Physical Preparation for Soccer

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Special Edition

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Preface

Originally this physical preparation guide was written as a series of blog entries for the Complementary training blog and it was entitled "8 weeks soccer pre-season plan". Here in this special edition for the 8 WeeksOut website, this series of articles has been collected and re-edited to a manual in a form of e-book.

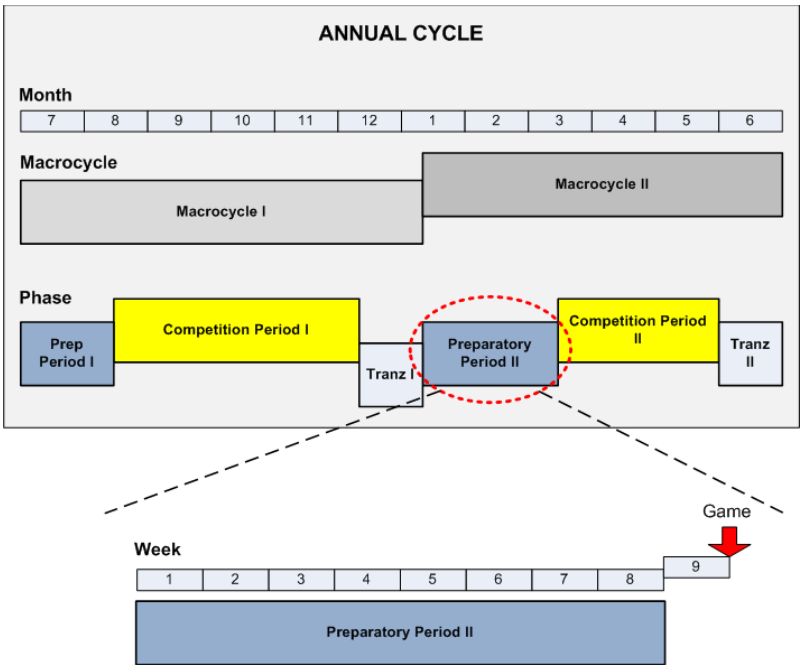
Introduction

Since the soccer is the most important secondary thing in Europe and pretty popular in Serbia and since I started working for the first time as physical preparation coach in soccer I decided to write down this physical preparation guide.

I have also summed my work experience and preparation philosophy from 2007 in 200 pages long manual entitled Physical Preparation for Soccer, so I suggest checking that one first if you haven't already. The truth is that I have 'evolved' from writing that manual and the reason for writing this one is to actually see where did I evolved in my philosophy. The periodization info from the manual is confusing and during that time I was in the pro-interval camp (bitching on aerobic training). There were also some questions that bothered me during that time period that I hope I have solved and provided some answers (or at least more questions), mostly by following more pragmatic, contextual/ecological and complementary philosophy and ditching dogma and either/or thinking.

Another thing that the readers should check before reading this template is my analysis of sport games structure (soccer is included) available here along with the short rant about endurance development in this one (make sure you read excellent series on endurance development by Lyle McDonald).

This physical preparation manual revolves around 8-weeks pre-season period. Why 8-weeks? It is usual in Serbian competition calendar that there is a *transition period* between two halves of the season, and usually the 2nd *preparatory period* before the next half of the season is around 8 weeks long. Because I am using Western terminology I am calling this preparatory period a *pre-season* since the soccer club is organizing preparations and training camps with the whole team.



It is important to mention that this 8-weeks pre-season plan is pulled from the bigger picture of annual plan and that's why it is lacking certain context. So to plan it, I will assume couple of things:

1. First game of the rest of the season is happening in 9th week and the team should be in certain *peak* (sport form) during that time. Why, you may ask. Because starting the rest of the season with a good performance and a win is really a good thing for building up the confidence of the team (especially depending on the previous half of the season performance). Sport form (peaking) will fluctuate during the rest of the season based on competition calendar (opposing teams and importance of the match), *peaking index* (for more info see Usage of subjective indicators in monitoring and programming of training) and the results, but it is important to start and finish strong. Everybody is waiting for the performance on the first game. Let's give them something to think about.

2. It is important to have at least 3-4 full time friendly games (90mins) in the weeks preceding the first game, so it is important to plan them accordingly and progress to full game over certain period of time

3. I am assuming the lower level of the athletes in the strength training (as it is normal with soccer players), no injuries, and a little bit of de-training in the transition period

4. I am also assuming availability of all the equipment, fields and facilities necessary to run this template. Of course in most of the cases that is not going to be the case and the template need to be tweaked.

5. I am assuming a lot of other things that I can't remember at the moment, so please note that this is ONLY a template, pulled out of the bigger context of annual plan and it is questionable if it fits to your specific situation, need and goals. I will not go into annual planning in this edition of manual especially not into the in-season planning and how to progress from pre-season plan to in-season plan. Maybe in another edition, or another manual.

Training components

Since the preparation system involves (1) training, (2) recovery and (3) competition, training components represent subgroups of training and include:

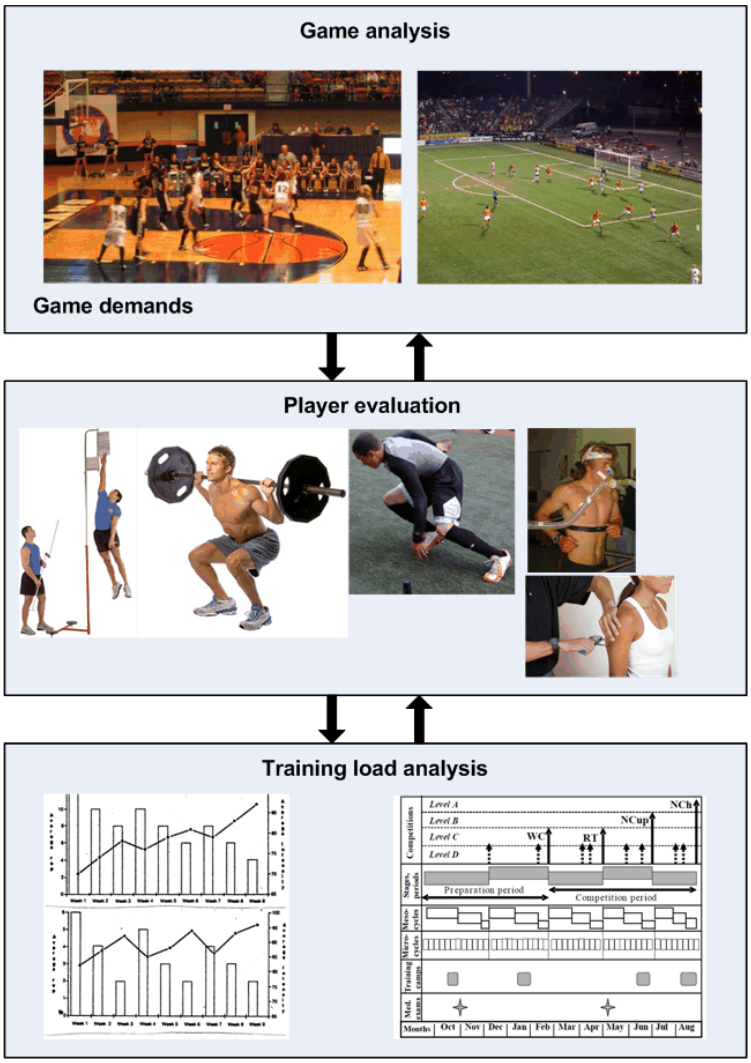
1. Technical preparation
2. Tactical preparation and decision making
3. Physical preparation
4. Psychological preparation and mental toughness
5. Athlete character and communicational skills

6. Strategy and game plan
7. Theoretical preparation

Each training component has even more subtypes and I will get into physical preparation component deeper a little bit later. Please note that recovery procedures could also be listed, along with nutrition and supplementation which can be subgroup of theoretical preparation.

Goal settings

Before setting goals for each training component we need to go through three-level analysis system that I have been mentioning in recent articles at my blog:



Although we are using only the first two levels, the third level is also important. Third level of analysis (Training load analysis) should give us some insight into the previous work done by athletes, so we can have certain *starting point* in terms of types of training they are accustomed doing and the level of stress they tolerated which may indicate working capacity of the players, along with injuries tendencies and types. This could be helpful in designing of the training program.

I am not going into the game analysis and the ***game demands*** in this article. A lot of research papers could be found online that goes into the analysis of the game and provide concise numbers and needs for all training components. In the picture below you can find demands for each position from FIFA manual and this is only a glimpse and very simplistic, so use it only as a starting point and as an example.

Position of the player	Physical qualities required	Technical qualities required	Tactical qualities required	Mental qualities required
Goalkeeper 1	• Size • Agility • Reaction + explosive speed • Jumping skills • Suppleness	• Safe hands • Good technique on the line and in the air • Good skills with the feet	• Choice of positioning and movement • Anticipation • Good distribution	• Personality • Confidence • Calmness and a certain eccentricity • Concentration • A certain eccentricity
Left and right-hand-side defenders 2 + 3	• Speed-endurance (aerobic and anaerobic) • Explosive speed	• Defensive technique • Tackling + sliding tackles • Skill at receiving the ball and good-quality passing • Running with the ball	• Positioning and repositioning • Timing • Involvement in attacking play • Versatility in attack	• Aggressiveness • Willpower • Confidence
Central defenders 4 + 5	• Height • Muscular power and jumping skills • Speed • Mobility	• Interception • Control of the ball in a duel situation • Heading • Long and short passing	• Anticipation • Positioning • Marking • Covering and support play	• Leadership temperament • Direction • Calmness, ability to remain unruffled • Courage
Defensive midfielder 6	• Endurance (aerobic) • Strength (in the duel) • Mobility	• Defensive technique • Passing • Receiving the ball and specific control • Dribbling the ball away for distribution upfield	• Positioning and repositioning • Anticipation • Pressing	• Fighting qualities • Humility • Co-operation • Willpower

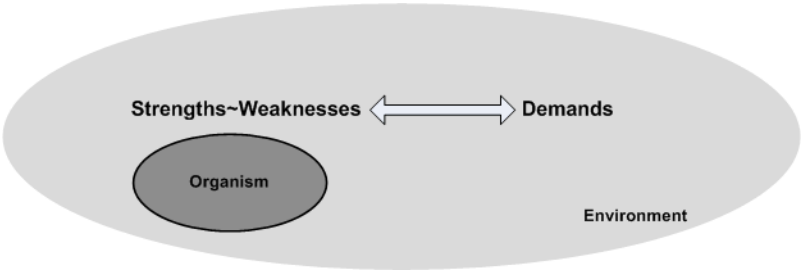
Position of the player	Physical qualities required	Technical qualities required	Tactical qualities required	Mental qualities required
Left and right-side midfielders 7 + 8	• Endurance (aerobic and anaerobic) • Speed	• Running with the ball • Dribbling • Crossing • Shooting	• Moving back to defend • Involvement in attacks • Pressing • Playing and winning duels	• Courage and generosity of spirit • Willpower • Concentration • Willingness to take risks
Attackers 9 + 11	• Power (in the duel) • Speed • Liveliness • Agility (depending on the type of player)	• Finishing (shooting) • Control • Heading • Dribbling, feinting	• Constant movement • Changing of positions • Runs into space and decoy runs • Feinting • Timing	• "Selfishness" • Opportunism • Trickery • Perseverance
The strategist *(Trequartista)* 10	• Depending on the type of player (and on the playing style)	• Ability to receive and deal with the ball skilfully • Passing • Dribbling • Finishing (shooting)	• A good footballing brain • Anticipation • Tactical awareness • Ability to lose a marker	• Leadership temperament • Creative mind • Willingness to take risks and able to think clearly • Confidence • Calmness

Second level involves evaluation of the players' characteristics based on the game (and position) demands (thus the tests need to be specific in a certain way) so we have their ***strengths and weaknesses*** for each training component, for an individual, sub-group or whole team in general. We can evaluate this from watching the players in a game (game is the best test, especially

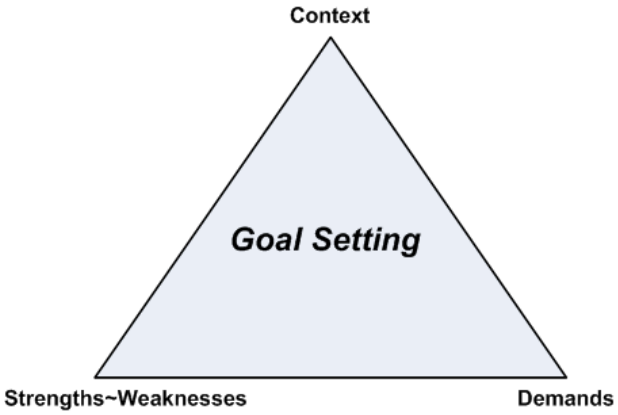
for assessing technical and tactical skills), or by devising testing battery (especially for physical preparedness). I will expand on physical preparedness testing battery a little later.

