Enhancement: which technologies are improved, and how?

When watching sport on a regular basis, it can feel as though the many pieces of technology used in sporting competitions are constantly improving. Commentators draw attention to athletes using the newest type of aerodynamic helmet or carbon fibre bicycle. Sometimes, the technological changes can be so enormous that the sport may barely be recognisable, such as when the America’s Cup sailing competition altered their rules to allow catamarans rather than only single hulls. At other times, it is the contrast between the technologies used by different teams that we notice, perhaps owing to personal preference or perhaps highlighting economic differences between various nations. Richer nations and sports are more likely to have the most up-to-date technologies than those with fewer resources.

The technologies that this chapter focuses on are those that are constituent for sport. They are not technologies that are external to the sport but utilised by athletes or coaches for training or other purposes; they are technologies that are used by athletes every time they train or compete. These kinds of technologies include balls in football, boats in rowing or yachting, bicycles in cycling and shoes in running. As these form necessary parts of each sport, it is understandable that improving these technologies has become another avenue for athletes to attempt to achieve an advantage over their competitors. At times, we have seen athletes adopt some unusual technologies, such as Australian Cathy Freeman’s choice to wear a full-body suit including head cover in the 2000 Olympic Games, which contrasted markedly with the very brief attire worn by many of her competitors.

This chapter examines how constituent technologies come to be enhanced or improved. It may seem obvious that all athletes would be constantly seeking the best technological options, but, as this chapter notes, determining the best option for an individual athlete can be very difficult. Further, the cases in this chapter show that the actor-network of sport includes many other actants that can influence athletes’ and/or coaches’ choices to enrol a newly enhanced technology. Overall, the central question explored throughout the chapter is why
some technological enhancements are easily integrated, or enrolled, into sport while others are resisted.

The goal of improvement

As Guttmann (1978) described, there is an undisputed link between the goal of sport and that of scientists, with both groups searching for greater human achievement. In sport, this is often achieved through improving and enhancing already existing equipment and technology. As Trabal (2008) notes, following this logic would assume that any new technological advances that have been shown to improve sporting performance would be enthusiastically adopted by athletes and coaches. However, as I argue throughout this book, this is far from the case. Through cases studies in kayaking and swimming and a range of other examples, this chapter examines how enhancements to already existing sporting technologies are both adopted and rejected.

Brohm (1978) argued that the quest for improvement caused competitive sports training to became ‘Taylorised’. He described how the body came to be treated as a machine and training was structured to produce maximum efficiency. Interestingly, Frederick Taylor, the originator of scientific management in the workplace, was also one of the first to introduce efficiency into sports training and sport technologies. While Taylor is best known for his work in conserving resources and producing maximum efficiency throughout the workplace (Taylor and Bedeian, 2007; Tenner, 1995), what is less well known about him is the way he applied these same principles to sport. Through applying his principles to the sports of tennis and golf, he invented and patented a number of new technological innovations (Taylor and Bedeian, 2007). Taylor was ahead of his time in determining that the design of the equipment utilised in sport could strongly influence one’s ability in the game. He believed that ‘there is a best way of doing everything’ (Taylor, 1912, cited in Taylor and Bedeian, 2007, p. 196) and applied this principle to sport in exactly the same way that athletes, coaches and scientists approach competitive sport today. Taylor patented two different tennis rackets, one with a spoon-shaped handle to allow very low or high shots to be returned more easily and one with double thickness in the middle of the strings to prevent fraying (Taylor and Bedeian, 2007). In golf, Taylor has been credited with inventing a number of features that have become commonplace in clubs today. He crafted himself an ‘extra-long, large-headed driver’ (Taylor and Bedeian, 2007 p. 199) and invented the concept of placing ridges on the face of clubs, allowing the golfer to produce backspin.
Taylorist methods became popular in sport during the early twentieth century, with coaches and athletes quickly seeing the potential for improved performance through adopting Taylor’s efficiency-focused practices (Tenner, 1995). Accordingly, the related concept of enhancing the technological implements and equipment used to play sport in order to improve results has now become commonplace. However, what this chapter addresses is the way that many of these new innovations are not seamlessly introduced into sporting practice. Instead, many new enhancements are either rejected outright by athletes or organisations, or create immense discussion and controversy between sports participants. Even as early as 1909 Taylor had one of his inventions, the Y-shaped putter, banned from golf on the grounds that it went against the rules of the sport, which had to be upheld in order to keep it pure (Taylor and Bedeian, 2007).

Butryn (2003) provides an excellent summary of literature examining resistance to technology. First, he describes how some theorists have raised concerns over the impact of new technologies on athlete autonomy (see Sage, 1998). The argument here is that if sport becomes dominated by technology, then athletes will have fewer opportunities for personal expression, and the workings of sport will be determined by the limits of the technologies rather than by the athletes themselves. Similarly, he notes how one unintended consequence of some new technologies has been an increase in injuries (see also Tenner, 1995). There is also an understanding of technologies adding to the ‘dehumanisation’ of sport (see Rintala, 1995; Simon 1994). In terms of dehumanisation, it is argued that athletes and spectators desire sport to be a contest of human endeavour, not a competition about who has the most effective technology.

Butryn himself argues against the technological determinist stance adopted by the above authors. Instead, he takes the cyborg-athlete as a given. Butryn (2003, p. 18) describes:

> Viewing elite athletes as cyborgs who are inextricably tied to a range of sport technologies helps to alleviate the tension between ‘natural’ and ‘artificial’ athletes and performances, because it carries with it the recognition that elite athletes do not simply enter into competitions as technological tabulae rasae. Rather, athletes have interacted with and been shaped by various technologies since birth.

