The idea of a multidisciplinary approach to preparing athletes is to make specialist knowledge from a variety of fields and disciplines available to assist athletes as they seek to achieve their goals. Such an approach has been in use by the medical profession for some time. However, when applied to athletics, traditional models for managing such a system have limitations related to the role of the coach. After describing existing management concepts, including the “Filter” and the “Basic Support” models, the authors propose a new approach, which they call the “Orbital” model. It is based on the trajectory of a planet (the athlete) orbiting around the sun (the athlete’s goal) and surrounded by satellites (professionals) linked together by rings (coaches/trainers). The authors then describe the development of a team along the lines of their model, which has been carried out over a ten year period in conjunction with the Brazilian Air Force Institute of Science in Physical Activity (Instituto de Ciências da Atividade Física da Aeronáutica – ICAF) and Centre of Olympic Excellence (CEOCAF). They explain the roles of the team’s various elements in working with a number of high-level Brazilian athletes. They conclude that, while their model is still in the process of refinement, it is clear that a multidisciplinary approach is essential for producing significant results at the highest levels of competition.
Of all the sports practiced by man, athletics, though not the most popular, continues to astonish the public again and again. The desire to be the fastest runner, furthest thrower, highest or longest jumper is a part of human nature. These wishes and dreams begin in childhood and can be seen in schools or even on the streets as children discover that they have the potential to be the best in an activity. In childhood games there is always a winner and a loser. Competition is a source of fun in the game, something that propels one to become better than the others, to strive for more. The passion to break records and go farther than one has gone before becomes a driving force.

Many factors can determine the victory of one child over another: genetic inheritance, how genes are expressed (phenotype), the environment, the psychological maturity of the child, social, physical and nutritional development, emotional experiences, and other passive variables that interact with one another.

In the world of sports, this idea can be extrapolated to a much bigger level. For instance, when looking at nations, those that conquer and win the most medals are seen as better than the others. It is a simple, objective, and universal way people use when they say that a good Olympic performance makes a country more developed and more powerful than others. Presently, to achieve a medal in any Olympic Games or World Championships is as professional a task as any other type of economic activity.

The saying “to know, to develop, to conquer” has a higher meaning when looking at things from this perspective. A champion is not a champion solely because of pure talent. Many are the factors involved in the process that leads to victory. Before victory, it is necessary to develop the talent with efficient training. This in turn makes it essential to first obtain the knowledge as to how exactly this development takes place. This type of work demands the participation of various disciplines working harmoniously as a team.

It is not enough, however, to simply bring together a group of experts in the areas that affect athletic development and expect that a winning team will emerge. The terms “interdisciplinary” and “multidisciplinary” are commonly used to define the action of a group of professionals in different areas. A group identity is born with similar values where individual qualities will progressively build and interact with one another to form a harmonious group in search of the goals the athletes should reach. According to DARLING and OGG (1984), the basic requirements for successful multidisciplinary systems are common and universal. They include good interpersonal communication and the connection and similarity in the lower-level disciplines.

The aim of this paper is to explore how a multidisciplinary team can help athletes in achieving high-level performances in sport. In doing this we present a new multidisciplinary model, explain its different sectors and explore the relationships that exist between these sectors.

Questions about multidisciplinary models

The multidisciplinary approach is not new. The medical literature is full of studies pertaining to multidisciplinary approaches and groups. It is possible to study how various professionals from the health and medical sciences work together and complement one another to achieve better care for a patient. (STERNER et al., 2001; COX et al., 1999; LARY et al., 1997; GEHRK, 1996; BUKOWSKI et al., 1986). In the field of sport, the examples of this type of collective work to obtain common goals increase with each year. Expertise and values are aggregated in the hope of contributing in a decisive way to the realisation of success on the field of play.