Training component	Strengths	Weaknesses
Technical preparation		
Tactical preparation and decision making		
Physical preparation		
Psychological preparation and mental toughness		
Athlete character and communicational skills		
Strategy and game plan		
Theoretical preparation		

So, now we have game demands and we have evaluation of the athletes in terms of their strength and weaknesses. In other words we now have ***what is needed*** and ***what do we have*.**



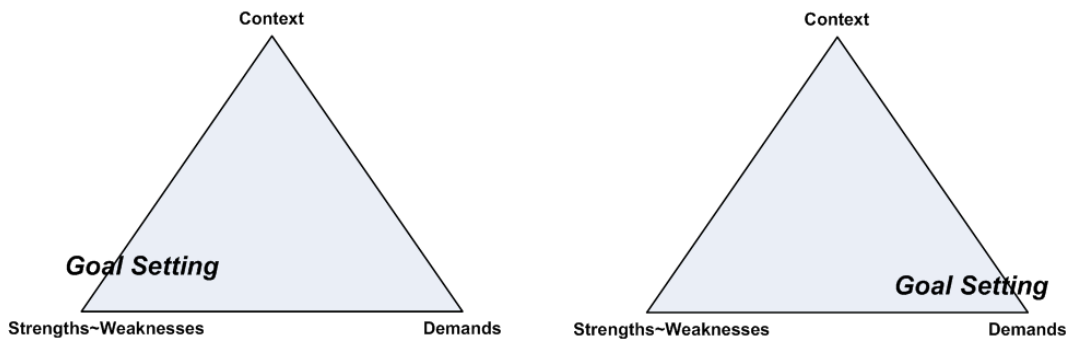
Taking context/environment into account (we can do SWOT analysis of the context) we have all **three constraints for goal setting**. Context could also include time limits, opponents we are facing and the important periods for peaking.



Goals should be set for each training component for a certain time frame (in this case for the pre-season and the rest of the season) utilizing SMART principle.

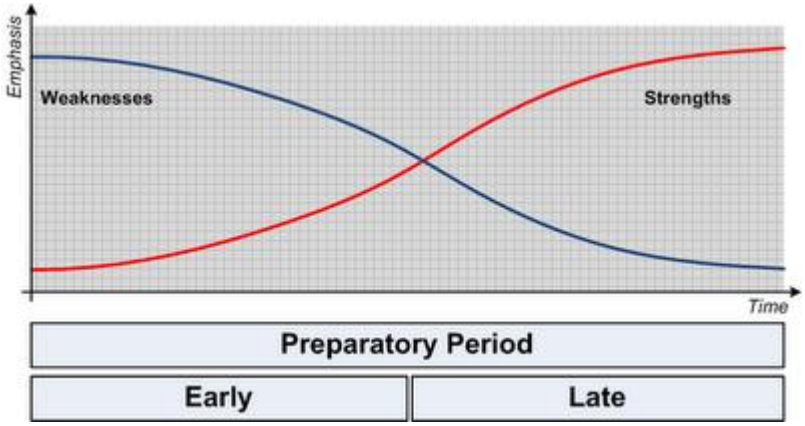
Mission statement:		
GENERAL GOALS		
Outcome goals		
Performance goals		
TRAINING COMPONENT	**FACTORS (Sub-Types)**	**GOALS**
Technical preparation		
Tactical preparation and decision making		
Physical preparation		
Psychological preparation and mental toughness		
Athlete character and communicational skills		
Strategy and game plan		
Theoretical preparation		

The question that arises and that is usually given to me by soccer coaches is whether one should organize training based on the game (and position) demands, in that case fitting the players to the games demands and playing system, or organize training based on the athletes' evaluation (his strengths~weaknesses) in that case fitting the training and the playing system to the athletes? If the life gives us lemons, should we make the lemonade? This can be depicted with the concept of the ***asymmetry*** of the constraints influence on the goal setting:



Answering this question with either/or logic will put you in a certain philosophical camp, but using both/and logic the answer is rather obvious. It is both. The question is when and in what degree. Let me expand.

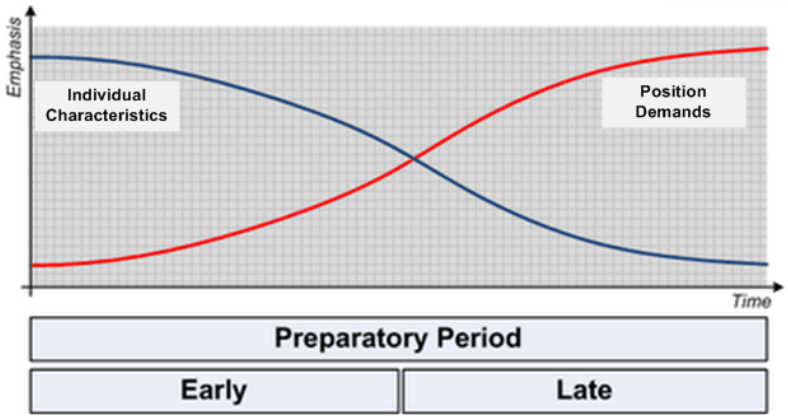
From the standpoint of team building and playing system building, one should try to hide individual and team weaknesses and bring up individual and team strengths, but in a way that emphasize opponent's weaknesses and suppress his strengths. This is a process that demands some time and this is why we can start working on weaknesses early on, and later on working on strengths. This can fluctuate during the longer time period (preparatory period) or shorter time period, like one week in the competition period. In the latter case, one can work on weaknesses displayed in the previous match during the first part of the week, and during the later part work on strengths for the next match.



From a physical preparation standpoint, do we individualize training based on the individual characteristics or based on the position played? Do we give and/or group players based on their characteristics (for example vVO_2max for intervals) or position they play (forwards do certain type of conditioning and middle fielders another) and its demands?

You guessed well: it is both. Why should we pick a certain 'philosophy' and stick to it? We can change how we organize the training during some training blocks and that is what I am going to do. We can base training load on individual characteristics during some time period and base training load on position played during another time period.

The philosophy that I will follow during this 8-weeks pre-season plan is that during the first part we are going to base (individualize) our training on individual strengths and weaknesses and provide ample time for the players to fix them and develop. Later, as the playing system is developed, it is going to be demanded from the players to be accustomed playing certain position. In senior selection development of the players is of secondary importance compared to winning games. Sad but true. If they can't play certain position, maybe someone else can.



It is questionable whether one should follow this philosophy with developmental athletes. In the senior selection clubs buy players to play certain positions and they better be ready and already developed to play it. But with younger developmental athletes one should spend more time on working on individual characteristics and developing players rather than developing playing systems. This is usually not the case. This situation can also be depicted with the asymmetry of the goal settings toward contextual constraints.

This ***asymmetry*** of goal settings is in the favor of the context constraints. When do you want results? With the kids we are all falling on the ***marshmallow test*** by looking for the results immediately and forgetting the long term development. Expert development is really a complex problem (I have talked about it in this blog entry) and it is questionable whether being successful as a youngster is a secure way to be successful as an adult, and whether the training should be **specialized** from an early age or more **multilateral**. Great read if you are interested could be found here. How much time do you have with the team? In Serbia we are changing coaches every 6 months, thus the coaches don't have time to emphasize long term development that includes developing *soccer intelligence* (decision making/tactical skills), *creativity* and *explosiveness*, but rather focus on things that yield short term success to maintain their job and money income, like glycolytic conditioning and set plays (pre-set tactical pattern), along with developing training system with what you already have rather than developing what you have. This is exactly why I wanted for the team to be pretty fit for the first game. That could cost me a job.

Now, you see how goals can be context dependent and how factors outside of soccer can constrain goals and soccer development (we can talk on the level of the country, even world). I am sure this is why Serbian soccer could be a lot better, because even with all that talent, outside factors like management of the club and their business policy affects what happens on the field and soccer in general, without expanding this to country culture, economic situation, political situation and other factors.

Hopefully I did explain how the complex interplay between context, athlete evaluation and game (position) demands influences goal settings and thus planning process. Another thing I wanted to deal with before writing something more practical is the topic of following the fixed template or really working on strengths and weaknesses.

What do I mean by this? One player lacks aerobic power, one lacks strength and third one lacks speed. In the period when we are working on players characteristics, are we going to plan the training so we are addressing individual weaknesses or are we going to follow certain pattern and let the weaknesses be addressed by good planning and individualized training load? To be honest, soccer is a team sport and the pre-season should follow the template, but the athletes should be allowed some individual training sessions to fix their own weaknesses (especially in the off-season). So, even if we have players with different weaknesses, they are going to follow the same template, but the workload is going to be individualized based on their own characteristic. For example, athlete that is lacking speed will still do aerobic power intervals (in the certain block), but the intensity is going to be based on his vVO_2max as it is going to be the same for an athlete lacking aerobic power. This is why working with team sports it is important to make compromises between individual goals and team goals. Sorry, but the world is not perfect.

A quick summary of the topics covered up till now:

1. It is important to have a big picture or annual plan before going to plan certain smaller periods.

2. Coach should have the results of the (1) game analysis (game and position demands), (2) player evaluation (his strengths and weaknesses based on the demand of his position), and (3) context analysis since this is constraining goal setting and planning process

3. Depending on the level of the play constraints can have asymmetrical effect on the goal settings and training in general. Remember developing teams and senior teams (pro athletes) and their goal settings and planning differences.

4. Goals should be set for each training component and it's subtype, and done for an individual player, sub-team (defenders, forwards, middle) and team in general

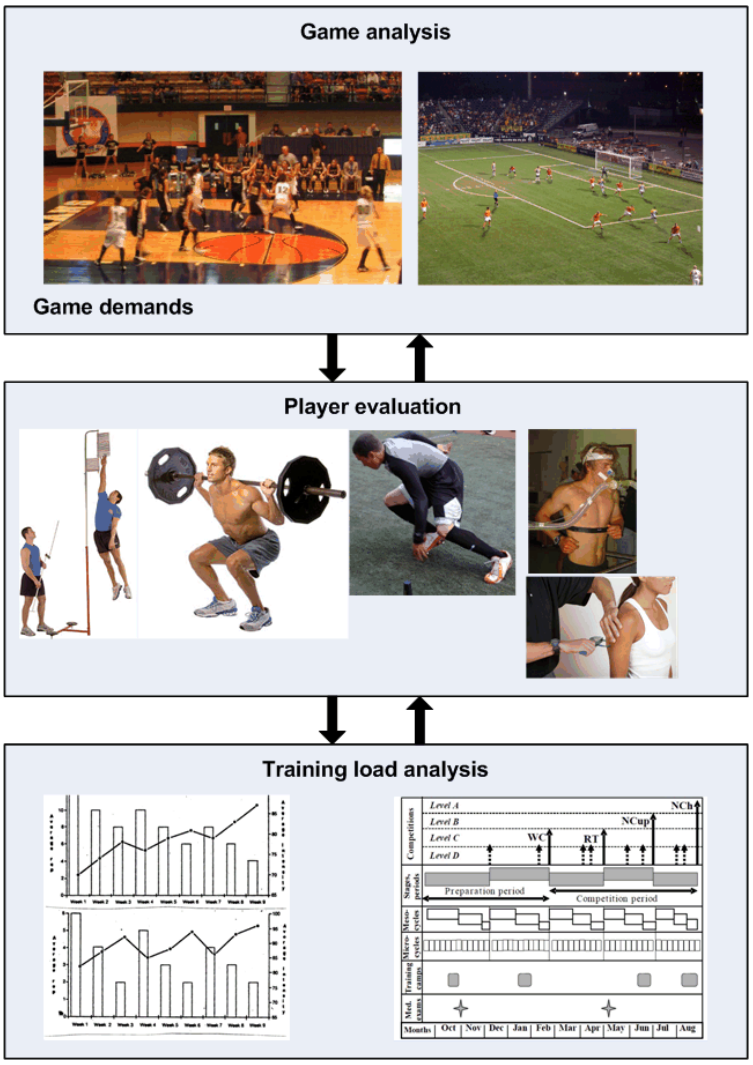
5. There is a certain compromise between individual and team goals and their emphasis might be different at different phases of the long term development and the annual plan