This quote is similar to the ANT stance on the technologisation of athletes. From an ANT perspective, the notion of a human body that is non-cyborgified does not exist. ANT emphasises that in all sports the human body is assembled with various equipment in order for the sport to take place. The runner
assembles with shoes and a running track, and the basketballer with a basketball, backboards and a wooden court. These items form as much a part of each sport as the players. Butryn (2003), in his study of elite athletes and their attitudes towards athletic equipment, found that, although the above fears of having their bodies corrupted exist in relation to doping and medical equipment, their attitudes to what he terms implement technologies (those technologies used in the act of playing the sport) ranged from embracing innovations in line with the goal of improvement, to discarding them, to complete indifference. Butryn expresses surprise that athletes chose not to adhere to the ‘win at all costs’ philosophy in not utilising all the implements or rehabilitative technologies at their disposal, despite these athletes competing at the very highest level. This is one of the questions examined in this chapter, with the case study of kayaking offering a possible explanation for why athletes are not always immediately keen to utilise new technological improvements.

Other studies of technology in sport have emphasised the influence of the human or social in determining whether new technological enhancements are adopted. For example, Pinch and Henry (1999) use an SSK (sociology of scientific knowledge) approach to examine the process of technological innovation in motor sport. They describe how the difference between SSK and ANT approaches is the weighting given to non-humans in the innovation process. ANT emphasises the importance of treating humans and non-humans in a symmetrical manner. While SSK acknowledges the importance of non-humans, those working from this approach accuse ANT of tending too far towards technological determinism. Regardless of this difference in the approach, Pinch and Henry’s (1999) work provides an excellent example of how technological decisions are not always made to enhance performance, but rather are subject to ideas from a huge number of groups with a variety of agendas.

Pinch and Henry describe a large number of groups who have shaped the technological innovations utilised in motor sport, including ‘the teams, their sponsors, the television companies, and the regulators of motor sport’. For example, they describe how the sponsors are torn by the desire to make the sport more exciting while also keeping it safe. The pressure to keep sponsors happy results in those involved directly in the sport feeling that it is external bodies without any technical knowledge of motor sport who end up directing the trajectory of innovations. For example, it is surprising how the design of the cars can be altered for a reason completely external to the racing, such as the ‘wings’ in the car being made larger in order to accommodate a larger area to place advertising (Pinch and Henry, 1999,
The majority of teams will group together to block a radical solution from one manufacturer if it threatens to produce cars that are much faster than all the other designs. Hence, there have been certain approaches (such as active suspension systems or turbo charging) that have been killed off, either in their infancy or at some later stage, through the regulative processes surrounding motor sport. (Pinch and Henry, 1999, p. 668)

This statement reveals how the teams are aware of the importance of retaining a close competitive race in order for their sport to continue to be viable and attractive to spectators. Like Butryn’s (2003) study, it shows how teams do not deliberately enhance their cars in order to gain an advantage, even though it is commonly assumed that gaining an advantage in performance is the ultimate goal of every athlete.

A central theme in Latour’s (1987) work is how innovations are not created as inventions by a single individual but instead come into practice through a number of iterations involving large numbers of humans and non-humans. This idea is shared by SSK and discussed by Pinch and Henry (1999), who describe how, although there are individual designers who are respected for their design abilities, the designer’s role is more about being part of a team than acting individually.

Similarly, ANT and SSK share an interest in the trajectory of innovation, in how technology comes into existence through an unpredictable pathway in which some avenues are closed down and others followed through (Pinch and Henry, 1999). Both approaches acknowledge that the trajectory that an invention follows is not necessarily the result of technical input but may depend on a variety of social and economic factors. In being interested in trajectories, the central question then becomes why are some technological enhancements easily adopted and become part of a sport, while others are never used. To examine this question, ANT theorists have generally deployed the concept of enrolment.

**Enrolment**

The central question tackled in this chapter, and discussed in other chapters of this book, is the question of why certain pieces of technology are enrolled or not enrolled within the sports environment. This question is one that ANT is
particularly well designed to answer, as the notion of enrolment is one of its central concepts.

Callon (1986) developed the concept of enrolment to examine precisely the mobilisation process that involves actors being integrated into a network working towards a common goal. In his heavily cited article examining the domestication of the scallops of Saint-Brieuc Bay, Callon describes the enrolment process as occurring in three phases: problematisation, *intérêtissement* and finally enrolment. The first step, problematisation, involves defining the problem and identifying potential actors to be introduced to create a solution (Callon, 1986; Tatnall and Davey, 2005). For the solution to be reached, an ‘obligatory passage point’ must be negotiated, which involves the alignment of the viewpoints of those involved, also known as ‘*intérressement*’ (Callon, 1986; Tatnall and Davey, 2005). *‘Intéressement’* consists of individual actants reinterpreting the problem in the context of their own concerns thereby motivating them to assist with a solution (Star and Griesemer, 1999). Latour (1991) describes this process as the alignment of points of view through using the example of a hotel manager and hotel guests aligning their goals to ensure a hotel key is returned. In this example, Latour describes how the addition of a heavy weight to the hotel key ensures the keys are returned to the hotel desk to the manager’s satisfaction and removed from the pockets of the guests to their immense relief, leading to a solution which satisfies both parties. Although in his landmark article Callon (1986) describes the process of *intérressement* as the researchers or scientists attempting to impose their point of view on the scallops and fishermen, Star and Griesemer (1999) argue that *intérressement* is wider than the imposition of one point of view on the other: that it is the alignment of goals from multiple viewpoints which cannot be understood from a single viewpoint. The third phase, enrolment, involves the stabilisation of the roles of the parties involved where all are working effectively towards a common goal (Callon, 1986; Tatnall and Davey, 2005).

