, from finances, relationships and interactions with others, to health, lifestyle, and energy consumption. The e-coach often makes such recommendations long before we have even thought of consulting a human, professional coach, and long before 'problem behaviour' has manifested itself. The e-coach mainly focuses on supporting and optimising 'everyday' behaviour.

Alongside the examples discussed in this book, digital coaching is making inroads in many other areas. Examples include Google Now, which presents itself as a digital personal assistant. Google Now shows the user relevant information without his explicit request. For example, it might tell the user to leave home earlier in order to get to an appointment on time. Other examples are smart baby onesies, socks, and nappies[96] that help parents monitor their baby's skin temperature, respiration and other bodily functions. Or think of the huge range of fitness, nutrition and relaxation apps that encourage users to live healthier lifestyles. For example the Lumo Lift (a posture coach that alerts you if your shoulders are slumping), the Stress Check (a smartphone app that tracks stress levels and helps you identify stress factors), or Sense (a flexible 'mum coach' that uses separate sensors to coach you in a wide variety of areas, from the number of espressos that you consume to your sleep behaviour).[97]

The advent of the e-coach fits right in with a new trend towards a more intimate relationship with technology (Van Est et al. 2014). We wear technology right on or under our skin, and it is getting to know us better all the time. Technology can now offer encouragement and support in a similar way a

96 Mimo Baby Monitor (http://mimobaby.com/), Owlet Vitals Monitor (https://www.owletcare.com/), Pixie Scientific (http://pixiescientific.com/)
97 Lumolift, http://www.lumobodytech.com/; Stresscheck, http://www.azumio.com/apps/stress-check/, https://www.sen.se/store/mother/

human coach does. Do we dominate the discussion during meetings? Do we sound too angry? How is my conversation partner feeling?

The advent of the intelligent digital assistant is also evident in the quest of firms that develop sensors and advanced data-mining techniques, and integrate them into mobile technology. Various chapters have pointed to the many, often small start-up firms and research laboratories involved in developing this technology. Larger, more established electronics companies are also jumping on the bandwagon. Several large mobile phone manufacturers have introduced sensors and software (apps) that allow users to track their physical activity and exercise.[98]

E-coaches are only the start of a trend towards omnipresent coaches and intelligent ambient technology that influences behaviour. Intelligent ambient technology refers to technology that is interconnected and integrated into our environment. It can increasingly steer behaviour in smart and subtle ways (Aarts & Marzano 2003; IBM 2001). Devices ranging from smart thermostats to smart cars are continuously connected to the Internet and thus acquire 'intelligence'. Right now the e-coach is usually a stand-alone product, for example a wristband, but in the future it will be connected to other smart technology in the vicinity. That means that your television will suggest you go to bed when the show you're watching is over because your smartphone indicates that you didn't get enough sleep last night and your stress levels over the past month show that you need energy to get through that important meeting tomorrow. The lamps in your living room will slowly dim to a level that automatically makes you feel sleepy.

This is why the Rathenau Instituut finds it important to start thinking – now – about the advent of the e-coach. E-coaches promise a great deal, both in their present and future form. They offer convenience and foster a sense of wellbeing, and can help us optimise our behaviour and avoid getting sick. But they also raise certain societal and ethical questions. Can e-coaches effectively and reliably help in changing behaviour? Will they really solve problems that society is facing such as obesity? What actually happens to all the data that e-coaches collect? Who is profiting from the analysis of such intimate data? What standards are e-coaches required to meet? How far is technology permitted to go in influencing and changing behaviour and lifestyle?

We will answer these questions in the conclusions presented here. The values that human coaches adhere to– expertise, respect for privacy and autonomy, integrity, and responsibility – give us an important analytical framework in this respect. We start by analysing what an e-coach is actually capable of and what

98 Examples include the Samsung Galaxy S5 and Galaxy Gear smartwatch, Apple's HealthKit platform, Health app and smartwatch, and Facebook with the purchase of the Moves fitness app.

the limits of the technology (currently) are (7.2). We then consider the way in which e-coaches are used in practice: what forms of e-coaching can be distinguished (7.3), and how do they relate to the core values set out in the professional codes of human coaches (7.4)? The chapter ends with a set of policy recommendations pertaining to digital coaches (7.5).

7.2 What is the e-coach capable of?

E-coaching is a process that consists of three steps: measuring, monitoring, and motivating. Digital technology collects data on the user, software analyses the data, and the user receives persuasive and motivating feedback based on that analysis. The e-coach must work its way through several phases of interpretation to move from 'measuring' to 'knowing', and then to providing its advice. In other words, to apply its knowledge of the user towards identifying a coaching strategy that will bring about the desired changes in behaviour. The examples given in this book illustrate that this is a complex process. Errors or inconsistencies can arise in every phase, raising the risk of wrong or ineffective advice. Below, we discuss the current state of technology by looking at these three steps: measuring, monitoring, and motivating.

7.2.1 Measuring: data collection

The present generation of e-coaches collects data on the user by means of sensors, 'external' databases, questionnaires, or self-reporting. The quality of these methods depends on a variety of factors, including reliability (does repeated use of the tool generate the same values?), validity (is the tool measuring what it should measure?), and accuracy (how precise is the measurement?). The level of quality has consequences for the way in which the e-coach interprets the user's behaviour, and for the advice (or lack thereof) that is based on this data (which may be incorrect). Users may also stop using the tool if they observe that it is not recording their behaviour properly (Mackinlay 2013).

Interpretation of sensor data

Human behaviour cannot always be measured directly. A sensor's 'physical' measurement has to be converted into data suited to the phenomenon that the e-coach is addressing. The e-coach must work its way through various phases of interpretation to do this. Many e-coaches that work with sensors, give the impression of precision and validity, but they may not be able to live up to their claims all the time. To illustrate, we will look at the relatively innocent example of a pedometer. It may, for instance, record that its wearer has walked 9876 paces on a particular day. But is that actually correct? The user's 'fitness' is expressed in number of paces or calories burned, which are calculated in different ways. As a result, an activity tracker may systematically calculate too many or too few paces for a particular movement (Bassett & John

2010).[99] Each tracker is optimised to measure movement in a particular direction, for example horizontally or vertically, and is therefore meant to be worn in a specific place (wrist, hip, or ankle). Consequently, every tracker has certain drawbacks. In the case of wristbands, the problem is how to interpret arm movements correctly. If I gesticulate wildly during an animated conversation, will the wristband tracker count my arm movements as paces? Will it overlook all the walking I've done in the supermarket (because I was pushing a shopping trolley and resting my wrist on the handle)? Hip trackers have trouble with activities that involve a lot of hip movement, such as dancing.

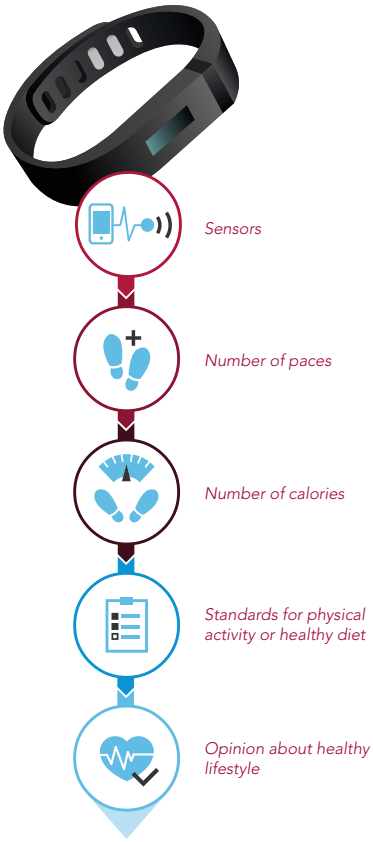
Similar validity problems have also been noted in other sensors that measure aspects of human behaviour. For example, it is difficult to measure stress levels on the basis of physiological signals because stress expresses itself differently from one person to the next and because circumstances such as physical activity can influence those signals. Multiple tools should always be used to obtain reliable measures of stress levels (see the chapter on work-related stress). The sensors used in the current generation of e-coaches often have quality limitations.

Example of interpretation phases in a pedometer: from measuring to changing behaviour

An activity tracker measures movement 'physically' and converts the measurements into paces and then into calories in order to assess the user's level of fitness and, in some cases, the extent to which he has a 'healthy' lifestyle. The user sees only the 'output', i.e. the number of paces and calories as interpreted by the app. The user compares the device's output to general standards of fitness (for example the recommended number of daily calories a person should consume, 2200 for men and 2000 for women, or suggested level of physical activity, 10,000 steps a day). Some apps even help the user make the comparison. In turn, these standards are related to more widely held views about what constitutes a healthy lifestyle.

