Sports IT and Digital Wellness:

Three Waves of Digital Transformation in Sports and Training

Charlotte Wiberg(✉)

Department of Informatics, Umeå University, 901 87 Umeå, Sweden
charlotte.wiberg@umu.se

Abstract. In the recent twenty years, people have developed a close relationship with digital technology in conducting sports and training. Initially, approximately 1995–2005, the first wave of Sport IT included technology as GPS watches and pulse measurement equipment connected to rudimentary digital services, designed by the brand delivering the watch and only available for the single user's needs. In the second wave, between years 2006–2010, APIs and platforms started to emerge, facilitating the data to flow between artefacts, services, brands and facilities. Aesthetics in information visualization and other User experience (UX) aspects become popular and the audience becomes broader. The third wave, in the interval of 2011 and forward, could be described as the maturing wave. People now become fanatic about showing results to others – in sport platforms and on general social media. Further, what symbolizes this wave is that the focus in use becomes more on hi-fi information rather than low-fi data. In the third wave, the usage is widely spread and covers a wide range of requirements from a wide range of users.

The paper gives a more thorough description of the three waves of Sports IT when it comes to applications and user cases. A thorough description of related work for each wave is given with the main goal to pinpoint where research has given fruitful insights and contribution. In order to give a deeper understanding of the waves, one detailed example of a typical digital service of each wave is presented. Finally, the phenomenon of Sports IT and digital wellness is discussed based on findings shown earlier in the paper.

Keywords: Sports IT · Digital wellness · Quantified self · GPS
Digital service design

1 Introduction

Through the recent history, say the last fifty years, Information Technology (IT) has been one of the most significant changes in people's lives. Of course, IT can be blamed for people staying inside in front of a computer or game console, sometimes with health problems as one of the results (c.f. Vandewater et al. 2004, Hesketh et al. 2007, Forster et al. 2010). However, besides being a cause for unhealthy ways, it has also provided people with support, motivation and inspiration for a healthier way of living where, so

M. Kurosu (Ed.): HCI 2018, LNCS 10902, pp. 219–227, 2018.
https://doi.org/10.1007/978-3-319-91244-8_18

called, pervasive computing, wearables, etc. including technology as cameras, pedometers, accelerometers and other sensors (c.f. Chi et al., 2005; Baca et al., 2009; Dourish, 2001). This usage of IT started to develop and spread around 1995. In this context, we call it Sports IT.

Initially, Sports IT included technology as Global Positioning System (GPS) watches and pulse measurement equipment connected to rudimentary digital services, mainly as stand-alone application on your PC. These included statistics of collected data, for single-user need only. You were only collecting and visualizing the data for yourself and your own needs. This type of Sport IT and use we here define to be the first wave of Sport IT – 1995 to approximately 2005. The main user group was high end sports people like elite athletes, marathon runners or triathlon athletes. The main goal here could be described as efficiency, i.e. the results were measured to control efficiency in training for maximum results. Also, worth noting in relation to this wave is that the data was only processed and available in this, brand dependent, closed digital environment.

In the second wave, between years 2006–2010, the technology became more mature and also more open. Collected data became generally more accessible for different types of platforms and applications through, so called, Application Programming Interfaces (API)s that were business standards and globally adapted by sports industry. This, including the fact that large technology platforms started to emerge from large sports actors such as Nike and others, truly facilitated the data to flow between artefacts, services, brands and facilities. The focus was the quantified self (c.f. Lupton 2016), i.e. the person could measure all sports activity conducted and this data could be stored anywhere and abstracted by any stand-alone digital Sports IT service or platform. During this time, the target group using the technology are a wide audience, from novices in training and sports to more hard core users. Many of the artefacts use much more low-fi data, i.e. the accuracy is not in focus, however the user experience and information visualization was important, since motivation and inspiration for a healthier life through use of Sports IT technology was the main theme during this period. Finally, in this phase, the game industry reacted to the trend of sports and fitness and fitness games and consoles appeared – where both software, i.e. games and hardware, i.e. consoles were developed with this theme.