A central component of the enrolment process is the concept of translation. Latour (1991) argues that the only way for *intérressement* to be achieved (or for points of view to be aligned) is for each actant to translate, or reinterpret, the situation into one which they were prepared to be part of the solution of. In order for enrolment to occur, it is not necessary for all actors to agree, but they must agree that a particular outcome is desirable. They agree on this by translating and understanding the situation in different ways. For example, the hotel manager’s desire that the hotel keys are returned to the hotel is translated by the hotel guests as them wanting to rid themselves of the heavy weight attached to the keys (Latour, 1991). Both result in the desired outcome of the keys being returned to the hotel, but for very different reasons. Callon and Law (1982, p. 618) describe
the necessity of actors pursuing the ‘imputed interests’ of others to enrol them successfully. Actors make their case through translating their own interests into the perceived interests of others. The goal is for the others to be successfully enrolled into the project and thereby fall into line in assisting with the project’s success. In translating their interests into their perceived notions of the interests of others and therefore attempting to enrol them, actors are essentially attempting to impose their version of order on the world.

A discussion of how new technologies may be rejected despite their effectiveness is provided by Trabal (2008), who, through adopting some ideas from Latour, describes how new kayak designs failed to be used by the top kayakers in France.

Case study: kayaking in France, Patrick Trabal

Trabal (2008) examined the introduction of a new flatwater single-seater kayak (K1) designed to offer the athlete greater stability in the water and therefore potentially faster times. A technician involved in the creation of the boat questioned whether the boat would actually be used by identifying two potential areas of resistance. First, the organisational body, the French National Canoe and Kayak Federation, was argued to be slow to change. Second, the top athletes were identified as being in opposition to change. Overall, the policy seemed to be that the preferred course of action was to use what had worked elsewhere rather than developing innovations. The results of this policy, as described by one technician, were that the French team was ‘one Olympiad too late’ (Trabal, 2008, p. 314).

While the above paragraph identifies certain groups as resistant or in opposition to new developments, Trabal (2008, p. 317) describes how, just like Latour, he wishes to be ‘symmetrical’. He aims to avoid judging groups as for or against, instead acknowledging that a range of actors can affect the adoption of new technological developments. In order to understand why a new design of boat could not easily be adopted by the kayaking community, Trabal used three methods. First, he conducted a questionnaire of all the top kayaking athletes at the time. He then conducted thirteen interviews with coaches and technical staff. Finally, he visited training sites and talked informally with athletes, coaches and technicians.

Overall, Trabal describes how the questionnaire found that the athletes’ attitudes to new technologies were generally positive. The majority expressed an interest in technical improvements in their sport, as well as
being comfortable with and happy using common technologies such as computers. However, as Trabal (2008, p. 322) points out, these are ‘only words’. By contrast, in one of the interviews, the complexity of the situation beyond these positive words begins to be revealed:

**Researcher:** To come back to the latest K1, if it was suggested that you use it here on this site, would you agree or not?

**Coach 1:** Well, yes! If we are told: OK, you’ve got this boat to test, here’s the construction protocol, here’s the means to do it, and here are two or three extras, well yes!

**Researcher:** And you think that the athletes would agree?

**Coach 1:** Yes, but, well … in the end …

**Coach 2:** They have to realise that it’s an opportunity!

**Coach 1:** But how are we going to sell it to them? What is clear is that it should have been sold to us before. But even if it’s been sold to us, we will need the means to be able to sell it to others.

This extract is a good example of Latour (1991) and Callon’s (1986) notion of enrolment or, as is often the more common case, lack of enrolment. Three groups are identified here: the Federation, the coaches and the athletes, and all three groups come to the boat issue with different attitudes. The difficulty of groups working together who come to an issue with different points of view is one that has been investigated extensively by ANT theorists, as in the example of Callon’s (1986) study of the domestication of scallops. In this case, Trabal explains that the different views on the boat come about through each group focusing on a different way of testing its effectiveness, and their belief in the boat. Some use an artificial testing tank, others argue for races, but the other ingredient is always the belief. Trabal (2008, p. 326) explains:

Scientific justifications based on curves and readings, a metrology spanning over the number of medals, sensations of the athletes in the grips of dealing with the boat, cannot separately suffice. Belief or non-belief in the project is a matter of adjusting to all these arguments. ‘It needs to be sold’ said the coach. Just like a sales representative in the throes of trying to convince his client must mobilize all the resources at his disposal (a ‘product brochure’ containing the measurements, understanding of the psychology of the person opposite, subjective descriptions of its uses, etc.), it is through a range of approaches that the conviction can be fostered.

This description clearly outlines why enrolment and adoption of the boat, have not occurred. The arguments for the improvements the boat offers had not been
Which technologies are enhanced?

explained to the athletes and coaches in a way that allowed these two groups to see the benefits offered to them. Instead, the athletes and coaches trusted their own knowledge and understanding of what would improve their performance over that of the technicians who developed the boat. For example, some of the athletes tested the boat by sitting at the front, despite the advice of the technicians that improved results would be obtained by sitting further back. The athletes did not heed the advice of the technicians because their own experience led them to believe they knew best about where in the boat one should sit for maximum effect. The technicians may have had the knowledge of the boat and its physics, but the athletes’ understanding came from their own experiences and feeling of being in boats, and the two groups had difficulty reconciling their different views.