99 The trackers are also optimised to measure an 'average' walking speed. As a result, they under estimate the number of steps taken by slow walkers, for example obese people or women in the final weeks of pregnancy (Bassett & John 2010).

Figure 7.1 Phases of interpretation in a pedometer



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Questionnaires and self-reporting

The main thrust of e-coach development is the computerisation of data collection. This is possible with the help of sensors, but if the variables are difficult to quantify, then questionnaires or self-reporting can be employed. Once again, these tools are subject to questions of reliability (do they repeatedly generate the same values?), validity (do they measure what they should be measuring?) and accuracy (how precise are the measurements?).

In the chapter on social e-coaches, we saw that apps like Pubercoach and Time Out! use questionnaires to determine how the user is feeling. The app asks the user several questions to determine his or her mood. There has been much debate about whether such methods are a valid way of identifying mood (Maus & Robinson 2009). Users must also resort to self-reporting when it comes to their diet. To ensure precision, they would have to weigh every single product that they consume. Much of the time, however, users fall back on less precise

but more user-friendly methods in which they select standard serving sizes and pre-programmed meals from a database. The problem with this type of self-reporting is that it is based on estimates and can therefore be subject to fairly large margins of error. Users may also enter the values incorrectly, or underestimate them (whether or not deliberately). Despite the limitations, there are also positive aspects to self-reporting. In his chapter on financial e-coaches, Harro Maas pointed out that actively recording our behaviour may produce precisely the awareness that we need to change our behaviour.

We have seen, then, that the e-coach has certain limitations with respect to both sensor-driven data collection and self-reporting. But that does not necessarily need to be a problem. The producer of the Fitbit activity tracker claims that although precision is important, it is the general trend that will contribute most to the results: 'What matters most is seeing your progress over time so you can achieve your health and fitness goals.'[100] A study on the use of activity trackers among a small number of users has shown that there are two possible outcomes. One group of users eventually figured out which activities the device is good at tracking and kept on using the device, and the other group quit using the tracker (Mackinlay 2013). The first group looked at the general trend as indicated by the figures. The other group considered the device worthless if it did not record activities (accurately) and if the e-coach's data was not representative of their actual behaviour. The researchers consider this a significant limitation of many current e-coaches, many users will stop using them as a result (ibid.).

7.2.2 Monitoring: data analysis

The e-coach uses the data it has collected to analyse the user's behaviour to make recommendations. To do this, it draws on a variety of assumptions, theories and standards. It is often unclear to users how the e-coach arrives at its recommendations. Which ideas about weight loss and diet are its health-related recommendations based on, for example? Which standards concerning a 'good' pattern of expenditure do financial e-coaches apply? Some of the authors in this book have pointed out the importance of understanding how the e-coach arrives at its recommendations . With that information, users can assess the trustworthiness their e-coach.

To a greater or lesser extent, the current generation of e-coaches is building on concepts taken from the behavioural sciences. The principles of goal-setting theory (Locke & Latham 2002) can be detected in many different apps. That theory sees a positive correlation between setting clear goals and achievement. Many e-coaches offer users the option of identifying specific goals. The e-coach assesses the data it collects against that goal, for example by comparing it to group averages or variations in the score over time. It is

100 http://help.fitbit.com/articles/en_US/Help_article/How-accurate-is-my-Flex

then up to the user to analyse the outcome, for example why his activity level slumps at a certain point every week.

The extent to which an e-coach's recommendations are based on principles of behavioural science as related to coaching, or the extent to which they incorporate forms of therapy (for example cognitive behavioural therapy), is as yet limited. Applications in the realm of healthcare are in the vanguard in that respect, for example the Time Out! app and the Pubercoach. Time Out! is based on the time-out method, which was derived from behavioural science and is used to prevent domestic conflicts from escalating. It remains an enormous challenge to personalise the coaching experience, however. Companies are working hard to integrate proven coaching strategies into consumer software.

Effective coaching also requires knowledge of the subject matter of the recommendations. By no means do scientists always agree about the best way to achieve a certain final goal. It remains difficult to turn scientific insights into specific recommendations, for example because every discipline looks at a certain phenomenon from a different angle and thus arrives at a different diagnosis and different recommendations (Slob & Staman 2012). The chapter on body management shows that, except for accurate statements concerning physical activity, there is no scientific consensus on what constitutes a healthy diet. The reliability of existing diets may in itself already be problematical, let alone their digitisation. And what works for one person does not work for another. Healthy stress for one person may be early-stage burn-out for the next. Today's e-coaches fail to consider individual differences sufficiently.

It may not always be necessary to integrate methods of behavioural science into e-coaches to actually change behaviour. That will differ from one type of user to another, depending on his motivation, the degree to which the user sees his behaviour as a problem, and the goal that the user has set for himself.

7.2.3 Motivating: feedback and behavioural change

The purpose of the e-coach is to provide feedback that is designed to motivate the user to follow up on the e-coach's recommendations. That happens in various ways. The current generation of e-coaches are based on the principle of the cybernetic feedback loop, a continuous loop in which the outputs of the measuring and monitoring processes are immediately passed on to the user as feedback. This direct feedback allows him to immediately modify his behaviour, receive more feedback, make further modifications, and so on. Many e-coaches add an evaluative component which compares the user's behaviour to his predetermined goals. The e-coach's analyses also provide reflective forms of feedback, for example by presenting long-term averages. The comparisons and statistics include (implicit) motivational elements: by showing the user how far he has progressed towards achieving his goal, the e-coach is reminding him of that goal and encouraging him to work on it.

The e-coach also issues explicit motivational messages; it might, for instance, encourage the user to take a short walk in order to achieve his goal ('get enough exercise'). The e-coach may make use of persuasive technologies in this context. For example, we have seen the subtle feedback that the Wattson Energy Meter provides in the form of coloured lights. The Time Out! app uses personalised tips to help the user during cooling-off periods. And the Foodzy app uses gamification to ensure that users remain interested in its service. For example, it awards badges when a user has attained a goal (such as eating enough fruit).

The extent to which the current generation of-coaches can apply flexible, context-dependent and personal feedback strategies is very limited, however. A new generation of wearables such as the Basis Band, which are meant to cultivate healthy habits in their wearers, reveal a growing interest in motivation and behavioural change. Research on persuasive technologies may well produce more refined alternatives of this kind in the future. For example, some researchers are looking into personalised persuasive strategies, with users being persuaded by the types of arguments to which they are already susceptible (Kaptein et al. 2010; Kaptein & Eckles 2012).

7.2.4 Effective behavioural change?

The purpose of the e-coach is to help users achieve their personal goals, whether that means getting more exercise or being more environmentally friendly. The big question, of course, is whether they are in fact helping users to do this. The limitations discussed in this chapter do not necessarily mean that e-coaches are *not* effective, although the risk of users giving up on them as a result naturally remains. Various studies have shown that e-coaches do in fact record positive results in some domains. Users of various types of activity trackers do indeed get more exercise, in all sorts of ways (Bravata et al. 2007; Byrnes 2014). For example, if they notice right before going to bed that they are still below their daily target, they spend five minutes jogging in place. Or when they walk or cycle home from the railway station, they might decide to take a longer route. E-coaches have also recorded good results in the area of sustainability. Consider the example of the Wattson Energy Meter, which scientific studies have shown to have positive results (Maan et al. 2011).

While research on the duration of these effects is rare, we do know that certain users of tracking gadgets and apps neglect them after a while. A 2012 study by PWC revealed that half of those who own a fitness tracker wristband stop using it after a while, and that two-thirds of all health apps are ignored after one or two goes (Byrnes 2014).

Then there is the question of the goal the e-coach is actually helping to achieve, and whether that is in fact the 'right' goal. A car that tells its driver how to save on fuel may be highly effective, but it will never tell the driver to go by bike instead of by car. The type of feedback and advice that the e-coach

provides also affects which behavioural change will be achieved. In Chapter 4, Compen, Ham, and Spahn comment that the colour feedback of the Wattson Energy Meter may not reduce energy consumption but rather cause consumption to be distributed – because the meter does not provide feedback on absolute energy consumption. According to these authors, then, users do not actually reflect on their own behaviour. That may lead to a limited idea of what sustainable behaviour entails, and subsequently, only limited changes in behaviour with respect to sustainability.

7.3 Reflecting on coaching practices

In this section, we reflect on the main question of this book: what new coaching practices are evolving due to the advent of the e-coach and what social, political, and governance issues do they entail? To find answers, we look at two issues: to what extent is the use of the e-coach based on existing or new practices, and to what extent are these practices putting pressure on existing regulatory frameworks? We identify four new forms of coaching, in addition to the current practice of human coaching.

