# eMotion 3D Sports Motion Analysis

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## ABSTRACT

The following report is a working business plan exploring the potential benefits of 3D Motion Capture in sports analysis in comparison to existing techniques.

It explores the current sports analysis market, highlights current competitors and researches the disadvantages and benefits of existing 3D motion capture systems. From a business point of view, the report analyses the potential for a mobile 3D sports analyses service in today's market and examines the finance required to successfully compete in that market.

The conclusions reached by the plan suggest that the business proposed would be viable provided all the forecasts and estimations are accurate and the service was marketed and run in the correct way.


## INTRODUCTION

This project has been approached with the aim of attempting to complete a working business plan that could be used to attain capital from potential investors or banks. As such, all the research and statistics had to be as accurate as possible to ensure that the business plan was reliable so it could, potentially, be used in the real world environment. I looked at using several different Motion Capture systems and used Bournemouth University's Access MoCap to research whether several top sports professional would find the system useful. During my market research, I also conducted interviews and questionnaires with several professional sporting bodies including the English and Wales Cricket Board, The West Hants Tennis Academy, The Motion Analysis and Research Rehabilitation Centre (MARRC) and Loughborough University. I also interviewed several professional sportsmen/women including Adrian Pearson, a professional County Level cricketer and coach for 16 years, Callum Callan, a PGA touring professional golfer, Michelle Farley, England under 16 Tennis player and Neil Bishop, an under 18 Hampshire County Cricket player. I used this research to explore whether there would be a potential demand for a 3D sports motion analysis system that could travel to where it was needed. I also conducted several other forms of research including analysing potentials customers and researching the costs involved.
The results of the report, although promising, perhaps explain why the service has not currently been available to date.

# eMotion Business Plan

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# Confidentiality Agreement

The undersigned reader acknowledges that the information provided by eMotion in this business plan is confidential; therefore, reader agrees not to disclose it without the express written permission of eMotion.

It is acknowledged by the reader that information to be furnished in this business plan is in all respects confidential in nature, other than information which is in the public domain through other means and that any disclosure or use of same by the reader may cause serious harm or damage to eMotion.

Upon request, this document is to be immediately returned to eMotion.

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This is a business plan. It does not imply an offering of securities.

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## Executive Summary

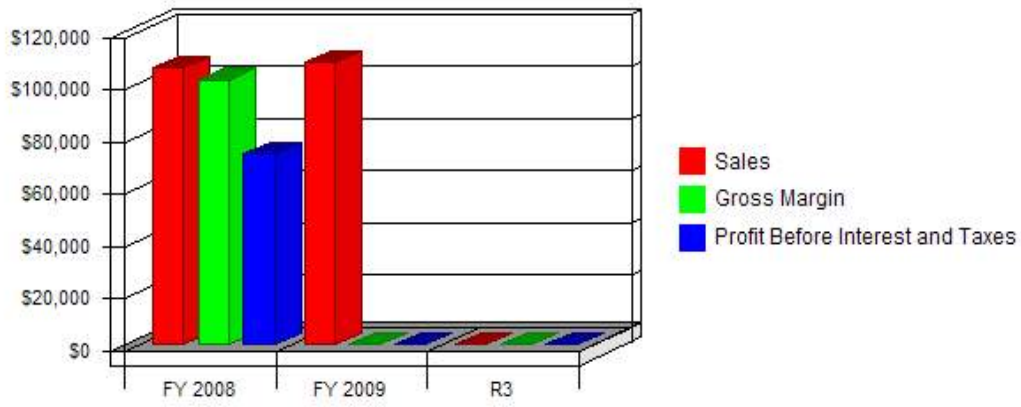
eMotion is a dynamic and pioneering business offering a state-of-the art mobile 3D motion capture service to the sports industry, allowing comprehensive sports motion analysis that was previously only accessible to the sporting elite. We provide a facility whereby customers may book us for any number of days to set up our 3D motion analysis system in a location of their choice. This enables sports athletes to have their technique analysed in 3D in their natural environment with the minimum of hassle to the client. For the first time, eMotion will provide access to an affordable system that in the past has costs hundreds of thousands of pounds to use. Located in London, eMotion is perfectly situated to service the hundreds of sports colleges, universities, clubs and national level teams that exist within the greater London area.[1] This plan aims to show how these customers will benefit from our service, how we intend to market the system and how we will be able to run a profitable business from it.

Our expected revenue for the first year's trading is in excess of £100 000, with approximately £73 000 profit. This revenue is expected to slowly rise to £117 000 by the end of our third year trading while combined profit over the three years is forecast to be in excess of £243 000.[2] These figures are based on the service being used at an average sixty percent capacity (two hundred and twenty days a year) over the three year period. The cash projected cash flow suggests that both Opening Balance Cash & Checking and Net Cash Flow will remain above zero for the first year of trading.

eMotion's short term objectives are to break even by the end of the first year and to have acquired contracts with 40 percent of eligible customers by the end of the first year. Our mid term objectives are to attract as many potential customers as possible and to be operating in profit by the end of the second year. The long term objectives of the business are to expand into different market locations such as Manchester and Birmingham.

We require £80 000 of capital in order to start trading in June 2007.

Highlights




[1] See Market Analysis section for details

[2] See Financial Plan for details

## Objectives

T o have acquired contracts with 40 percent of eligible customers by the end of the second year.

T o break even by the end of the first year.

T o be operating in profit by the end of the second year.

T o expand into a further location by the start of the third year.

T o expand into a further location by the start of the fifth year.

F or all locations to be operating in profit by the end of the seventh year.

T o establish a regional base in London by the start of the eighth year.

## Mission

eMotion aims to be the number one expert in providing high quality, easily accessible sports motion analysis to sports clubs and athletes of various levels. From university teams through to international level athletes, eMotion can help coaches improve their player's techniques by making use of technology previously only accessible to the elite few. Through an effective and educational marketing drive, eMotion hopes to lead a technological revolution in sports training throughout the country by highlighting the benefits of accessible and affordable 3D motion capture analysis. Once the benefits of the technology have been highlighted to potential customers, a consistently professional, high quality and reliable service must be delivered that meets and exceeds all of the customer's expectations.

## Keys to Success

Keys to the success of the company will include:

1. Effectively communicating the benefits of using our service to potential customers.
2. Providing a consistently reliable, flexible and accessible service that meets the needs of the customers.
3. Ensuring that the majority of eligible customers sign up to the service and commit to a fixed length, renewable contract.
4. Securing the majority of available markets before any potential competitors establish themselves.

## Company Summary

eMotion aims to establish itself as the market leader of sports motion analysis in the UK. By providing a service that travels to its customers, sports clubs and coaches will be able to integrate our service into their sports training to allow them to better assess and improve the technique of their athletes. Using state-of-the-art portable motion capture technology, our company will be able to set up and capture an athlete's technique in full 3D at any desired

location, indoors or out. This data can be used by coaches, physiotherapists and other professionals to assess and improve the athlete's technique. The company will be based in London with its mobile motion capture service being able to travel to customers throughout the greater London area. This will be in return for an annual membership fee and charge for every day the service is used.

## Company Ownership

eMotion will operate as sole trader with unlimited liability. As of this writing, however, eMotion has not been registered and is still considering alternatives of legal formation

## Start-up Summary

In order to keep start up costs to a minimum, eMotion will operate as a mobile business with very few overheads. This will be done by using a website and other forms of marketing to establish the business while using a branded van to transport the motion capture equipment between customers. As such, more money can be used for marketing and equipment as opposed to rent and other overheads.

£16 000 will be needed to create a professional, informative and functional website that can be used by customers to sign up to and find information about our services as well as arrange appointments.[3] Special client sections will also be developed that allow our customers to access the 3D data captured and compare it to previous sessions, other athletes etc... This will also allow us to create revenue by selling advertising space on the website.

£1 000 will be needed to market the business before we begin operating so that we have customers signed up to the service as soon as we start trading. The main form of marketing will be a representative for the business who sells the service on a per customer basis along with advertising in trade magazines.

£180.00 will be required to cover the legal fees of registering the business with Companies House.[4]

£58 900 will include the purchase of motion capture equipment (£45 000)[5] as well the businesses van (£8000), marquee (£5400)[6] and start up cash (£500).

## Services

eMotion aims to provide a service which is currently only available to top end professional sports men and women. Currently, 3D motion capture technology is only used in a handful of institutions around the country, most of which are universities. We aim to provide this service to any level of athlete from University up to International in any sport that can make use of the technology.

Sports motion analysis has been around for many years, starting with coaches visually observing their students it slowly progressed to include the use of film. Coaches would film their students and this would be slowed down and played back for analysis. With the advent of affordable and accessible video cameras, coaches were able to use

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3 Quote provided by ‘mjaWiredCreatives’, see appendix for more details

4 Quote obtained from http://www.biz-in-a-box.co.uk/shopexd.asp?ID=6.

5 Estimate provided during an interview with Andy Ray from Vicon UK. Obtained March 11 2007

6 Quote obtained from http://www.curlew.co.uk/40trad/index.htm. Provided on March 13 2007

technology to help in performance analysis on a much larger scale. As a result, software such siliconCOACH, Gasp and Xcitex's ProAnalyst have emerged that allow coaches to more scientifically track the movement of their sportsmen/women. This software allows you analyse video footage by slowing it down, directly comparing it to other players or professional's footage as well as determining the angles between joints in two dimensions. Systems such as these are still being used by many sports coaches including, among others, the PGA Golf Instructor Steve Thorn and the Director of Tennis at the West Hants High Performance Tennis Academy, Mark Reid. During an interview with me I asked both these coaches if they were aware of any 3D motion capture technology, both of whom answered yes but believed it was only used occasionally by international level Athletes. After contacting the English and Wales Cricket Board, I discovered that even top level England bowlers only have access to the a 3D motion capture facility at Loughborough two days per annum.[7] It is this service that eMotion would make accessible to the majority of sports coaches as opposed to the minority of sporting elite.