The third wave, in the interval of 2011 and forward, could be described as the maturing wave. An important parallel trend in this third wave is the emerging trend of using social media. This also became important in Sport IT use, since it became very popular in relation to visualize sports-, training-, and dieting results to others. The driving force here was that it became an inspiration to people by showing results to your friends. Further, what also has become important is to carefully choose genre of artefact based on underlying theories and models, e.g. it is not only important to monitor your weight curve or count calories, but to choose *type of* diet and to also record and monitor BMI-value and fat percentage – both in your upper and lower body. As it turned out in the very technology deterministically driven phase 2, i.e. what could be measured were measured and stored without initial idea of what theoretical baseline to use. In this third phase, the services were designed with a specific basis for measurements in combination with proper information visualization in relation to this basis are the winners when it comes to downloads and use. Examples of personas using the Sport IT in this phase are

(1) people already doing sports, training, exercise or dieting, (2) people inspired to start to train or diet where Sports IT can facilitate and inspire the person by supporting not only by monitoring the quantified self but also facilitating, often personalized, learning about the activity and/or diet. Further, communication channels with coaches and trainers are often included if needed, i.e. *your personal trainer online*. Overall, the third phase are characterized by personalized digital service based on specific persona – i.e. elite athlete, team members, member at sports facility, marathon runners, student at sports academy, dieting people that have chosen program to join etc. This third wave could be seen as the time where the Sports IT became a *mature technology*, individualized for each person's needs in order to make each person achieve the goals set by him- or herself – not seldom shown to others in social media.

2 The First Wave – "Because I Have Technical Support to"

In 1995, sports watches were big and clumsy and gave only general data. It was expensive because of no critical mass in selling, and the main target audience was people very interested in their progress in training – elite athletes down to amateur long distance runners with high goals in their training. The main goal here could be described as *efficiency*, i.e. the results were measured to control efficiency in training for maximum results. Also, worth noting in relation to this wave is that the data was only processed and available in this, brand dependent, closed digital environment. The expression "*because I have technical support to*" refers to a technological deterministic view of IT use (for discussions about technological determinism c.f. Smith and Marx 1994, Binber 1994). Hard core athletes had driven technology development in this area and at this time it was *possible* to measure heartbeats, steps and geographical data – so they *did.* The technological deterministic view is "There is technology – I will use it". Often, this view is present early in a technology development cycle generally, where social aspects and consequences are not in focus. The user just try out technology without reflection. The connection between technology and user are therefore quite loose, since the technology often is designed/developed without any thoughts on user requirements.

2.1 First Wave Case – GPS Hard Core Technology for Marathon Runners

Marathon runners on different levels train an enormous number of hours in order to be able to complete a race. Usage of Sport IT is very frequent in this group, and the reason is to keep track of training data – hours, length of runs, pace etc. The main focus here is efficiency, i.e. to use training hours in the most efficient way to reach the best race result. A secondary goal is to keep motivated. By using self-monitoring technology like Sports IT devices, the motivation could be kept on high levels as it may be motivating to see how many hours, miles etc. you have completed. However, the last aspect is not vital to this group to stay motivated to do their sport (Fig. 1).

Fig. 1. When running a marathon, wearable Sport IT is used in first wave of Sport IT (Photo by Filip Mroz on Unsplash)

The two most common measures are finished number of miles by using GPS and measurement of someone's pulse. Most of the technology measure both of the types of data. However, depending on what the platform came from – from the GPS world or measuring pulse world – interfaces and forefront data was different. Important to note is that interface design and aesthetics were not in focus here – only displayed data counted. The more data, the merrier were the paradigm here (Fig. 2).

Fig. 2. Many marathon runners using Sports IT equipment for measurement of personal data during the race. (Photo by Mārtiņš Zemlickis on Unsplash)

3 The Second Wave – "Because I Feel Motivated by Using It"

In the second wave, between years 2006–2010, APIs and platforms started to emerge, facilitating the data to flow between artefacts, services, brands and facilities. The focus was the quantified self, i.e. the person could measure all sports activity conducted and this data could be stored anywhere and abstracted by any stand-alone digital Sports IT service or platform. During this time, the target group using the technology are a wide audience, from novices in training and sports to more hard core users. Many of the artefacts use much more low-fi data, i.e. the accuracy is not in focus, however the user experience and information visualization was important, since motivation and inspiration for a healthier life through use of Sports IT technology was the main theme during this period. If the paradigm in the first wave was efficiency, here User Experience (UX) is in center (For a thorough discussion about UX c.f. Wiberg 2003, Swallow et al. 2005, Forlizzi and Battarby 2004, Hassenzahl 2008, Karapanos et al. 2009).