6. Training should be based both on the game (position) demands and athlete's needs, and this fluctuates over the players career and the annual plan

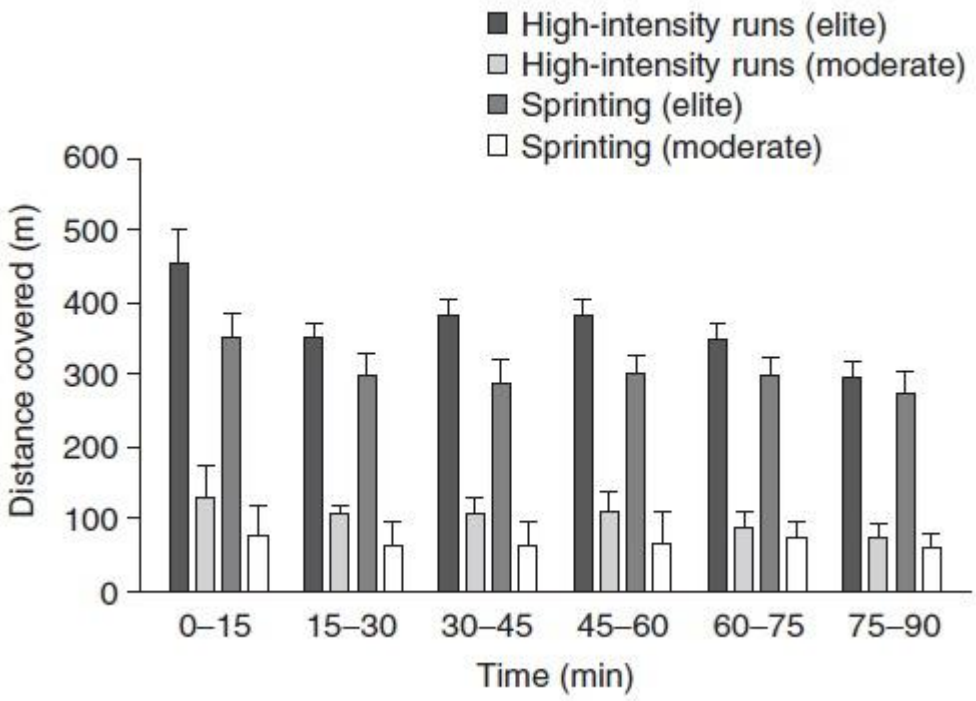
7. Since soccer is a team sport, training plan should follow the general template, yet the workload should be adapted to athlete's characteristics (when we are doing training based on them) or position played (when we are doing training based on that).

Physical Preparation Goals

Speaking of goals, what are the goals of Physical Preparation training component? That's easy, right? **Improving performance** and **reducing injuries**. But what is improved performance and how do we judge it? To answer that we would again need to take a look at three-level analysis system.



First level of analysis is game analysis and involves different types of analysis. One of them that is important for physical preparation is **time-motion analysis**. Time-motion analysis provides time durations (distances and/or frequencies) of certain movement patterns that emerge during the game. Without going into depths of time-motion analyses and their results, one of the interesting aspects of it is the total distance covered in a game and more importantly distance **covered at higher intensities** (since this makes a crucial distinction between higher and lower level of players) and its distribution over a game time. In the picture below taken from AWESOME article (the one that I will come back to numerous times and it is a must read) by Edwards and Noakes:



It can be seen from the picture that the difference between elite and moderate level soccer players is in the amount of high intensity activity during a game (even if they might have same total distance covered and VO_2max). Also, it is important to maintain amount of high intensity activity toward the end of the game, especially the last 15 minutes where it is usual that most of the goals are given/get.

Thus, the improved performance (along with injury reduction) from physical preparation standpoint is in the improvements of the (1) **quality of the high intensity activity** (neuromuscular power) and (2) **the ability to maintain it longer and more often**. All activities of physical preparation are thus aimed to reach those goals or improve TRANFSER to the game-match activity within those lines.

Another interesting and crucial concepts brought by Edwards and Noakes is the **pacing strategy.** Here is the quote from the paper:

> Soccer players are well known to self-regulate match-play efforts according to numerous intrinsic and extrinsic factors such as their current fitness levels, the importance of the game, and positional and tactical considerations.[2,25] The level of each player's sustained cardiovascular stress during a match has also been shown to be positively related to pre-match aerobic fitness,[18] with better conditioned players more able to sustain a higher level of physical work throughout the full duration of the match and regulating core body temperature more effectively at a sustainable level.[15,16,18] This suggests that players modulate effort according to a subconscious strategy based on both pre-match (e.g. prior experience in similar circumstances, fitness levels, match importance) and dynamic considerations during the game (skin temperature, accumulation of metabolites in the muscles, plasma osmolality and substrate availability). Each player's perception of a developing cellular homeostatic disturbance consequently induces behavioral changes across all outfield positions (such as covering an opponent's movement rather than intercepting, walking rather than jogging, or passing rather than dribbling) to limit physical efforts so as to avoid unsustainable elevations in physical discomfort at a premature stage of the match. As such, subconscious physiological factors influence conscious behavioral decisions to regulate effort.

In our own research we have shown that fatigue (you can read more about the fatigue in this blog entry and in papers by Ament *et al.* and by Marino *et al.*) affects pacing strategies of the players depending on the context (in this case position played). Thus, the fatigue that is developed during the game affects (by both conscious and un-conscious mechanism) pacing strategies of the players (in which case middle defenders are differently affected than middle fielders and forwards for example).

Ament *et al.* provided really good overview of current fatigue understanding in the table below:

Table I. Overview of possible sites of exercise-associated fatigue

I. Peripheral fatigue
A. Exercise-related changes in the internal environment
During exercise workloads above the point of increased blood lactate accumulation (OBLA), changes in the internal environment (blood, extracellular fluid) include:
1. Accumulation of lactate and hydrogen ions (protons). The accumulation of hydrogen ions is partly buffered such that there is an increased liberation of carbon dioxide from bicarbonate. As a result, the respiratory quotient will increase
2. Accumulation of ammonia
3. Accumulation of heat, leading to increased sweat secretion. The loss of water may lead to dehydration
B. Exercise-related changes within muscle fibres
1. Accumulation of P_i (inorganic phosphate) in the sarcoplasm, causing a decrease in contractile force due to an inhibition of cross-bridge interactions
2. Accumulation of H^+ ions in the sarcoplasm, also causing a decrease in contractile force due to an inhibition of cross-bridge interactions. In addition, the accumulation of H^+ ions may cause a depression in calcium re-uptake in the sarcoplasmic reticulum. This might be the main cause for the lengthened relaxation time after fatiguing contractions
3. Accumulation of Mg^{2+} ions in the sarcoplasm. Mg^{2+} counteracts the Ca^{2+} release from the sarcoplasmic reticulum
4. Inhibition of the Ca^{2+} release of the sarcoplasmatic reticulum by accumulation of P_i (see point 1). The Ca^{2+} release is inhibited by precipitation of calcium phosphate within the lumen of the sarcoplasmatic reticulum and by phosphorylation of the Ca^{2+} release channels
5. Decline of glycogen stores and (in extreme cases) decline of blood glucose levels. Even a short-lasting decline of blood glucose might seriously interfere with CNS functions. A depletion of the glycogen stores leads, in a manner not well understood, to increased muscle fatigue
6. Decreased conduction velocity of action potentials along the sarcolemma, probably as a result of exercise-associated biochemical changes in and around the muscle fibres. The drop in conduction velocity is reflected in the EMG (change of frequency content) but has no known immediate effect on the muscular force production
7. Increased efflux of potassium ions (K^+) from muscle fibres. The increase in potassium in the lumen of the t-tubuli may lead to a block of the tubular action potential and, hence, less force due to a depression of excitation-contraction coupling
8. Neuromuscular synaptic transmission may become blocked; however, this seems to be a factor mainly of importance in disease (myasthenia gravis)
II. Central fatigue
1. The conduction of axonal action potentials may become blocked at axonal branching sites, leading to a loss of muscle fibre activation. The relative importance of this factor is unknown
2. The motor neuronal drive might be influenced by reflex effects from muscle afferents. Thus, central fatigue effects might, to some extent, be compensated for by mechanoreceptor reflexes (types IA and II from muscle spindles; type IB from Golgi tendon organs)
3. Stimulation of type III and IV nerves (chemo- and nociceptive afferents) induces a decrease in motor neuron firing rate and an inhibition of the motor cortex output
4. The excitability of cells within the cerebral motor cortex might change during the course of maintained motor tasks, as suggested by measurements using transcranial magnetic stimulation
5. The synaptic effects of serotoninergic neurons might become enhanced, causing an increased sense of tiredness and 'fatigue'. This may occur as a result of an increased influx into the brain of the serotonin precursor tryptophan. During prolonged exercise, such an increased influx of tryptophan may result from an exercise-evoked decrease in the blood concentration of BCAAs
6. Exercise-induced release of cytokines. IL-6 induces sensations of fatigue and IL-1 induces sickness behaviour in animals. In many diseases the production of these cytokines is enhanced

BCAAS = branched-chain amino acids; **EMG** = electromyograph; **IL** = interleukin; **OBLA** = onset of blood lactate accumulation; **P_i** = inorganic phosphate.

Edwards and Noakes proposed three complementary pacing strategies in soccer:

Table I. A summary of characteristics within the multi-level pacing model in elite soccer

Pacing strategies	Purpose and characteristics	Set-point	Dynamic
Macro-pacing	Overall pacing plan for the match. A subconsciously pre-conceived strategy based around a set-point of tolerable physical discomfort expected over the duration of the game	√	x
Meso-pacing	Inter-half pacing plan. This variation from the macro-plan enables up- and downregulation of effort during a match based on tactical and specific match considerations	√	x
Micro-pacing	Dynamic pacing plan. This strategy enables the player to evaluate the impact of acute periods of intense exercise on the set-point strategies. For example, a prolonged sprint late in a game may require an extended recovery to protect homeostasis	x	√

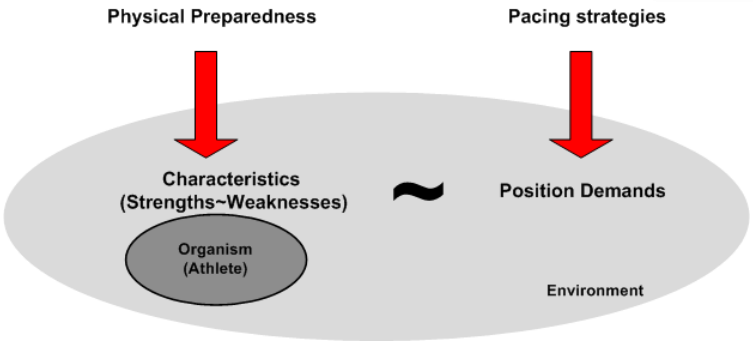
set-point = pacing strategies based on defending exercise homeostasis at an individualized set-point of tolerable physical discomfort in accordance with each player's fitness and experience; **dynamic** = pacing strategy based on the principles of negative feedback where temporary fluctuations from the set-point require longer or shorter recovery, depending on whether exercise homeostasis is threatened.

Thus along with decreasing fatigue (by increasing physical preparedness), the goal of training should be to improve pacing strategies of the players and different physiological factors that will affect macro-pacing, meso-pacing and micro-pacing strategies within the game.

