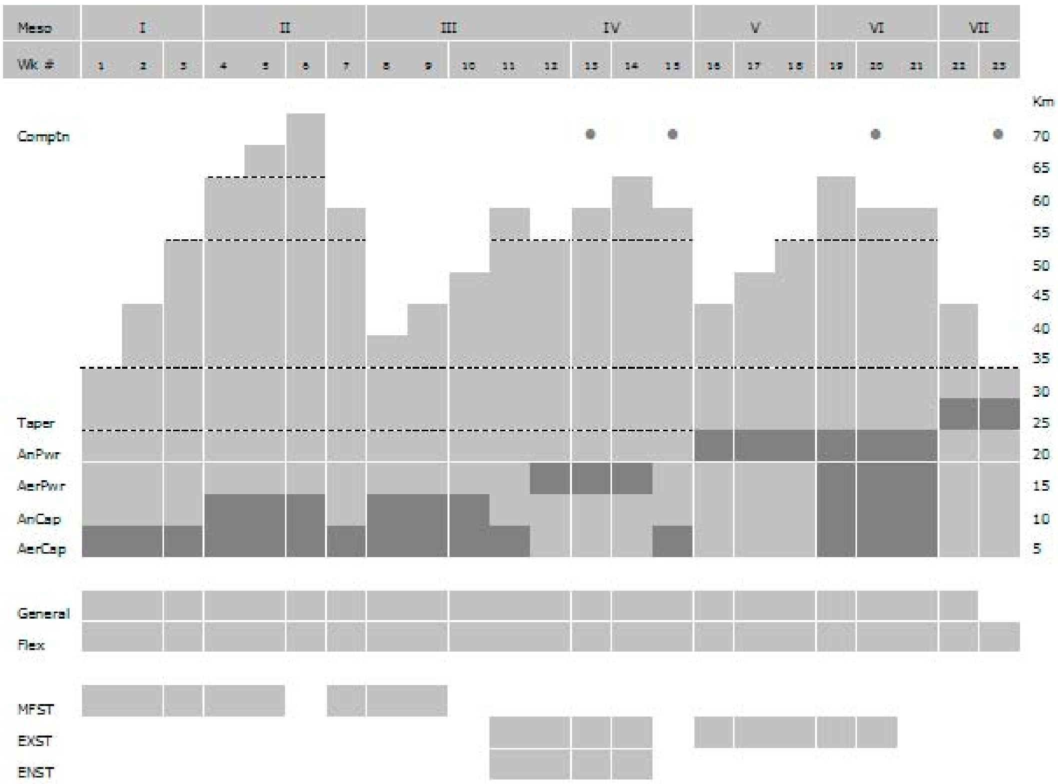
A
Swimming-specific Systematic Approach
To
Individual Performance Plans



CLIVE RUSHTON

Introduction

The Individual Performance Plan (IPP) will form the 'core document' on which all support services provided by the NZ Academy of Sport (NZAS) will be based. It will be compiled by the swimmer and coach in conjunction with NZAS and SNZ personnel. The final submission must be approved by SNZ before services can be accessed.

The services requested through the content of the IPP must each be seen to have a positive effect on a planned performance change of the swimmer. Each swimmer will require a different mix of support reflecting their individual strengths and weaknesses and their personal and training-specific circumstances but there are common themes which apply to all – these are the prioritized swimming themes which should be considered when compiling an IPP ready for final submission.

1. Stay healthy (if you are sick or injured you cannot train)
2. Hydromechanics (reducing the resistance to forward movement)
3. Biomechanics (maximizing the effect of available power)
4. Physiology
   - 4.1. Aerobic Capacity (increasing the total amount of energy available for aerobic conversion – equating to a bigger fuel tank)
   - 4.2. Anaerobic Capacity (increasing the quantity of energy available for anaerobic conversion – equating to a higher rev limit on the engine
   - 4.3. Aerobic Power (maximizing the use of aerobic energy during the race – equating to more and bigger cylinders)
   - 4.4. Anaerobic Power (maximizing the use of anaerobic energy during the race - equivalent to a higher octane level!)
5. Psychology (optimizing the integration of all systems to promote stabilization, consistency and predictability of performance)

Although the themes have been prioritized in terms of importance they need to be *considered* in a different order – there is no point looking at the implications for a healthy lifestyle (priority #1) until you can assess the time and stress effects of the required total workload (priorities #2, 3 and 4) and you can't assess those until you have determined the goal performance target and analysed it into its constituent parts to identify the components of the workload. First is to become clear about the performance goals, then aware of the implications of those goals in terms of training frequency, volume, content and effect. The 'workbook' approach to planning will, therefore, introduce content in the following order:

1. Target competition, performance goal, GAP analysis, and time available for change
2. Target splits (race segments)
3. Race analysis components (partial performance parameters)
4. Test results (complex performance diagnostics)

5. Multiple events and multi-day competitions
6. Recovery strategies
7. ‘Invisible’ training
8. Staying healthy
9. Consolidating the Plan
10. Checking the logical flow and ensuring ‘no stone unturned’.