The survey performed by Trabal (2008, p. 322) also reveals the different understandings of what was the best boat. Table 1 demonstrates the very wide range of views held by athletes and a lack of agreement about what the most effective boat would be. This was even before discussions around the technical qualities of the boat. It also illustrates the breadth of

<table>
<thead>
<tr>
<th>Participant responses regarding the best boat</th>
<th>Line racing ($n = 29$)</th>
<th>Slalom ($n = 31$)</th>
<th>Descent ($n = 27$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The best boat … is the current world champion’s boat</td>
<td>3.96</td>
<td>2.93</td>
<td>2.59</td>
</tr>
<tr>
<td>The best boat … is mine!</td>
<td>4.86</td>
<td>6.12</td>
<td>6.31</td>
</tr>
<tr>
<td>The best boat is the one I will have built in collaboration with a constructor</td>
<td>5.37</td>
<td>6.61</td>
<td>5.11</td>
</tr>
<tr>
<td>The best boat is the one studied in the laboratory</td>
<td>4.30</td>
<td>2.97</td>
<td>4.00</td>
</tr>
<tr>
<td>The best boat is the one my coach will recommend</td>
<td>4.19</td>
<td>3.47</td>
<td>4.30</td>
</tr>
<tr>
<td>I am not very informed of the latest technological developments in boat-building</td>
<td>4.25</td>
<td>3.29</td>
<td>3.37</td>
</tr>
<tr>
<td>There is no such thing as the right boat; it is the right athlete that counts</td>
<td>6.22</td>
<td>6.90</td>
<td>5.58</td>
</tr>
<tr>
<td>All competitors should have the same boat</td>
<td>3.61</td>
<td>0.77</td>
<td>2.80</td>
</tr>
</tbody>
</table>

Source: Trabal, 2008, p. 322
the network involving in boat-building. The athlete, coach, laboratory and current world champion are all raised as potential influences in the creation of a new boat.

The high result achieved by ‘There is no such thing as the right boat, it is the right athlete that counts’ also suggests that athletes do not rate the boat as highly significant for success, which could be another contributing factor to why a new boat was not enrolled easily. This indicates the relative importance of the boat in the minds of the athletes, with it appearing that athletes ranked the boat as not as important as their own training. While, at times, other authors have been surprised at athletes’ lack of knowledge or interest in new technology (see, for example, Butryn, 2003), Trabal comes to the realisation that whether an athlete or coach is interested in technology is almost the wrong question. Instead, he reveals how the network of elite sport contains a huge number of components and it is impossible for athletes/coaches to spend all the time they would like on every one of these. For athletes, time is a commodity, and they must be careful how they use this important resource (Woodward, 2013). Lack of time means they must choose to focus on those components they feel will result in the most success. For some athletes and coaches, technology is one of these components; others might see other factors, such as strength training or psychology training, as a higher priority. Either way, athletes and coaches make deliberate choices about how to spend their limited time and so do not adopt technological enhancements easily simply because a technician or scientist says they work. Many other options also work effectively, but athletes have limited time, so must choose the combination of options that works best for them within the time they have. Consequently, their particular actor-network may or may not include enhanced technology.

Emphasising elite sport as existing as a socio-technical network demonstrates how it is inaccurate to frame athletes and coaches as for or against new technological developments. Rather, elite sport training is a constant process of weighing up which aspects can create the most effective performance, and new enhancements or technologies are merely one variable that athletes must consider. Viewing athletic performance as a network ensures that the enrolment or non-enrolment of a piece of technology can be understood in relation to the other aspects of the sport. This is an important point for elite sport programmes and for technology manufacturers to be aware of. Managers or manufacturers often focus purely on the effectiveness of a piece of technology...
and thus make the assumption that athletes and coaches will enrol the technology because scientific tests reveal it to be effective. But as Trabal’s (2008) study shows, athletes may already have their own network that they believe to be effective for themselves, and lack the time or inclination to investigate alternatives, and it is only through understanding the athletes’ actor-networks that this can become apparent.

The case of the kayak highlighted two particularly important aspects for understanding how and why technological enhancements are not necessarily seamlessly adopted by athletes and coaches. First, viewing the athlete as a network emphasises how each athlete has their own very particular actor-network and their own individual views on what will be most effective for enhancing their own network. Therefore, an athlete is not likely to enrol any new technological enhancements without careful consideration of how it may affect their network as well as their performance. Second, determining whether a new enhancement will improve performance can be surprisingly difficult. There may be several ways that technologies can be tested in order to test their value, and different groups see different methods as valuable. Nevertheless, the final decision comes down to how athletes assemble with the new enhancements. I will now explore these aspects and others through examining the prominent case of the competitive swimsuit.

Case study: the competitive swimsuit, 1992–2010

One of the roles of international sporting federations is to set the rules for their sport. Rules perform a number of roles, including determining that the winner of the event is the participant(s) who performed most effectively at the particular activity deemed necessary in that sport. But in many cases technologies can perform sporting activities more effectively than humans can. For example, a boat can travel much faster through water than a human. Therefore, it is up to sporting bodies to ensure that each sport remains a contest of human abilities, with technologies generally regulated to limit the effect they have on the human body. In this sense, sporting federations and ANT theorists are interested in the same thing: how do you determine whether technology has acted? The following case study examines the International Swimming Federation’s (FINA) efforts to answer this question in relation to setting swimsuit regulations for World and Olympic competition.
**FINA’s swimsuit regulations**

In 2009 FINA rewrote the competitive swimming regulations, to take effect from 1 January 2010. The new rules required that swimsuits met double the number of criteria that they had in 2009 in order to gain FINA approval, which included passing fourteen distinct tests. These tests were developed with the aim of determining whether the swimsuit had the capacity to ‘affect’ swimmers’ performances in a way that was illegal based on the rules of the sport. They include multiple tests for buoyancy, body compression, body coverage, roughness and thickness. Undertaking the tests requires the use of a variety of equipment, including scanners, measuring tools and an underwater camera (Manson, 2010), demonstrating that the addition of the new rules included the expansion of the swimming network to include a variety of test mechanisms that were not previously required. This expansion of the swimming network was deemed necessary owing to FINA’s determination that a particular type of popular swimsuit – the full-body, polyurethane suit – had impacted on swimming results in a significant way for several years, culminating in the World Championships in 2009.