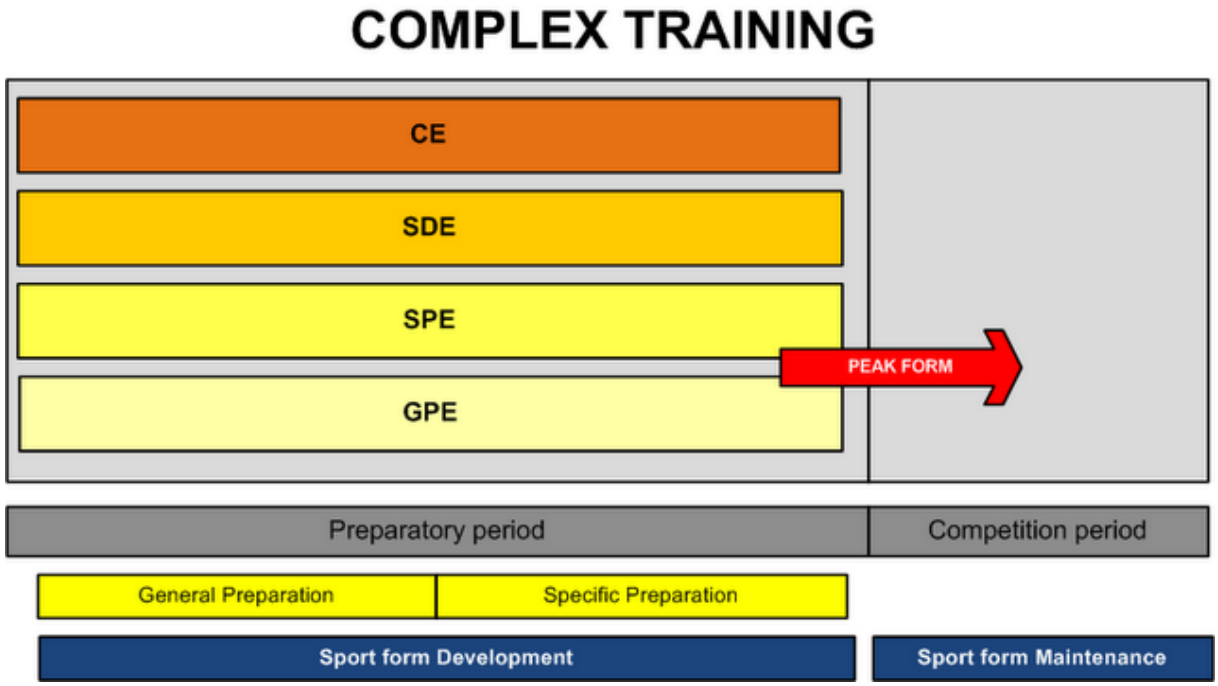
I know that this sound confusing, and that's why I urge you to read the mentioned papers.

Since the players with improved physical preparedness will be able to ***afford*** different pacing strategies, it is extremely important that they get used to playing. That's why it is important to actually play while improving fitness. This goes well with the concept of *affordances* from ecological psychology and constraints-led approach to skill acquisition. Improved fitness will afford players the ability to improve pacing strategy, but to do it they need to get *attuned* to improved physical preparedness by being involved in playing soccer. For example, increased vLT (velocity at lactate threshold or functional threshold) and vVO_2max (velocity at maximum oxygen consumption), along with hydration status and nutritional status will *afford* players the ability to increase macro- and meso- pacing strategies, while improved RSA (repeated sprint ability, which is also related to vLT and vVO_2max) and glycolytic power/capacity will *afford* players the ability to increase micro-pacing strategies. Anyway, to improve those pacing strategies it is not enough to increase only physical preparedness (along with, of course, technical skills and tactical-decision making), but also devise special training sessions specially aimed at improving pacing strategies by utilizing small-sided games and full-sided games (10v10). The importance of this concept can be seen in the fact that more advanced athletes compared to lower levels along with having similar aerobic capabilities affords themselves better pacing strategies and show better performance.

The mentioned concept is of special importance in the last parts of the game where the fatigue builds up and thus players need to *learn* optimal pacing strategies to allow them to fulfill their tactical and strategic tasks and finish the game. The concept of pacing strategy goes well with the discussion of whether one should base training on individual characteristics of players or positional demands. Now you see why it is important to do BOTH of those concepts, since basing training on individual characteristics makes individualization easier in improving physical preparedness, yet basing training on positional demands allow improvements in specific pacing strategies of the players. We need to do both.



All of this goes well with the concept of ***complex training*** by Anatoly Bondarchuk, that allows the best transfer between training elements in such a small amount of time as is 8-weeks pre-season period. Here is the picture from Periodization Confusion article.



For the sake of simplicity I classified methods and exercises together based on the work of Dr Anatoly Bondarchuk. This classification can be applied to all seven mentioned training components.

Name of exercise/method	Description	Content
Competitive (CE)	Exercises that are identical or almost identical to competition event	10v10 on full pitch 10v10 with different constraints Friendly games
Specialized developmental (SDE)	Exercise that repeat the competitive event in training but in its separate parts	Small sided games with different constraints aimed at emphasizing certain aspect of performance
Specialized preparatory (SPE)	Exercises that do not imitate the competitive event, but train the major muscle groups and physiological systems	Technical and tactical drills (pre-set) Speed, explosive, reactive training Strength training (legs)
General preparatory (GPE)	Exercises that do not imitate the competitive event and do not	Strength training (assistance, upper body)

	train the specific systems.	Prehab-rehab Core training Stretching/mobility Low intensity plyos Aerobic training (running and non-running) Activities involving other sports Warm-up

Exercise classification based on work of Dr Anatoly Bondarchuk and UKA Exercise Classification Hierarchy

So, for this 8-weeks pre-season period I decided to use complex-method of assembling all four types of exercise/methods. Although this classification 'merges' all training components to provide bigger picture, same classification can/should be done for each training component and it's sub-types. This is exactly what I am going to do for physical preparation.

In the following table I've listed major sub-components of physical preparation with their goals

Sub-component	Goal	Exercise/Methods Used
Speed work	Improvement in the acceleration, speed and agility	GPE, SPE
Explosive strength	Improvement in the explosive strength and reactive-strength	GPE, SPE
Strength	Improvement in the relative strength and functional hypertrophy	GPE (upper body & core), SPE (lower body)
Aerobic capacity/power	Improvement in vLT and vVO_2max	GPE, SPE, SDE
Glycolytic capacity/power	Improvement in RSA (repeat sprint ability) and special endurance	GPE, SPE, SDE

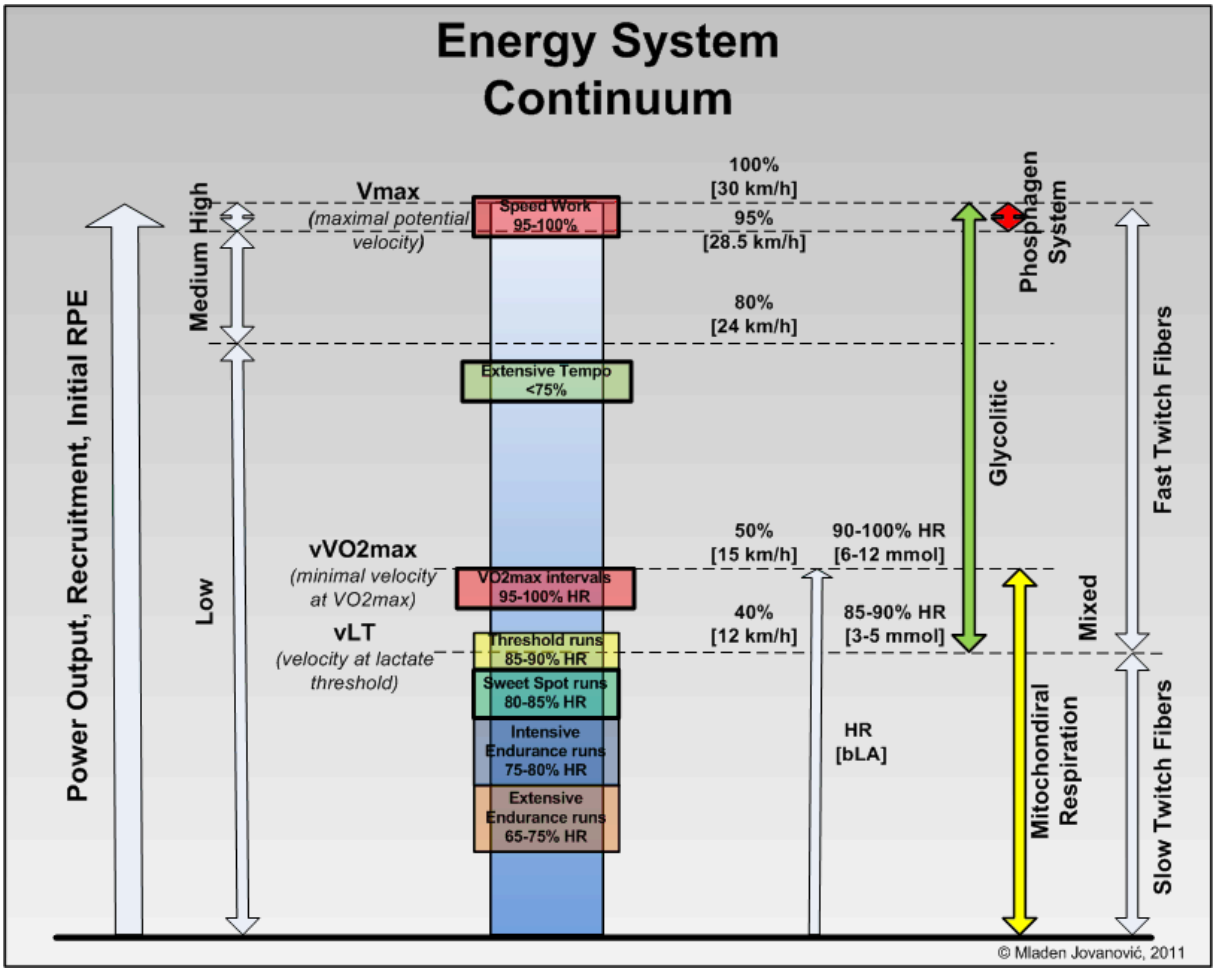
Since I consider soccer to be ***alactic-aerobic sport*** (see the interview with the fitness coach David Tenney of Seattle Sounders, along with this article series), where the aim is to improve quality of high-intensity efforts that tax alactic energy system and to improve the speed of recovery between them (this tax aerobic energy system, since the speed of CP recovery is dependent on aerobic power, yet there are some thoughts that it is also recovered using the glycolytic system), it is also important to do some glycolytic capacity/power training since this will further *pull* aerobic capacities and also improve micro-pacing within the game.

Another interesting concept worth mentioning are the 'matches' concept form cycling (see Training and Racing with a Power Meter). It could be said that each athlete has certain amount of matches in the match box and can *burn* them during specific situations in the game. This may include long sprint in the counter-attack, or repeated short sprints and duels. After burning this 'match' athlete will experience *transient* fatigue and will demand lower pace in the game. This fits well with the micro-pacing concept. Thus, the goal of glycolytic capacity/power is to increase the number of the matches in the match box, so to speak. This type of work plateaus quickly and there

shouldn't be too much of volume of it. More on this could be read in excellent series on endurance development by Lyle McDonald, especially in this part.

I have also put RSA into glycolytic sub-group although it may be argued against it and whether it demands its own group. It is believed that replenishment of CP (that is spend during the sprint) during the recovery is achieved by aerobic system, and the higher the aerobic capacity/power the faster the recovery and thus the lower the fatigue effects (this has been shown in the research numerous times, although there are some contradictory ones, anyway, I am too lazy to list them). This is why aerobic power/capacity training provides *a base* for RSA development. Anyway, there are some new ideas that *the quick* (there are two parts of it: quick and slow) replenishment of CP are achieved by glycolytic mechanism. This doesn't change my planning though, and if you are more interested I direct you to the great new up-to-date review article regarding energy systems by Baker *el al*, which also goes into debunking lactate as toxin and cause of fatigue. Great read and it is free.

In the next picture there is the Energy System continuum (in running) that I've depicted for the sake of 'conceptualizing' couple of different ideas (recruitment of fast twitch and slow twitch fibers, RPE, HR, bLA, etc), so please note that this is only conceptual, although usable to depict some training modalities.



I'll come back to this picture again when I will talk more about each sub-component of physical preparation and in this case aerobic power/capacity and glycolytic power/capacity development.

Athlete Evaluation

Ok, back to our three level analysis system. I guess I covered game-analysis from physical preparation standpoint (although there is more to it, and if you are interested I suggest you also check research by Rampinini *et al.*, Gabbett *et al.*, Stølen *et al.*, di Salvo *et al.* among many others) now we need to cover **athlete evaluation**.