Tables and examples are included in the test and consolidated working tables and charts are placed at the back of the document.

1

Target competition, performance goal, GAP analysis, and time available for change

Before starting to consider the themes for planning purposes you will need to determine your goal, your current status (starting point) and the amount of time available to make the necessary changes. The goal can be stated as a “result” or finishing position, (win the World Championship Trials) but that doesn’t help the planning process much. Better is to state a “performance” or time, (swim at least 0:59.0 at the World Championship Trials) and best is to use a combination of both (win the final at the World Championship Trials by swimming at least 0:59.0). The “at least” is very important. Declare this performance goal for <u>each</u> of your main events. Next, identify the target competition and date, and calculate the number of weeks available for change.

Current		Target Competition			Weeks
Date	Week #	Name, venue	Date	Week #	available
3-jul-2006	*27*	*World Champs Trials, AKL*	*12-Dec-2006*	*50*	*23*

Clearly state your performance goal

Win the final at the World Championship Trials by swimming at least 0:59.0

Calculate the time and percentage differences between your current performance level and your goal level.

			Difference	
Goal performance		Current performance	Time	Percentage
			1:00.36 minus 0:59.0	MSExcel:=1.36/60.36%
Event *1*	*0:59.0*	*1:00.36*	*0:01.36*	*2.25*
Event 2				
Event 3				
Event 4				

This simple exercise will indicate if your goals are high enough to justify the investment of SNZ and NZAS services and if they are ‘realistic’. As a ‘rule of thumb’ anything over 3% would be difficult to envisage in less than a full year but this depends on your current age and standard, training background and current training circumstances, and individual ‘talent’ or ‘response-ability’.

Next, answer honestly if the goal is attainable <u>in the available time</u>.

Yes	*No*

If you think the 'performance GAP' is not closable in the time available you should revisit the target performance level and set it at a tough but attainable standard.

If you are happy with the goal performance you can make an initial assessment of any necessary changes to the broad training programme, particularly frequency (number of training sessions each week) and volume (total kilometers each week); don't lock these in place at this stage but make a note of them. The accompanying checklist with tick-boxes indicates the probable support areas relevant to this step in the process. There is a consolidated chart at the end of the workbook to bring all the necessary support services together.

Anthropometry	
Training conditions	✓
Biomechanics	
Exercise physiology	
Strength & conditioning	
Nutrition	
Sport psychology	
Massage	
Medical	
Physiotherapy	
ACE	
Coach support	

2

Target splits (race segments)

The next step is to identify the distinguishing characteristics or qualities of the goal performance, compare these to your current status in the same areas, then identify the support required to attain the new goal.

State your target splits for your goal performance, then compare them to the splits for the world record for that event.

Target		Word record		% difference
	0:59.0	*0:56.61*		
Target spit	% of total	World record split	% of total	Difference in %
0:27.5	*46.6*	*0:26.67*	*47.1*	*+0.5*
0:31.5	*53.4*	*0:29.94*	*52.9*	*-0.5*
	MSWord =31.5/59.0%			53.4-52.9

Compare the way you plan to split the race with the way the world record holder splits the race – does your way make sense? Everyone will be slightly different but, if it looks radically different (say, more than 1% difference for any single split) you should reassess your race strategy (the world record holder probably knows what they're doing). The example shown is questionable because, although there is less than 1% difference, the two splits are approximately +0.5% and -0.5% which is a 1% stretch over 100m; the question must be asked, "*Can this swimmer swim this strategy when the world record holder does something radically different?"* It may be possible but searching questions must be asked.