3.1 Second Wave Case – Nike+ - Aesthetics and Fun

The showcase in this wave is the global collaboration between Nike and Apple, which became a groundbreaking success due to some core aspects. First, two huge platforms, and existing customer groups joint together. This was groundbreaking at the time. Second, the timing was right for a larger and less hardcore runner audience to adopt Sport IT technology. Finally, the concept was playing with simplicity and aesthetics which was new in Sport IT world. Earlier, platforms, artefacts and interfaces were more functional and at its most usable. To also include more pleasure values was new and very attractive to the audience. Below, an example of one shoe using the built-in pedometer that sent information through a plug-in to an iPod, which gave audio feedback to the runner regarding time, pace etc. The interfaces as well as the accuracy in measurements were leaning towards a general audience. It was good looking but with rudimentary measurements (Fig. 3).

Fig. 3. In the second wave, a broader group of people were targeted for the Sports IT concepts, where facility and aesthetics were up front. The image shows Nike+ sensor and connected iPod.

4 The Third Wave – "Because Others See Me Doing It"

The third wave, in the interval of 2011 and forward, could be described as the maturing wave. People are not only measuring calories, pace and weight – they also get inspiration by receiving (positive) feedback by positing results and images from their Sport IT activities on social media. Social media suddenly became full with number of kilometers, curves of average speed of bike rides etc. As social media get more and more graphical, images of scales, plates with food etc. appear frequently. Finally, when the selfie hit the ground as a trend, the gym image taken through a mirror becomes mainstream.

Another important aspect in this third wave was not only to do a random diet, but to choose app or platform based on *what type of* diet, or theoretical framework to base training, sport or diet on. The number of apps on Appstore for diets exploded and they were filled with recipes etc. As it turned out in the very technology deterministically driven phase 1 and 2, i.e. what could be measured were measured and stored without initial idea of what theoretical baseline to use. In this third phase, the services clear of their basis for measurements in combination with proper information visualization in relation to this basis are the winners when it comes to downloads and use. The target audience in this phase are (1) people already doing sports, training, exercise or dieting, (2) people inspired to start to train or diet where Sports IT can facilitate and inspire the person by supporting not only by monitoring the quantified self but also facilitating, often personalized, learning about the activity and/or diet. Overall, as the technology use matured in Sports IT, the user group got wider and the applications grew in number. As we can see a strong development curve in the sensor technology, the number of interesting artefacts grow. Besides posting information online into social media, the direct communication between people in relation to Sports IT grow. Trainer to client, client to client etc. grow. The third wave – the mature wave – of Sports IT gives both developers and clients great business and motivation to continue to develop technology as well as use.

4.1 Third Wave Case – Lifesum and Runkeeper

In order to show upon real cases, two platforms are described below. First, Lifesum is described and discussed – a platform for monitoring weight, exercise with a large number of add-ons like receipts and more. Secondly, Runkeeper is described. This is a platform from the exercise part of wellness. So, here focus is more on that part. Together, they give an overview of the third wave Sports IT spectrum.

Lifesum includes goal bar of what weight to reach in your weight loss. Further, it has a database of calorie counted food and beverages which helps in the food diary. Another feature is that it gives notifications as drinking sounds during the day in order to remind you to drink water. You take notes in the app how many you had (Fig. 4).

Runkeeper includes features as GPS – map support, music control, interval sounds, i.e. when you have reach a specific number of kilometers or miles for instance, you hear a sound. All to get you motivated to keep going (Fig. 5).

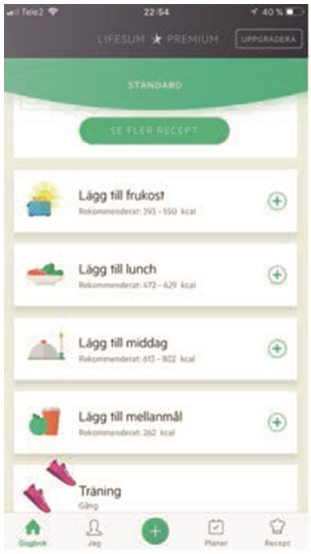

Fig. 4. Screenshot of Lifesum – an app mainly for diet control. However, it also includes exercise and water drinking.

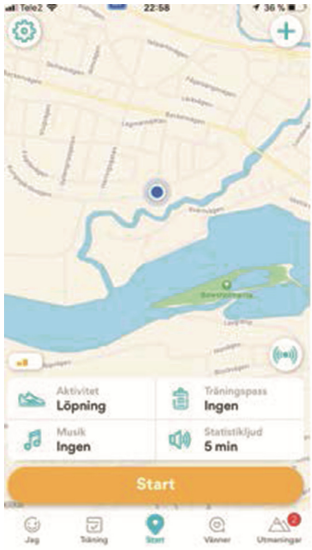

Fig. 5. Screenshot of Runkeeper – an app originating from the exercise/running world.