Based on our experience, the biggest problems with this approach, besides the essential prerequisites proposed by DARLING & OGG (op.cit), are in the management of the team of professionals working together. Coaches, physical trainers, doctors, researchers, physiologists, sports scientists and others, all of
whom are all experienced in each of their respective areas, often have difficulty seeing that their other colleagues’ work is as important as their own. The more specialised the professionals, the more they believe themselves to be auto-sufficient. What is more, because of the speed with which new information and knowledge is being generated, it is highly unlikely that most people are able to follow all that is being introduced into their field, even with all of their “expertise.”

From the point of view of the coach, being good technically does not seem to be enough to achieve the best results and contact with professionals in other areas of expertise is necessary. This point presents a second problem: how can a coach interact with said professionals without being threatened by them? Discussing training with a physiologist, along with following the guidelines put forth by a biomechanist minimises, for some, the importance of the coach.

A third problem is in translating what a professional in his or her area believes is correct for optimum performance into something viable in terms of the training. At times, the coach does not have sufficient knowledge to incorporate what another professional has recommended in a way that maximises the impact of the information on the training and the athlete. In such a case, the work can become stagnant, punctilious and ill-organised.

However, despite the problems mentioned here, it appears that a heterogeneous mixture of knowledge can lead to greater success in athletics than would otherwise be possible. Therefore, there is a need to prepare a multidisciplinary team to work cohesively with the ultimate objective always in mind, otherwise any accidental success achieved might be attributed only to individual talent or chance.

**Traditional multidisciplinary models**

In the IAAF Academy course for elite coaches, it is pointed out that: “a team is a group of people doing something together.” Naturally, this saying must be looked at for its deeper meaning. Working together for a common goal is already something different altogether. Even so, in every working process there is some loss, even if the result achieved is bigger than if only one person were working towards it. What is necessary is for someone to take a leading role, to keep the team focused on the main objective (the athlete and his/her performance) and minimise any loss inherent in the process.

In the course, two multidisciplinary models are presented (Figure 1). In the first, the “Filter” model, the coach is the sole guide of the athlete. He/she acts as a filter for all the information coming from a team of professionals in areas such as biomechanics, physiology, etc that can influence the performance...
of an athlete. The coach selects and digests the information and applies it to the training programme. In the second, the “Basic Support” model, the coach functions as technical support for the athlete and the various professionals working with the athlete. These professionals interact directly with the athlete under the guidance of the coach. In both models, feedback is used to try and maximise the application of the information.

Both models have advantages and disadvantages. In the first, the coach needs to be knowledgeable enough in various areas in order to take advantage of all of the information from the various disciplines. If the coach doesn’t have the knowledge needed, there is a tendency to ignore or “throw away” important information hindering the achievement of the outcome desired. However, if the coach does possess a wide field of knowledge, the tendency might also be to discard information from the work of the group, this time because the coach assumes he/she already is privy to sufficient knowledge in a particular field. Notwithstanding, this seems to be the most widely used approach. As it makes the coach the controlling figure in the process, he/she does not feel as threatened since he/she is the one to make the information available to the athlete in training. Success or failure is a direct result from his/her own decisions.

In the second model, decisions are made collectively. This model, apparently, is more accepted by professionals who work in conjunction with many other disciplines and fields because it is more democratic. Here the coach may or may not have substantial knowledge in the other fields. An athlete’s deficiencies, the difficulties of training and the performance obtained, are all passed from the coach to the multidisciplinary team, which is managed by the coach.

In both models, the main figure is the coach. The athlete and his/her performance are the goals and objectives of the process, the “output.” However, in neither model does the athlete decide what course of action to take. In fact, this process involves a hierarchy of sorts. Maybe because the coach is the person most directly available to the athlete and more present on a day-to-day basis, he/she is elected as the one to be the link between the athlete and the multidisciplinary team.

The biggest disadvantages in these two models are that in the first, the team works on what the coach sees as best, limiting the team’s exploratory capacities in search of the higher goal, while in the second, the team works freely and directly with the athlete but ideas can be censored by the higher power (first model). In the end, neither model is ideal for maximising potential.