**A brief history of controversial swimsuit designs**

Several authors, including Magdalinski (2009) and Craik (2011), have chronicled the development of what are sometimes referred to as ‘plastic’ suits from their beginnings in the 1990s. Both Magdalinski and Craik agree that the first swimsuit that created any controversy was Speedo’s Aquablade, worn by 77 per cent of the winners at the 1996 Atlanta Olympic Games. This was the first time that suspicions were raised that a swimsuit might be having too much ‘effect’ by providing athletes who wore the suit with an unfair advantage, owing to the high percentage of gold medal winners who wore the suits (Magdalinski, 2009). The next suit to cause controversy was the Speedo Fastskin, developed in 1999. This suit differed from all other previous swimsuits, owing to the way it covered the whole body. Prior to this, suits had consisted of relatively brief attire, and Craik (2011) argues that the appearance of swimmers now swathed in black, was shocking to many spectators and contributed to suspicions about the suit. The suit was also different in deviating from the traditional nylon-based fabrics used to make swimsuits, with its surface designed to resemble sharkskin.

The next revolution in swimsuit technology has been identified as occurring in 2008, with the launch of the Speedo LZR Racer (Berthelot et al., 2010; Magdalinski, 2009). In contrast to the Fastskin of 2000, the Speedo LZR Racer
included quite a different global network. At the production level, Speedo boasted of the use of NASA’s wind tunnels, Ansys fluid flow analysis software, the water flume at Otago University, New Zealand, and scientists from NASA, Otago University, the University of Nottingham and Iowa State University (Barak, 2012; Craik, 2011; Matthews, 2008). The suit was produced through first identifying that a particular blend of elastane nylon significantly reduced friction in comparison with shaved human skin. Next, it was established that certain parts of the human body produced large amounts of drag, and that these were reduced if polyurethane panels were placed over those body sections. Finally, in order to minimise both friction and drag, the suit was not sewn together, but rather ‘bonded by acoustic vibrations’, resulting in a seamless suit (Matthews, 2008, p. 32).

Following the Speedo LZR Racer in 2008, a range of suits using similar technology appeared in 2009, the most popular being the Jaked J01 and the Arena Powerskin X-Glide (Neiva et al., 2011). The major difference between the new suits and the LZR Racer was that the new models were 100 per cent polyurethane, rather than only 50 per cent.

At the beginning of 2009, FINA’s ruling was that suits could only be a maximum of 50 per cent non-permeable material, using the argument that the material traps air, thereby increasing a swimmer’s buoyancy. However, swimsuit manufacturers Arena, BlueSeventy and Jaked argued that there was no proof that buoyancy was increased and threatened to sue FINA if they banned the suits. Consequently, at the World Championships in Rome, 2009, all types of suits were legal, and an unprecedented forty-three world records were broken (Harvey, 2009; Neiva et al., 2011). The 2009 World Championships have now become notorious in swimming history, owing to the allowance of the wide range of swimsuits and the high number of records broken.

In 2009 FINA finally voted against the use of fully body suits, with the new rule introduced on 1 January 2010. As previously noted, the new rules expanded the swimming network to include fourteen new tests and their respective testing equipment in order for swimsuits to be approved for world and Olympic competition (Mason, 2011).

The enrolment of swimsuits by swimmers

From 1999 onward many swimmers enthusiastically enrolled the full-body swimsuits, in the belief that wearing them would produce faster performances.
This argument is consistent with the ‘classic’ argument discussed earlier in the chapter that technology is primarily enrolled in sport in order to enhance performance. For example, multi-Olympic gold medallist from Australia Grant Hackett described how ‘You feel so streamlined through the water. It’s like you’re cutting through the water like a hot knife through butter’ (cited in Craik, 2011, p. 72). This quote demonstrates Hackett’s belief in the improvement in his performance that resulted from wearing the Speedo Fastskin.

Hackett’s quote suggests that the Fastskin was easily enrolled into the sport because intérressement was easily achieved. The goals of the swimmers, in wanting to achieve faster times, were met. The goals of the manufacturers, in wanting the most successful swimmers to wear their swimsuits, merged perfectly. The goal of the international swimming regulatory body FINA to raise the profile of swimming was also met through the possibility of more world records being broken as a result of the suits, making the sport more exciting for spectators to watch. There suits were available from a range of manufacturers. While prior to the Sydney Olympic Games there were some issues regarding availability, which almost led to the suits being banned from the USA Olympic trials owing to the unfairness of not all athletes being able to access them (Magdalinski, 2009; Newberry, 2000), by the time the games took place there were a range of manufacturers offering this style of suit, all keen for the top athletes to wear their suits. The suits also acted as a perfect intermediary (see Chapter 1) through ensuring that they improved athletes’ speed every time they were worn. These points of view were all in agreement, and thus this style of suit was adopted and soon became the norm.

Nonetheless, consistent with the kayakers in Trabal’s (2008) study, not all swimmers immediately adopted the wearing of what were understood to be the ‘best’ suits at the time. Instead, the networks of many swimmers included sponsors who acted to complicate what may appear on the surface to be a simple case of performance enhancement. The connections between individual swimmers, swimming teams and their sponsors all strongly affected the enrolment of various swimsuits.