To assess and evaluate the players we need to do a test battery, since one test can't tell us about all aspects of performance. Again, the best test is the game, but to evaluate physical preparedness factors and to use them to create individualized training and provide certain overload we need to use explicit testing battery. Knowing both (game analysis and athlete evaluation) can provide us with more info, especially what physical preparedness factor might limit (does it limit and how much) certain game performance. We can assess this by doing "cross-study" analysis and showing statistic correlations (some of the above mentioned articles goes into this) which can give us some insights, but we can also do longitudinal-study where we find correlations between improvements over time and this provides more insight into the training transfer than cross-section study. Example of cross study would be how much is vVO_2max correlated to distance covered (total or higher-intensity distance) at one instant in time, but the longitudinal study would give us answer to how much an ***improvement*** in vVO_2max correlates with ***improvement*** in distance covered and thus provides us with the idea of training effects transfer in a much better way. Unfortunately, the longitudinal studies takes longer to complete and are more complex (demands training intervention) and thus more expensive, thus there are not so many of them.

Anyway, since I am talking about physical preparation here, for each sub-component I will provide a test that can assess that aspect of physical preparedness.

Sub-component	Tests
Speed work	30m sprint with 10m time Zig-zag run with and without the ball
Explosive strength	Vertical Jump Reactive jumps to assess Reactive Strength Index (RSI)
Strength	Squat Bench Press 3RM Chin-ups
Aerobic capacity/power	YoYo Intemitent Recovery Level 1 vLT and vVO_2max tests (laboratory or field)
Glycolytic capacity/power	150 or 300m shuttles RSA

Some other test might be included too, like range of motion test or Functional Movement Screen, body composition, biochemical tests (blood, urine) or what have you.

I have included some links, but I will not go into too much details regarding testing and stuff since it demand a book on itself. You can check Functional Testing in Human Performance if you want.

With this info we can track physical preparedness improvement over time, along with individualizing some training sessions. If we have certain *model* we can define strengths and

weaknesses (taking some athlete model as a comparator) in physical preparedness of the athletes. In my opinion it is very complex problem to define strength and weaknesses and whether working on strengths or weaknesses alone will improve performance, so I warn again using simplistic and reductionist methods of doings so, but rather use more complex methods, that also involve game analysis (of other elements like technical skills, tactical decision making, psychology characteristics, etc), level of play, etc. Some people are so retarded that they use this type of battery of tests to *identify* talents. Retarded I know, since physical preparedness is only one aspect of success in soccer or any other sport.

One thing I want to clear is why I've used specific tests to assess vLT and vVO_2max and also YoYo test. Well, I will use vLT and vVO_2max to program and thus individualize certain training sessions, but it is impossible to *extract* those variables from the YoYo test results (I've been talking over the email with famous researcher David Bishop from Australia regarding this and he basically told me that). The reason for this is that success in YoYo test is not only related to vLT and vVO_2max, but also to glycolytic capacity, neuromuscular system, changes of direction skills and inter-effort recovery abilities. You can find more on this in the free article by Martin Buchheit regarding a similar test 30-15IF.

The reason I included YoYo test is that it is highly sensitive, reliable and valid tool to assess improvements in, should I call it that way, soccer specific endurance and highly correlates with distances covered at higher intensities during a game. Thus, YoYo is really important test even if it doesn't provides information to make individualized interval sessions. If I need to choose only one test to do, I would do YoYo test.

Physical preparation sub-components

For each physical sub-component it could be written a whole book, thus I will try to keep it short and direct the readers toward more info with links. I also suggest checking my old Physical Preparation for Soccer manual since it covers some of this in greater detail. Physical preparation sub-components are listed in the table below.

Sub-component	Goal	Exercise/Methods Used
Speed work	Improvement in the acceleration, speed and agility	GPE, SPE
Explosive strength	Improvement in the explosive strength and reactive-strength	GPE, SPE
Strength	Improvement in the relative strength and functional hypertrophy	GPE (upper body & core), SPE (lower body)
Aerobic capacity/power	Improvement in vLT and vVO_2max	GPE, SPE, SDE
Glycolytic capacity/power	Improvement in RSA (repeat sprint ability) and special endurance	GPE, SPE, SDE

Speed work

In the old Physical Preparation for Soccer I've spent a lot of pages writing about speed development, especially the difference between speed and agility. Thus you can refer to that one for more examples. My final paper "Training and testing agility in sports" written in 2007 deals with agility and speed too and the transfer between them. In Planning and programming of training in sport games you can find more info about three types of movement patterns (off-the ball movements).

I guess that the discussion regarding agility and usage of closed drills goes into the *form~substance* dichotomy. Sometimes we need to *isolate* a certain "substance", but we need to have the bigger picture in mind. From ecological standpoint (constraints-led approach to motor learning) one cannot split perception~movement, thus the best practice for agility is the soccer itself and other forms of small sided games and specific *live* drills (simplification, rather than part practice). Anyway, we sometimes need to *isolate* the "substance" (simplification) to create overload and improve learning. This might be called organic or holistic approach. It is both. This is why my blog is called *Complementary Training.* Anyway, for this reason I have made two type of speed (agility) work – technique and power.

Component	Specificity		Examples
Speed Power Work	GPE	Linear	Sprints from various positions (0-30m acceleration, 30-60m max speed); Hills; Sled work; Ins & Outs…
		Lateral	Cross-overs with sled; cross-overs; mirror drills; sprints from jumping…
	SPE		Tag games; live soccer drills; merging technique with speed (conjugated exercises)
Speed Technical Work	GPE	Linear	Wall drills; Butt-kicks; A-Skip; B-Skip; Skips; Build-ups; Small hurdles, sled pushes ('specific strength')…
		Lateral	Coordination ladder drills; shuffling; cross-over; deceleration techniques; lateral skips; COD polygons; quick-feet (repositioning); sled pushes ('specific strength')…

For more info regarding speed work I suggest checking all Charlie Francis materials, especially GPP Essentials. Kelly Baggett's No Bull Speed Development Manual is also worth checking.

Explosive strength

Similar to speed, a lot of explosive strength is covered in Physical Preparation for Soccer. In the table below is the classification I use:

Component	Specificity		Examples
Low intensity ('aerobic') plyometrics	GPE	Linear	MB against wall (upper body & core); jumping rope; line drills; coordination ladder; low box drills; zig-zag hops, jumps and bounds; pogos…
		Lateral	
Deceleration	SPE	Linear	Jump and stick variations both double leg and single leg
		Lateral	Bound and stick; lateral jump and stick; side lunge and stick
Explosive strength	SPE	Linear	MB throws; vertical jump; broad jump; triple jump; step-up jump; squat jump; lunge jump; scissors;
		Lateral	Side-to-side jump; zig-zag bounds; side-lunges; lateral step-up jumps
Reactive strength	SPE	Linear	Depth jumps; hurdle jumps; bounding; power skipping; LL-RR bounds; Rim jumps; pre-run jumps..
		Lateral	Side-to-side hurdle jumps, cone jumps

For more info I suggest checking Kelly Baggett's Vertical Jump Bible along with 7 Modern Day Myths About Plyometrics. Actually, read everything he wrote.

Strength Work

I highly suggest checking my Planning The Strength Training articles along with Lyle McDonald's Categories of Weight Training for more info regarding this very subject. Another article worth looking at is also Lyle's Beginning Weight Training since most of the soccer players are beginners in this area. Kelly's The Myth of Non-Functional Hypertrophy and The Myth of Relative Strength are also great reads.

The exercises could be classified to the following groups:

Category	Exercises
Upper body push horizontal	Bench press; Push-ups; DB bench press; dips
Upper body pull horizontal	Cable row; T-bar row; DB row; supine row; YTWL
Upper body push vertical	Press; Push Press; DB Press; DB Flys
Upper body pull vertical	Chin-ups; pulls-ups; lat-pull down; pull-over
Knee dominant	Squat; Front Squat; Split squat; lunge; lateral lunge; step-up
Hip dominant	Deadlift; RDL; Hip thrust; R. Hyper; Hyper; GHR; Nordic curl
Ankle	Standing and seated calf
Core	Roll-out; leg lifts; curls; side bridge; full-contact twist; pallof press; chops; MB throws; high-rep curls

High repetition exercises could be considered GPE and low repetition exercises for lower body could be considered SPE. Prehab work (activations, thera band, etc) is GPE.

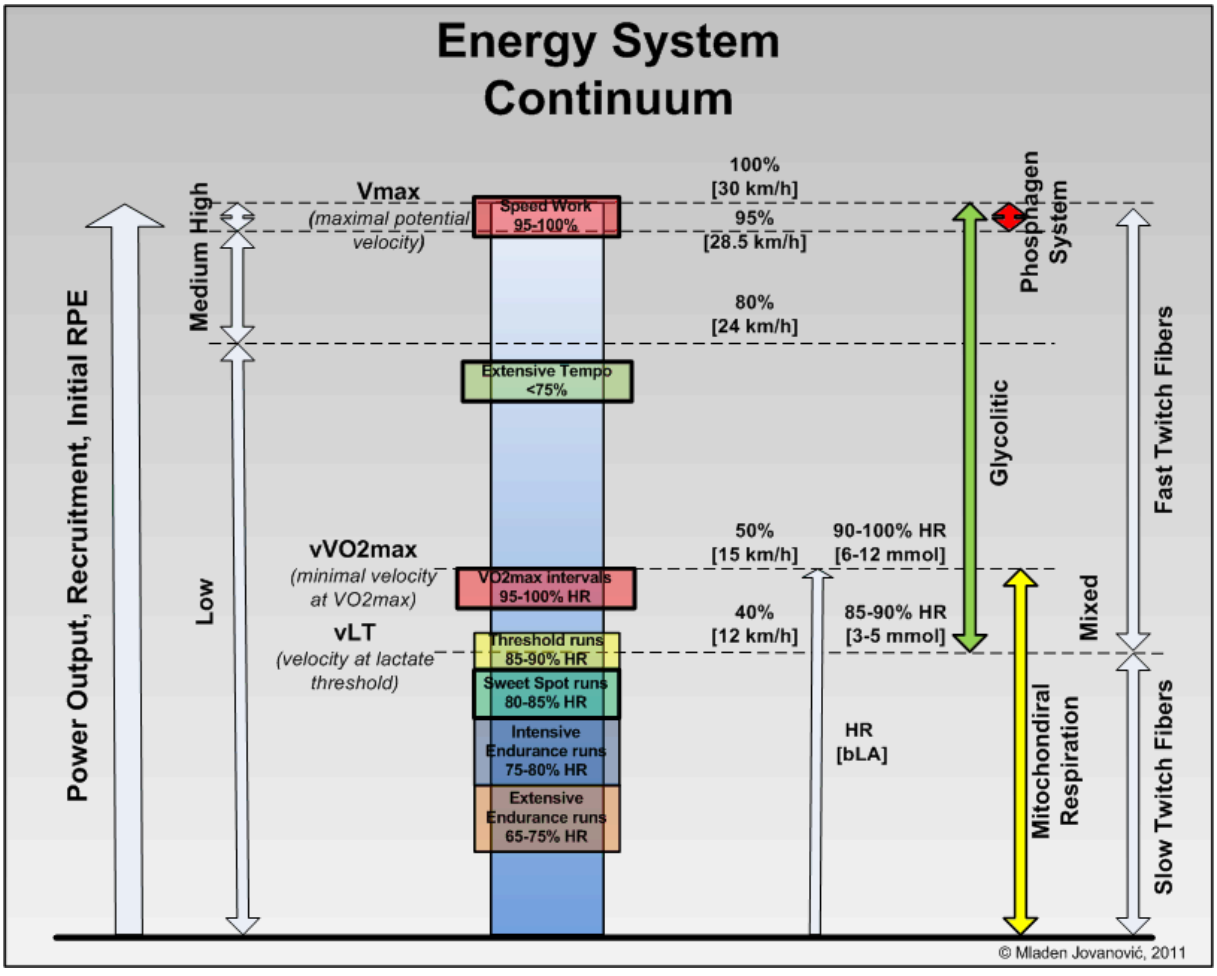
Programming of strength training involves a lot of "it depends" answers. Check the mentioned links along with How To Implement and Manage Set and Rep Schemes and please note that a lot of info out there is written with the strength athlete in mind.

Keep this simple. There is a huge trend in last decade that gives strength training too much of an emphasis. Yes, it is important, but the physical preparation is not only strength training.

Aerobic Capacity/Power

If you haven't already, you should go and read Lyle's Methods of Endurance Training . Make sure to check out my blog rant on endurance for team sports and for more soccer-specific stuff I suggest reading KNVB Conditioning aspect in developing a style of play along with Little's Optimizing the Use of Soccer Drills for Physiological Development.