Now compare your target splits with your PB splits:

PB		Target		% difference
	1:00.36	*0:59.0*		
PB spit	% of total	Split	% of total	Difference in %
0;29.07	*48.2*	*0:27.5*	*46.6*	*-1.6*
0:31.29	*51.8*	*0:31.5*	*53.4*	*+1.6*

This strategy is a major change from the way this swimmer arrived at their current best time and should be revisited – the 1st to 2nd 50m 'drop-off' for the world record holder was 3.27 seconds, the target split drop-off is 4 seconds but the PB was set with a 2.22 second drop-off. It seems stupidly wrong to change race tactics so drastically.

Once you have target splits which make sense and have compared them with your historical race splits you can make your second assessment of required changes to the training programme. If your target splits are essentially the same *patterns* as your PB splits (i.e. similar percentages) you may simply need to continue your training content as before but with greater focus and application. In the above example the target splits are significantly different to the word record splits but the historical splits (PB) are more evenly split than the world record race pattern; why change? This is an example where the swimmer and coach should go back and re-think the goals.

If the finally agreed goal splits show a radically different pattern than the PB splits then either the race strategy needs to change to take best advantage of conditioning or the training content needs to change to allow the performance to occur because of a more beneficial effect.

Race strategy

- Going out with less effort will allow you to continue through the race at even pace or, more efficiently, using negative splits and will help save energy for a big finish.

Training effect

- Better aerobic training will enable you to go out
- fast and allow you to continue through the race at even pace or, more efficiently, using negative splits.
- Better anaerobic training will enable you to finish the race at a higher speed.

Anthropometry	
Training conditions	
Biomechanics	
Exercise physiology	✓
Strength & conditioning	
Nutrition	
Sport psychology	
Massage	
Medical	
Physiotherapy	
ACE	
Coach support	

3

Race analysis components (partial performance parameters)

So far we've looked at 'surface' data which describes how fast you're swimming but it tells us nothing about how you're swimming fast. The race needs to be broken down into segments and 'partial performance' indicators and a good amount of detail considered. Data on the world's best swimmers is available on www.swim.ee and you should compare your performance with this data to determine your strengths and weaknesses. You may not be able to complete all the partial measurements but the more data you have the better you are able to plan; however, even the minimum readily available data will give you a clear picture. The percentage difference between your current status and your goal (using the world best percentages) will indicate your relative strengths and weaknesses – there will be a greater possibility of change in the areas where you have the bigger difference. The start, turn and finish need to be examined as well as the stroke length (SL - the distance traveled during each stroke cycle), stroke rate (SR - the repetitive frequency of the stroke cycle) and 'clean swimming speed' (CSS (swimming unaffected by starts, turns or finish, i.e. between 15-45m and 60-95m during a 100m race). This exercise does not compare your speed with the speed of the world record, it compares the way you put together your swim with the way the world record holder puts together their swim. Once you have determined the degree of change required in each area you can start to plug in the appropriate training to bring about the change:

	Current Status		World Record		
	1:00.36		*0:56.61*		
	Time	% of total	Time	% of total	Difference in %
Start (15)	*7.00*	*11.6*	*6.73*	*11.9*	*-0.3*
1st 25m	*13.08*	*21.7*	*12.39*	*21.9*	*-0.2*
Finish	*3.36*	*5.6*	*2.92*	*5.2*	*+0.4*
Avg turn (5+10)	*9.00*	*14.9*	*8.64*	*15.3*	*-0.4*
Avg CSS (m/s)	*1.60*		*1.70*		*-5.9*
Avg SL (m)	*1.74*		*1.81*		*-3.9*
Avg SR (s/min)	*55.3*		*56.6*		*-2.3*

In common swimming coach terms:

Time = distance (m) / average velocity across the whole race (m/s). e.g. 60.36 = 100/1.6567

Velocity = SR in strokes/minute / 60 * stroke length in m/cycle. e.g. 1.6567 m/s = 55.3 / 60 * 1.74

SR = velocity in m/s* 60/ stroke length in m/cycle. e.g. 55.3 strokes/minute = 1.6567 * 60 / 1.74

SL = velocity in m/s * 60/ stroke rate in <u>cycles per minute</u>. e.g 1.74 m/cycle = 1.6567 * 60 / 55.3

The example shown illustrates close similarities in the way the swims are constructed – comparisons of the times for each sector as a percentage of the total swim show 0.4% or less difference in the start, first 25m, turn and finish proportions; the race *strategy*, therefore, does not need to change significantly, in fact, except for fatiguing at the finish, this swimmer is [relatively] slightly better than the world record holder in these measured areas. However, when we examine the methods used to attain those times we immediately see why the world record is so much faster – in terms of CSS it is nearly 6%, almost the full 3.75 seconds difference between the two swims. The *components* of CSS, SL and SR are 3.9% shorter and 2.3% lower than the WR values, both quite large differences.