- The e-coach as support, in which the e-coach supplements an existing coaching programme between a human coach and a user.
- The e-coach – the device – as coach. In this form, no human coach is involved.
- Collective coaching. Here, e-coaching (the device as coach) is no longer solely used by an individual to achieve a self-selected life goal, but initiated or stimulated by government, employers, or insurers as a persuasive policy tool.
- Ambient coaching, an evolving practice in which e-coaches are omnipresent and incorporated into increasingly smart, subtly steering environments.

This section describes the features of these practices.

7.3.1 Human coach

The existing practice of human coaching is extremely varied. Coaching is offered in many different forms and for a very wide range of purposes, from career and fitness coaching to relationship and debt relief counselling. The methods employed also vary considerably. There is therefore no one definition of coaching. What is common to all these various forms is that they all provide guidance in changing a particular aspect of the client's (the coachee's) behaviour. Data is collected on the coachee's behaviour by means of self-reporting and assignments that the coachee completes, as well as by the coach's observations during

coaching sessions.[101] The human coach interprets the data and determines the coaching strategy and feedback. The coach is consequently aware to only a limited extent of the coachee's behaviour outside the sessions, and can only provide feedback during those sessions.

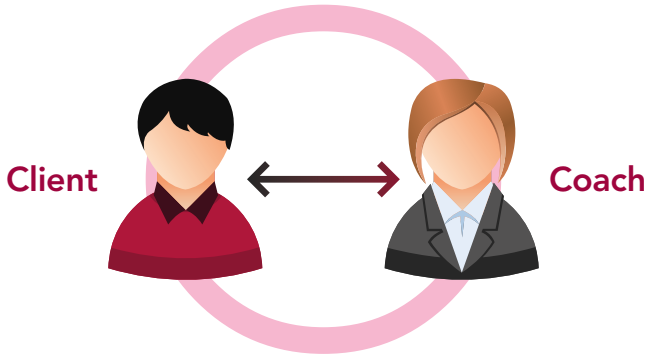
As we have seen, the title 'coach' is not a legally protected one. Anyone can call himself a coach. In the box in Chapter 6, we saw that quality assurance in the field of coaching is based on general professional codes, accreditation, and seals of approval. These have been drawn up by various professional associations, for example NOBCO (the Dutch association of professional coaches) or the Dutch Association of Psychologists (NIP), and they focus on four basic principles: expertise, respect, integrity, and responsibility (NIP).

Four values for human coaches:
- Expertise
- Respect for fundamental rights such as the right to privacy and autonomy
- Integrity
- Responsibility

The professional codes make demands on the expertise of the human coach (for example the quality and continuity of their training), protect the privacy and autonomy of clients (for example by professional confidentiality in the relationship with clients), require coaches to act with integrity (by acting independently and objectively), and ask them to take responsibility (by acting scrupulously). The codes are applicable in various contexts, from career coaching at an employer's request to relationship coaching or nutritional advice at the request of the client.

101 Coaching often consists of several face-to-face sessions between coachee and coach in which they work towards the desired change in behaviour by means of reflection, exercises, and the coach's advice. There are now online forms of coaching in which the coachee and coach can communicate more often by e-mail and other means. Some forms of coaching no longer include any face-to-face contact (Kool, Timmer & Van Est 2013).

Figure 7.3 Human coaching practice



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7.3.2 The e-coach as support

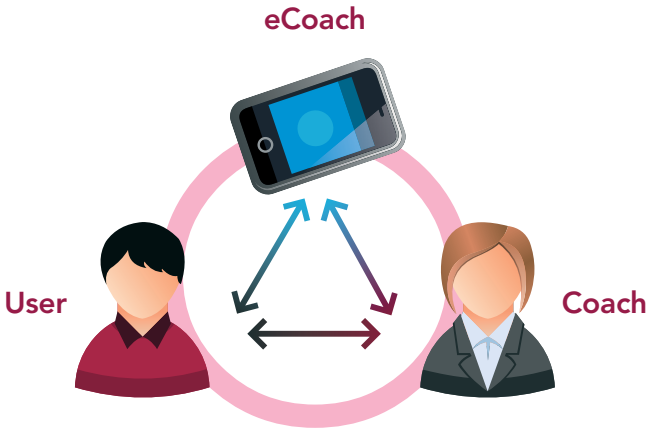
The use of the e-coach to supplement existing coaching programmes is giving rise to a new form of coaching. An e-coach can monitor and advise the user outside the traditional intermittent coaching sessions and provide feedback 'just in time', as we saw in the example of the Pubercoach or the Time Out! app. Activity trackers can also be combined with supervision by a professional coach, such as a dietician or personal trainer. Some financial coaches offer online courses to help users get their housekeeping book in order. That means that coaching is becoming *more invasive*, in that it is provided continuously and in an ever-growing number of life domains.

To some extent, this supplementary form of coaching is taking place within the existing practice of professional coaching. The quality of coaching and of professional coaches is guaranteed by existing professional codes, as mentioned above. A professional coach can also help clients to interpret the data collected by the e-coach correctly and to assess the true value of the suggestions that the device has offered. However, the e-coach itself is not covered under the existing professional coaching codes.

Philips has drafted a code of conduct for professional coaches who supervise people using the e-coach in its DirectLife programme.[102] The code is similar to other professional codes on some points, but it does not apply to the e-coaching devices themselves.

102 http://www.directlife.philips.com/service_support/coaches_code_of_conduct/

Figure 7.5 The e-coach as support



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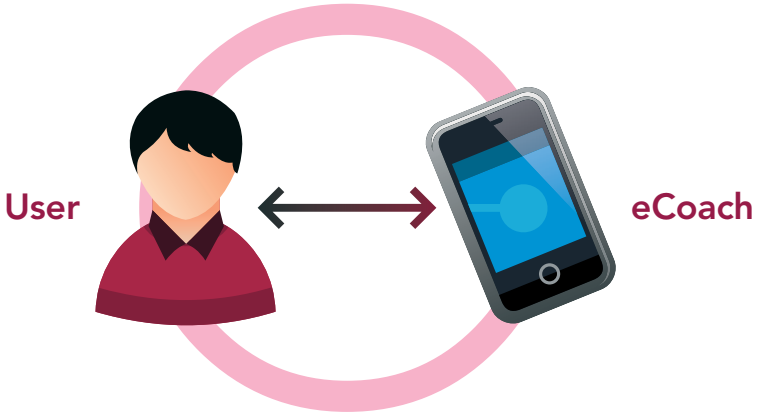
7.3.3 The device as coach

Many commercially available e-coaching applications focus on 'self-coaching', i.e. coaching by the device. In this case, a professional coach is no longer involved. The device 'reads' the user digitally as best as it can, whether that means his energy consumption, finances, facial expressions, or stress levels. Based on this data and by using software, the e-coach comes up with recommendations for the user. Many of these e-coaches are provided free of charge or for a low price, a situation that may considerably increase access to and availability of coaching. While many people would not turn to a professional coach to help them adopt more sustainable habits, they will find it easy enough to download an app. That means that the target group for coaching is shifting towards a broader group of users who want some form of assistance or coaching without their actually having 'problems' (e.g. being in debt or overweight).

Figure 7.7 The device as coach



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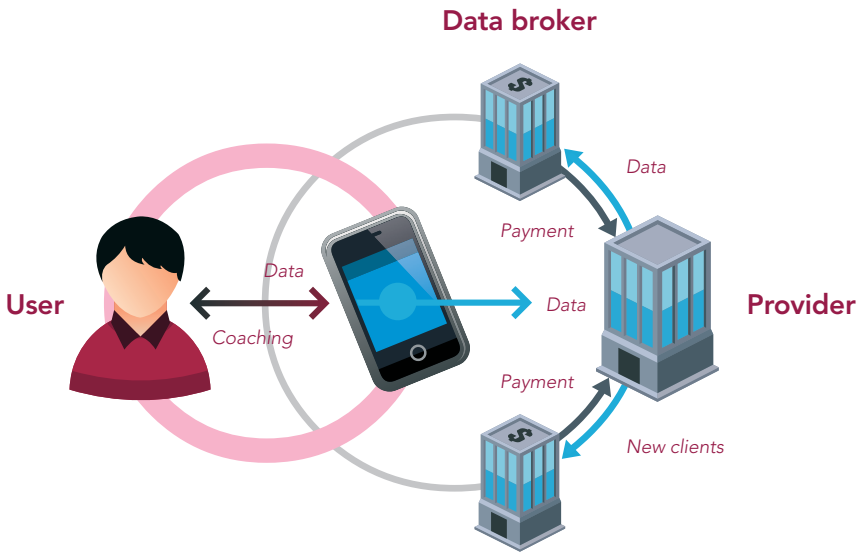
Another key difference between e-coaching and the established practice of human coaching is that the coaching relationship is no longer strictly between the user and the coach. The human coach has been replaced by a device, and such devices are provided by producers or developers – in many cases one or more commercial parties that do not have coaching as their core business. The user thus has a relationship not only with his e-coach (the device), but also with the provider, and in many cases with a network of associated parties as well. All these parties have a particular interest in the coaching being provided. In the chapter on sustainability coaches, Compen, Ham and Spahn observe that all the stakeholders involved in e-coaching 'are leading to an enormous proliferation of persuaders, each with its own interests'. We saw in various chapters of this book that this is giving rise to questions about privacy and the neutrality of the coaching recommendations (see the next section).