In order for eMotion's motion capture to be accessible to as many people as possible, it is important that it is a relatively mobile system that can be used to analyse a wide variety of sports in their native environment. For this reason, a Vicon MoCap system has been decided on as it offers several benefits to the other systems on the market. Vicon is the trade name of the recently merged Vicon Motions Systems and Peak Performance Inc. Vicon is part of OMG plc which trades on the London Stock Exchange and manufactures what is widely regarded as the best optical motion capture system available. This system is based around the use of it's MX40+ camera, which was the world's first 4 million pixel motion camera and can provide frame rates of up to one thousand frames per second, enabling high speed actions like golf swings to be captured in extremely accurate detail[8]. Due to our budget however eMotion will be using the Vicon 3+ system which offers resolutions of 659x493 pixels and frame rates of 240fps. This should prove more than adequate for the purpose eMotion will be using the system for. The camera works by transmitting and detecting strobe light which is reflected off markers worn by the subject. This light can range from infrared, visible and near infrared depending on the system's application and location. For example, infrared light can be used when you need the cameras to be inconspicuous and unobtrusive while visible light can be used when greater power and range are needed. For the system to work, the subject must wear highly reflective white markers which the cameras are able to detect and thus track.


**Image 1:** The LED strobe lights visible of the Vicon MX3+ camera. These strobes emit light while the camera records its reflection of the white reflective markers worn by the subject. As can be seen, the camera is very portable and is able to be mounted on either a tripod or wall mount. Images courtesy of http://www.vicon.com. 27 March 2007

For most purposes, a minimum of eight cameras would be needed to cover a large enough caption area. These cameras must be set up and calibrated beforehand by mounting them on stands around the capture space and calibrating them using a calibration object provided by Vicon. Once the cameras are set up, they must not move at all or else they will need to be recalibrated. After this step, the cameras are connected to a hub called the MX Net which is in turn connected to a PC. Using a set-up of eight cameras would enable us to capture an area of approximately 3 cubic meters.[9] If, however, eMotion decides in the future to expand and wants a larger capture

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7 Obtained from David Rose, Information and Resource Manger, England and Wales Cricket Board. March 8 2007. See appendix for full questionnaire.

8 http://www.vicon.com/products/mx40.html. Referenced 06 March 2007.

9 Interview with Andy Cousins, MoCap producer, Bournemouth University. 13 March 2007

space all that is required is to buy further cameras. For every additional eight cameras, another MX Net will be needed which, in theory, makes it possible to expand the system indefinitely. This would make investing in the Vicon system a relatively safe decision for eMotion as there is a reduced chance that the business would outgrow the equipment as the system is capable of adapting to the needs of the business

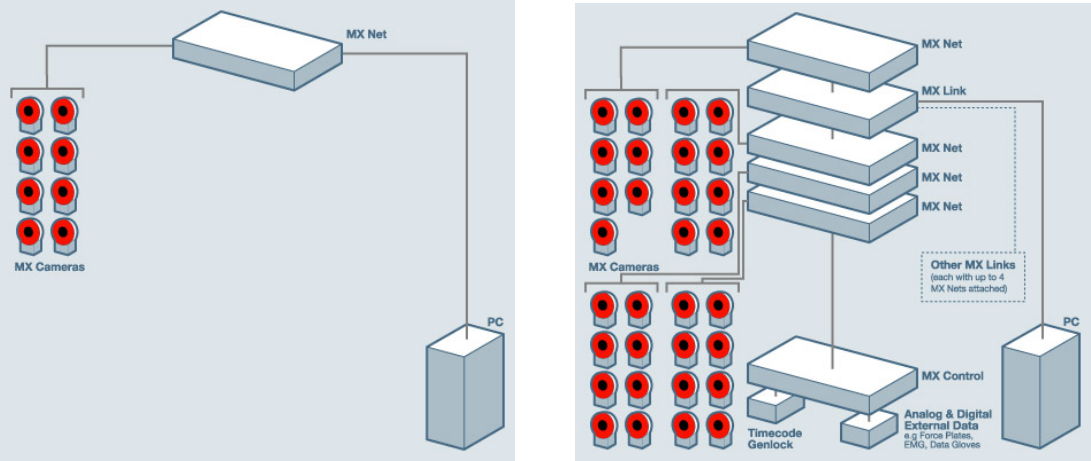


**Image 2:** Illustration explaining the flexibility of the Vicon Motion Capture set-up. Simply by adding more MX Nets, you are able to increase the number of cameras indefinitely. The size of the capture volume depends on the number of cameras: the more there are the greater the volume. This set-up ensures that eMotion's investment is secure because it is able to be upgraded easily in future. Image courtesy of http://www.vicon.com. 14 March 2007

In order for eMotion to attract the highest number of consumers as possible it is important that the system is fully portable and capable of being used on location. After speaking to Andy Ray at Vicon UK, he stated that the MX system is capable of being used outdoors provided the lighting conditions are acceptable.[10] This is because there shouldn't be any reflections from other light sources otherwise the software would incorrectly interpret them as markers. To avoid this, he says companies in the past have used portable canopies/marquees which help control the lighting. As such, eMotion has assigned £4300 for the purchase of a black marquee which can easily be set up at most outdoor locations and is large enough to accommodate most sports. For example, should an athletics club want their long jumper's motion captured, we would be able to set up the marquee around the jump pit allowing them to perform in their normal environment. By doing this, the number of potential customers vastly increases as we will be able to accommodate sports such as golf, javelin, shot-put, cycling, high jump, tennis, football, cricket etcetera. Also, by creating a mobile motion capture facility we are likely to attract more customers as it is a lot less inconvenient for the client if they do not have to travel anywhere.

In order for any potential customers to subscribe to the service, however, we would need to highlight the potential benefits gained through using a 3D system over the traditional 2D video capture set-up. This would be best done by eMotion personally visiting each potential customer and offering a free trial. In this way, they would be able to see first hand the benefits the system offers and would be more likely to subscribe to the service. Using Bournemouth University's motion capture facility, Access MoCap, I invited several sports professionals along to demonstrate the potential benefit of 3D motion analysis. Although the set-up at Bournemouth is different to Vicon's, the principle is the same and it provided an opportunity to see if 3D motion capture would be of any use to sports coaches. Mark Reid, the Director of Tennis at The West Hants Club brought Michelle Farley who is an Under 16 National Level Tennis player currently being scouted by the head of British Tennis. Neil Bishop, a county level cricket player for Hampshire and Steve Thorn, a PGA qualified golf instructor also had their technique captured in 3D. The MoCap facility at Bournemouth uses active markers which transmit, rather than reflect, infrared light. This means that the suit that the subject needs to wear can be relatively constrictive with wires, battery packs and

[10] Interview with Andy Ray from Vicon UK. March 11 2007

markers. As a result, Mark Reid felt that Michel Farley was unable to recreate the tennis serve as accurately as possible because she felt inhibited by the suit[11]. Using a Vicon system would remove this downfall as you do not have to wear any specific suit, just some reflective white markers.

To complement the 3D motion capture analysis, members of our service will have access to a special member's area on our website. Among other features, they will be able to view any of their athlete's previous sessions in video format and directly compare it to a database of 3D MoCap data of professional athlete's technique. This will allow coaches and sports medicine professionals to compare the difference in technique between their pupil/patient and a professional athlete, as well as compare the changes in the person's technique over several motion capture sessions. This feature is explained in more detail in the website section of the business plan.

The following images from the MoCap session at Bournemouth highlight the benefits of 3D motion capture compared to video analysis.

**Image 3.**

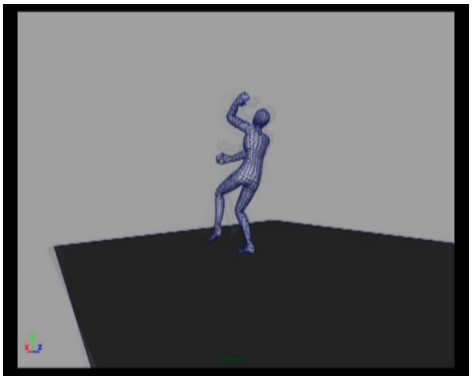

**Image 4.**

As can be seen in the above figures, 3D motion capture (image 3) allows you to get any distance away from the subject, whether you need to be close or far it is a far more flexible system than the fixed position of the video analysis in image 4.