**Other multidisciplinary models**

As previously mentioned, other multidisciplinary models exist in various areas of human activity. MYBURGH (2003), in an article about what it takes to be a high-level endurance athlete, postulates that physiology is not the only knowledge base responsible for perfecting an athlete to compete internationally and achieve top results. The author explains that endurance capacity has great individual variation in most populations and that historically, sport scientists from the disciplines of physiology, biochemistry, and histology have made the main studies of endurance capacity. These have focused on testing maximum aerobic capacity, the lactate threshold, the activity of oxidative enzymes, the quantity of short contracting fibres and other areas in an effort to direct training and predict performance.

The triangle in Figure 2 represents the traditional understanding of the influence science has on training and it elucidates the crucial characteristics that shape high-level endurance athletes. The whole system is supported by a tripod, which comprises the disciplines that support scientific training. If one of the three supporting disciplines becomes unstable, the whole system is in jeopardy, especially if under pressure. This illustrates the stagnation that occurs with intermediate-level
athletes who do not reach success because they are too unstable to attain the performance that would catapult them into the category of a high-level athlete. The external triangle represents the knowledge necessary for optimal training needed for athletes to achieve significant results.

Nevertheless, the author affirms that the research being done in other disciplines, such as genetics and other biological sciences, has as its goal to perfect athletic performance. To accommodate these new scientific disciplines, the author suggests incorporating histology with physiology and having biochemistry include the area of molecular biology. The third pillar of support would be genetics. In reality, the training programme should incorporate the three pillars in the biological sciences because the principal stimulus in affecting the performance in endurance is due to genetics. Other factors are also considered important, such as a proper diet and strategies in recovery and competition. This way, the author believes that a multidisciplinary approach becomes primordial as the link between the biological aspects, which are normally dominated by sports scientists, and the non-biological aspects, which the author says other scientists have difficulty in understanding and translating theory into a practical approach for training. This would be the challenge sports scientists have in the next decade, since studies with sound statistical data are very hard to attain with high-level athletes in a specific event. Figure 3 presents the triangular model that the author adapted to include the interaction of the new biological sciences and non-biological disciplines.

Despite the new model incorporating these new biological sciences, the system still lacks some important disciplines, like biomechanics for example. In fact, BARTLETT (1997) has already referred to
the importance of the inclusion of the ever-growing field of biomechanics, even though there is some controversy regarding the influence it can have in the control and coordination of movement and in injury prevention, which are its two areas of study (NELSON, 1989). More recently, however, the doubts surrounding this field have been fading as we see its potential for perfecting motor movements more efficiently in various sports like, for example, a swimmer’s stroke (HAY et al., 1993) or the stride of high-level long distance runners (CAVANAGH, 1989).

In his analysis of various topics related to the study of athletic activities concerning biomechanics BARTLETT (op. cit.) concludes that various problems currently have no solution and that they should be extrapolated to other areas of interest in other disciplines. The author explains that a big difficulty in finding answers to these problems is due to the nature of the statistical tests and hypotheses, because these must leave the controlled laboratory setting and be examined in the environment of the discipline. The expectation is that new questions will be posed and that scientists will work together to solve interdisciplinary problems.

MYBURGH’s modified triangular model does not explain the interaction between the various disciplines and it limits itself to the disciplines that make up the base of the multidisciplinary system. What about the part of the team that takes care of the physical and mental state of the athlete, or an athlete’s rehabilitation, or those that handle bureaucratic and administrative questions (like having passports in order, money for trips, hotel accommodations, etc.), those who take care of logistics and infrastructure problems (training locations, uniforms, etc.), lawyers who handle participation contracts for international events, professionals who take care of an athlete’s image and many others? How is it possible to make this seemingly infinite number of professionals work in unison and positively complement each other?