Figure 7.9 The device as e-coach and the underlying network of parties involved



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The e-coach (and its provider) are not part of the established practice of coaching where existing professional codes do apply. As a result, using an e-coach raises questions concerning each of the core values embodied in the professional codes for coaches:

- Expertise: questions concerning the e-coach's validity and effectiveness.
- Respect: questions concerning confidentiality of the relationship between the user and the e-coach, respect for the user's autonomy.
- Integrity: questions concerning the neutrality of the coaching recommendations.
- Responsibility: questions concerning professional responsibility.

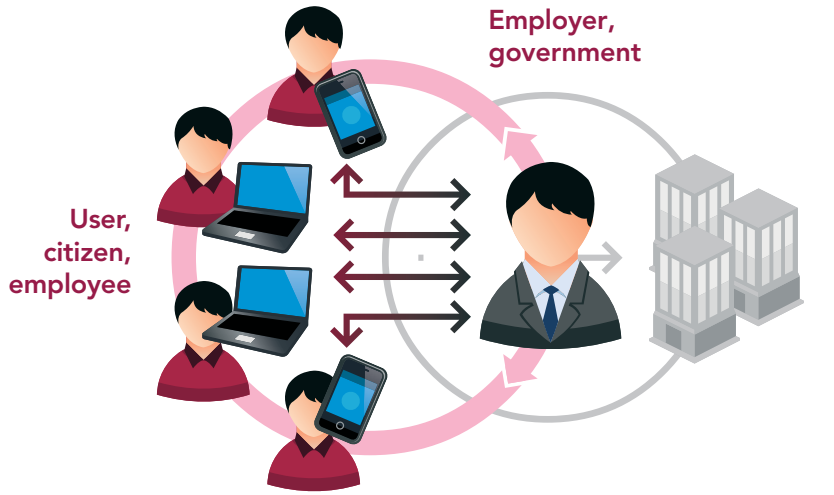
We look at this is greater detail in section 7.4.

7.3.4 Collective forms of coaching

At the present moment, most e-coaching applications focus on the individual, with individual users choosing whether or not to use the e-coach. But the widespread availability of e-coaches may bring about changes in the context in which coaching is used. We have seen examples in this book of 'collective' applications, where employers or authorities encourage the use of e-coaches or even make it compulsory. For example, we saw how an employer made the

FleetBoard system mandatory at work, forcing all employees (drivers) to use it. The interests involved, i.e. sustainability, improved labour productivity, and the drivers' right to privacy, began to conflict. The British supermarket chain Tesco was recently criticised for using the data collected by its employees' activity trackers to assess employee productivity (Rawlinson 13 February 2013). The stress coach may also be an interesting tool for employers (and employees), although employers are not yet permitted to prescribe its use (for the arguments against their doing so, see the chapter on work-related stress). The European Union's aim of replacing all traditional household energy meters with smart meters by 2020 (see Chapter 4) is an example of government actively stimulating the use of e-coaches to achieve its policy objectives. The Dutch Senate initially rejected the bill incorporating this directive into Dutch law, among other things because it raised privacy objections. Besides the examples given in this book, we see that insurance companies too are offering insurance packages that involve the monitoring of behaviour, mainly with respect to healthy lifestyles and fuel-efficient and safe driving practices (see box).[103] E-coaching apps also begin to be incorporated in corporate wellness and vitality programmes[104].

Figure 7.11 Collective forms of coaching



103 For examples of car insurance, see Fairzekering or Whoosz!.
104 http://fd.nl/economie-politiek/902641/werkgevers-grijpen-in-tegen-werkstress

In all these examples, both sides can benefit. E-coaches are advantageous to both their users (employees, citizens, insured persons) and the employers, authorities, or insurers involved. The benefits may be shared ones; for example, both the employee and the employer have an interest in reducing work-related stress. In Chapter 6, Marc van Lieshout, Elsbeth de Korte, and Noortje Wiezer emphasise that the design of the e-coach is important in ensuring that it is used responsibly: For what purposes is the e-coach being used? What data can be accessed by the parties offering the coaching? What guarantees have been given to users to safeguard their data?

The design of the e-coach is even more important because the involvement of insurers, employers, and government raises questions about the extent to which e-coaching will remain a free and individual choice. Will these parties apply so much pressure that users feel obliged (or indeed *are* obliged) to make use of an e-coach? In collective coaching, the emphasis shifts from e-coaching for a self-selected goal to e-coaching as a persuasive policy tool used to achieve collective goals. To what extent is it permissible for other parties – such as government – to steer behaviour by means of persuasive e-coaches? Can the use of an e-coach be made mandatory? What persuasive technologies are permitted in that case? What consequences does that have for the e-coach users' right to privacy? For now, it is unclear what terms and conditions will apply for 'collective coaching' and how the four core values set out in the professional codes of human coaches (expertise, respect for privacy and autonomy, and responsibility) can be guaranteed? Clearly, the less voluntary the use of an e-coach is, the stricter the requirements that should be set for it. It is up to the party that prescribes the use of the e-coach to demonstrate the necessity of doing so. That party will also have to ensure that the e-coach adheres to all four core values.

Examples of insurance packages based on behaviour tracking by e-coaches

Vitality

"It's the nudge to get you off the sofa, it's the motivating friend with helpful tips to improve your life and it's a proven way to get healthier and be rewarded." PruHealth insurance, UK

The British insurer PruHealth has an insurance package called 'Vitality'[105] in which policyholders can earn points for living a healthy

105 https://www.pruprotect.co.uk/vitality/
www.pruprotect.co.uk/literature_and_tools/vitality_points_table.pdf

lifestyle. Various e-coaches are used to monitor that lifestyle, including a heart rate monitor, a calorie counter, and an activity tracker. The more points the participant earns in a year's time, the more money the insurance company reimburses and the lower his insurance premiums in the year ahead. For example, he can earn 10 points a day by engaging in a random sport, up to a maximum of 40 points a week. Completing an online health check earns him 100 points. To qualify for reimbursement, the participant has to earn at least 800 points in the space of a year.

Fairzekering
"By controlling your driving behaviour, you can also keep a firm grip on your wallet!"

The Dutch automobile insurer Fairzekering[106] uses a 'Chipin' device to monitor the driving behaviour of its policyholders closely. The device clicks into place under the dashboard and keeps track of how the driver brakes, drives and pulls up, as well as where and when he does so. The driver can check his driving behaviour after each journey and see how he has scored. Depending on his driving score (which is colour-coded), the insurer may reimburse a portion of his insurance premium. Green means he gets 35% of the premium back, orange stands for 10%, and red means no reimbursement.