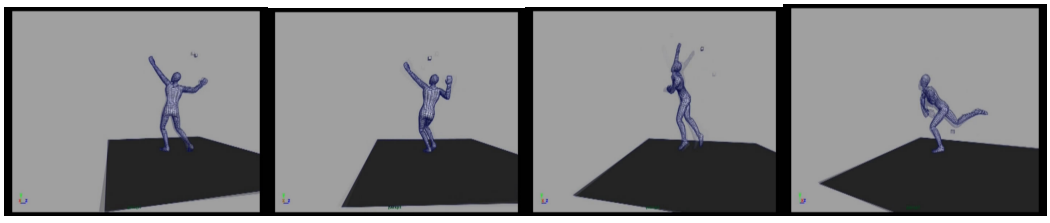

**Image 5.**

As is demonstrated by the above sequence of frames in image 5, 3D motion capture allows the user to rotate and move around the subject in any direction they choose while the athlete performs his or her action. This allows the viewer to gain a much deeper understanding of the motion involved.

[11] Interview with Mark Reid, Director of Tennis at the West Hants Tennis Academy. March 13 2007

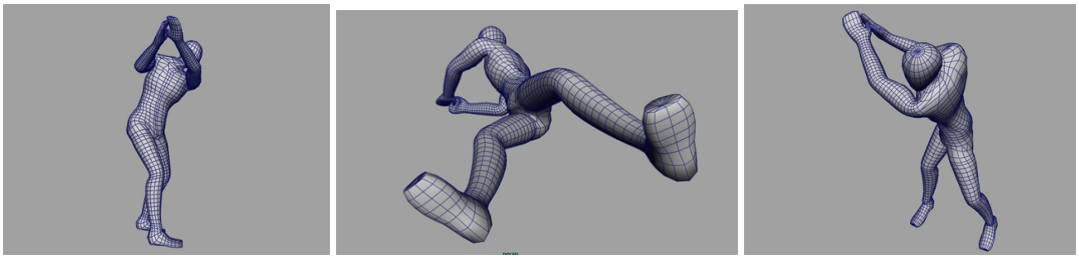

**Image 6 .** In this image, we can also see that the viewer is able to pause the motion and view the static pose from any conceivable angle. This is in stark contrast to the fixed viewpoint of the video analysis system as highlighted in Image 10.

**Image 10.** Example of how only one viewpoint is available during video analysis, resulting in some limbs and joints being obscured from the viewer. Image obtained from video motion analysis conducted at Bournemouth University. March 13 2006

After watching the results in real time, Mark Reid said that the system was definitely a marked improvement over current systems and that he was very impressed with the technology, especially if it could be done without the constrictive suit. The system allowed him to view a 3D representation of Michelle from any angle during any phase of the serve, the representation of which could either be a generic 3D character or alternatively a 3D skeleton. Mark Reid felt that the character was more useful for tennis as it allowed the coach to more accurately assess what was happening during the serve.[12] He stated that one problem with analysing serves is determining what happens with the hips during the backswing phase, a problem which is easily solved when able to view the subject form all angles at any particular time. Steve Thorn also agreed that the technology would be very beneficial and appealing to many golf instructors, adding that golf was a sport that spent a lot of money on technology and would almost certainly make use of the system, provided it was cost effective and practical. In addition, Callum Callan, a touring golf professional and golf instructor said during interview that the service eMotion offers would be highly useful and provide many benefits over current techniques. The only reservation he had about the system was price, but said that should it prove reasonable, he would definitely be interested in offering the service to his pupils. He also confirmed that in his opinion, most golf instructors would want to offer the service in order to appeal to more customers.[13]

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12 Interview with Mark Reid, Director of Tennis at the West Hants Tennis Academy. March 13 2007

13 Interview with Callum Callan, PGA Professional Touring Golfer. March 12 2007

Neil Bishop also said that the Hampshire coaches would find the system particularly useful for assessing the cause of injuries and their possible prevention. The Hampshire County Cricket Physiotherapist would also benefit from the technology in being able to assess the cause of injuries and assessing what changes would bring about the best affects. Neil Bishop currently suffers from serious back pain when bowling and believes that the 3D motion capture would certainly be a useful tool in injury prevention when combined with physiotherapy.

We also questioned Lindsey Parry, a qualified Sports Biokinetisist who currently represents South Africa in the Triathlon and who who runs his own Biokinetic practice. He stated that a service such as the one provided by eMotion would be very useful for his practice as it would allow them to analyse the stresses placed at certain joint angles. He said it would also be invaluable for analysing positions that require explosive movement and for sports techniques that require aerodynamic positions. The only reason that he has not used this technology in the pat is that it has only been available to universities and is too expensive to justify the costs.[14] eMotion's solution of providing a mobile service that many sports professionals could share would solve this problem provided the service was reliable, accurate, convenient, reasonably priced and professional.

Mark Reid has stated that The West Hants Club would definitely think about using the facility again in the future, saying they could offer it in addition to the many other services currently on offer to top level players such as biometric screening, diet analysis, performance analysis etcetera. This is good news for eMotion as it confirms that customers would be willing to pay for the service, and if the price is reasonable, would be used by a larger amount of people in all levels of sport

## Market Analysis Summary

We have decided to trade in the greater London area for several reasons including population size, demographics and physical size. With London being the capital, it is also host to many of the country's leading sports centres including the future National Tennis Centre, The England and Wales Cricket Board, Middlesex and Surrey County Cricket Clubs and several Rugby Union teams including England, Saracens, Wasps and Harlequins. The UK's second largest university, The University of London, along with several specialist sport's colleges such as Eltham Green School and Whitton College and more than 100 sports medicine professionals are all located within the Greater London area. According to the Office for National Statistics, the 2005 mid year estimate for the population of the greater London area is 7.517 million people, a figure which is set to steadily rise.[15] In 2005, 62 percent of adults aged 15 or over regularly participated in sport according to Min Tel, a leading market research company[16]. As a result, it can be estimated that approximately 4.5 million people people in London regularly participate in sport. This, in addition to the 2012 Olympic Games, means that there is a vast sports market in a relatively small area that is currently not serviced by anything similar to eMotion.

## Market Segmentation

For technical reasons, it will not be possible to offer a 3D motion capture service for every sport played in London. For example, it would not be possible to capture a swimmer's action because the cameras would not have an unobstructed view of the markers. There are many disciplines, however, that would be able to benefit from the service such as:

- Golf
- Cricket

[14] Questionnaire. Lindsey Parry, Biokinetisist. March 08 2007

[15] http://www.statistics.gov.uk/CCI/nugget.asp?ID=6. Obtained March 13 2007

[16] http://academic.mintel.com/sinatra/academic/search_results/show&&type=RCItem&page=0&noaccess_page=0/display/id=2099. Obtained March 13 2007

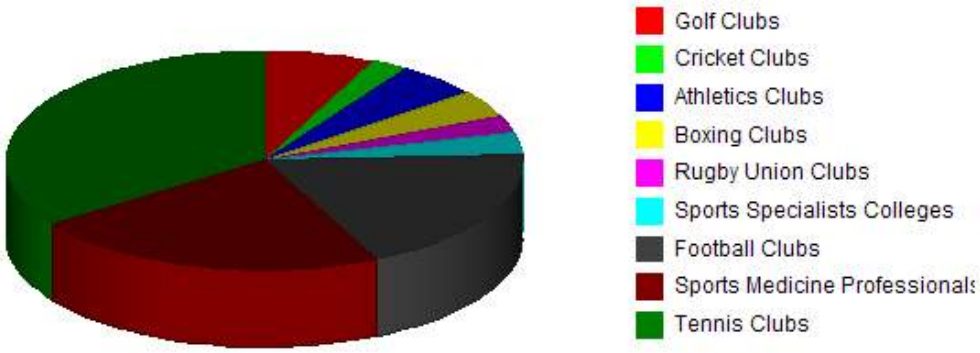
- Tennis
- Athletics
    - Cycling
    - Long Jump
    - High Jump
    - Sprinting
    - Middle and Long Distance Running
- Boxing
- Football
- Sports Medicine

The market can further be segmented into various competitive levels, for example:

- Recreational
- School Level
- Club Level
- County Level
- National Level

| **Market Analysis** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Potential Customers** | Growth | 2007 | 2008 | 2009 | 2010 | 2011 | CAGR |
| **Golf Clubs** | 3% | 38 | 39 | 40 | 41 | 42 | 2.53% |
| **Cricket Clubs** | 0% | 13 | 13 | 13 | 13 | 13 | 0.00% |
| **Athletics Clubs** | 4% | 28 | 29 | 30 | 31 | 32 | 3.39% |
| **Boxing Clubs** | 0% | 22 | 22 | 22 | 22 | 22 | 0.00% |
| **Rugby Union Clubs** | 4% | 14 | 15 | 16 | 17 | 18 | 6.48% |
| **Sports Specialists Colleges** | 0% | 18 | 18 | 18 | 18 | 18 | 0.00% |
| **Football Clubs** | 0% | 102 | 102 | 102 | 102 | 102 | 0.00% |
| **Sports Medicine Professionals** | 0% | 123 | 123 | 123 | 123 | 123 | 0.00% |
| **Tennis Clubs** | 0% | 191 | 191 | 191 | 191 | 191 | 0.00% |
| **Total** | 0.54% | 549 | 552 | 555 | 558 | 561 | 0.54% |

**Market Analysis (Pie)**




## Target Market Segment Strategy

Our target market is any of the sports disciplines mentioned previously where it is physically possible to capture the athlete's technique with the 3D motion capture equipment. We will also be focusing on all levels of the sport from school level up to national level in order to maximise the businesses potential returns. Certain segments will, however, have a higher priority when it comes to marketing due to the potential returns available in those segments. For example, national level teams have more money available to spend on the service than school level teams. These high level clubs will not provide enough demand for the service all year round so it is important that lower level clubs are able to use the facility and, in doing so, maintain demand for the service.