Leading into the 2008 Olympic Games, the Speedo LZR Racer was believed by swimmers to be the most effective suit on the market. The media, who followed this controversy closely, reported that teams who were sponsored by Speedo, such as the already strong USA and Australian teams, were believed to be at an advantage by having easy access to the Speedo LZR Racer. Other national teams were felt to be at a disadvantage, which led to some swimmers and teams switching allegiances. Japan dropped its contracts with Mizuno 8022 and other firms in
order to wear the LZR Racer. Italy, sponsored by Arena, agreed to allow its athletes to wear the LZR Racer as long as they paid a fine. But German swimmers were required to retain their links with Adidas and therefore were not allowed to wear the LZR Racer. Arena also accused Speedo of producing a culture of uncertainty and confusion through pressuring athletes over the need to wear their swimsuits (Matheson, 2008). These arrangements therefore strongly affected which swimmers were able to wear the LZR Racer, with sponsorship deals both facilitating and preventing enrolment. These examples demonstrate how the networks of the swimmers, in holding particular sponsorship arrangements, was of much greater significance in determining the enrolment of swimsuits. The belief in their performance enhancement value may have contributed strongly to swimmers’ desire to wear the suits, but the reality of the network of swimming, by including very particular sponsorship arrangements, did not make enrolment possible.

At the same time there was an actant with the power to disrupt this arrangement: FINA. In 2008, in an attempt to level the playing field, FINA responded to the concerns by insisting that all swimwear manufacturers must make their suits available to all Olympic competitors. On the one hand, this allowed the enrolment of the LZR Racer by all swimming competitors. On the other, it severely disrupted the swimming network by providing Speedo with an advantage. One journalist (Matheson, 2008) argued that the ruling only benefited Speedo, with the belief in the superior nature of their suits being so strong that 90 per cent of swimmers opted to wear the LZR Racer at the 2008 Olympic Games – albeit many of them with the Speedo logo blacked out, to avoid breaking sponsorship agreements.

In following the swimming network further through the extensive media coverage, to encompass the position of swimming manufacturers, we find that there is no doubt that Speedo benefited financially from FINA’s ruling. One news report claimed that after 2008, Speedo’s market share of men’s swimwear rose from 64 per cent to 76 per cent (Lloyd, 2008). A different journalist argued that this was due not just to the suits, but partly to Speedo’s actor-network, including the sponsorship of swimming phenomenon Michael Phelps. The same journalist estimated that Phelps’s airtime produced US $3.6 million for Speedo (Matheson, 2008).

At the 2009 World Championships a year later, the situation had changed. With other manufacturers following in Speedo’s lead and creating their own high-technology suits, swimmers had a range of options available to them. The suits believed to be the most effective in 2009 were not those produced by Speedo; they were instead the 100 per cent polyurethane suits such as the Jaked
J01 and the Arena Powerskin X-Glide. However, not all athletes chose to wear these suits. Journalists noted how Michael Phelps opted to stick with the LZR Racer despite its being only 50 per cent polyurethane (Diaz, 2009), as did British 2008 Olympic gold medallist Rebecca Adlington (Hart, 2009).

The decisions made by Phelps and Adlington to stick with Speedo rather than moving to a 100 per cent polyurethane suit demonstrate that the decisions of athletes to work with particular technologies are based on a wide network rather than simply being based on which is the superior product. In the case of both these athletes, their network included a long-standing close association with Speedo, which meant that media reports such as the one by Hart (2009) interpreted their stance as demonstrating loyalty to the brand. It is understandable that swimmers who are earning significant amounts of money from their sponsors may wish to remain loyal to them because of that financial incentive. It could therefore be argued that there are two conflicting understandings of professional swimmers making such decisions: on the one hand, that of the swimmer as a competitor who wishes to win the race at all costs; on the other, that of the swimmer as a member of a sport not renowned for large potential earnings wanting to continue to benefit financially. Most of the time these two understandings align, but not always. In the case of swimming, this conflict appears through the non-human entity of the swimsuit. The swimsuit acts as the publicly visible proof of the swimmer’s network. The brand and style of the swimsuit are easily identifiable and clearly demonstrate the swimmer’s choice. There were a range of choices that swimmers made based on national or financial loyalties.

For example, while Phelps and Adlington remained loyal to Speedo, the American Dara Torres switched suits from the LZR Racer to a Jaked with the logo blacked out because she did not qualify for the semi-finals in her first event wearing the Speedo suit. In a media interview she described blacking out the logo to avoid causing any difficulties with her Speedo sponsor, but said she believed wearing the Jaked would make her more competitive:

I don’t want to get myself in trouble … Obviously I’m sponsored by Speedo. But everyone here is wearing these suits and they seem to be going fast. The times are kind of outrageous, what’s going on here. I feel like if you want to be on par with everyone, you have to do what they’re doing. (Torres, cited in Newberry, 2009, para. 8)

Torres here articulates the conflict between the desire to succeed and the pressure of sponsorship. Ironically, sports journalist Karen Crouse (2009) argues that, far from the suits providing an unfair advantage, the rules that required
manufacturers to make all their suits available to all competitors created a more level playing field. Crouse (2009, p. B11) claimed:

The suits had a democratizing effect on the results, levelling the playing field for countries that have long been playing catch-up to the United States and Australia. At the 2007 World Championships, those two countries accounted for 30 of the 40 victories. In Rome [the 2009 World Championships], they finished with 13 as swimmers from 17 countries won gold medals.

While Crouse does not provide any evidence that it was the swimsuits alone that accounted for these results, it is an interesting explanation in the light of the usual assumption that new technologies can make sport unfair by giving those with access to them an unfair advantage. This is quite different from the more common situation where new technological advancements are only available to those with the economic power to access them, such as the case of altitude chambers, which will be discussed in the following chapter.