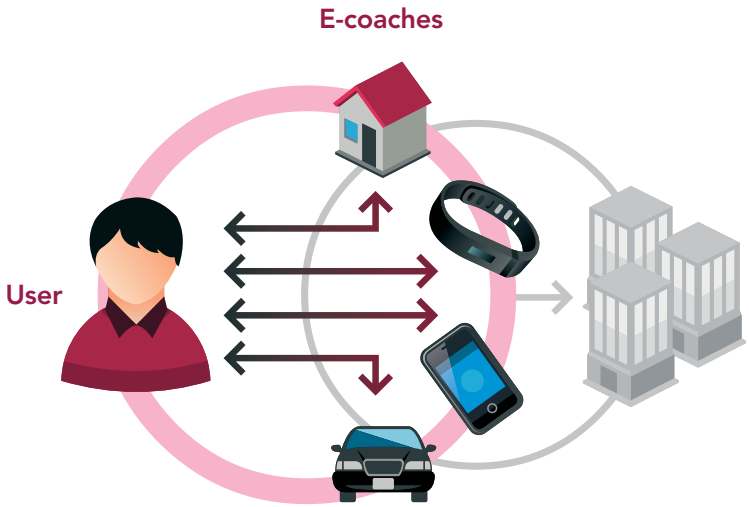
7.3.5 Emerging practice: *ambient persuasion*

Today's generation of e-coaches will be replaced by smart e-coaching applications that are integrated into our daily environment. Since the 1990s, technology theorists have been speculating about how IT will be integrated into our everyday surroundings. Terms such as 'ubiquitous computing' (Weiser 1991), 'ambient intelligence' (Aarts & Marzano 2003) and 'autonomic computing' (IBM 2001) sketch a future in which all the equipment and devices that we use and all the spaces that we inhabit are fitted with smart devices and network technology. With the technology running in the background, our surroundings and devices can communicate, anticipate our behaviour, and adapt themselves to our needs and habits. Smart environments of this kind are no longer relegated to the realm of fantasy, it seems; more and more of our tools and appliances – cars, thermostats, lamps, locks, and toilets – are online and equipped with smart sensor technology. Nest, a smart thermostat, quantifies and tracks its users' behaviour, learns from what is has observed, and then automatically raises or lowers the temperature. Other smart devices, such as

106 http://www.fairzekering.nl/hoe-werkt-het/

the EmoSpark Home Console, key into the user's mood. Philips' smart lamps can radiate a colour shown to induce drowsiness as bedtime approaches. The Gartner research firm estimates that by 2020, some 26 billion devices will be connected to the Internet (Gartner 2013).
The advent of smart environments is integrating the aspects of measuring, monitoring, and motivating into our surroundings. That means that e-coaching will become an omnipresent phenomenon. Researchers are currently studying whether smart environments can also coach users (Anderson et al. 2011). Because devices are interconnected, they can work together to support and motivate the user. We already mentioned the example of the television that tells you when it's time for bed and the smart lamps that emit a sleep-inducing colour at the same time. Considering these visions shows the importance of timely anticipating the future by identifying guarantees and criteria for e-coaching.

Figure 7.12 Ambient coaching



Rathenau Instituut

7.4 An e-coach without a code?

The core values embodied in the professional codes of human coaches offer an important framework for the criteria that digital coaches should satisfy. In the previous section, we saw that questions arise concerning these values in every e-coaching situation. Below, we discuss these questions in detail.

7.4.1 Expertise – no overall quality guarantees

The quality of the e-coaches currently available differs enormously. No specific demands are made on the validity, reliability, accuracy, or effectiveness of

e-coaches in the consumer sector. Rules that apply are those imposed under general statutory frameworks and consumer protection legislation concerning product quality, liability, privacy, transparency, and misrepresentation. As a result, commercial coaching applications are made available by product developers – some more serious than others – that may or may not have gone to much trouble to find hard scientific evidence for the effectiveness of their product. It is difficult not just for consumers but also for professionals to spot the difference between an app that has been tested extensively and can live up to its claims and one that cannot.

This problem applies to all sorts of e-coaching applications, but it is particularly problematical in the case of digital health coaches. Apps that produce incorrect diagnoses or are incapable of calculating physiological values properly could pose a serious health risk to their users, for example. In 2013, an investigation was carried out into four British apps meant to identify skin cancer. Some of the apps identified melanomas as benign when they were in fact cancerous (Wolf et al. 2013). In 2012, the New England Center for Investigative Reporting concluded in a review of 1500 health apps that many of them had little or no basis in scientific research, did not follow any medical guidelines, and had not been tested in clinical trials (Sharp 2012). This could apply to all sorts of digital health coaches, such as apps that measure stress levels or blood pressure through a smartphone, or apps that claim to offer a remedy for seasonal affective disorder (SAD). That app, which can be purchased for USD 2.99, advises users to turn their phone light to its highest brightness and to use the app for 15 to 45 minutes every day 'to put a smile on your face and help wash away the Winter Blues'. But experts say that a phone light is too weak to treat SAD; that in fact requires lights that are ten times as bright (Sharp 2012).

In some cases, health e-coaches can be categorised as 'medical software' and are used for diagnostic, treatment, or testing purposes. CE certification is then required in the Netherlands and the European Union. This is applies to apps that monitor vital bodily functions (for example glucose levels) and would be harmful to users if they were unreliable. Similar rules apply in the USA.[107] But questions remain about the quality of these apps, even when they do have CE certification. Because the the CE marking only guarantees compliance with EU product safety requirements, it does not necessarily guarantee their clinical relevance for making a particular diagnosis.

By no means all health-related apps require a CE marking. In such cases, the makers may indicate that the app is 'for entertainment purposes only'.[108] In his

107 http://www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/ConnectedHealth/MobileMedicalApplications/ucm255978.htm

108 For examples of 'medical' apps that make this claim, see http://mobihealthnews.com/35444/the-rise-of-the-seemingly-serious-but-just-for-entertainment-purposes-medical-app/

chapter on body management, Sander Voerman points out the institutional distinction between the consumer sector and the clinical sector, with government strictly regulating clinical services but serving mainly as a watchdog in the consumer sector. Voerman indicates that policy issues are more complicated when they concern a practice that is not clearly situated either in the clinical spectrum or in the consumer domain. And it is precisely in this grey area that we often find e-coaching applications relevant to body management. They may not be 'medical software' according to the guidelines, but they are health related.

The 'for entertainment purposes only' disclaimer does not release developers from all responsibility. They may still be guilty of misrepresentation in that consumer expectations concerning the nature of the product also play a role in this regard. In 2011, the US Federal Trade Commission brought a claim against the 'Acne Cure' app for misrepresenting research and for making false claims. The developers claimed that the phone light would clear up acne[109].

The demands made on expertise for e-coaching apps become even more important when people have less to say about using the e-coach and are encouraged or ordered to do so by other parties, such as their employer or the authorities. It is up to the party that prescribes the use of the e-coach to prove its quality and effectiveness. For now, however, it is unclear what impact e-coaches actually have on behaviour, and for how long. It should also be noted that e-coaches focus on motivating individuals to change their behaviour. If the individual lacks such motivation, the e-coach will have little effect. In addition, motivation is only one of the factors that influence behavioural change. Having the resources and opportunity to change also plays a vital role. It is easier for people who live close to good cycling and walking trails to get more physical exercise than those who live in built-up areas without pavements or cycle paths. For people on a limited income, the high (or higher) price of healthy food makes it hard to make the 'right' choices. Harro Maas cites the example of consumers who are struggling to keep track of their finances owing to the digitisation of payment transactions. Cash has largely given way to bank transfers, and the printed statements that used to arrive in the post at home have been replaced by a digital portal. Consumers have to make more of an effort and have been given more responsibility for keeping track of their own payment transactions. The question then is how much government can and should hold individuals responsible for changing their behaviour.

7.4.2 Respect for privacy and autonomy

Because it collects intimate data and uses persuasive technology, the e-coach has a direct impact on our fundamental right to privacy and autonomy. In the

109 www.ftc.gov/news-events/press-releases/2011/09/acne-cure-mobile-app-marketers-will-drop-claims-under

existing professional codes, respect for these rights is an important basic principle. Below, we discuss the questions that the advent of the e-coach is raising about privacy and autonomy guarantees.

Privacy: an e-coach without professional confidentiality?

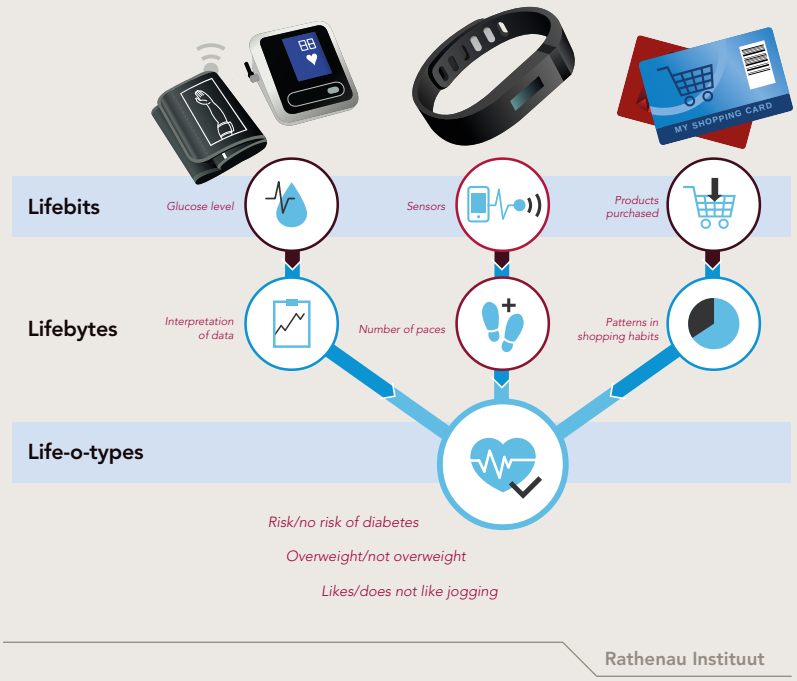
The e-coach is increasingly digitising aspects of our behaviour and our physical 'state'. That means that it collects highly personal and sensitive data from individuals, for example on their energy consumption or emotions. Processing such data may constitute an unwanted intrusion into users' private lives. The enormous potential of the e-coach lies in its ability to discover connections or patterns that we ourselves have failed to recognise. But that ability comes at a price in that it places our privacy at risk. In 2011, negative reports began to circulate about the Fitbit activity tracker because its users' sexual activity had become accessible through Google. The data that the wristband collects overnight and during the day is uploaded to the user's online profile. That data makes it possible to track certain patterns of activity, including activity of a sexual nature. The standard privacy settings for profiles allowed all user data to be visible to others, but many users were unaware of this.[110]