We have contacted several people in various professions throughout the sports industry and all agree that the service eMotion offers would be highly beneficial. The manager of one of London's most exclusive clubs, City Golf & Health Clubs, said during an interview that they have looked into installing a 3D motion analysis system in the past but it proved too technical and costly to set up. They currently only have golf simulators and 2D video analysis and told me they would be very interested in the service eMotion could provide.[17] They are keen to arrange a demonstration so that should it be viable they could look at offering the service on a weekly basis. Golf in particular, is an industry that traditionally spends a large amount of money on technology. In 2004, consumer spending on golf was £460 million pounds, a rise of 23 percent in the five years since 1999, despite falling prices. Since greater London constitutes approximately 12.4 percent of the UK's population, it can be estimated that more than £50 million pounds is annually spent by consumers on golf in the London area. This together with the fact that there are more than 38 golf institutions in the area offering golf instruction means that there is huge potential demand for the service.

[17] Interview with Manager of City Golf and Health Clubs. http://www.citygolfclubs.com. Conducted March 12 2007

Figure 10: Consumer spending on golf goods, 1999-2005

| | £m | Index | £m at 1999 prices* | Index |
|---|---|---|---|---|
| 1999 | 382 | 100 | 382 | 100 |
| 2000 | 396 | 104 | 410 | 107 |
| 2001 | 411 | 108 | 435 | 114 |
| 2002 | 430 | 113 | 469 | 123 |
| 2003 | 447 | 117 | 505 | 132 |
| 2004 | 460 | 120 | 536 | 140 |
| 2005 (est.) | 470 | 123 | 569 | 149 |

* calculated using MinTel's Leisure Goods deflator
Source: MinTel

Tennis and cricket are also sports that could make extensive use of the service offered by eMotion. London is soon to be home to the National Tennis Centre, which offers several facilities for its pupils such as a world class sports science and medical centre. Currently the centre has no plans for a 3D motion capture facility, however, eMotion could offer such a service to them at a fraction of the equipment cost. There are also 7 High Performance Tennis Centres in London which would also definitely benefit from the system, as explained by the Director of Tennis at the West Hants High Performance Tennis Centre in Bournemouth. The same is true for Cricket, where the England, Surrey, Essex, Middlesex and Kent cricket teams could use our services which have previously been unavailable to them in London. After contacting Adrian Pierson, a county level professional cricketer and coach for 16 years, he informed me that in his opinion there would be huge demand for this service in professional cricket. He sated that county level layers currently only have access to video motion analysis and that any company that was able to provide 3D motion capture would definitely be used by many teams and coaches.[18] In addition to high level institutions such as these, we will also target the other 191 tennis clubs, 13 cricket clubs and 98 football clubs around the capital. There are also at least 14 Rugby Union clubs which would benefit from motion capture analysis as well as several higher level clubs such as Saracens, Harlequins, Wasps and the England Team

Figure 21: Estimated consumer expenditure on cricket and rugby, 2001-06

| | £m | Index | £m at 2001 prices* | Index |
|---|---|---|---|---|
| 2001 | 292 | 100 | 292 | 100 |
| 2002 | 312 | 107 | 283 | 97 |
| 2003 | 332 | 114 | 274 | 94 |
| 2004 | 350 | 120 | 263 | 90 |
| 2005 (est.) | 388 | 133 | 254 | 87 |
| 2006 (fore) | 412 | 141 | 248 | 85 |

* calculated using MinTel's Leisure Goods deflator
Source: RFU/ECB/RFL/Premier Rugby/MinTel

[18] Adrian Pierson. Ex County Level professional cricketer. Interview conducted February 22 2007

In terms of actual athletes who participate in our target sports, the current level of cricket participation in the country has remained an average of 1.2 percent since 2002, meaning that an estimated 90 204 people regularly play cricket in the Greater London area. Rugby Union has enjoyed a 1 percent rise in regular participation to reach the 2005 figure of 0.8 percent or 601 360 people in London. Athletics, however, has enjoyed a 4 percent rise in regular participation levels, meaning that 1.2 percent or 90 204 Londoners regularly participate in the sport, the same number as cricket.

Figure 16: Regular participation in sports, 2002-05

| Base: adults aged 15+ | 2002<br>24,659<br>% | 2003<br>24,984<br>% | 2004<br>23,874<br>% | 2005<br>24,343<br>% | % point change 2002-05 |
|---|---|---|---|---|---|
| Swimming | 10.3 | 10.9 | 10 | 10.7 | 0.4 |
| Cycling | 5.4 | 5.7 | 5.6 | 5.5 | 0.1 |
| Golf | 4.6 | 4.9 | 5.1 | 4.9 | 0.3 |
| Football (Association) | 4.1 | 3.8 | 3.7 | 5.9 | 1.8 |
| Snooker | 3.4 | 3 | 2.9 | 3.3 | -0.1 |
| Darts | 2.4 | 2.4 | 2.2 | 2.5 | 0.1 |
| Bowls | 2.1 | 1.9 | 2 | 2.1 | - |
| Badminton | 2.1 | 2.3 | 2.6 | 2.1 | - |
| Tennis | 1.9 | 1.9 | 1.8 | 1.8 | -0.1 |
| Fishing – coarse | 1.8 | 1.5 | 1.9 | 2 | 0.2 |
| Cricket | 1.3 | 1.2 | 1.1 | 1.2 | -0.1 |
| Mountain biking | 1.3 | 1.3 | 1.5 | 1.2 | -0.1 |
| Fishing – trout/game | 1.2 | 1.2 | 1 | 1.2 | - |
| Skiing | 1.1 | 0.8 | 1.2 | 1 | -0.1 |
| Squash | 1 | 1.3 | 0.8 | 1.1 | 0.1 |
| Billiards | 0.9 | 0.5 | 0.7 | 0.7 | -0.2 |
| Fishing – sea | 0.9 | 0.8 | 0.9 | 1 | 0.1 |
| Athletics | 0.8 | 0.8 | 0.7 | 1.2 | 0.4 |
| Rugby union | 0.7 | 0.6 | 0.6 | 0.8 | 0.1 |
| Extreme sports | 0.7 | 0.7 | 0.8 | 0.9 | 0.2 |
| Table tennis | 0.7 | 0.7 | 0.6 | 1 | 0.3 |
| Chess | 0.7 | 1 | 0.9 | 1 | 0.3 |
| Basketball | 0.5 | 0.5 | 0.6 | 0.7 | 0.2 |
| Hockey | 0.5 | 0.5 | 0.6 | 0.5 | - |
| Boxing | 0.4 | 0.5 | 0.6 | 0.5 | 0.1 |
| Motor racing | 0.3 | 0.3 | 0.3 | 0.4 | 0.1 |
| Rugby league | 0.3 | 0.1 | 0.2 | 0.4 | 0.1 |
| Motorcycle racing | 0.3 | 0.3 | 0.3 | 0.2 | -0.1 |
| Ice skating | 0.3 | 0.6 | 0.5 | 0.5 | 0.2 |
| Marathon running | 0.3 | 0.3 | 0.3 | 0.4 | 0.1 |
| Show jumping | 0.3 | 0.2 | 0.2 | 0.1 | -0.2 |
| Wrestling | 0.3 | 0.1 | 0.4 | 0.3 | - |
| Motor rallying | 0.2 | 0.1 | 0.2 | 0.1 | -0.1 |
| Snowboarding | 0.2 | 0.2 | 0.2 | 0.5 | 0.3 |
| Stock car racing | 0.2 | 0.1 | 0.2 | 0.1 | -0.1 |
| American football | 0.1 | 0.1 | 0.1 | 0.1 | - |
| Ice hockey | 0.1 | 0.1 | 0.2 | 0.2 | 0.1 |

Taken from the TGI survey of around 25,000 adults

Source: GB TGI, BMRB Summer 2002-2004 & Quarter 3 2005/Mintel

As can be seen from the above table, the participation levels for emotion's target customers are as follows:

- Cycling: 5.5 %
- Golf: 4.9 %
- Football: 5.9 %
- Tennis: 1.8 %
- Cricket: 1.2 %
- Athletics: 1.2 %
- Rugby Union: 0.8 %
- Boxing: 0.5 %

This creates a total of 21.8 percent of the adult population that regularly participate in one of our target sports, or 1 638 706 people in Greater London. If we were to conservatively estimate that only 10 percent of these participants compete for their clubs, that would provide the estimate of 163 000 potential customers in our target market. This, in addition to the 122 sports clubs and 123 sports medicine professionals in our target market, means that there should be enough demand to justify the start up costs involved in setting up eMotion.