The enrolment and non-enrolment of swimsuits as facilitated by FINA

Like all international sports federations, FINA’s role in its sport takes multiple forms. FINA is required to promote swimming and ensure the financial viability of the sport, which, as with the swimmers, includes negotiations with sponsors on a constant basis. But FINA is also responsible for setting the rules, and for ensuring that the rules are followed. With regard to this second point, FINA’s primary role was to determine whether the swimsuits had acted to improve performances in an illegal way. As discussed in Chapter 1, determining whether non-humans have acted can be extremely difficult, and the case of the swimsuits proved to be particularly challenging for FINA.

The discussion of the potential banning of full-length swimsuits began as early as 2000, with questions being raised about the full-body suits. At the time the regulations set by FINA stated:

FINA rule SW 10.8: ‘No swimmer shall be permitted to use or wear any device that may aid his speed, buoyancy or endurance during a competition (such as webbed gloves, fins, etc). Goggles may be worn.’ (FINA, cited in Craik, 2011, p. 73)

Following the 2000 Olympic Games there was considerable debate about whether the Fastskin suit was a ‘device’ that aided ‘speed, buoyancy or endurance’. Given
that FINA was unable to produce any definitive evidence that the suit did aid speed, buoyance or endurance, the argument in this area centred on whether this suit was a device or a costume. As fashion theorist Jennifer Craik (2011) argues, the swimsuit was unsettling because it contrasted so strongly with the swimwear as worn over the last century. While swimsuit debates had historically centred on the accusation of swimwear being too brief, this suit instead covered the entire body. As such, the swimmer was transformed into a completely different figure from what the public was used to seeing. This example demonstrates Latour’s and Venn’s notion of how ideas can be folded into new technologies and how their effect can vary as a result of what is folded within (Latour and Venn, 2002). In this case, the idea of a swimmer having a very visible body was so strongly folded into the idea of competitive swimming that the appearance of a swimmer swathed in a black suit from wrist to ankle was alien and shocking. Therefore it is understandable that it would be easy for the audience to see the suit as a device rather than a normal swimming costume, even though FINA did not see any grounds to ban the suit at the time.

Craik’s (2011) argument is a good example of the way ANT can draw attention to what is elsewhere termed ‘affect theory’. Thrift (2008) argues that a weakness of ANT is that it does not allow for the consideration of human emotions, since emotions are a purely human phenomenon and ANT argues against the existence of a ‘pure’ human. By contrast, I argue that the above example demonstrates how emotional affect can potentially be ‘folded’ into a technology as part of the network that makes up that particular technology. In this case, Craik (2011) argues that the reaction to the appearance of swimmers swathed in black full-body suits was one of shock, which suggests that that shock then becomes part of the network of this style of suit.

Nonetheless, despite the reactions of shock that spectators experienced, at this point FINA did not see any grounds to ban the suit. They could not find any evidence that the suit broke any particular swimming regulation. As a result, swimmers very quickly adopted it as their preferred style of suit, and it soon became the norm for the competitive swimming body to be seen covered in a full-body black suit.

In 2008, with the invention of the 100 per cent Speedo LZR Racer, the question of whether full-body suits should be banned was raised again. The large number of world records broken in 2008 and 2009 created a belief that the suits must produce some sort of unnatural assistance, and should therefore be banned. Yet the effects of the suits were not equal for everyone. Some swimmers benefited more from the new suits than others. Some swimmers posted
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spectacular times while wearing the full-body suits and far slower times without, while others posted similar times in both scenarios. For example, in the 200m breaststroke, Rebecca Soni is one of the few swimmers whose times have improved since 2010 despite the suits being banned. Journalist Karen Crouse (2010) described her as being renowned for having a very unusual breaststroke technique, including possessing a very strong core, meaning the suit would not be of as much benefit to her. Similarly, in an interview with Crouse (2009, p. D1) Soni’s coach, Dave Salo, explains that the suits give all swimmers an ideal physique, rather than one created by hard work and athleticism: ‘A lot of kids who aren’t in very good shape can put on one of these suits and be streamlined like seals.’ In a different media interview, retired Olympic gold medallist Duncan Armstrong argued that the suits compress the body and therefore allow it to sit higher in the water: ‘That’s why you do thousands of hours in the pool, working on your hand pitch and your strength, to be able to sit higher in the water. Once you sit higher, you swim across the water – not through it. Once you swim across it, you’re faster’ (Harvey, 2009, p. 61). Kainuma et al. (2009, p. 69) agreed with Salo and Armstrong by arguing:

the corset-like grip of the suit supports and holds the swimmer so they can maintain the best body position in the water without losing flexibility of movement. Furthermore, this high-speed swimsuit makes the surface of the swimmer’s body very flat and smooth, thus reducing water resistance.

The second point made by Kainuma et al. (2009) describes the suit’s ability to compress the body. Similarly, multi-Olympic gold medallist Grant Hackett reported in an interview that he was surprised to see some swimmers wearing more than one suit in order to maximise the effect of the compression (Millar, 2008). Kainuma et al. (2009) additionally propose that the tightness of the suit, in restricting blood circulation, could be a significant factor in improving performance, observing that the LZR Racer was particularly effective in short course events but not in events longer than 400m, where greater blood circulation is required.

These explanations reveal how the swimsuit technology cannot be considered separately from the athletes’ bodies, and that therefore swimming must be viewed as an assemblage of body and suit. The different bodies of the athletes have as much to do with the effectiveness of the suit as the suit’s design. According to Salo, bodies that are less strong and toned can reap greater benefit from the suits. This argument is confirmed by the popularity of the suits at the Masters swimming level, where media reports claim that athletes in their forties...
or fifties have been found to swim faster than they did in their twenties by wearing the suits (see, for example, Sataline, 2009). The use at Masters level demonstrates how the swimsuit and the body acts together as a network assemblage in order to produce faster times. Rebecca Soni’s success in improving her times after the polyurethane-suit era, including breaking the world record at the 2012 Olympics, demonstrates how she has found a way to substitute the effect of the suit herself through her own training.