It is a part of human nature that our relations are extremely susceptible to individual variations. To remove the focal point in this so that it does not detract from the process, each person has to interact harmoniously with the others in search for the common goal; each member of the team must respect the other members and accept their suggestions and interventions. With this in mind, we propose a new system for integrating multidisciplinary teams in a harmonious fashion, the Orbital Model.

The Orbital Model

The Orbital Model was developed in the search for something that would be an ideal management concept for a multidisciplinary team. From a pedagogical point of view, it is a theoretical model. From a methodological point of view, its composition aims to balance the participation of each team member so that none feels excluded or more important over the others, while at the same time trying to address the problems identified in the traditional and MYBURGH models.

In order for the Orbital Model to work well, the set of requirements expressed by Darling and Ogg, who looked at the interdisciplinary approach proposed by BUKOWSKI et al. (op. cit.) for patients, must be met. These include: mutual respect and understanding between team members, mutual respect between the athlete and the team of professionals, continuous coordinating and joint efforts, ample communication between the athlete, or team, and families if need be. These elements are interlinked and essential to the attainment of the final objective: the conquest.

Two characteristics define and set this system apart from others: 1) it is dynamic, which means either one team/discipline (professionals) is acting in a more intense way over the athlete/team, and 2) it gives the possibility of having an infinite diversity of disciplines (professionals) included as needed, depending on the needs of the athletes/team, always having the goal/objective as a guide (which in the end translates into significant results in World Championships and Olympic Games).
The sun represents the objective for the team. It is the unchangeable guide for the team’s efforts, since it always means going for the conquest. If the objective is reached, the team can feel fulfilled and rewarded. The sun literally illuminates the path towards the objective while the entire planetary system moves around it.

The planet represents the athlete (in team sports, the competitive team). It is under direct influence of the sun as well as the satellites around it. The satellites have direct effect on the planet, just as the moon directly affects the tides on Earth. The satellites represent the various professionals from the different disciplines that work together towards the objective. The number is undefined and new professionals can be added to solve various problems.

Figure 4 presents the four basic elements of the Orbital Model: the sun, the planet, the satellites, and the rings.

The rings represent the coach. It is up to him/her to integrate the movement of the satellites in a harmonious way to maximise the benefit from all their influences. This doesn’t mean that the coach is directing what is influencing the team/athlete. The way to the objective is guided by the wishes of the team; it directs the athlete to the supreme objective in every system: conquest. Nevertheless, there must be agreement between all parts in the system so everyone participates in a democratic way. This will not in any way diminish the importance of the coach. It is up to him/her to make sure that everyone is working together well. Since he/she is the best of all interlocutors, it is up to him/her to decide what kind of intervention has priority over the others in any case of necessity (group immaturity).

The planet, the satellites, and the rings are all subject to change, but the sun, because it is an objective to be reached, is immutable. It is up to the rings to decide how fast the satellites rotate around the planet and ensure that the system has sufficient energy to move around the sun. As the system rotates and moves, the influence and interference changes. Depending on the phase of the training programme or the necessities of the athlete, this can vary greatly.

Figure 4 - The Orbital Model
Team interaction in the Orbital Model

Similar to other systems, the identity of the team using the Orbital Model is formed by the group itself. The system is not just isolated individuals coming together from time to time to attain a goal. Therefore, the easiest way to create a unique collective identity is to work closely together on a day-to-day basis in an integrated manner.

With this in mind, Brazil has been developing a research institute in the area of physical sciences that over the past thirteen years has been promoting studies and helping coaches in a variety of areas. The ICAF – Brazilian Air Force Institute of the Science of Physical Activity (Instituto de Ciências da Atividade Física da Aeronáutica), based in Rio de Janeiro, has an impressive curriculum of participation in many conquests. It participated in evaluating Brazil’s five-time World Cup champion soccer team, Brazil’s world champion men’s and women’s volleyball teams and various medal-winning athletes at Pan-American Games in Winnipeg 1999 and Santo Domingo 2003. The ICAF has also contributed other valuable services to the sports community in Brazil and the world.