## Service Business Analysis

## Competition and Buying Patterns

There is very little existing competition when it comes to providing 3D motion capture of an athlete performing their sport in a real world environment. What competition exists is primarily based in Universities around the countries, with the 3D motion capture facilities being used primarily for research purposes. We contacted Barrie Wade from one of the leading suppliers of motion capture Equipment, Quilisys, who provided a list of all the companies they had supplied with the intention of using the equipment in sports science. More than fourteen universities had purchased their system for non-commercial sports science purposes, which means that if any sports clubs would like to use the equipment they would have to make a request to the Universities involved. The same was true when we contacted Andy Ray from Vicon, widely acknowledged as the world's leading optical Motion Capture suppliers. He informed us that only a small percentage of their customers bought the equipment for sports analysis purposes and those that did were mostly universities.[19] The main example is Loughborough University whose sports department uses the system for several commercial and non commercial purposes. Their facility uses the same Vicon set-up as proposed by eMotion which they find highly capable of handling the demands of sports analysis. One of Loughborough's main commercial clients is the National Cricket Centre based in Loughborough. We contacted David Rose who is the Information and Resources Manager at the England and Wales cricket board who informed us that currently England only has access to Loughborough's 3D motion capture services two days per annum. For this, they are charged in excess of £250 000 pounds excluding additional costs such as labour.[20] The only other major competitor, who is also not in London, is the Motion Analysis Research and Rehabilitation Centre at the University of Worcestshire. They too use a Vicon set up and only occasionally hire out their studio for commercial sports analysis. After an interview with the head of the center and Worcestershire, we were informed that only about ten percent of all the work they do is for commercial sports analysis, such as the analysis of pace bowlers in national level cricket. Apart from these facilities there is virtually no other competition in

[19] Interview with Andy Ray from Vicon UK. March 11 2007

[20] Obtained from questionnaire with David Rose, Information and Resource Manger for The England and Wales Cricket Board. March 8 2007. See appendix for full details

providing a mobile 3D sports motion capture and analysis service. There are, however, several other different systems that could compete with us should someone decide to use them.

Motion Capture was originally developed as a photogrametric analysis tool in biomechanics research and has since moved into many fields including sports training, mechanics and computer animation. Today, various motion capture systems exist that each have their benefits and disadvantages. Many 2D video analysis systems exist that constitute the main form of competition with eMotion's system. These systems include Xcitex's ProAnalsyst, Silicon Coach and Gasp, all of which work on the principle of identifying and tracking pixels for simple angle and velocity calculations. They also provide the ability to slow down footage and compare it directly with previous attempts or other professional's techniques. Although these systems are useful to coaches, it does not form any real barrier to entry in the market place as 3D motion capture provides many additional benefits, as described earlier.

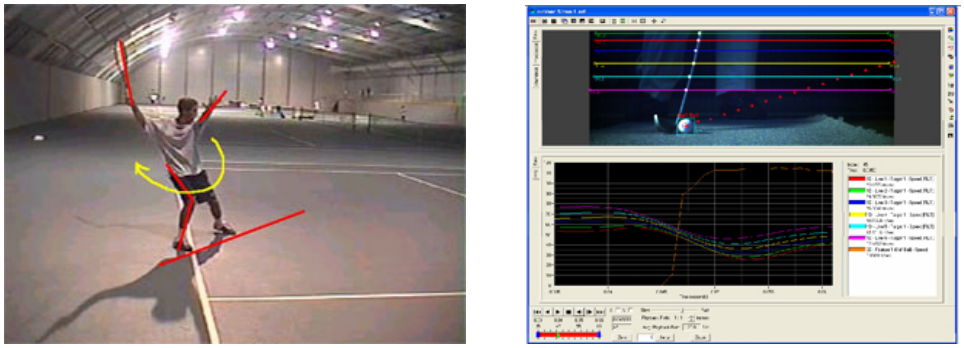


**Image 11:** Two screen shots illustrating the simplicity of 2D motion capture analysis compared with 3D. The software is Xcitex's ProAnalyst which is one of the most advanced 2D programs available. Images obtained from http://www.xcitex.com. March15 2007

Virtually all 3D systems, however, work on the principle of tracking physical markers which are located on the various joint positions of the subject. These markers can be inertial, infra-red, magnetic, acoustic or reflective depending on the system. For example, a system developed by the company Animazoo, known as GypsyGyro-18, uses small inertial sensors (gyros) located at the subject's joint positions to detect the 3D location of the joints over time. This system allows for an extremely large capture area as the subject is free to move in any area he or she chooses. Because the system is, in effect, self contained, there is no possibility of it being affected by outside influences such as light and reflections. As a result of this, no clean up of the data is required afterwards which allows for real-time motion capture, enabling the subject to see the results immediately. However, this system is not really suitable for the sports motion analysis market because the suit does not enable the sports person to move in a completely unrestricted way. They may also harm themselves if they were to land awkwardly on one of the trackers.

**Image 11.** The Gypsy Gyro-18 system,. The suit is far too obtrusive and dangerous for use in sport's motion analysis, a highlighted by the large black box on the front of the suit. Image courtesy of http://www.animazoo.com. 15th March 2007

Another potential competitor to the Vicon system is the same system that Bournemouth University's Access MoCap uses. The system uses active markers which transmit LED light to electronic sensors positioned around a solid cube frame capture area. Because of this, the system is extremely hard to transport and therefore would be ineffectual competition for the eMotion Vicon set-up. The suit that contains the actives markers is also very bulky and constrictive because of the wires and battery packs attached to it. This would make it difficult to get a natural performance from the athlete and would also pose a health and safety risk for physical sports such as high jump, rugby and long jump. No such problem exists with the Vicon set-up as the markers attached to the athlete are small, wireless and easily detachable. Another example of a 3D active marker system is one called Codamotion whereby the sensor is simply a horizontal bar mounted on a tripod. This is a lot more portable than Bournemouth's system however it is no where near as accurate or as complex and would not be sufficient for detailed sports motion analysis.

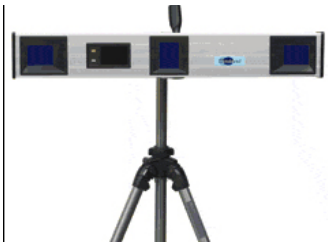


**Image 12.** The codamotion system. Although highly portable, the system is not accurate or powerful enough to give reliable results for sports motion analysis Image courtesy of http://www.charndyn.com/ 14 March 2007

The only relatively large scale producer of motion capture systems that provide competition to Vicon's system is Qualisys. Their systems are based on the same principle as Vicon's where LED strobes emit infra red light whose reflection is detected from reflective markers worn by the athlete. This method has proved to be the most suitable for many motion capture purposes because it is portable, relatively easy to set up and highly accurate. Qualisys's system does not, as yet, have as much market share as Vicon because the cameras are not as powerful or accurate and they are a smaller camera.

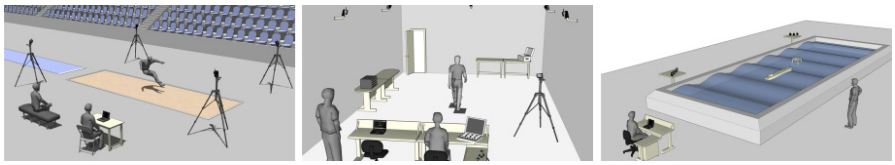


**Image 13**. Illustrates the potential uses of Qualisys's MoCap system in sports analysis such as long jump technique. Left: Used Middle: Example of typical set up. Right: Used in mechanics for motion tracking, such as in a wave tank. Image courtesy of http://www.qualisys.com 14 March 2007

As with all of the above systems, there potential use by sports professionals is eMotion's only real competition. Presently the systems described above have either been too inaccurate, difficult to set or expensive to buy/operate and have therefore not gained a foothold in the market. eMotion aims to change this by providing a highly accurate system that is easy and relatively cheap to use because it is shared by many different institutions.

## Strategy and Implementation Summary

## Competitive Edge

eMotion has the following competitive edges:

- The service is completely portable and is able to be operated indoors and out, resulting in the minimal of hassle for our clients.
- Our customers have access to database of professional athletes MoCap data and a fully customisable member's web space
- The service is able to be tailored to our customers requirements
- eMotion provides good customer relations due to one on one contact with customers

## Marketing Strategy

eMotion will implement the following marketing strategy

- Hire a personal eMotion representative who can explain the benefits of the system to potential customers
- Advertise in national and local trade magazines
- Create informative booklets/marketing packs for distribution to potential customers
- Offer free trials to anyone who is interested in the service
- Advertise on appropriate online websites

## Sales Strategy

eMotion's sale strategy will include creating a membership scheme whereby any clubs or sports professional who are interested in the service are offered a free trial. This will allow the customer to experience the benefits offered by 3D motion capture first hand and will ultimately encourage them to use the system as part of their regular training routine. In order to use the system again however, they will have to become annual members of eMotion, whereby they will be entitled full access to the membership section of the website, as explained later. The cost of this membership will be a very reasonable £20.00 per month and will enable them to call out the service whenever they need it provided it is not already booked. Every time the service is called however, they will be charged a set daily fee. This will encourage them to have as many of their athletes analysed on the same day as opposed to calling out the service every week or month, allowing us to better serve our other customers. By charging a daily fee, we will also not have to set up and dismantle the equipment a many times as would be necessary should we be called to several places in one day. The added benefit of operating through a fixed length membership contract is that it deters competitors from starting a copycat business because our customers have an incentive to remain loyal to eMotion because they are tied into a fixed length contract. This loyalty will also be achieved through the website where they should become dependent on using it as a tool to aid with their sports analysis and player development. Additional revenue will also be generated through our website from advertising because the site should attract considerable hits every month.