Speed on the first 25m
Deficiencies in this parameter could be caused by a deficient start (15m), an inability to 'get out fast' after the start (15-25m) or a combination of both. You may need a higher maximal speed which could be attained by having a higher stroke rate after the dive or it may be purely because of an inefficient and ineffective dive; either way the required training will become obvious if you analyse the current status.

Start
The start is traditionally measured from the starting signal to the head passing the 15m mark. The speed of this segment has a significant affect on many race results, especially if a high speed can be attained with a low energy cost. Once you have your personal data (from race timing by your coach or the official Race Analysis from NZ Championships and major competitions), compare it to the world norms using the percentage of the total race time, e.g. 7.0 seconds for the start as a percentage of 60.36 seconds for 100m is 11.6% (7.0 divided by 60.36 multiplied by 100 or in MS Excel =7/60.36%); the world standard is 11.9% so this swimmer is relatively faster than the *pattern* of the best – the time may not yet be at world's best level but the race strategy is correct.

If the start results are less than they should be (measured <u>during</u> a race, not using one-off starts in training because these will invariably be faster than manageable in a race) you may need:

1. Flexibility to get into a more effective start position
2. Better reaction to the starting signal
3. Power to drive off the block faster
4. Core strength to hold a firm, controlled, streamlined position on entry and during the underwater phase
5. Better underwater kick technique
6. Increased leg power promoting a faster and/or stronger kick
7. Better coordination in the 'breakout' or transition to swimming ("swimming through the surface")

The number and combination of these improvements deemed both necessary and possible will indicate the type of additional training you need to include in your IPP:

1 and 4 will require targeted stretching.
2 may require neural training (faster muscle contraction response) or psychological input (improved concentration).
3, 4 and 6 will require land based strength and conditioning exercises and more specific start training (e.g. at least 200 starts each week, which is land-based strength and conditioning with the fall broken by landing in the water!)
5, 6 and 7 will require specific kick training in the water
#7 will require specific stroke coordination training

Clean Swimming Speed (CSS)

The choice is; raise one value while keeping the other stable, or raise both values. If either SL or SR were very low it may be advantageous to plan training to attack just the single low parameter, in which case either SR would have to raise to 58.6 or SL would have to lengthen to 1.844; these are HUGE changes but *either* would take the swimmer to the same CSS as the world record holder.

The +10cm SL change may not seem a lot, it is after all, merely the length of this line -- but changes of that magnitude are dangerous with elite level swimmers – they tend to change the whole balance of the stroke, coordination is almost impossible to maintain, and the additional strength required to control the body while maintaining the original SR would take years to develop. Targeted SL changes in swimmers of Open-level international standard should be no more than 1 or 2cm each year. This swimmer's goal time is 'only' 1.3 seconds faster than the current status so a change of 1cm in average SL (to 1.75m) and 1 stroke per minute in average SR (to 56.3) will be enough to make the difference; those are SMALL changes but they will take some carefully planned training to be incorporated into the swimmers repertoire in a manner which is stable under competitive conditions.

If the deficiency is in CSS the problem could be related to, technical or physiological issues or core body position problems. Technical issues affect stroke length and physiological issues affect stroke rate. Low core body strength will detrimentally affect streamlining by increasing wave and /or form drag (not form and/or wave drag) and, as a consequence, produce technical and physiological problems,

Core body position

Core body strength issues will be observable by the coach during training and during a race. In the case of an inability to *achieve* a sound body position the training plans would identify stretching as a suitable inclusion to increase flexibility, or the case of an inability to *maintain* a sound body position, strength and conditioning would be identified.

Identification of technical or physiological deficiencies will be related to the propulsive impulses delivered by the hands or feet; technical problems will revolve round a) power delivered in the wrong direction, b) power delivered for too short a time, or c) not enough power. Physiological issues will be either caused simply by the frequency of the propulsive impulses or an inability to transfer momentum from the 'fixed' hand through the arm to the rotational joint of the shoulder allowing the body to move forward. SL and SR are standard Race Analysis measurements at NZ Championships and major international competitions and should be monitored regularly by coaches during training and recorded during every race. Data from the world's best swimmers is available on www.swim.ee. Note, it is not possible to consider SL or SR in isolation from each other – they are inextricably intertwined; change one and you will affect the other. The good trick is to improve one and lose less on the other than you have gained on the one, a better trick is to improve one and keep the other stable, while the best trick is to improve both (that's the way to world records). Each swimmer's SL and SR combinations will differ depending on their height, relative limb length, technical effectiveness and efficiency, style of swimming, streamlining, physical conditioning, and genetic neural and physiological make-up; however, there are quite tight long/short and high/low ranges of SL and SR which characterize swimmers at world level – if you are outside those ranges you'd better grow or identify some drastic training input to correct the deficiency.