An interesting experience that illustrates what a successful multidisciplinary team can do can be seen from the example of when Ronaldo da Costa broke the world record in the marathon with a time of 2:06:05 in Germany in 1998. To prepare for this feat, da Costa took part in various blood tests at the ICAF. These tests helped us determine how the athlete was responding to the training programme and helped establish biochemical and haematological parameters to aid in perfecting the programme we had devised as his coach. In a routine exam during the training phase, we noticed that some creatinekinase parameters were elevated. This told us that the athlete was being overloaded by the training programme, which if not corrected could have lead to a more serious muscular lesion preventing the realisation of an important result in competition. Following the availability of this information, our specialists in physiology, training and nutrition suggested the coach change the training and that the athlete follow a diet specifically designed to aid recovery from this state.

At the same time, the athlete’s strides during racing were analysed. It was diagnosed that if the strides increased in by one (1) centimetre, the metabolic wear and tear on the body would be the same, which would allow the athlete to keep the same speed while going longer distances. In light of this, the biomechanics coach elaborated a series of educational exercises to be incorporated in the daily training programme. The results were groundbreaking. Da Costa was the first man in history to complete a marathon averaging less than 3 minutes per kilometre. After the race, he still had sufficient energy to perform gymnastics stunts at the finish line. His success was due in part to the cutting edge work done by the multidisciplinary team working with him.

More recently the ICAF has been working with the CEOCAF- Centre of Olympic Excellence of the Afonsos Camp - under the aegis of the Sports Commission of Aeronautics and closely linked to the Brazilian Air Force. The association between ICAF and CEOCAF allows for the implementation of the Orbital Model by a group of professionals who already work together on a day-to-day basis. Their coming together is natural and the group has grown and developed in a balanced and homogeneous manner.

While the ICAF has laboratories specialising in physiology, biomechanics, biochemistry, psychology, and physical and nutritional training, the CEOCAF has state of the art facilities, which include an athletics track, multi-use gymnasium, physiotherapists, an aquatics facility and many other structures characteristic of centre of excellence in sports. Naturally the model proposed can be applied to other environments and cultures, however, it is necessary that its members are mature enough to work together in search of the objective.
Organisational structure

The ICAF and CEOCAF team currently includes professionals such as teachers, researchers, and coaches involved in the various research laboratories as well as other elements who make up the satellites in the system:

- physical educators – coaches – trainers;
- doctors involved in different specialties;
- exercise physiologists;
- sports biochemists;
- nutritionists;
- psychologists;
- physical therapists;
- nurses;
- “managers”.

To better define and clarify the strategies to be utilised in search of results, it is necessary to establish the objective and methodology used by each professional or group of professionals involved.

The Coach

Objective: It is up to the coach to establish the training programme to meet the objectives set for the athlete. In the training process there are short-, medium-, and long-term goals to consider while taking into account the sports calendar and the type of competition: Olympic Games, Pan American Games, World Championships, South American Championships, National Championships, etc. The training programme works backwards from the most important competition. To reach the objectives, coaches should schedule preparatory competitions composed of: control tests, competitions leading to improvements in technical results, and competitions that vary in degree of difficulty.

Methodology: Various methodologies linked to physical conditioning, the training programme, the technical and tactical preparation, the complementary training, the nutritional preparation, the psychological preparation, and the ideal time for the competition (the target competition) are used. The use of specific methodologies for the organic and neuro-muscular training, the use of interval, continuous, and localised training loads, together with the various training methods such as circuit-training, power-training, weight lifting, isometric training, fartlek, Cerutty, marathon training, altitude training, cross promenade, interval training, interval-tempo training, tempo training, and many others characterise the programme.

The ICAF Biomechanics Lab

Objective: To analyse the various biomechanics inherent to the activities of a high-level athlete and promote more efficient performance.