## Milestones

£18 000 will need to paid as a salary to the person operating the motion capture equipment. This will likely be the founder of eMotion and thus is likely to increase when the finances allow.

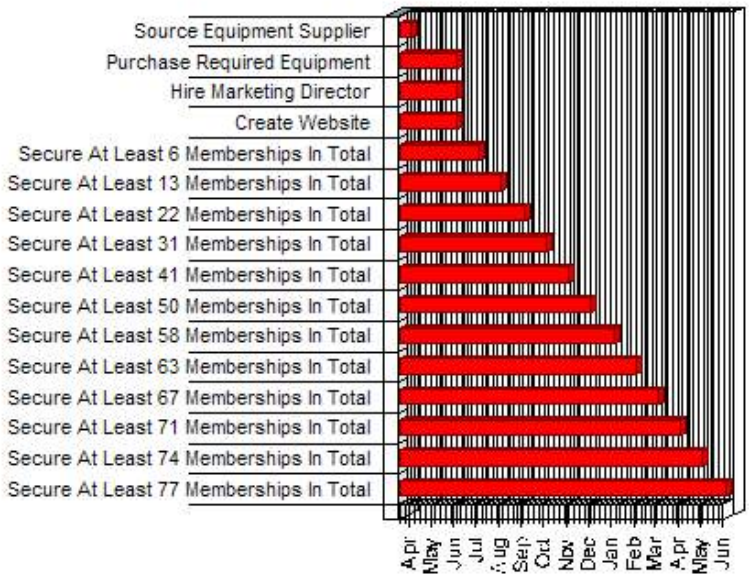
£1500 will be paid to an employee whose job is to personally sell the service to new customers. After six months, enough new memberships should be generated through word of mouth and other forms of marketing.

The number of membership sales per month is in-line with the sales forecast and are the bare minimum of sales that need to be achieved for each given month

Table to follow...

| Milestones | | | | | |
|---|---|---|---|---|---|
| **Milestone** | Start Date | End Date | Budget | Manager | Department |
| **Source Equipment Supplier** | 16/3/2007 | 1/4/2007 | £0 | Steven Bishop | N/A |
| **Purchase Required Equipment** | 16/3/2007 | 1/6/2007 | £0 | Steven Bishop | N/A |
| **Hire Marketing Director** | 16/3/2007 | 1/6/2007 | £0 | Steven Bishop | N/A |
| **Create Website** | 16/3/2007 | 1/6/2007 | £0 | Steven Bishop | N/A |
| **Secure At Least 6 Memberships In Total** | 16/3/2007 | 1/7/2007 | £0 | Steven Bishop | N/A |
| **Secure At Least 13 Memberships In Total** | 16/3/2007 | 1/8/2007 | £0 | Steven Bishop | N/A |
| **Secure At Least 22 Memberships In Total** | 16/3/2007 | 1/9/2007 | £0 | Steven Bishop | N/A |
| **Secure At Least 31 Memberships In Total** | 16/3/2007 | 1/10/2007 | £0 | Steven Bishop | N/A |
| **Secure At Least 41 Memberships In Total** | 16/3/2007 | 1/11/2007 | £0 | Steven Bishop | N/A |
| **Secure At Least 50 Memberships In Total** | 16/3/2007 | 1/12/2007 | £0 | Steven Bishop | N/A |
| **Secure At Least 58 Memberships In Total** | 16/3/2007 | 1/1/2008 | £0 | Steven Bishop | N/A |
| **Secure At Least 63 Memberships In Total** | 16/3/2007 | 1/2/2008 | £0 | Steven Bishop | N/A |
| **Secure At Least 67 Memberships In Total** | 16/3/2007 | 1/3/2008 | £0 | Steven Bishop | N/A |
| **Secure At Least 71 Memberships In Total** | 16/3/2007 | 1/4/2008 | £0 | Steven Bishop | N/A |
| **Secure At Least 74 Memberships In Total** | 16/3/2007 | 1/5/2008 | £0 | Steven Bishop | N/A |
| **Secure At Least 77 Memberships In Total** | 16/3/2007 | 1/6/2008 | £0 | Steven Bishop | N/A |
| **Totals** | | | £0 | | |

**Milestones**




## Web Plan Summary

The website for eMotion needs to be extremely informative, professional and user friendly. It must fulfill three major purposes for it to be classified as successful. Its two main functions are to act as a marketing tool for the business and to provide an online tool for existing customers. Its third purpose is to generate enough internet traffic as to allow revenue to be generated from advertising on the site.

1. Marketing Tool: The website will contain sections which explain in concise detail how the system works and what benefits it can provide for any potential customers. This can be done through a series of illustrated case studies, testimonials and demonstrations. For example, the website could show you, through the example of a tennis player, direct comparisons of our systems versus other video capture technology. Several professionals in top positions could also provide testimony as to how the system has helped them and why it is a worthwhile investment. The site should create an impression of a modern, professional and dynamic business that is affordable and desirable to any potential customers
2. Member's Portal: A section will be available to existing customers where they can access all of their past motion capture sessions on video. This will allow them to compare progress over time by directly comparing two different videos. They will also be able to compare their athlete's technique to a large database of other professional athletes and assess any changes in technique that needs to be made. They will also be able to share different sessions among various people, enabling a coach to share a video of their athlete with a physiotherapist or fellow coaches. They will also be able to keep an online diary of every person’s progress and be able to organise the MoCap video either by date or by athlete.
3. Internet Advertising: With the website acting as both a marketing tool and a member's portal, a large and consistent volume of internet traffic should be generated. This will allow us to host various subtle advertisements on our site which will generate a considerable income depending on the site's monthly hits.

## Website Marketing Strategy

The website will be marketed through all the physical marketing we do as well as by arranging deals with members that allow us to advertise our service on their home page. For example, a Tennis Club might allow us to advertise the use of our system at that club by placing an advert for our website on their homepage.

We will also pay for advertisements for our website on other leading sports sites such as the websites of the Rugby Football Union, Wimbledon and the 2012 Olympic Games.

## Development Requirements

The website will be relatively complex to implement compared to most basic websites. This is because it must allow members access to a secure area where they can personalise their member's portal. Examples of this user interactivity and customisation include being able to add notes, select and control MoCap videos, and compare two or videos either side by side or by overlaying them.

We contacted a website design company called mjaWiredCreatives and asked for a quote to implement the website plan. The following is based on that quote:[21]

1. £1 000 - £1500 to develop a fully functional, yet 'static' website that enables viewers to see the facilities, services and past case studies (or testimonials) of your work.

2. £10 000 - £15 000 to create a client log in and database, with a custom built 'plug-in' flash component that enables comparisons with any professional artist that we have in our archive, whilst also being able to compare with client's past uploads to demonstrate progression.

3. £1 500 - £2 000 to create a forum in order to develop relations with existing clients. This honest and open approach to communications encourages possible clients to be more inclined to join. This forum will allow for suggestions and improvements/developments in the product to be made so that we are always aware of our customer's needs.

4. £1,000 per annum for maintenance subscription.

[21] mjaWiredCreatives. See appendix for full quote. Obtained March 12 2007

## Management Summary

eMotion will consist of the following personnel when trading commences:

- Director - Steven Bishop
    - Responsibilities include creating the business plan, securing investment and finance, and any other tasks necessary for the day to day running of the business.
    - Responsibilities also include the daily transport, set-up and operation of the motion capture service.
- Investors
    - No investors as of yet
- Marketing Director
    - Responsible for securing new memberships by personally meeting with potential customers.
    - Also in charge of organising other marketing as described in the marketing plan.

A Marketing Director will only be needed for the first six months of trading, after this period word of mouth and other marketing should sustain the required growth. According to sales predictions, the motion capture service will only be booked an average of 200 days per annum allowing the director to focus on marketing and any other of the businesses needs the rest of the time. Should the system be booked for more days than are forecast, a full-time Marketing Director may have to be hired.

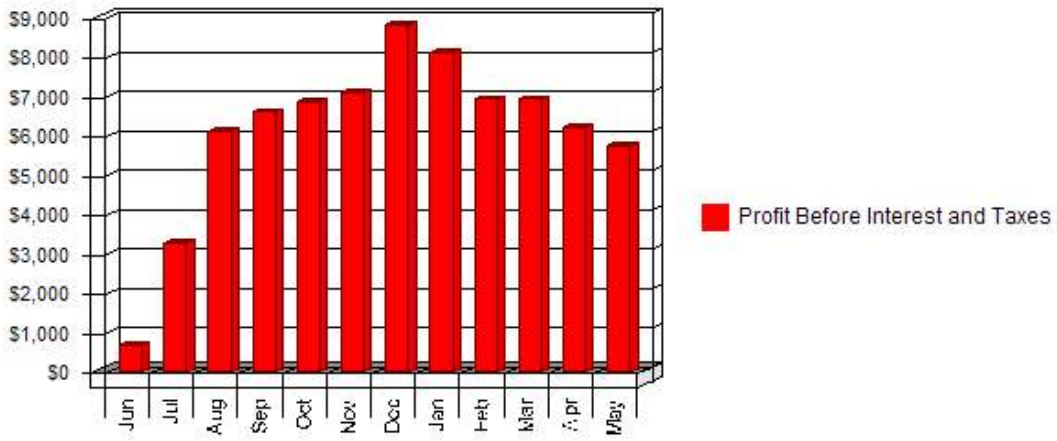
The transport, set-up and operation of the motion capture service should be able to be performed by one person, although some training may be required before trading commences.