Extending stroke length should mainly be attempted with swimmers whose technique is deficient. Swimmers with well constructed, stable technique will have relatively consistent stroke length which is mainly a function of limb length and other stable physical dimensions. Technically stable swimmers who improve their performance may give the illusion of increasing their stroke length when they actually maintain their length for a larger proportion of the race before it starts to decay. Just how much potential speed is lost is determined by where the decay starts during the race and the degree of that decay.

SL should be expected to deteriorate during a race; if it doesn't the swimmer is not racing at their limit, however, the goal should be to maintain as much SL as possible and increase the SR. However, extending the stroke length beyond a 'naturally flowing' rhythm early in the race demands a high use of strength and is an illusion – the appearance of a long 'stroke' is actually a longer 'fix' and glide without any additional propulsive impulse.

Technical: (affects SL)

- Power delivered in the wrong direction – required training changes would be simple stroke technique adjustments (IPP may include video or flume visits) and may also involve flexibility to enable more advantageous limb positions to be comfortably held.
- Power delivered for too short a time – this will require complex stroke technique adjustments using underwater video and/or flume visits.
- Not enough power – a simple strength and conditioning issue.

Technical adjustments and changes should be factored into the IPP early in the season so they become stabilized before the competitive period and their benefits are felt throughout the majority of the preparation period.

Physiological: (affects SR)

- Frequency of propulsive impulses – if this parameter is higher than the accepted range then the problem is probably related to SL which will be too short. If SR is too low the IPP inclusion would be high-speed sprints to increase neural activation and/or lactate production sets.
- Ability to transfer momentum – inclusion may be explosive strength exercises in swim-specific positions including eccentric explosive strength designed by the Strength & Conditioning provider.

Combined with the average CSS (SL and SR relationships) across the race should be a comparison of the *degradation* of each parameter <u>during the race</u>. If the SL deteriorates to an unacceptable degree during the race it will be related to swim-specific strength and require increases in anaerobic power. If the stroke rate deteriorates or the swimmer is unable to raise it to compensate for deterioration in SL it indicates a deficiency in swim-specific endurance and aerobic power will require development.

Finishing speed

This is measured over the final 5m of the race (head passing the flags to the hand touching the wall) and is important in shorter races or in extremely tight finishes. Problems here are usually related to determination to win, concentration regarding awareness of challenging competitors, or a lack of knowledge of the best stroke-specific methods of reaching the wall ("*It is the swimmer's responsibility to activate the touchpad at the earliest possible opportunity*." CR). In rare cases the problem may be physiological requiring an increase in anaerobic power (VO_2Max) and/or the ability to use it during extreme fatigue conditions (lactate tolerance). Each identified are of weakness can be factored into the IPP.

Turns

These are measured from the head passing the flags when approaching the wall to the head passing the 10m mark on the push-off – a total of 15m, sometimes known as "5-in+10-out". There are five phases of the turn each of which requires observation, measurement and analysis before IPP services can be appropriately applied:

- Approach – swimmers may slow down when approaching the turn, usually because they have not practiced enough high-speed turns in training. IPP input may be simple – train better, or may be complicated because training conditions are sub-standard with too many swimmers in each lane, a pool too shallow for effective practice or apparently insufficient time available for turn practice. The latter 'reason' is, in fact an excuse and should not be part of an IPP submission.
- Rotation – the time from the end of the last stroke to the feet hitting the wall should be the same as the time taken for one stroke cycle; if it is longer then the speed of rotation (forward for long-axis strokes, backwards for short-axis strokes) is too slow. IPP input may be gymnastic exercises for agility, core strength development, filming to identify biomechanical deficiencies (e.g. legs too straight on log-axis strokes, or feet too far apart on short-axis), or education to teach effective movements.
- Feet on wall – this should last <u>no more</u> than 0.3 seconds; if it is longer the problems fall into two classes, a) lack of mental focus and application, b) incorrect head position when the feet hit the wall. The first one is addressed by a sharp slap to the head! The latter one is important – if the head is higher or lower than the feet the swimmer cannot push in a straight line and usually waits until an easier push is possible when the body has re-aligned; the waiting takes time! Underwater filming (or an observant coach) will demonstrate the problem and teaching will enable the swimmer to have the head and body ready to push *when* the feet arrive at the wall, not after.
- Push – first check out the head position when the feet hit the wall; if it is wrong, as explained above and the swimmer still pushes, the push cannot be effective – it cannot be parallel to the water surface and must follow a banana-shaped trajectory. Other areas of potential improvement on turns are the same as points # 3 through 6 from the start:
    - Power to drive off the block faster
    - Core strength to hold a firm, controlled, streamlined position on entry and during the underwater phase
    - Better underwater kick technique
    - Increased leg power promoting a faster and/or stronger kick
    - Better coordination in the 'breakout' or transition to swimming ("swimming through the surface")

  …and the remedies are the same.
- Transition – exactly the same as point # 7 from the start.

In addition to analysing one-off test situations or the *average* SL, SR or turn time during a race, you need to know the *actual* data for *each* turn and a mid-pool measure of SL *and* SR for *each* 50m of a race. The *change* in these values during a race is as important, maybe more important, than the average value for the whole race. Degradation of results will indicate a lot about the physiological conditioning of the swimmer and the ability of the swimmer to control parameters during conditions of high fatigue, while random fluctuations of values during a race will indicate focus and application issues.

Anthropometry	
Training conditions	
Biomechanics	✓
Exercise physiology	✓
Strength & conditioning	✓
Nutrition	
Sport psychology	✓
Massage	
Medical	
Physiotherapy	
ACE	
Coach support	✓

4

Test results

Formal standard tests under [relatively] controlled conditions are easy to set up for swimmers. Pool conditions are stable and the fatigue state during a micro-cycle is readily controllable. Monitoring the effect of the training is achieved through step tests, usually 6 or 7 x 200m with 'stepped' increasing speed. Blood samples analysed for lactate and glucose allow detailed analysis of the event-specific aerobic oxidative, aerobic glycolytic and anaerobic condition of the swimmer. Specific measures include the speed of the swimmer at a standard lactate value (usually 4mM), known as tV4 (time at velocity 4), the maximum lactate value (LaMax) and the relationship between those two points. tV4 illustrates the aerobic capacity of the swimmer, La Max the anaerobic capacity and the relationship illustrates the applied power. Stroke count (indicating stroke length and technique effectiveness), stroke rate and heart rate add to the data-rich possibilities of feedback allowing the next training phase to be planned effectively and in full knowledge of the swimmer's physiological status.

Competitions are a special form of training and a wonderful opportunity to set up a test situation **IF** the correct data is collected and observations, analysis and evaluations are made.

5

Multiple swims

Anthropometry	
Training conditions	
Biomechanics	
Exercise physiology	✓
Strength & conditioning	✓
Nutrition	✓
Sport psychology	✓
Massage	
Medical	
Physiotherapy	
ACE	
Coach support	✓

Key characteristics of world class swimmers are the ability to perform a PB in heats, swim faster in semi-finals, even faster in finals, and repeat the demonstration four or even more times across a multi-day competition. Success depends on these multiple swims - heats, semi-finals and finals, and multiple swims on individual and relay events demonstrating the ability to a) repeat, b) increase performance, c) be resilient across multi-day competitions. Deficiencies in the ability to perform well in each of these areas are best analysed in terms of capacity:

In "The Science of Winning" Jan Olbrecht identifies characteristics of swimmers with high or low aerobic and anaerobic capacities; coaches can 'label' swimmers depending in which matrix quadrant they fall, and learn clear training messages.