I am reposting the Energy System Continuum picture for the sake of reference:



Also take into the consideration tables from Lyle's Methods of Endurance Training

Goal	Intensity	Work Interval	Rest Interval
Neuromuscular Power	Maximum	6-15 seconds	Complete (2-5 minutes)
Anaerobic Power	Just Below Maximum	30-45 seconds	2-5 minutes
Anaerobic Capacity	High	60-90 seconds	60-90 seconds
Aerobic Power	Above maximum steady state	2-5 minutes	2-5 minutes
Aerobic Capacity	At/near maximum steady state	8-20 minutes	4-10 minutes

Method Name	Volume Per Workout	Frequency	Intensity	Lactate
Miles Build Champions (Extensive Endurance)	How Long Do You Have	6-7 days/week+	130-150	1.5-2 mmol
Tempo Training (Intensive Endurance)	1-3 hours	3-4 days/week	150-160	2-4 mmol
Sweet Spot Training	1-3 hours	3-4 days/week	155-165	2-4 mmol
Threshold Training	1-3X10-20 minutes/5-10′ rest	2-3 days/week	170-180	4-8 mmol
Aerobic Capacity (VO2 max Intervals)	3-6X3′/3′ rest	1-2 days/week	VO2 max	High
Anaerobic Power	8-12X30-45 seconds/3-5′ rest	1-2 days/week	Max	Owww
Anaerobic Capacity	8-12X60-90 seconds/60-90 rest	1-2 days/week	Max	Owww
Neuromuscular Training	6-10X6-15″/Full rest	Variable as hell	N/A	N/A

Please note that the volumes for the endurance training listed above are for endurance athletes. Again, we come to the problem of fitting the info from individual sports for team sports like soccer (or as Lyle call them – *mixed sports*) since they demand both endurance and speed and power. In the summary of Lyle's Methods of Endurance Training there is a discussion how to fit this info for certain situations. Excellent read.

As for **extensive tempo** I suggest checking mentioned GPP Essentials by late Charlie Francis. Extensive tempo should improve capilarization of FT fibers, their aerobic capacity and improve recovery between bursts, along with providing some speed technique work (relaxation) and improving efficiency of running. In endurance circles this is usually called *strides* and it can be combined with continuous work (pre-post).

Thomas Little provided excellent guide table for organizing small sided games for SDE Aerobic power/capacity development in Optimizing the Use of Soccer Drills for Physiological Development which I use an excellent starting point.

Table 2
Methodology for the main forms of endurance training for soccer and appropriate soccer drills

Training type	Appropriate training load: Intensity: %HR	RPE	Lactate, mmol/L	Duration: Total work, min	Rep duration	Reps	Rest	Soccer drill examples: Drill	Reference
Lactate threshold	80–90	Quite hard	3–6	30–60	6–30 min	1–8	<1 min rest	5 × 5	(7,18,19,25,28)
								6 × 6	(18,19,25)
								7 × 7	(6)
								8 × 8	(18,19,30)
Vo_2max	90–95	Stressful	6–12	12–35	3–6 min	4–8	0.5–1 rest ratio	3 × 3	(2,18,20,25)
								4 × 4	(14,18,19,28)
Anaerobic	>85	Maximal	>10	4–16	20 s to 3 min	2–4 sets of 4–8	1–4 rest ratio	2 × 2	(1,19,27)
								3 × 3 possess	(17)

%HR = percent heart rate; RPE = rating of perceived exertion; Reps = repetitions.

Training loads adapted from Bompa (5).

In the following table there is the classification of methods used

Goal	Specificity	Examples
Aerobic Capacity	GPE	*All non-running activities (bike, cross, rower) including aerobic plyometrics and circuit weights or complexes*
	SPE	Sweet spot running for 20-40min at 80-85% HRmax; 2min runs at vLT (or 80% of vVO_2max) with 1 min easy jog; extensive tempo; polygons and technique work
	SDE	**8v8-5v5** 80-90% HRmax, 6-30min, <1min rest, 1-8 reps
Aerobic Power	GPE	*All non-running activities (bike, cross, rower) including aerobic plyometrics and circuit weights or complexes*
	SPE	Billat intervals at vVO_2max, like 15-15, 30-30, 60-60, even 2-5min with 1:1 rest organized in shuttles or straight line; polygons and technique work
	SDE	**4v4-3v3** 90-100% HRmax, 3-6min, 1:1 to 1:2 work-to-rest, 4-8 reps

Glycolytic capacity/power

As I have already mentioned soccer is alactic-aerobic sport, yet some of the glycolytic conditioning is important. I will not go into too many details here since it is easy to find a lot of ways to torture athlete with this method, from suicides, shuttles to RSA.

Goal	Specificity	Examples
Glycolitic Capacity Power	GPE	*All non-running activities (bike, cross, rower)*
	SPE	Suicides, shuttles, RSA, tabatas, polygons and technique work
	SDE	**2v2-3v3 (possession)** >85% HRmax, 20sec-3min, <1min rest, 2-4 sets of 4-8 reps, 1-4 rest-to-work ratio

In the Interview with Aaron Schwenzfeier by Bret Contreras, Aaron made some great info on „mental thoughness“ training, and I am reposting it here:

> ...Many coaches are adamantly against the idea of developing “mental toughness” through working athletes to the bone, and most times fall in to this camp... but there are times when I feel there is opportunity in really ‘driving’ athletes to their breaking points.
>
> I think it needs to be skillfully and artistically managed through types of bodyweight drills that present extreme discomfort but are relatively safe. It’s at this point of doing team drills in states of extreme discomfort though, that I think the situation needs to be handled with care; the message of why we are doing what we are doing is continually ‘hammered’ and the vision of the team needs to be emphasized. It’s not a matter of the coach screaming negative words into the athletes’ ears of who are nearly drowning in their own sweat, but it’s the coach reinforcing a message of such clarity that the athletes gain an absolutely black and white view of the situation and what’s expected and their role within the team. Because I know we get many athletes who are very talented but really have just floated along in life and never really had direction and been pushed to levels they were not aware they had. Our job as coaches is to help athletes reveal to themselves what they really might be capable of.
>
> So in essence I am sometimes a fan of just doing things that suck, just because they suck... but only when necessary. This type of stuff only goes for certain sports though, particularly team sports. Trust me, I am not cussing and degrading athletes, but talking in a very direct tone without raising my voice too high. No meat-head one-liners or chest beating, but matter-of-factly presenting the information needed....

Thus one of the purposes of glycolitic capacity/power training is to build „mental toughness“ so to speak. I find it useful in purposefully fatiguing athletes before playing small-sided game or even full-sided game with the aim of developing ability to push in the last minutes and develop position specific pacing strategies when fatigues. You aren’t going to do this all the time, but you should be doing it from time to time. I will come back to this later.

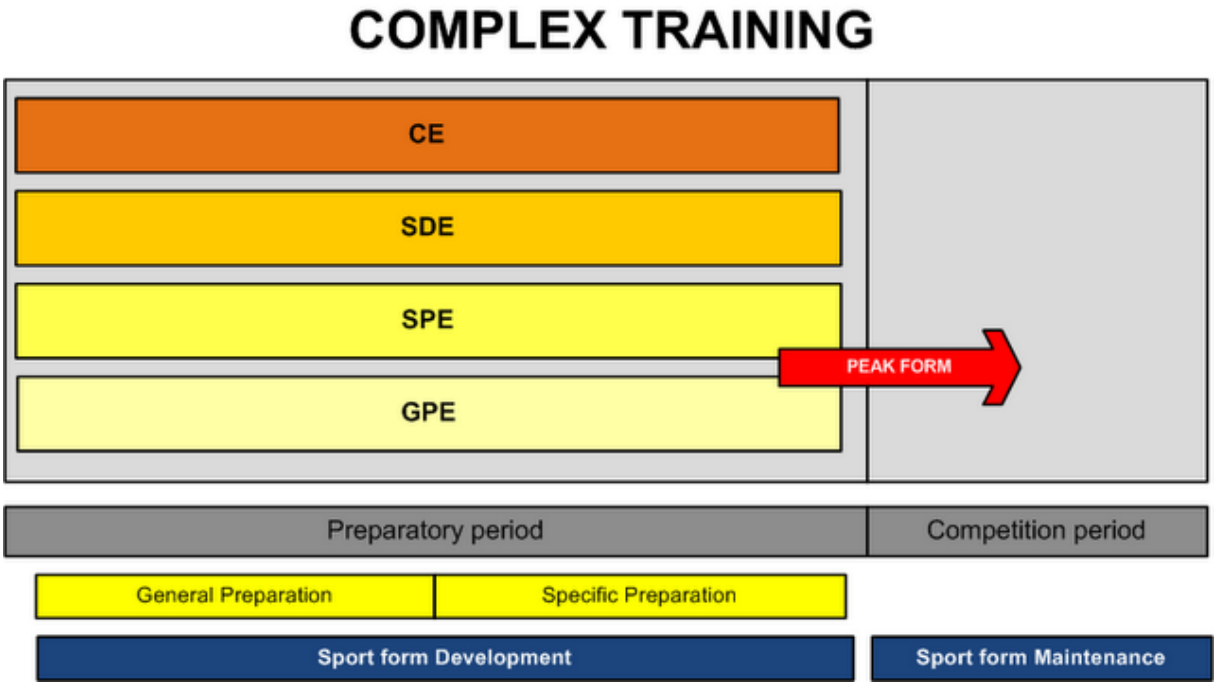
Body recomposition and Nutrition

Bodyrecomposition can become a goal since carrying excessive fat or not having a certain amount of muscle mass can be detrimental on performance, along with having poor dietary habits. Since this is way out of topic, I will direct you to the work of Lyle McDonald at BodyRecomposition.com. For fat loss you should read Fat Loss for Athletes article series, and make sure to get Applied Nutrition for Mixed Sports book. I made the review here.

Putting it all together

It is time to put all of the info into an 8-week template. By template I mean general plan and weekly plans, but without exact loading and drills used. Organization of the training sessions, days and weeks will be highly dependent on your *context* (facilities, number of athletes, assistants, weather, etc), thus I will only provide models so to speak.

8 weeks is a short amount of time, thus complex training should be utilized. By complex training I refer to Bondarchuk's exercise/methods classification, where all groups of exercises/methods should be used in parallel, although some of the exercises might *rotate* every couple of weeks within same group.