The question of whether the polyurethane suits increased buoyancy could not be answered because of the different ways that different bodies assembled with the suits. The suits had been accused of breaking the rules because they increased a swimmer’s buoyancy through trapping air. However, sports journalist Harvey (2009) claimed that this was unable to be tested because the ability of air to be trapped was entirely dependent on the shape of an individual swimmer’s body and the fit of the particular suit. Harvey’s claim suggests that the determining factor is the network assemblage of body and suit, not the swimsuit alone.

As FINA struggled to determine conclusively whether the suits increased buoyancy or aided speed through examining the suits themselves, its decision eventually to ban the suits was based on different criteria entirely. A report by Manson, presented to the FINA Bureau in 2010, details the approach that led to their decision to ban full-body swimsuits. FINA took the approach of analysing the improvement in world record times that occurred between 1992 and 2009. They noted that over the long term there were a variety of explanations for the constant improvement in times, including technique shifts, professionalisation, accessibility of the sport for a larger population and technology. But in the short term they determined that the number of world records broken at the 2009 World Championships (forty-three) was so much larger than any previous individual competition that a specific factor was almost certainly responsible. They then matched this up with the fact that this was the only championships in which 100 per cent polyurethane, full-body swimsuits had been permitted. Consequently, FINA determined that from 2010 onwards new types of technology would be enrolled into the sport in order to test swimsuits to ensure they met the criteria of the new rules.

The rules prevented swimmers from using any non-textile material (Craik, 2011; Manson, 2010). Additionally, it also banned the use of suits that were fully body-length, with men being allowed suits from waist to knee, and women from shoulder to knee (FINA 2011). With the introduction of these rules, journalists presented doubts about whether any world records
would be broken in swimming ever again (see, for example, Partridge, 2011). However, at the London Olympic Games in 2012 eight swimming records were broken, exactly the same number as at the Athens Games in 2004, suggesting that swimmers are still able to improve their times without wearing full-body suits.

Conclusion

This chapter has confirmed the value of viewing the athlete, and sport, as an actor-network. From this perspective there is no doubt that the enrolment of new enhancements to technology and equipment is not a simple matter. The functionality of the particular enhancement is not necessarily a reason for athletes to enrol it. Instead, the athletic process exists as a carefully balanced actor-network where athletes have limited time and must therefore weigh up the impact of any new enhancement on all aspects of their network. For example, various swimmers weighed up the impact of using a polyurethane swimsuit on their performance as well as on their sponsorship agreements. In some cases these two aspects aligned, so enrolling the new suit was therefore an easy decision. But in others they had to choose between these two aspects of their network. At the same time, the athletes’ bodily network – their make-up of bones and muscles etc., along with their training – determined whether their bodily assembled with the suit in a significant way. In some cases the body assembled with the suit to produce a far better performance, but not in every case. Similarly, in the case of the kayakers, a crucial point was the necessity for the athletes to sit further back in the boat in order for the new boat to work most effectively. But the athletes’ training meant that they were familiar with sitting in a particular position in the kayak, and changing it might have changed other aspects of the network, including how they moved carefully trained body parts.

Both these examples illustrate Latour’s insistence that actor-networks should be understood as rhizomes through emphasising the way that every point in the network can potentially affect any other point. It is particularly important that sports managers, coaches and manufacturers are aware of this. Enrolling new enhancements is not as simple as the coaches in Trabal’s (2008) study assume, when they argue that they need to be sold to athletes in order for athletes to try them. The coaches’ assumption oversimplifies the complexity behind athletes’ use of technological enhancements.
Viewing athletes as actor-networks also explains the results of Butryn’s (2003) study, which found that athletes ranged from enthusiasm to indifference in their discussions of implement technologies. For some athletes, technological enhancements are of great importance and a significant part of their network. For example, Dara Torres explained to the media how she felt the need to wear the polyurethane swimsuit in order to keep up with other athletes, regardless of her sponsorship agreements. For her, ensuring she was using the most up-to-date technology was of great importance. By contrast, Michael Phelps did not opt to wear the fully polyurethane swimsuit; this was clearly a less important part of his actor-network than it was for Dara Torres.

The cases in this chapter also reveal the difficulty of determining whether a particular enhancement was effective. In kayaking, Trabal’s (2008) survey revealed a variety of ways to determine which boat was the most effective, with no clear evaluative criteria being identified. Determining how a technology acts to affect performance can be extremely difficult. This was strongly emphasised by FINA, who could not identify particular tests to identify whether the polyurethane swimsuits broke any swimming regulations, and instead decided to ban the suits purely on the grounds of statistical analysis. The rapid increase in times and world records set were the only evidence that FINA had for the effect of the swimsuits.

Nonetheless, the evidence was sufficient for FINA to add fourteen new tests to their swimsuit requirements. The increased complexity of the rules illustrates the way that actor-networks are continually shifting and expanding, depending on the actions of humans (such as swimmers, coaches and manufacturers) and technologies (swimsuits) but particularly owing to the way these combine to have a transformative effect on performance. The result of the transformative action is a new inscription in the form of new rules as part of FINA’s regulations. The story of the polyurethane swimsuits thus becomes folded into these regulations, but the regulations will soon become black-boxed, meaning the story of how and why such strict regulations came to be required will be obscured from view, and perhaps eventually forgotten.

Both cases discussed in this chapter include technologies that were publicly visible. In the two cases the type of boat or the type of swimsuit was easily observable. This contrasts sharply with other technologies in sport that are either utilised only in a training context or used under clothing or in the body, rendering them invisible. The following two chapters now focus on far less visible technologies: altitude chambers, GPS units and doping.