Lifestyle profiling by e-coaches

The profiles generated from data collected by e-coaches are becoming ever more detailed. BodyMedia, a start-up firm in health wearables that was recently acquired by Jawbone, has made that clear with its patent application for an app that will combine data collected by multiple e-coaches.[1] The patent refers to 'life bits', 'life bytes' and 'lifeotypes'. A 'life bit' is a piece of data that comes directly from a wearable, for example showing the position of someone's body at a particular moment or his blood glucose at a certain time. A 'life byte' is a piece of data generated from the various life bits and indicating that the wearer sits more than they stand, for example. The 'lifeotype' is the profile generated by combining the various life bytes. The lifeotype is a detailed description of someone's lifestyle. For example, 'not enough exercise, diet low in vitamins and minerals, high blood pressure, risk of diabetes'.[2]

110 http://techcrunch.com/2011/07/03/sexual-activity-tracked-by-fitbit-shows-up-in-google-search-results/

Figure 7.13 Lifestyle profiling by e-coaches



The data collected during coaching sessions with a human coach is protected by the relationship of trust that exists between the coach and the coachee. The information shared by the coachee is treated as confidential. The advent of the e-coach, however, introduces another party into that relationship. The coachee enters into a separate agreement with the e-coach's provider in which he agrees to the latter's general terms and conditions and to its privacy policy. The professional confidentiality does not apply to the e-coach, although general privacy and data protection rules still do. The question is how much these rules weigh up against the risks to privacy posed by the e-coach.

The data collected by the e-coach is interesting to many different parties. Online data markets have grown so complex that users are losing track of the data flows and the parties involved. On the one hand, there is the issue of who controls the data that the user 'gives away', for example about his physical activity or energy consumption. On the other, the user has little understanding of how that data is being used, i.e. how the data 'returns' to the user. What profiles have been generated based on that information? What services and special deals will he be offered (or not)? What does the provider know about the user's behaviour and preferences? How is that knowledge being used to influence him? It is unclear at the moment to what extent aggregate and

individual data is actually being sold. Although various app providers say that they do not sell users' individual data, their privacy terms in fact give them the leeway to do so.[111]

Other risks to privacy were pointed out in a number of chapters. In Chapter 6, Marc van Lieshout, Noortje Wiezer, and Elsbeth de Korte admitted that it is difficult to separate the personal and work-related data that the stress coach collects, although the rules concerning this are strict enough. Using a stress coach narrows the gap between our private life and our work, with data from different sources about our health, fitness, and mental resilience being merged. It is growing increasingly difficult to distinguish between the various contexts of peoples' lives when they use one or more e-coaches. In Chapter 4, Compen, Ham, and Spahn mention the issue of function creep, i.e. data that is collected for one purpose being used later for another. Although data protection legislation works with the concept of purpose limitation (data collected to attain one purpose cannot simply be used to attain another), function creep does occur in practice. Marc van Lieshout, Noortje Wiezer, and Elsbeth de Korte have also emphasised the risk of incorrect and improper use of data collected by e-coaches. If explicit agreements have been reached on doing so, for example, stress data can be used in employee appraisal interviews. According to these authors, it is not all that far-fetched to imagine digital stress coaches being included in packages of employment terms.

Finally, the e-coach is turning our present-day conceptualisation of privacy upside down. That becomes clear when we consider the concept of privacy as the 'sanctity of the home' or the integrity of the human body (Universal Declaration of Human Rights). These concepts are also laid down in the Dutch constitution. But by installing smart meters in our homes that need to share information with parties outside our home to work properly, those homes are no longer isolated or closed off areas. A 'connected home' raises a fundamental question: what will happen to the private home as a place to which we feel we can withdraw and not be observed by others (Timmer, Kool & Van Est 2014)? Even our bodies are no longer 'inviolable'. We wear sensors on or even under the skin that show us what has hitherto been an invisible part of ourselves.

Respect for autonomy

The professional codes for coaches also regard the user's autonomy as something that must be respected and promoted. But when the e-coach uses persuasive technology, the user's autonomy may be restricted or even manipulated. Persuasive technologies can increase the user's autonomy if they help

111 http://m.motherjones.com/politics/2014/01/are-fitbit-nike-and-garmin-selling-your-personal fitness-data

him achieve his personal goal.[112] If users know which persuasive methods the e-coach is using, they will have a better understanding of how the e-coach is influencing them, giving them more autonomy.[113] That is why in Chapter 4, Compen, Ham, and Spahn argue that developers should give users a greater say in the development of persuasive e-coaches, so that they can determine who the various interested parties are and ensure that their interests are as closely aligned as possible. If the parties are employers and employees, for example, then the obvious forum for arranging this is the works council. In addition, they advocate the idea of the government setting conditions for the use of persuasive technology, for example making an information leaflet mandatory that explains the e-coach's methods. This would give users more transparency and strengthens their position.

Respect for autonomy is even more important when e-coaching is not entirely voluntary but imposed by others, for example the authorities (as we saw in section 7.3.4) or other parties, such as employers. When is it permissible for other parties to manipulate behaviour by means of a persuasive e-coach? Can the use of an e-coach be made mandatory? For example, should government be allowed to make speed limiters in cars mandatory because they have shown to be effective in improving safety and fuel efficiency? The more areas of life in which e-coaches influence behaviour and the more subtle that influence becomes, the more important it is to question their respect for the user's autonomy. After all, how can a user keep track of how his smart environment is observing him and which information and recommendations he is receiving as a result?

In a recent report, the Dutch Council for Social Development (RMO 2014) concludes that government may indeed use persuasion techniques or 'nudging', but only under strict conditions: government must act with restraint when the policy issues involved are controversial, offer complete transparency about the tools used, and permit sufficient counterarguments during the democratic policy-making process. If we apply the basic conditions proposed by the RMO to the use of e-coaching, this means (1) restraint concerning controversial policy issues – with the burden of proof lying with government (or other parties that impose e-coaching on users), (2) transparency about the e-coach's methods and persuasive techniques used, and (3) public debate of the goals, methods, and effectiveness of the e-coach. Government will need to account for using a persuasive coach and back up its decision to use it with evidence. In the example of the mandatory speed limiter, it would have to show that such a device does in fact make driving safer than when matters are left to the driver. The more persuasive the e-coach's techniques are and the more controversial

112 Various studies have been published concerning the extent to which users do in fact retain or are restricted in their autonomy (Anderson 2014; RMO 2014; Schermer 2007).

113 This may also limit the effect, however. If a user knows that he is being influenced in a certain manner, he becomes less susceptible to that influence.

the policy issue or goal for which it is being used, the heavier the burden of proof should be. The weight of that burden also determines whether government should request an independent opinion on the matter, for example from the Council of State.

Another aspect of autonomy is whether the user is free to select a coach or e-coach, and whether he can switch to another coach if he so desires. That also means that the user must be able to export the data that the e-coach has collected from him to the new e-coach. Some coaching apps have a data export function, but by no means all. It can also be difficult, if not impossible, to import data into new coaching apps.

7.4.3 Integrity – neutral and independent advice?

Independence, objectivity, avoiding misrepresentation, and supplying information about the terms and conditions (financial and otherwise) of coaching are some of the criteria related to integrity that are laid down in the professional codes of coaches. A client must be able to trust that the coach's recommendations have not been influenced by other interests. In the case of the e-coach, however, this is not self-evident.