Aerobic Capacity	Anaerobic Capacity: Low	Anaerobic Capacity: High	Aerobic Capacity
High	• No better competition performances after intense or extensive and voluminous work • No real feeling of exhaustion after races and impression of being able to swim faster • Swimmer performs best in competition shortly (4-6 days) after voluminous training • Swimmer does not like short interval workouts or fartlek exercises • No clear improvement of competition results if taper lasts longer than 1 week • No high lactates after maximal short as well as distance events • Competition best times on long distances are relatively better than on short events • Best times in long and short course pools are nearly the same	• Performs very good even when not tapered • Several best times during successive days of competitions • Very fast recovery from training and competition • Reaches high lactates after short and long events • Is fast on short and long events	High
Low	• Develops over-use injuries easily • No high lactates after maximal short events, but high values possible after long events • Bad results on long events and moderate performances in short competitions • Slow recovery from training and competition	• Reaches high lactates after short and rather low values after long events • Swimmer 'dies' in the last part of the event • Only 1 (or 2) good events in competitions of more than 1 day • Bad results on long events but very good in short races • Best performances after long rest	Low
	Low	**Anaerobic Capacity** High	

Distractions and unusual or unexpected conditions

Anthropometry	
Training conditions	
Biomechanics	
Exercise physiology	
Strength & conditioning	
Nutrition	
Sport psychology	✓
Massage	
Medical	
Physiotherapy	
ACE	
Coach support	✓

Easily distracted swimmers will not apply themselves consistently in training nor prepare themselves appropriately for competition. Those who cannot deal with unusual conditions (e.g. intense heat or cold, high humidity) will not have a flexible enough performance model and will consider their preparation as one-dimensional and impossible to adapt. Those who are 'phased', thrown off track by unexpected conditions (e.g. travel and transport complications, competition delays, broken goggle straps at the starting line) require better pre-competition training using tactics deliberately designed to distract and confuse – the coach is responsible for this. In extreme cases sport psychology may be used to help the swimmer cope or adapt and accept a more flexible performance model.

> *"My first suggestion for the better mental preparation of swimmers would be the better educational preparation of coaches."* James 'Doc' Counsilman

Monitoring and recording

Swimmers and coaches should keep daily records and logs of work done and results posted, together with impressions, thoughts and comments. The minimum evidence necessary to ensure accurate tracking, monitoring and effective evaluation of training is the annual competition and training plan, swimmer attendance record, and test set and competition results. Regular 'step tests' are a compulsory inclusion in IPP.s

Anthropometry	
Training conditions	
Biomechanics	
Exercise physiology	
Strength & conditioning	
Nutrition	
Sport psychology	
Massage	
Medical	
Physiotherapy	
ACE	
Coach support	✓

Some swimmer and coach units will benefit from daily 'blind' assessment of the swimmer's application and attitude. This is especially true when the swimmer is easily distracted or does not exhibit regular application to 'deliberate' training ('training which elicits maximal feedback'). Swimmer and coach should score each training session (on a '1 to 5 scale) for application, attitude and performance. Clear messages will appear. If both regularly score low, the swimmer has to change; if both regularly score high there is no problem, if there is a distinct and regular dissonance between the scoring (e.g. swimmer scores 4, high, whereas the coach scores 2, low) intervention may be required so both parties view the task in a similar manner.

6

Recovery

In answer to the question, "*What if the swimmers are not recovering from one weights session to the next?"* an eminent strength expert replied, "*Train more often*."

Short of causing acute injury, it is probably not possible to train too hard. In fact, the point of training is to cause problems in cellular tissues which then repair themselves to a more appropriate structure or higher functionality. Problems with adaptation are caused not by training too hard but by recovering too little. Careful micro-cycle (short-cycle) design, a healthy performance lifestyle and intelligently planned recovery measures will ensure high training loads can be continued throughout the season without physical breakdown causing sickness, injury and lay-offs; without continual high training loads high goals are not possible.

Recovery measures include appropriate and adequate nutrition, adequate sleep and rest, and massage - especially during periods of high volume or high intensity work. Correct nutrition depends on a full understanding of exercise and food – if help and advice are required place them in the IPP early in the season so understanding can be consolidated and absorbed into a performance lifestyle and any 'nutritional lag' (time delay while vitamins and minerals work their invisible magic) can be planned prior to the most intense training periods. Expect an extended period to occur, maybe even a number of years, before a full understanding of the effects of good or bad nutrition on training and competition performance is gained.

Anthropometry	
Training conditions	
Biomechanics	
Exercise physiology	✓
Strength & conditioning	
Nutrition	✓
Sport psychology	
Massage	✓
Medical	
Physiotherapy	
ACE	
Coach support	✓

Massage sessions (if allowed as part of the IPP) should be planned in line with the intensity and volume of work. They are not a luxurious privilege but an effective recovery measure to ensure the swimmer is 'ready to go' for the next training session and phase. Plan them as a finite number each week (0, 1 or 2) at appropriate times throughout the season.