## Financial Plan

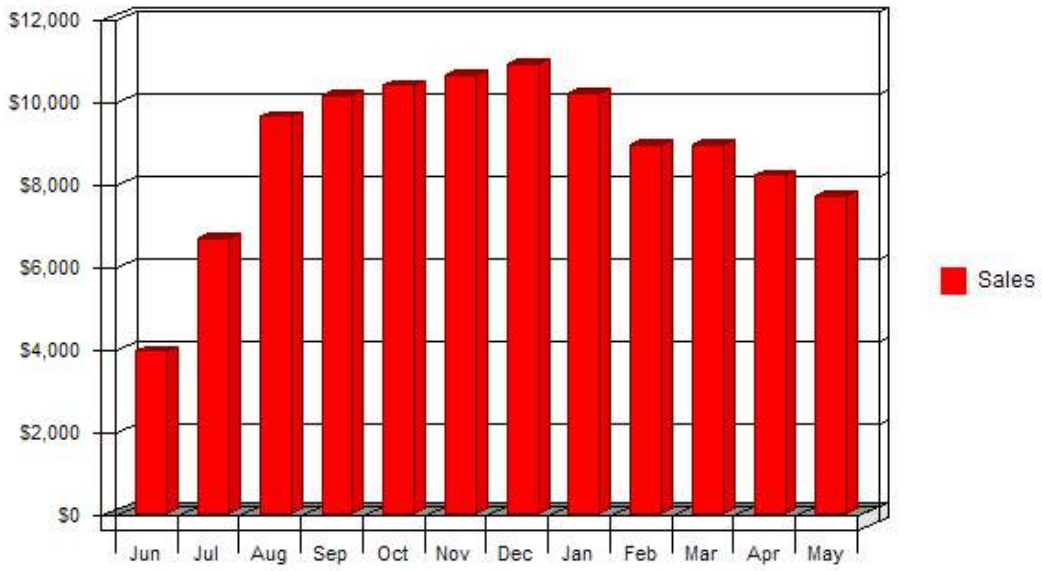
Because of the slow growth of the sports industry, there are only a set number of potential customers. Once all of these customers are members of our service it will be impossible for our business to grow further in its current market. This does not mean the business will be unprofitable but rather that it will produce steady profits over the years provided no market factors drastically change. Profits will increase once the investment loan has been paid off, leaving more profit to be paid to any future shareholders in the form of dividends or else left for reinvestment in the business. Once the growth and revenue has stabilised, the only way for the business to expand would be to reinvest its profits to facilitate the expansion into alternative markets. According to our business objectives, eMotion plans on operating in a further two markets by the start of the fifth year of trading. These operations should prove even more profitable than the current London service as they will not have liabilities such as bank loans and interest repayments to deduct from the profits. As a result, the more profitable services we operate in different markets the more money will be available to invest in further expansion. This would allow us to corner the market and reduce the possibility of any competitors starting to trade.

## Projections

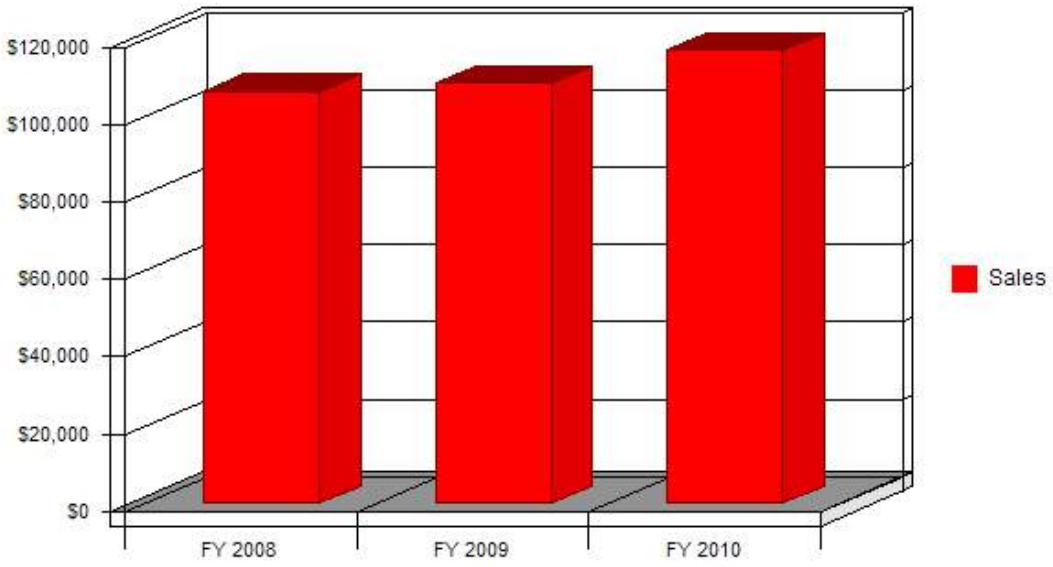
Profit Monthly



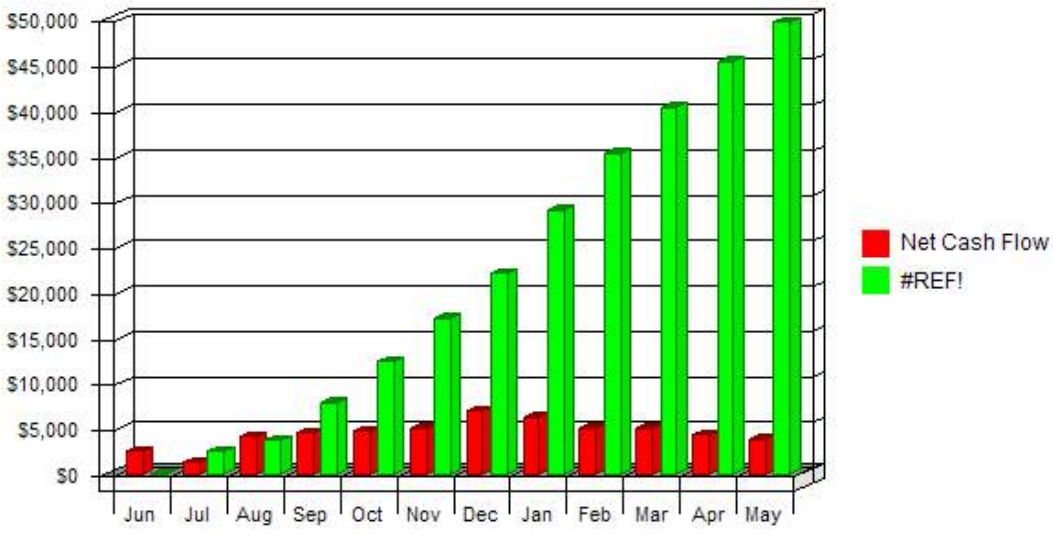

**Sales Monthly**



**Sales by Year**




## Projected Cash Flow



| Financials | | | |
|---|---|---|---|
| | FY 2008 | FY 2009 | FY 2010 |
| **Beginning Balance** | £0 | £53,624 | £53,624 |
| **Plus Money Received** | | | |
| **New Investment** | £0 | £0 | £0 |
| **New Loans** | £80,000 | £0 | £0 |
| **Sales** | £106,304 | £108,440 | £116,980 |
| **Other** | £0 | £0 | £0 |
| **Subtotal Money Received** | £186,304 | £0 | £0 |
| **Less Money Spent** | | | |
| **Direct Costs** | | | |
| **Direct Cost of Sales** | £4,760 | £5,163 | £5,633 |
| **Other Costs of Sales** | £0 | £0 | £0 |
| **Normal Operating Expenses** | | | |
| **Payroll and Payroll Taxes, Benefits, Etc.** | £27,000 | £20,000 | £22,000 |
| **Rent and Utilities** | £0 | £0 | £0 |
| **Sales and Marketing Expenses** | £1,200 | £1,100 | £1,000 |
| | £0 | £0 | £0 |
| **Other Outflows** | | | |
| **Payments of Taxes** | £3,240 | £2,160 | £2,160 |
| **Debt Payments** | £16,000 | £16,000 | £16,000 |
| **Purchase of Assets** | £76,080 | £0 | £0 |
| **Debt Interest** | £4,400 | £4,158 | £3,929 |
| **Subtotal Money Spent** | £132,680 | £0 | £0 |
| **Ending Balance** | | | |
| **Ending Balance Cash and Checking** | £53,624 | £53,624 | £53,624 |
| **Profit Before Interest and Taxes** | | | |
| **Sales** | £106,304 | £108,440 | £116,980 |
| **Less Cost of Sales** | (£4,760) | (£5,163) | (£5,633) |
| **Gross Margin** | £101,544 | £103,277 | £111,347 |
| **Less Operating Expenses** | (£28,200) | (£21,100) | (£23.000) |
| **Profit Before Interest and Taxes** | £73,344 | £82,177 | £88,347 |
| **Net Cash Flow** | £53,624 | £60,082 | £64,59 |