The usual revenue model for coaching is based on payment for a service provided, i.e. coaching. The client pays the coach directly or via his employer, insurer, or another party. But the advent of the e-coach has given rise to new revenue models in which coaching is increasingly provided free of charge or for only a small (or limited) fee, and the provider earns its money by delivering other services to businesses. The provider's product is not really coaching at all, but rather the *data* that is collected during the coaching process.[114]

For example, the financial e-coach Mint distinguishes between its 'users' and its 'clients'. Users are people who receive coaching (they set up a free online account, upload their data, and manage their finances there). Clients are businesses that want access to Mint's users and are prepared to pay for the privilege. They advertise to Mint's users and offer them product deals. Harro Maas shows that Yunoo, the predecessor digital housekeeping book AFAS Personal, worked in a similar fashion. Part of the company's revenues came from recommending specific products or services in exchange for a fee. In Chapter 2, Sander Voerman says that it is likely that a system of sponsorship will arise in the field of body management, with developers and e-coaches concluding contracts with producers, for example to award sponsored badges when their products are consumed. New insurance models are arising both in

114 The revenue models that we have observed for e-coaches fit in with a wider Internet trend in which companies are offering services 'for free'. 'Free' in this case means that although the user does not pay a direct fee to use the product, he pays indirectly by surrendering his personal data. The producers of wearables such as fitness tracker wristbands also earn money from the sale of their hardware (i.e. the armband itself).

the Netherlands and abroadin which users share data with medical insurers in exchange for lower insurance premiums.[115]

In other words, we are seeing new revenue models that are driven by financial interests, with the e-coach's provider being paid to recommend a specific product or service. This may not always be the best recommendation for the user, however; rather, it will be a recommendation that earns money for the provider. Users do not know that the e-coach may be arriving at its recommendations in that way. Maas points out that the issue in the case of financial coaches is similar to that of price comparison websites. In 2012, the Netherlands Authority for the Financial Markets (AFM) investigated the transparency and objectivity of the advice given on price comparison sites; only one such site passed the test. Maas argues that a similar investigation should be carried out for financial e-coaches. The AFM has now drawn up standards for price comparison websites that make transparency about the revenue model mandatory.

Alongside recommendations that are influenced by financial interests, we see that e-coaching may involve conflicting interests. A provider may market an e-coach that has a specific purpose and underlying value but that can also serve other purposes, for example a smart meter that analyses the client's behaviour and in so doing measures peak demand in the grid. This allows the energy company to streamline the energy supply and make it as cost-efficient as possible. In Chapter 4, Compen, Ham, and Spahn point out that a producer can position itself in the market as 'sustainable' whereas it mainly wants to make money in other ways.

7.4.4 Responsibility

The final principle set out in the various professional codes is professional responsibility. This means acting according to certain standards of quality, knowing one's limits, preventing and limiting any damage, and avoiding misrepresentation and misuse. In the case of human coaching, the profession organises these matters by means of professional codes, accreditation, and seals of approval. Clients can look up whether their coach is a member of a professional association, what accreditation he has, and what seal of approval he may be permitted to use. These quality instruments offer clarity and transparency and give clients a choice.

115 See the Vitality insurance packages in the United Kingdom, in which clients can earn points for living a healthy lifestyle. Various types of e-coaches and other methods are used to monitor that lifestyle. US insurance company Aetna works with various health apps, including Runkeeper and Fitbit.http://www.theguardian.com/technology/appsblog/2013/sep/03/fitness-health-apps- sharing-data-insurance Dutch insurance company Menzis offer the 'Healthy Together programme (Samen Gezond) in which popular fitness apps such as RunKeeper help clients to earn health points. http://www.menzis.nl/web/Consumenten/Klantenservice/SamenGezond/HoeSpaarIkPuntenVoorSamenGezond.htm

In the emerging digital practices, accountability to users is limited. A user needs information about what the e-coach is capable of, but also about what it is not capable of (knowing its limits). He must also know to what extent the provider's claims about the e-coach's capabilities rest on sound science (quality and avoiding misrepresentation). Users should also receive clear and straightforward information about how the e-coach deals with his data and which persuasive method or methods the e-coach uses. Responsibility can be organised using methods similar to those applied in human coaching practice, for example a seal of approval for e-coaches.

7.5 Recommendations

E-coaching is becoming a broad societal trend. Technology is set to help and support us in every area of our lives, from finances and relationships and interactions with others to health, lifestyle and energy consumption. Professional codes, seals of approval, and accreditation programmes have been developed to promote the quality of human coaches. These tools are not yet in place for the emerging practice of e-coaching. There is no guarantee that an e-coach is actually quantifying behaviour properly or that it comes by its recommendations honestly. That means that users run the risk of receiving incorrect, commercially slanted, or ineffective advice. It is not clear to users how the digital coach deals with the intimate information that it is collecting about their behaviour, emotions, and lifestyle, and whose interests are being served in this manner.

The requirements for admitting e-coaches to the market and the standards that should apply are still under development. Given the huge differences in quality, the admission criteria for e-coaches should be made more uniform, initially in negotiations between product developers and consumers (and their representative organisations), if necessary followed (and supported) by amendments in consumer protection law. The Rathenau Instituut advocates introducing quality criteria that will ensure that e-coaches have expertise, respect the privacy and autonomy of their users, and act with integrity. We have therefore taken the values embodied in existing professional codes for human coaches as our basic principles. We have turned these into recommendations for product developers, users, consumer organisations, policymakers, and regulatory bodies. Based on the principles of *quality* and *responsibility*, we urge product developers and consumer organisations to design a seal of approval that enables users to ascertain the quality of an e-coach. *Respect for privacy* means that both product developers and government in its capacity as regulator must get to work preparing for the stricter privacy legislation that is on the horizon. *Respect for autonomy* requires providers to be transparent about the persuasive methods applied by the e-coach, and also means that collective forms of e-coaching can only be used under strict conditions. Finally, *integrity* means that it must be clear to consumers how the e-coach (provider) makes money. In other words, transparency about the revenue model should be mandatory.

7.5.1 Professional seal of approval

The quality of the e-coaches now coming onto the market differs enormously. Developers often make lofty promises for their e-coaches. Because the technology is often still limited, however, many e-coaches cannot live up to such claims. E-coaches can make incorrect or ineffective recommendations. The potential risks that arise depend on the area of application and the invasiveness of the e-coach. The risks are greatest in the medical context, where incorrect diagnoses or unreliable tests can put users' health at serious risk. It is no wonder, then, that policymakers, politicians and regulators are particularly keen to scrutinise health coaches.

Health coaches

Medical devices and medical software are already subject to regulation. The regulations determine whether an e-coach should be classified as 'medical software'. If so, then it cannot be marketed without a CE marking. So far, very few apps have the CE marking. The Dutch regulatory body, the Healthcare Inspectorate [*Inspectie voor de Gezondheidszorg*], is monitoring this situation and recently announced that it would be tightening up its checks on the CE certification of medical apps in 2014 (Min VWS 2014). As we saw in section 7.4.1, however, CE certification is no guarantee for the clinical relevance or quality of a coaching (or other) app, and the vast majority of health-related coaching apps now available are not covered under the relevant EU directive.

In late 2013, Members of Parliament Hanke Bruins Slot and Lea Bouwmeester submitted a motion to the Dutch House of Representatives in which they asked the Minister of Health [Volksgezondheid, Welzijn en Sport] 'to support the establishment of a national digital portal that provides an overview of properly functioning apps and their applicability' (Kamerstukken 2013-14, 33750-XVI nr.30). Their proposal had been driven by the 'proliferation of medical apps whose effectiveness has not always been demonstrated' and the important contribution that apps can make to improving personal health.

The Minister of Health acknowledges the importance of guaranteeing the quality and reliability of medical apps not covered under the medical software directive (Min VWS 2014). Both the Netherlands Patients and Consumers Federation (NPCF) and the Dutch Federation of Physicians (KNMG) have taken steps to provide their members with information about effective apps. The NPCF has published a list of apps on the 'Digitale Zorggids' website, along with reviews by physicians and users. In 2012, the KNMG, the NPCF, and the ZN (the industry association of Dutch medical insurers) announced a pilot for a seal of approval for medical apps in their National eHealth Implementation Agenda. The Health Minister is working with parties in the healthcare sector to explore 'the potential for collaboration, the shared aim being that users of apps should know where to turn to find the necessary information' (Min VWS 2014).