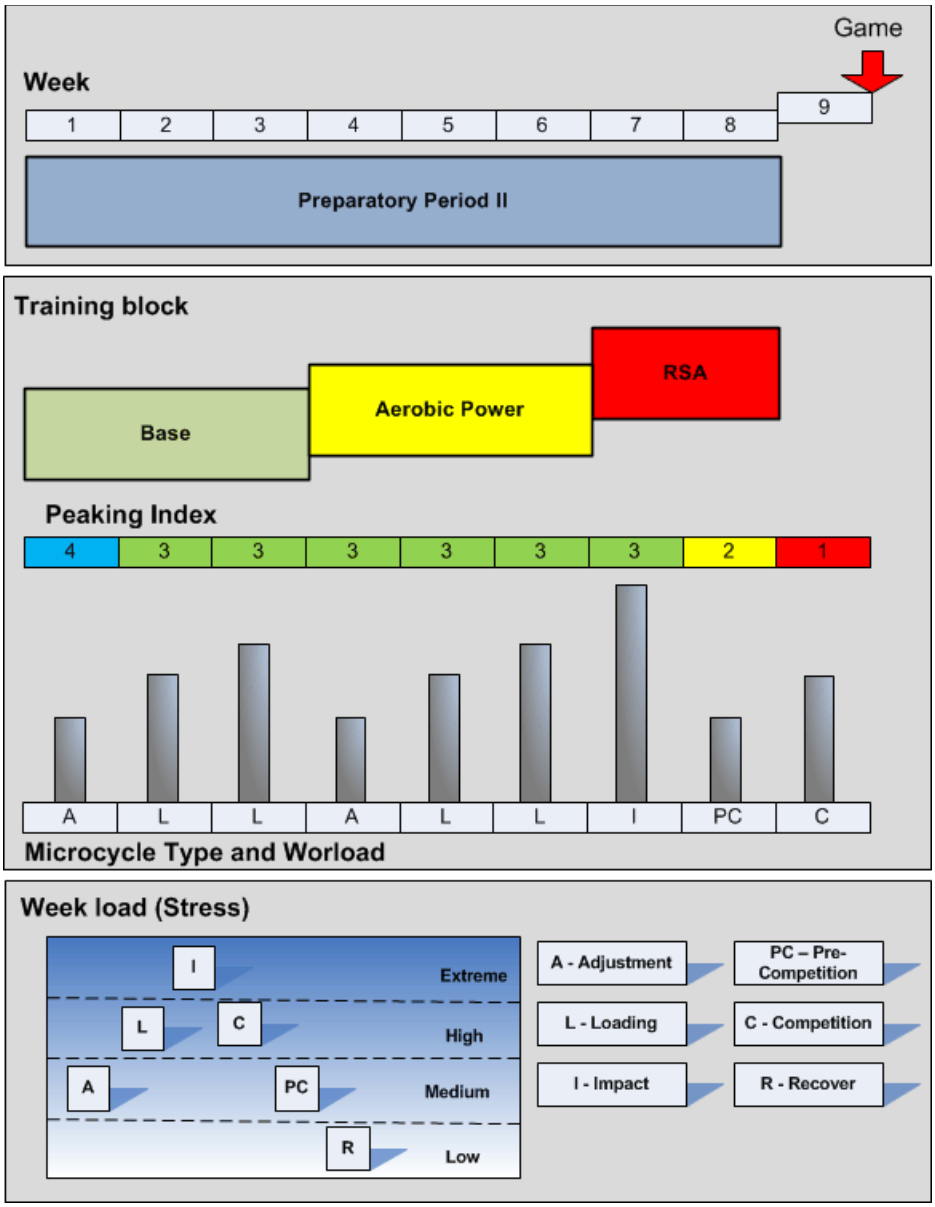


Name of exercise/method	Description	Content
Competitive (CE)	Exercises that are identical or almost identical to competition event	10v10 on full pitch 10v10 with different constraints Friendly games
Specialized developmental (SDE)	Exercise that repeat the competitive event in training but in its separate parts	Small sided games with different constraints aimed at emphasizing certain aspect of performance
Specialized preparatory (SPE)	Exercises that do not imitate the competitive event, but train the major muscle groups and physiological systems	Technical and tactical drills (pre-set) Speed, explosive, reactive training Strength training (legs)
General preparatory (GPE)	Exercises that do not imitate the competitive event and do not train the specific systems.	Strength training (assistance, upper body) Prehab-rehab Core training Stretching/mobility Low intensity plyos Aerobic training (running and non-running)

Exercise classification based on work of Dr Anatoly Bondarchuk and UKA Exercise Classification Hierarchy

The way you are going to organize development of goals for each training component, especially physical preparation will be dependent on context at hand (level of the athletes, weather, facilities, time limits, peaking indexes etc), along with biological, biomechanical and psychological basis of the development. Please note that I will be talking mostly on physical preparation goals here, but the overall system should include plan for developing goals for other training components as well. More about the planning strategies in terms of goals development you can find in What the heck is Periodization anyway and Periodization Confusion.

For the sake of example, I decided to organize goals development of the physical preparation in three blocks that follows mostly the biological basis of endurance development. I am not saying that things should be done or organized like this all the time or in your case, but I am rather providing an example how to organize everything that is said in the previous parts of this series.



Peaking index is a concept from the Periodization-5th Edition: Theory and Methodology of Training by Tudor Bompa. I have explained it's usage in the Usage of subjective indicators in monitoring and programming of training article. Anyway, here is the short description:

- **Peaking index 5** is 50% preparedness, characteristic of the transitional period. Training workloads are very low due the rest and recovery goals.
- **Peaking index 4** is 60% preparedness, characteristic of the preparatory period when athletes are not yet ready to play. Training workloads are the highest here, and since the fatigue is highest here, the athletes are not yet ready to play.
- **Peaking index 3** is 70-80% preparedness typical for friendly games and games against weaker opponents. Training workloads are still high/medium here, and the training is still directed toward improving preparedness. Fatigue is medium.
- **Peaking index 2** is 90% preparedness characteristic of the period and competitive games against opponents from the top of the table. Training workloads are medium level and fatigue is in medium/low level
- **Peaking index 1** is 100% preparedness and is characteristic for Play-off periods, when peak form/shape is achieved. Training workloads are lowest and based on a concepts of peaking

Peaking Index	Preparedness level	Fatigue	Weekly training workload	Willingness to train	Muscle soreness
5	<50%	Low	Low	(progress) Low to High*	(progress) High to Low*
4	50-60%	High	Very high, Progressively	Low-Medium	Medium-High
3	60-80%	Medium	High	Medium	Medium
2	80-90%	Medium-Low	Medium	High	Low
1	90-100%	Low	Medium-Taper	Extreme	None

*** Willingness to train is low and the muscle soreness is high during the Peaking Index 5 because of the fact that competition season is over and athletes need rest and recovery.**

Peaking index is an index of the sport form and it is related to the **overall stress levels** (weekly workload) with the special consideration of the **volume and intensity**, **specificity of the training exercises/methods** and **training block** (emphasis). I could say this is more an art than it is a science. Listed percentages don't mean anything except being just guidelines.

One interesting concept I recently came across in the Training and Racing with a Power Meter book was the *cycling form*. This *cycling form* is the result of the fitness and freshness during the certain time period and it is determined by the sliding average training load over the longer time period (fitness) and sliding average training load over the shorter time period (freshness). This is all based on the Banister's Impulse-Response model. You can read more about this concept in the mentioned book or in The scientific inspiration for the Performance Manager or in What is the Performance Management Chart in TrainingPeaks WKO+?.

Thus this *cycling form* a **dynamic** state that is dependent on the workload you have done in the last, for example, 30 days (which is related to *fitness*) and workload you have done in the last, for example 5 days (which is related to *freshness*). This is why if you reduce training workloads to hold a peak for too long, you are going to lose your *fitness* and thus performance will suffer. Or if you keep pounding all the time your *freshness* will suffer. Thus, we are unable to hold a peak (sport form) for too long, and during the season, which is especially long in the soccer competitions, it is important to juggle with work and rest and the importance of the games and to plan accordingly. This is why Peaking Index is so useful in training planning.

Compared to cycling or running where objective data is used to calculate workloads, it is nearly impossible to objectively calculate workload in team sports, since we are doing strength training, practices, speed, endurance, etc. We just can't sum apples and oranges. One concept that might be useful could be subjective indicators like session-RPE. You can find more about subjective indicators in the Usage of subjective indicators in monitoring and programming of training article.

Speaking of weekly loading, it is important to mention that the bars on the 8-weeks pre-season plan graph are not absolute, but relative to peaking index, training block and microcycle type. Thus adjustment microcycle in the Aerobic Power block can be more stressful than loading microcycle in the Base block.

Contents of the blocks

In the table below is the listed content of the blocks from the physical preparation standpoint.

	Base Block	Aerobic Power Block	RSA Block
General Goals	Increase in Aerobic Capacity and Strength	Increase in Aerobic Power (VO2max, vVO_2max)	Improvement in RSA, glycolytic power/capacity and fatigue toleration
Duration	3-5 weeks	2-4 weeks	1-3 weeks
Speed	Acceleration, Hills	*Lower volume:* Max speed, Acceleration	RSA *Lower volume:* speed/acceleration
Explosive strength	Deceleration, low intensity plyos, explosive, reactive	*Lower volume:* explosive, reactive	*Lower volume:* Low intensity plyos
Strength	Strength Higher reps (progression)	*Lower volume:* Strength lower reps	*Lower volume and intensity (-10%)* Strength lower reps

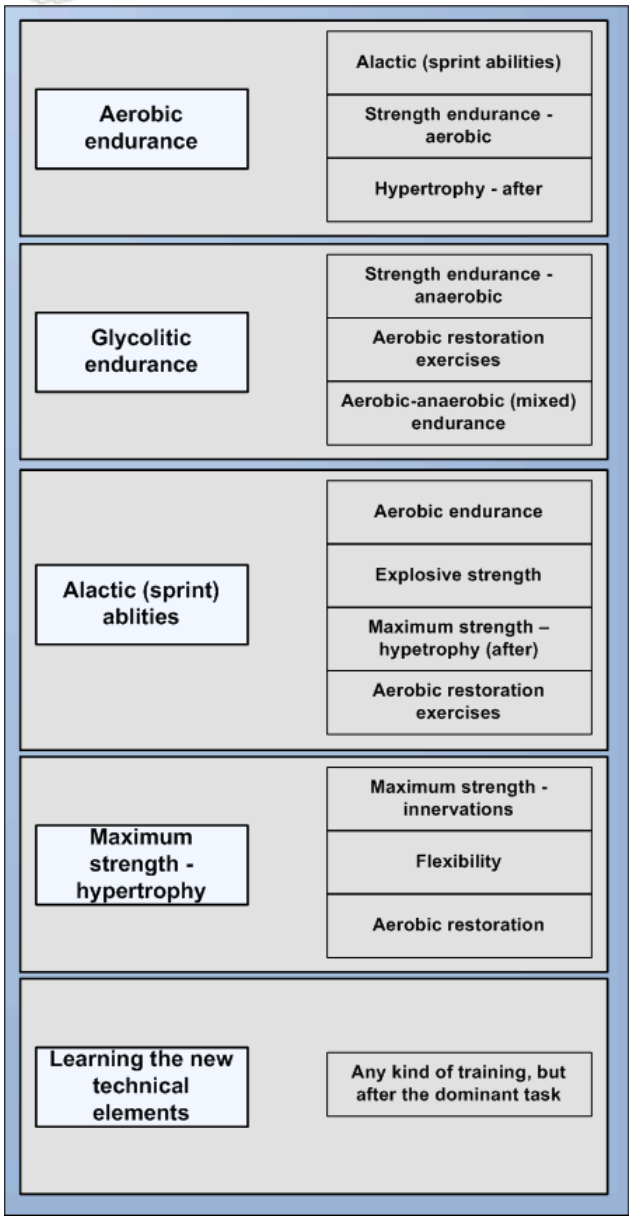
Aerobic power/capacity	Aerobic capacity Sweet spot Tempo 8v8-5v5	Aerobic Power Billat Intervals 3v3-4v4 *Lower volume:* Aerobic Capacity	*Lower volume:* Aerobic Capacity
Glycolytic power/capacity	None	None	RSA 2v2-3v3 possession Shuttles

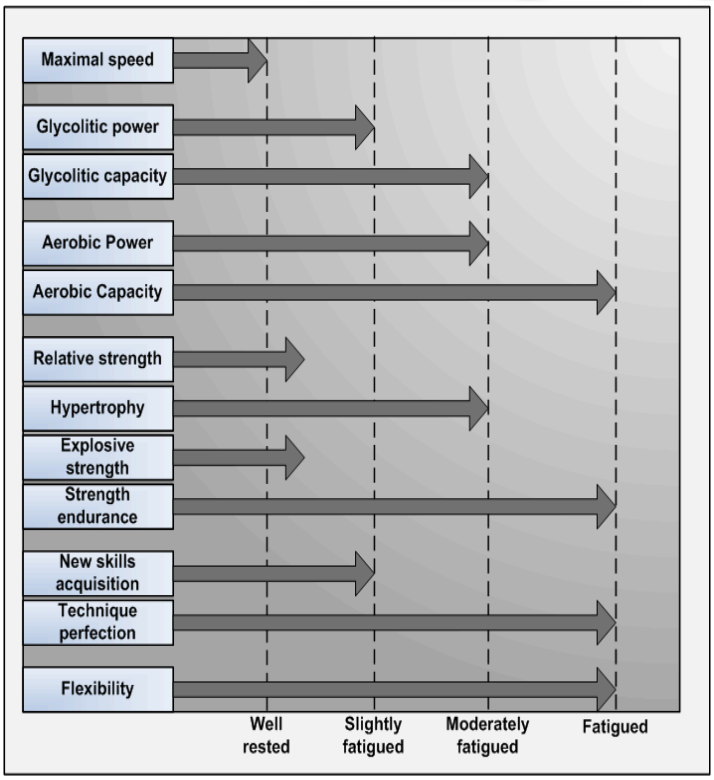
Even if the pre-season follows a general template there should be some time for more individual work on players' weaknesses, yet this depends whether we are talking about starter or bench guy, pro or developmental.