Methodology: The biomechanics lab uses various specific types of equipment including an electromyography machine, videography, and vibration and force measuring instruments. To adapt these instruments to research, new software and interfaces are created in the lab to analyse and collect data. Besides this equipment, this lab also uses observation and questionnaires as methods of evaluation.

Biochemistry Lab

Objective: To study the wear and tear of metabolic processes associated with high-level training and how the athletes’ bodies adapt to risk factors generated during training. The result of these studies establishes specific biological markers (blood, urine, etc.) for each athlete so that the effects of the training programme can be seen on the body as time goes by. The main benefit is the identification of injury at an early stage so the problem can be taken care of efficiently and quickly with the least possible damage on the body.

Methodology: The methodology used by this lab takes into account biochemical and haematological markers to analyse the wear and tear on the athlete’s metabolism. The athlete’s medical history is thoroughly analysed to help evaluate the results.
Physical Conditioning and Nutrition Lab

Objective: To research physical conditioning methods in the proper environment, e.g. in the many ICAF laboratories, so that these methods can be later applied outside the lab. This is done while at the same time offering nutritional support that responds to the needs of the athlete and his/her training programme.

Methodology: The Physical Conditioning and Nutrition Lab uses specific methods and equipment to realise research into the areas affected by this in training. Evaluation methods are then elaborated and new programmes are developed. The nutritional needs of the athlete are established based on daily energy expenditure. Balanced menus are created base on the composition and caloric value of the food consumed.

Exercise Physiology Lab

Objective: To study performance-linked physiological and morphological characteristics in high-level sport performers.

Methodology: The Exercise Physiology Lab uses methods and equipment to develop research into the areas of ergospirometry and kinaanthropometry specific to an athlete's needs. To do this, it has gas monitors, heart rate monitors, dynamometers, a pool for hydrostatic weight measurement, bioimpedance equipment and equipment used for anthropometric measurement, such as skin-fold callipers.

Psychology Lab

Objective: To investigate psycho-social and chronological aspects that can influence the athlete’s performance.

Methodology: Most of the time the techniques used to collect data (questionnaires, interviews, and observation) are created and validated in the lab, depending, of course, on the sample studied and the nature of the research. Usually a qualitative measurement is used where the interview and observation are the main techniques. However, quantitative methods are also used when necessary.

Sports Medicine

Objective: To offer medical support for the research done at ICAF and support the athletes training at CEOCAF.

Methodology: Athlete selection, preventing the inclusion of individuals with any contraindication to the tests performed, follow-ups in the clinic for athletes with specific treatment needs, monitoring the health conditions of the athlete/team, performing physical strength tests on the treadmill or bike, electrocardiogram tests, measuring maximum oxygen intake, and using ergospirometric tests together with Exercise Physiology Lab.

Physiotherapy Section

Objective: To use physical therapy to help ICAF and CEOCAF athletes based on their needs. Physical therapy has taken a leading role in the multidisciplinary context because of its role in preventing injury. In fact, after every practice or even during practice, the physical therapist uses his techniques to help restore homeostasis and help the recovery process in preparation for the next practice. When the athlete becomes injured, his/her performance suffers, and the physical therapist takes a leading role, along with the coach, to help aid recovery.

Methodology: Various biophysical equipment and techniques are used, including ultrasound and laser, mechanotherapy, massage therapy, cryotherapy and neural mobilisation.