Other coaches

A seal of approval for health coaches is the first, crucial step. The concern about quality and reliability is not confined to medical apps, however. As we have seen, the quality of e-coaches varies in every area of coaching. The qualifications for admitting e-coaches to the market and the standards that should be applied for these areas are still under development. Given the variations in quality, the admission criteria should be made more uniform, for example by introducing a seal of approval that provides consumers with information about:

1. the purpose and the target group of the e-coach: information on what the e-coach is (not) capable of, who it is (and is not) intended for, and which purpose it serves;
2. the effectiveness of the e-coach: explaination on how the e-coach arrives at its recommendations. W hat methods does it use to encourage behavioural change? Examples are the use of persuasive technology that influences the user's subconscious. What evidence base is available?

Recommendation 1: Developers and consumer organisations: develop a seal of approval that informs users about the quality of e-coaching applications.

Information on the quality should also be integrated into the technology as far as possible. An e-coach can be designed so as to explain to users how it has arrived at certain recommendations. Researchers are working on developing 'explaining agents', i.e. smart digital assistants that can explain what they do, both to the user and, if necessary, to a professional practitioner who is working with the user. The explaining agent should be flexible, so that the aims and methods can be refined or adapted to the relevant coaching programme. The information that the e-coach shares with others should also be flexible, with agreements being made in advance about the type of information to be shared and what information the user regards as sensitive (Harbers et al. 2014).

7.5.2 Adhere to privacy principles and regulations

The e-coach collects intimate data from its users' lives. Sloppy collection, storage, processing, or distribution of data can undermine users' trust in the e-coach, or even lead to resistance. Privacy guarantees are essential to responsible e-coach design. Various authors in this book show how privacy risks can be reduced by making different design choices (Privacy by Design). In his chapter on body management, Sander Voerman points out that all the data collected by a fitness app does not necessarily *need* to be made accessible to the provider in the cloud. The data can also be encrypted and then stored in

the cloud, ensuring that it can only be decoded locally, on the user's own devices (*Zero Knowledge Privacy*[116]).

The worries about privacy in e-coaching reflect the current public discourse about privacy on the Internet. The European Union's new General Data Protection Regulation will tighten up existing privacy legislation (European Parliament 2013). First of all, it will reinforce the basic principles of data protection, including transparency, consent, data minimisation, purpose limitation, and so on. Second, 'data controllers' will in all likelihood be given new responsibilities, for example the mandatory application of Data Protection by Design, Data Protection by Default,[117] and Data Protection Impact Assessments.[118] Third, regulatory bodies will have the option of imposing stricter sanctions. Fourth, the 'data subject' – the end user – will be given new rights, for example the 'right to be forgotten' and the 'right to data portability'.[119] Fifth, privacy policy will be standardised, so that users will receive clear and comprehensible information from different providers about their privacy terms, which they can then easily compare. The Dutch Government supports the main outlines of this EU proposal (Min EZ 2013).

On paper, the General Data Protection Regulation appears to satisfy a number of key criteria for protecting the privacy of e-coach users. But the incorporation and implementation of the regulation will not be easy in actual practice. For example, there are as yet no standard tools for Data Protection by Design or Data Protection Impact Assessments. Organisations – especially smaller ones – also lack the knowledge and capacity to meet these obligations.[120] The Dutch Government has announced that it will be working with expertise centres on 'best practices' in the area of Privacy by Design and Privacy Impact Assessments (Min EZ 2014).

Product developers and consumer organisations will also need to work together on providing accessible and standardised privacy information, for example with a privacy version of the information label on foods.[121] That is why it is important to ensure that product developers implement the legislation properly and that regulators monitor such implementation.

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116 A zero-knowledge protocol is a cryptography protocol that enables a person to prove that a specific statement pertaining to him (e.g. 'this person is older than 18 years of age') is true without his disclosing that information to others.

117 Privacy by Default indicates that a product or service's standard settings must be an accordance with data protection legislation.

118 A Data Protection Impact Assessment is intended to analyse potential privacy risks associated with processing personal data in advance in order to assess how these risks can be minimised (e.g. by means of Privacy by Design).

119 For a detailed review of the changes, see Reding 2012.

120 The EU proposal states that if the data controller processes the data of more than five thousand data subjects within a twelve-month period, or if its core activities involve the processing of sensitive data, then a data protection officer must be appointed.

121 See for example Kelley et al. 2010, or http://www.azarask.in/blog/post/privacy-icons/

Recommendation 2: Product developers: prepare for the new privacy legislation by building privacy into the e-coach's design.

Recommendation 3: Government: ensure that sufficient information is provided and enforce the new, stricter privacy legislation.

7.5.3 Respect autonomy; be transparent about persuasive technologies

With e-coaches using persuasive technologies and possibly restricting the user's autonomy as a result, providers must be transparent about the methods that their e-coaches use. For example, users should be given more insight into the persuasive methods that the e-coach uses, and they should also be in a position to determine whether they wish to be persuaded in this way. They will have more freedom of choice as a result, something that will be even more important as the persuasive influence of e-coaches becomes omnipresent and grows more subtle.

Recommendation 4: Providers: be transparent about the persuasive methods that the e-coach uses.

The more e-coaching leaves the realm of voluntary choice, the more pressing is the need to guarantee users autonomy. Government should be allowed to use persuasive technology, for example in the form of e-coaches, but only under the strictest conditions: (1) restraint in controversial policy issues, (2) transparency about the e-coach's methods and persuasive techniques used, and (3) public debate of the goals, methods, and effectiveness of the e-coach. Government will need to demonstrate in advance that a persuasive coach can be used, and must justify its reasons for doing so. The more persuasive the e-coach's techniques are, and the more controversial the policy domain or goal for which it is being used, the more government should account for its actions and the heavier its burden of proof should be. In the case of controversial subjects, government should request an independent opinion, for example from the Council of State.

Recommendation 5: Government should be allowed to use e-coaching under strict conditions: it must provide evidence showing that the use of an e-coach is justified.

7.5.4 Mandatory transparency about revenue models

The advent of e-coaching means that users now deal with a network of parties, each of which has its own commercial or other interests. The user's interest may not always be the top priority. E-coach users must be able to trust that they are receiving neutral and independent advice. E-coach providers should therefore be compelled to disclose their revenue model to users. What are they being paid for? What does that payment consist of? Users can then determine whether other factors might be influencing the advice that the e-coach is providing.

Recommendation 6: Regulatory bodies: investigate and monitor the revenue models of e-coaching applications.[122]

Recommendation 7: Government: make transparency about the revenue model mandatory.

7.6 Final remarks

This book has discussed the advent of a new technological trend. In addition to the opportunities presented by the e-coach, we also saw that it raises questions about the quality and reliability of the recommendations that it makes. The rapid pace of scientific and technological progress is forcing society to consider how to cope with the impact of all these changes on our lives. Often, that leads to discussion of whether technological advances should be made subject to certain conditions, and what principles we should base those conditions on. In this book, we have seen how existing codes and the values that they embody offer a very useful framework for regulating new, emerging practices. The professional codes of human coaches can serve as a yardstick for their new, digital counterparts.

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Who was Rathenau?

The Rathenau Instituut is named after Professor G.W. Rathenau (1911-1989), who was successively professor of experimental physics at the University of Amsterdam, director of the Philips Physics Laboratory in Eindhoven, and a member of the Scientific Advisory Council on Government Policy. He achieved national fame as chairman of the commission formed in 1978 to investigate the societal implications of micro-electronics. One of the commission's recommendations was that there should be ongoing and systematic monitoring of the societal significance of all technological advances. Rathenau's activities led to the foundation of the Netherlands Organization for Technology Assessment (NOTA) in 1986. On 2 June 1994, this organization was renamed 'the Rathenau Instituut'.

More and more people are using their smartphone to motivate them to jog or to monitor their stress levels. The growing popularity of smartphones equipped with sensors is leading to a new sort of coach: the electronic lifestyle coach or e-coach. E-coaches can help their users attain personal goals, for example weight loss or environmental awareness.

The next generation of coaching apps will quantify our behaviour, emotions, physical activity, and bodily functions. Smart software can analyse all this data and discover patterns that are invisible to us. In effect, these apps will function as a sixth sense and help us make a whole range of everyday choices. There's no doubt that such apps are handy – but can we trust them? On what do they base their recommendations? Do coaching apps adhere to the concept of professional confidentiality? Who is actually profiting from the intimate data that they collect? How far can we permit technology to go in influencing our behaviour and lifestyle?

Sincere Support examines these question by looking at five case studies. It shows that the quality of the e-coaches available today varies considerably. The requirements for admitting e-coaches to the market and the standards that should be applied are still under development. The Rathenau Instituut therefore advocates the introduction of quality criteria to ensure that e-coaches have expertise, are reliable, respect the privacy and autonomy of their users, and act with integrity.

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