Planning of the microcylces

Now when we have global picture it is easy to plan individual microcycles. What I usually do is get some pre-planned **models** of the microcycles for a given training block, but plan from week to week, maybe a week or two in advance taking into account the global plan. It is impossible to plan every workout for the whole pre-season since you don't know in advance what will happen and how are athletes going to react. Yet, you should have a template or model.

For microcycle and training session planning I highly suggest getting Block Periodization by Vladimir Issurin. Issurin outlined numerous planning principles of the training sessions and microcycles, and some of them are compatibility of the motor abilities and optimal readiness for development of each. The following graphs are based on Vladimir Issurin's book.





It is of crucial importance to take those into consideration when planning microcycles and training sessions. Sometimes it is impossible to follow the guidelines and some compromises should be made.

Technical training sessions

As for technical/tactical training sessions (TE/TA) there are certain models, but before I present them it is important to classify the training exercises/method used in technical and tactical training sessions.

Competitive (CE)	10v10 on normal field 10v10 with tasks Friendly games Official games
Specialized developmental (SDE)	10v10 to 1v1 games with constraints with the aim of emphasizing/developing certain technical, tactical, strategical element on normal or reduced field size
Specialized preparatory (SPE)	Pre-set play (i.e. 4v0) Technical drills and polygons
General preparatory (GPE)	Ball control Technique correction Off-the ball movement mechanics

There are two types of TE/TA sessions: ordinary and complex. Ordinary training session is when only soccer practice is done and complex training sessions are when soccer practice is combined with physical preparation. The design of complex training sessions is dependent on the goals of physical preparation part of the workout (mostly energy system used), thus both parts need to be 'integrated'. In the table below there are couple of models that could be used as an example

Ordinary	Complex (ATP/CP)	Complex (Aerobic)	Complex (Glycolysis)
General Warm-up Specific Warm-up (GPE, SPE) SDE exercises/methods SPE exercises/methods SDE exercises/methods CE exercises* Cool down ** This model is based on Teaching Games for Understanding (TGfU) where you start with the game, isolate specific aspect, and end with a game to 'integrate' learned*	General Warm-up Specific Warm-up (GPE, SPE) Speed and Explosive strength (GPE, SPE) SPE exercise/methods SDE exercise/methods Strength (GPE, SPE) Cool down	General Warm-up Specific Warm-up (GPE, SPE) SDE exercises/methods SPE exercises/methods SDE exercises/methods Aerobic capacity/power games (SDE) Aerobic capacity/power games (SPE, GPE) Cool down	General Warm-up Specific Warm-up (GPE, SPE) RSA Glycolytic power/capacity (SPE, GPE) Glycolytic power/capacity games (SDE) CE exercises* Cool down ** The aim is to purposefully induce fatigue to practice CE in fatigued state*

8-weeks pre-season template

Although I will not cover microcycle templates (models) for each training block (and phase: preparatory, competitive and transition) and type, I will provide an 8-weeks pre-season template based on the solution of the three training blocks.

The planning process basically involves *vertical integration* of the training blocks, peaking index (PI), microcycle type and stress level.

For such a purpose we are going to design a table that integrates all the mentioned factors.

MC	Block	PI	Stress	Mon	Tue	Wed	Thu	Fri	Sat	Sun

The next step is to fill the table with MC, Training block, Peak Index (PI), stress level and dates, along with putting factors like scheduled travel, camps, medical check-up, testing and non-training days and friendly games.

MC	Block	PI	Stress	Mon	Tue	Wed	Thu	Fri	Sat	Sun
1	Base Block	4	A	Mon 10. Jan	Tue 11. Jan	Wed 12. Jan	Thu 13. Jan	Fri 14 Jan	Sat 15. Jan	Sun 16. Jan
2		3	L	Mon 17. Jan	Tue 18. Jan	Wed 19. Jan	Thu 20. Jan	Fri 21. Jan	Sat 22. Jan	Sun 23. Jan
									Friendly Game	
3		3	L	Mon 24. Jan	Tue 25. Jan	Wed 26. Jan	Thu 27. Jan	Fri 28. Jan	Sat 29. Jan	Sun 30. Jan
									Friendly Game	
4	Aerobic Power	3	A	Mon 31. Jan	Tue 1. Feb	Wed 2. Feb	Thu 3. Feb	Fri 5. Feb	Sat 5. Feb	Sun 6. Feb
									Friendly Game	
5		3	L	Mon 7. Feb	Tue 8. Feb	Wed 9. Feb	Thu 10. Feb	Fri 11. Feb	Sat 12. Feb	Sun 13. Feb
									Friendly Game	
6		3	L	Mon 14. Feb	Tue 15. Feb	Wed 16. Feb	Thu 17. Feb	Fri 18. Feb	Sat 19. Feb	Sun 20. Feb
									Friendly Game	
7	RSA	3	I	Mon 21. Feb	Tue 22. Feb	Wed 23. Feb	Thu 24. Feb	Fri 25. Feb	Sat 26. Feb	Sun 27. Feb
									Friendly Game	
8		2	PC	Mon 28. Feb	Tue 1. Mar	Wed 2. Mar	Thu 3. Mar	Fri 4. Mar	Sat 5. Mar	Sun 6. Mar
									OFC. TEST GAME	
9	CO MP	1	C	Mon 7. Mar	Tue 8. Mar	Wed 9. Mar	Thu 10. Mar	Fri 11. Mar	Sat 12. Mar	Sun 13. Mar
									GAME	

With friendly games it is important to provide certain progression in minutes played. Now, with this filled it is easy to continue with individual sessions based on templates (which I haven't provided though). Maybe you will not agree with the design/progression, but just keep in mind that this is only example.

MC	Block	PI	Stress	Mon	Tue	Wed	Thu	Fri	Sat	Sun
1	Base Block	4	A	Mon 10. Jan	Tue 11. Jan	Wed 12. Jan	Thu 13. Jan	Fri 14 Jan	Sat 15. Jan	Sun 16. Jan
				Speed Explosive TE/TA	TE/TA 8v8-5v5	TE/TA Sweet spot	Speed Explosive TE/TA	TE/TA 8v8-5v5	TE/TA Sweet spot	Rest
				TE/TA Strength	TE/TA Tempo		TE/TA Strength	TE/TA Tempo		
2		3	L	Mon 17. Jan	Tue 18. Jan	Wed 19. Jan	Thu 20. Jan	Fri 21. Jan	Sat 22. Jan	Sun 23. Jan
				Speed Explosive TE/TA	TE/TA 8v8-5v5	Speed Explosive Strength	TE/TA 8v8-5v5 Sweet spot	TE/TA Strength	**Friendly Game**	TE/TA Sweet spot
				TE/TA Strength	TE/TA Tempo		TE/TA Tempo			
3		3	L	Mon 24. Jan	Tue 25. Jan	Wed 26. Jan	Thu 27. Jan	Fri 28. Jan	Sat 29. Jan	Sun 30. Jan
				Speed Explosive TE/TA	TE/TA 8v8-5v5	Speed Explosive TE/TA	TE/TA 8v8-5v5 Sweet spot	TE/TA Strength	**Friendly Game**	Rest
				TE/TA Strength	TE/TA Tempo	TE/TA Strength	TE/TA Tempo			
4	Aerobic Power	3	A	Mon 31. Jan	Tue 1. Feb	Wed 2. Feb	Thu 3. Feb	Fri 5. Feb	Sat 5. Feb	Sun 6. Feb
				Speed Explosive TE/TA	TE/TA 4v4-3v3	TE/TA Tempo	Speed Explosive TE/TA	TE/TA 4v4-3v3	**Friendly Game**	Rest
				TE/TA Strength	TE/TA		TE/TA Strength	TE/TA		
5		3	L	Mon 7. Feb	Tue 8. Feb	Wed 9. Feb	Thu 10. Feb	Fri 11. Feb	Sat 12. Feb	Sun 13. Feb
				Speed Explosive TE/TA	TE/TA 4v4-3v3	TE/TA 8v8-6v6 Sweet spot	Speed Explosive TE/TA	TE/TA 4v4-3v3	**Friendly Game**	Rest
				TE/TA Strength	TE/TA Billat intervals		TE/TA Strength	TE/TA Billat intervals		
6		3	L	Mon 14. Feb	Tue 15. Feb	Wed 16. Feb	Thu 17. Feb	Fri 18. Feb	Sat 19. Feb	Sun 20. Feb
				Speed Explosive TE/TA	TE/TA 4v4-3v3	**Friendly Game**	TE/TA	TE/TA 4v4-3v3	**Friendly Game**	Rest
				TE/TA Strength	TE/TA Billat intervals		TE/TA Strength	TE/TA Billat intervals		
7	RSA	3	I	Mon 21. Feb	Tue 22. Feb	Wed 23. Feb	Thu 24. Feb	Fri 25. Feb	Sat 26. Feb	Sun 27. Feb
				Speed Explosive TE/TA	3v3-2v2 TE/TA	**Friendly Game**	RSA TE/TA	3v3-2v2 TE/TA	**Friendly Game**	Rest
				TE/TA Strength	Shuttles TE/TA		TE/TA Strength	Shuttles TE/TA		
8		2	PC	Mon 28. Feb	Tue 1. Mar	Wed 2. Mar	Thu 3. Mar	Fri 4. Mar	Sat 5. Mar	Sun 6. Mar
				TE/TA Sweet spot	Speed Explosive TE/TA	3v3-2v2 TE/TA	TE/TA	Tone TE/TA	**OFC. TEST GAME**	Rest
					TE/TA Strength	Shuttles TE/TA				
9	COMP	1	C	Mon 7. Mar	Tue 8. Mar	Wed 9. Mar	Thu 10. Mar	Fri 11. Mar	Sat 12. Mar	Sun 13. Mar
				Rest	Speed Explosive TE/TA	TE/TA 8v8-5v5	TE/TA	Tone TE/TA	**GAME**	Rest
					TE/TA Strength	TE/TA Tempo				

And that's it. Sometimes, or most of the times, it is not necessary to plan training sessions in advance this far, and we are for sure going to change thing or two, or even more. If the athletes are too fatigued, sometimes it is better to give a day off or an easy day instead of going by the paper and following it to the letter. Thus, consider this only as an example. As would late Charlie Francis say: "It is better to be undertrained than overtrained".

Addendum

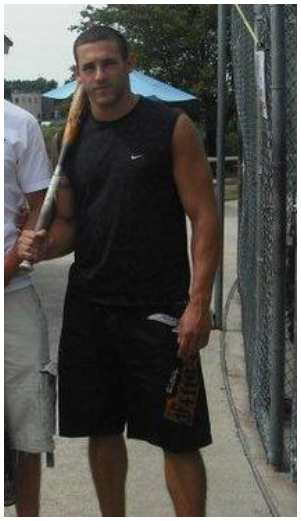
Having wrote original article series in January, 2011 and working in FC RAD as head physical preparation coach from that time, I have put a lot of mentioned ideas into practice. I must admit that we have reduced total training workload and kicked out *sweet spot* steady state workouts (since a lot of technical training volume falls under that zone) from our last pre-season period.

I am still trying to figure out periodization approach for in-season training, along with modifying pre-season training based on the real world training with elite soccer players. There is a lot of info on individual sports, based on *traditional* training theory, but when it comes to team sports there is a huge lack of information regarding training approaches and periodization. Following blindly *traditional wisdom* where one is about to peak 1-3 times a year and has 2-3 times longer preparatory period to competition period and applying it to team sports where the season is 2-4 times longer than preparatory period and where every Saturday/Sunday there is a match (or even more), is not very smart in my opinion. We lack real world info on this very subject, and sometimes I feel I am alone and need to find the solution on my own. For this very reason I ask for all the coaches out there to share their problems and solutions so we can all prosper in *team sports training wisdom.*

I am also asking readers to regularly check out Complementary Training blog for more up to date articles and thoughts regarding physical preparation in team sports, especially during the in-season. Me and my training approach evolve over time and by the time you read this e-book, I have probably changed a thing or two.

If anyone is about to utilize some of the ideas from this manual, I would be more than to hear your results and implementations. Good luck!

About the author



I am a physical preparation coach from Belgrade, Serbia, currently serving the position of head physical preparation coach in FC RAD, soccer club from Belgrade.

I was involved in physical preparation of professional, amateur and recreational athletes of various ages in sports such as basketball, soccer, volleyball, martial arts and tennis.

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