Conclusion

The Orbital Model proposed in this work is still theoretical since its full implantation is still on its working stages. The ICAF and CEOCAF professionals have yet to use the Orbital Model to the best of its potential. Although the groups posses more than a decade of
Multidisciplinary training: the Orbital Model

Track and field athletes who receive support from ICAF/CEOCAF and coach Carlos Cavalheiro

The following elite athletes have used and/or still benefit from the expertise of the multidisciplinary team:

**Men**

ROBSON CAETANO DA SILVA – Personal Bests: 100m-10.00, 200m-19.96, 400m-45.06 and 60m-6.63, 200m-20.65, 300m-32.19 (world best performance)

Titles: Bronze Medal 200m Seoul Olympics, Bronze Medal 4x100 Atlanta Olympics, 3 times World Cup 200m Champion, Bronze Medal 200m Indianapolis World Indoor Championship, Gold Medal 100m, 200m, Havana Pan American Games, 14 times South American 100m, 200m, 4x100 Champion, World Ranked Number 1 in 1989

RONALDO DA COSTA - Personal Bests: 10km-27:53, 15km-42:41, half marathon-1:00:54, 25km-1:15:58, 30km-1:30:34, marathon-2:06:05 (former world record holder)

Titles: Bronze Medal World Half Marathon Championships in Oslo, Silver Medal Marathon World Road Relay Championship Copenhagen, Bronze Medal World Road Relay Championship in Manaus, Best World Marathoner 1998


ANDRÉ LUIZ RAMOS – Personal Bests: half marathon-1:02:04, 25km-1:14:42, 30km-1:29:55, marathon-2:08:26

ARTUR DE FREITAS CASTRO – Personal Bests: half marathon-1:01:18, marathon-2:10:06

DELMIR ALVES DOS SANTOS – Personal Bests: 10km-28:18, 15km-42:51, 10 miles-46:43, half marathon-1:01:58

RÔMULO WAGNER DA SILVA – Personal Bests: half marathon-1:03:18, 25km-1:15:12, 30km-1:30:09, marathon-2:11:28

NESTOR ARIEL GARCIA – Personal Bests: 10km-28:14, half marathon-1:02:36, marathon-2:12:48

PAULO ALVES DOS SANTOS – Personal Bests: 10km-28:12

ELIAS RODRIGUES BASTOS – Personal Bests: marathon-2:12:08

TOMIX ALVES DA COSTA – Personal Bests: half marathon-1:03:10, marathon-2:12:50

ELISVALDO RODRIGUES DE CARVALHO – Personal Bests: half marathon-1:02:42


**Women**

GEISA APARECIDA MUNIZ COTINHO – Personal Bests: 100m-11.56, 200m-23.10, 400m-51.44


SILVANA PEREIRA – Personal Bests: 10km-33:20, 15km-50:45, half marathon-1:11:15, marathon-2:37:57

RIZONEIDE WANDERLEY – Personal Bests: 15km-50:50, half marathon-1:12:47, marathon-2:35:46

RIZONEIDE WANDERLEY – Personal Bests: 15km-50:50, half marathon-1:12:47, marathon-2:35:46

SOLANGE CORDEIRO DESOUZA – Personal Bests: half marathon-1:12:21, marathon-2:34:51

MARLENE TEIXEIRA FORTUNATO – Personal Bests: half marathon-1:14:05, 25km-1:30:05, marathon-2:33:35


LUCIENE SOARES DE DEUS – Personal Bests: half marathon-1:14:25, marathon-2:35:18
experience in the field, there are still small kinks that need to be worked out so that their work will complement each other flawlessly. The important thing is the constant search for perfection in the work they are doing. In practical terms, we have found that the multidisciplinary approach is more of a process.

In fact, the traditional models for managing multidisciplinary teams seem to be closer to what is done in reality, even with all of their limitations. That not withstanding, the Orbital Model is an interesting and innovative alternative to the problems looked at in this article. At present, we are searching to perfect the processes in models 1 and 2 in an attempt to get closer to the Orbital Model.

This work does not end the discussion about multidisciplinary models. On the contrary, we believe that the multidisciplinary systems can mutate to adapt to the different realities of varying countries and cultures. The one thing that is essential is that a training programme which looks to produce significant results at the highest levels of athletics competition must make use of a multidisciplinary approach that integrates the increasing number of scientific and technical disciplines and the various professionals who work together and have the great responsibility of building the athletic development of a nation.

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