5 Discussion

Sports IT as a technology phenomenon is definitely here to stay – it is not a short term trend. Hopefully, the diversity will be motivating in itself for people, so that they get more interested because of the flexibility in Sport IT technology when it comes to personalization in the platforms and apps. Another significant thing is the technology development speed – everything is getting more and more accurate, wearable and more UX friendly, which help in IT adaptation. However, looking at Sports IT throughout those three waves in history, gives some insights. Below, these are further developed.

5.1 Industry Standards vs. Market Value

It is important that platform owners and producers globally come together and even further discuss and collaborate when it comes to APIs, and other industry standards, in order to further facilitate for users to bring the data seamless between platforms, in order to avoid lock-in effects. These are negative for all involved – customer, developer and platform owners. To bring or spread the data is vital in this technology segment.

On the other side, some actors believe that a protectionist way is the right way. If I lock in the clients they will stay – forever – seems to be the model. All with the purpose to keep a high rate of market share to get a high market value. The sports and wellness industry has to look beyond this short-term advantage in order to build a sound market in total.

5.2 Function, Usability and Experience – User's Needs

Throughout the three waves of Sport IT use, different levels of user's need has been in focus. (c.f. Jordan 2000). Initially, especially in early part of first wave, functionality was the main or only aspect at stake. The user wanted the data, and user was very persistent so even if he or she didn't actually understand the interface initially, she had motivation to complete task even if usability was poor. Later on, however, with a wider user group, usability became as important as functionality. In the second and third wave, the third aspect in Jordan's stairs of user needs, i.e. pleasure/(or UX) is highly important as well. So, Sports IT is a typical example where Jordan's theory apply – it is deterministic that over time user needs will evolve from not only need for functionality but also usability and finally UX.

5.3 There is an App for that vs. Individualization

In Sport IT of today, the flood of apps handling registering of food and training is enormous. There is a danger that platforms will not gain enough attention to survive. The balance here is to make it general enough but with a thought of personalization as well. The negative side of personalization part of the scale is that it gets more complicated to interact with the app or artefact whenever individualization/personalization is around if not done in a smart way. This aspect might be the most vital in order to succeed in Sports IT in the future.

References

Foster, D., Linehan, C., Kirman, B., Lawson, S., James, G.: Motivating physical activity at work: using persuasive social media for competitive step counting. In: Proceedings of the 14th International Academic MindTrek Conference: Envisioning Future Media Environments (MindTrek 2010), pp. 111–116. ACM, New York (2010)

Forlizzi, J., Battarbee, K.: Understanding experience in interactive systems. In: Proceedings of the 5th Conference on Designing Interactive Systems: Processes, Practices, Methods, and Techniques (DIS 2004), pp. 261–268. ACM, New York (2004)

Hassenzahl, M.: User experience (UX): towards an experiential perspective on product quality. In: Proceedings of the 20th Conference on l'Interaction Homme-Machine (IHM 2008), pp. 11–15. ACM, New York (2008)

Hesketh, K., Wake, M., Graham, M., Waters, E.: Stability of television viewing and electronic game/computer use in a pro- spective cohort study of Australian children: relationship with body mass index. Int. J. Behav. Nutr. Phys. Act. **4**, 60 (2007)

Jordan, P.: Designing Pleasurable Products: An Introduction to the New Human Factors. Taylor & Francis, London (2000)

Karapanos, E., Zimmerman, J., Forlizzi, J., Martens, J.-B.: User experience over time: an initial framework. In: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI 2009), pp. 729–738. ACM, New York (2009)

Lupton, D.: The Quantified Self. Wiley, Cambridge (2016). ISBN: 1509500618

Smith, M.R., Marx, L.: Does Technology Drive History?: The Dilemma of Technological Determinism. MIT Press, Cambridge (1994). ISBN: 0262691671

Swallow, D., Blythe, M., Wright, P.: Grounding experience: relating theory and method to evaluate the user experience of smartphones. In: Proceedings of the 2005 Annual Conference on European Association of Cognitive Ergonomics (EACE 2005). University of Athens, pp. 91–98 (2005)

Vandewater, E.A., Shim, M., Caplovitz, A.G.: Linking obesity and activity level with children's television and video game use. J Adolesc **27**(1), 71–85 (2004)

Wiberg, C.: A measure of fun. Extending the scope of web usability. Department of informatics. Umeå University (2003)