## 9. Appendix

| Financials | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb |
| **Beginning Balance** | | | | | | | | | | |
| | Ending Balance Cash and Checking | £0 | £2,542 | £3,770 | £7,839 | £12,382 | £17,160 | £22,177 | £29,112 | £35,342 |
| **Plus Money Received** | | | | | | | | | | |
| **New Investment** | | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 |
| **New Loans** | | £80,000 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 |
| **Sales** | | £3,935 | £6,670 | £9,645 | £10,144 | £10,384 | £10,643 | £10,902 | £10,182 | £8,944 |
| **Other** | | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 |
| **Subtotal Money Received** | £0 | £83,935 | £6,670 | £9,645 | £10,144 | £10,384 | £10,643 | £10,902 | £10,182 | £8,944 |
| **Less Money Spent** | | | | | | | | | | |
| **Direct Costs** | | | | | | | | | | |
| **Direct Cost of Sales** | | £154 | £283 | £417 | £442 | £447 | £467 | £488 | £473 | £418 |
| **Other Costs of Sales** | | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 |
| **Normal Operating Expenses** | | | | | | | | | | |
| **Payroll and Payroll Taxes, Benefits, Etc.** | | £3,000 | £3,000 | £3,000 | £3,000 | £3,000 | £3,000 | £1,500 | £1,500 | £1,500 |
| **Rent and Utilities** | | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 |
| **Sales and Marketing Expenses** | | £100 | £100 | £100 | £100 | £100 | £100 | £100 | £100 | £100 |
| | | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 |
| **Other Outflows** | | | | | | | | | | |
| **Payments of Taxes** | | £360 | £360 | £360 | £360 | £360 | £360 | £180 | £180 | £180 |
| **Debt Payments** | | £1,333 | £1,333 | £1,333 | £1,333 | £1,333 | £1,333 | £1,333 | £1,333 | £1,333 |
| **Purchase of Assets** | | £76,080 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 |
| **Debt Interest** | | £366 | £366 | £366 | £366 | £366 | £366 | £366 | £366 | £366 |
| **Subtotal Money Spent** | £0 | £81,3 | £5,44 | £5,57 | £5,60 | £5,60 | £5,62 | £3,96 | £3,95 | £3,89 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 93 | 2 | 6 | 1 | 6 | 6 | 7 | 2 | 7 | 1 |
| **Ending Balance** | | | | | | | | | | | |
| **Ending Balance Cash and Checking** | | £2,542 | £3,770 | £7,839 | £12,382 | £17,160 | £22,177 | £29,112 | £35,342 | £40,389 | £ |
| **Profit Before Interest and Taxes** | | | | | | | | | | | |
| **Sales** | | £3,935 | £6,670 | £9,645 | £10,144 | £10,384 | £10,643 | £10,902 | £10,182 | £8,944 | £ |
| **Less Cost of Sales** | | (£154) | (£283) | (£417) | (£442) | (£447) | (£467) | (£488) | (£473) | (£418) | ( |
| **Gross Margin** | | £3,781 | £6,387 | £9,228 | £9,702 | £9,937 | £10,176 | £10,414 | £9,709 | £8,526 | £ |
| **Less Operating Expenses** | | (£3,100) | (£3,100) | (£3,100) | (£3,100) | (£3,100) | (£3,100) | (£1,600) | (£1,600) | (£1,600) | ( |
| **Profit Before Interest and Taxes** | | £681 | £3,287 | £6,128 | £6,602 | £6,837 | £7,076 | £8,814 | £8,109 | £6,926 | £ |
| **Net Cash Flow** | | £2,542 | £1,228 | £4,069 | £4,543 | £4,778 | £5,017 | £6,935 | £6,230 | £5,047 | £ |

**Summary**

- High potential demand for the service
- Relatively low operating costs
- Relatively low marketing costs
- Few barriers to entry
- Few competitors
- Reliable and valuable service
- High start-up costs (equipment)
- Untested market
- Low returns

While the idea and concept behind eMotion is a relatively good one, I believe the risks involved in starting a completely untested business model are too high to justify the risks involved. The revenue generated by the service is not forecasted to grow rapidly and a lot of effort would be required to considerably expand the business. Had I not have completed this business plan, I would not be aware of any of the above benefits and disadvantages and for that reason I believe this project has been a success. It has taught me the methods and processes that need to occur when taking a business idea from its concept stage to reality and these skills will undoubtedly come in use later on in life when I plan to run my business.

# APPENDIX

**David Rose**
**Information and Resource Manager**
**England and Wales Cricket Board**
**10th March 2007**

## Innovations Project Questionnaire

Do you use any sort of technology/software to aid in sport's motion analysis?

Vicon Cameras (High Speed 1,000 fps) and Polygon Viewer software to analyse footage and data.

Silicon Coach for 2D analysis of player movement.

If so, how useful is this in helping you?

The Vicon system has been fundamental in the bio mechanical understanding of our fast bowlers, linking to how we can prevent injuries in the future.

What frustrations and limitations are present in the current technology available to you?

We have still not found a cost effective and accurate means of tracking player movement in the field. We would like to understand the distance coverage, speed, forces and timings of our fielder movements. Current technology is to cost prohibitive. Also the relative static nature and then dynamic short sharp bursts of movement in a fielders movement means GPS tracking is not accurate.

Do you currently have access to any 3D motion capture facility?

Yes, via Loughborough University.

If so, how often and by whom is the facility used?

We have at least two days per annum for testing with the Vicon System and we track our fast bowling group and have just started with our Spinners Group.

Do you charge others to use the facility?

No, it is not ours. We hire it.

In your opinion, would 3D motion capture/analysis just benefit professional athletes or athletes of all skill levels?

Motion analysis can have impacts on all skill levels, but in the context of each individuals physical make up, their technical ability, fitness and medical history together with their psychological profile. Unfortunately collecting all this information is only usually done for professional athletes.

Are you aware of any other sports centres that have access to 3D motion capture facilities?

Yes.

Roughly what is the cost involved in operating a 3D motion capture and analysis facility? (For example, equipment costs, staff costs, space etc…)

Not sure as we rent the equipment. Costs are £250k for kit + depending on the system you want. Then you add staff costs of approx. £10k for a couple of days of setting up, collecting and analysing data and reporting writing.

**Lindsey Parry**
**Biokinitisist**

**08 March 08 2007**

## **Innovation Project Questionnaire**:

Do you use any sort of Technology/software to aid in sport's motion analysis?

*Not currently, but have made use of camcorder in the past. During early years worked in a practice that had full recording, sensory and computer playback.*

If so, how useful is this in helping you?

*Very useful, is easier to break down complex (compound movements) and analyse each "unit" of movement to determine where problem exists and where improvements can be made. Playback also has big advantage in being able to show patient/athlete precisely what movement pattern they are performing. This is of particular use as people generally see their movement patterns as different to what they are in reality and once they have*

*seen what they are actually doing they are easier to correct.*

What frustrations and limitations are present in the current technology available to you?

*Even the most basic of computer related analysis systems is very costly and doesn't justify its cost in a private practice.*

*The feedback is complex and only understandable to the practitioner so simple explanation to the client must be manually done by practitioner.*

*Systems are often complex to set up so very time consuming so use is limited.*

*Most systems are not easy to transport meaning you are confined to one area i.e. always in a lab, can't take the analysis out doors and use in situation.*

Are you aware of any other technology that exists that you think would help in assessing people's biomechanical problems?

*Besides the very complicated expensive lab type systems using infra red sensory equipment, no.*

*There are also very expensive machines to test strengths of different muscles, again while useful these do not justify cost in a private practice.*

If you could capture a person's motion in 3D while performing their sport, would this be of any use to you?

*Absolutely, in terms of the stresses placed at certain angles. Technique in sports that require aerodynamics. Or positions for explosive movement this would be invaluable.*

Do you currently have access to any such facility?

*No, there are very few places in the world where you can do this and they are usually at universities that specialize in a particular line of research such as aerodynamics or water flow etc.*

In your opinion, would access to 3D motion capture facilities help in assessing potential problem areas and improve performance/technique? Why?

*Yes. It will help to pick up problems with mechanics in certain phases of movement. People with lower back pain for example will be able to see in what part of a movement there is excessive flextion/extention and rotation at the same point and by altering small movements can prevent above all happening at same time. Sports that require skill and timing will be able to pick up a trigger that is slowing a movement or pulling a movement up short thereby allowing the assessor to determine which muscles need greater strength or flexibility etc.*

If so, would this just benefit professional athletes or athletes of all skill levels?

*Athletes of all skill levels will improve and reduce injury risk from learning correct techniques as well as strengthening key arrears under strain due to their particular movement pattern.*

*The draw back for the recreational athlete might be the cost involved in this type of analysis.*

If you had convenient access to a centre with 3D motion capture facilities, would you make use of them if they charged a reasonable price?

*Without question.*

If so, how often do you think you would use this facility?

*Reasonable cost and well situated to my work place every time I got a new patient which would be daily.*

What in your opinion would be a reasonable price to charge for use of the centre? (Initial setup charge cost and then per half hour cost)

*To be worthwhile as a tool I could regularly use:*

*My cost to client: R 275-00*
*If the center was doing the analysis and sending me the results, R200-R300 per hour charged to the client would make it viable for the everyday social athlete*

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