7

‘Invisible training’

Anthropometry	
Training conditions	
Biomechanics	
Exercise physiology	
Strength & conditioning	
Nutrition	
Sport psychology	✓
Massage	
Medical	
Physiotherapy	
ACE	✓
Coach support	✓

Surrounding the best training plans, best coaches and most dedicated swimmers is the dreaded effect of invisible training – that which takes place away from the pool or gymnasium. School pressures, exams, bank balances, employment issues, accommodation, family and personal relationships, expectations from support groups and self, imposed deadlines for performance, etc. all take a high toll, either in time or energy, on the ability of the body to cope with high training loads. A performance lifestyle demands these pressures and constraints are absent or at least managed and controlled and a healthy, positive attitude permeates the approach to goal attainment. ACE service providers will help ensure all the invisible training issues are identified and appropriate programmes or support put in place.

8

Health

Underlying all the previous categories of consideration is health! If you are sick or injured you cannot train. If you cannot train, you cannot improve; you must, therefore, stay healthy.

The IPP must include an annual medical screen, together with anthropometric and muscle balance assessment at the beginning of each season. These will identify any underlying conditions or deficiencies before they start to hinder training or performance. Appropriate services will then be identified by the health care professionals and may include physiotherapy, strength & conditioning etc. These are remedial inputs and will only become part of the IPP after the initial screening.

Anthropometry	✓
Training conditions	
Biomechanics	✓
Exercise physiology	✓
Strength & conditioning	✓
Nutrition	✓
Sport psychology	✓
Massage	✓
Medical	✓
Physiotherapy	✓
ACE	✓
Coach education	✓

9

Constructing the annual plan

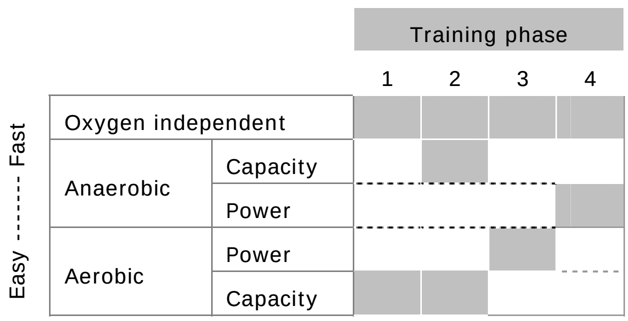
Once you have identified all the issues relevant to the individual swimmer you can start to fill in the components of the plan. Many of the IPP categories are measurable, some are not; subjective assessment and intelligent 'guesswork' based on knowledge and experience is required to determine some of the necessary components of the Plan. The swimmer and coach, however, must make an educated assessment as to <u>which</u> changes are possible in the time available and the <u>amount</u> of change possible in that time – this will mean your goal % change will likely not exactly mirror the list of differences between your current status and the world's best as, for most swimmers, the short, or medium term goal is not the world record. Your *long-term* goal should, of course, be to mirror, or exceed those differences between your current performance and the world record.

Anthropometry	
Training conditions	✓
Biomechanics	✓
Exercise physiology	✓
Strength & conditioning	✓
Nutrition	
Sport psychology	
Massage	
Medical	
Physiotherapy	
ACE	
Coach support	✓

Only two factors will be known before all the preceding analysis is conducted – the date of the target competition and the starting date; these two will produce the number of weeks available for training but until all the analysis has been carefully thought through there is no way any planning can assume training intensities, frequencies, volume or balance; quite simply, without the analysis the coach and swimmer have <u>no idea</u> what training will be necessary to achieve the goal or if the goal is remotely attainable in the time available. Of course, the analysis may make clear that much higher goals than originally envisaged are possible – wouldn't that be good news?

As well as the target competition there will be other important competitions which can be pencilled in. They should not, however, be 'cast in stone' at this stage unless the swimmer has a contractual obligation to attend.

Coaches should plan their periodisation depending on the individual characteristics and current training status of their swimmers but the general training sequence should be as indicated here – first, general 'base' endurance work, then further development of the aerobic capacity together with anaerobic capacity. This is followed



by transforming the aerobic capacity into aerobic power and finally transforming the anaerobic capacity into anaerobic power. Oxygen independent training - maximal speed (therefore very short distance) sprints – can happily live with all other types of training and can be included in all phases. The total training period available is termed the macro-cycle (big-cycle), while each discreet phase is a meso-cycle (middle-cycle) and will consist of a number of consecutive micro-cycles (small-cycles), each usually lasting a week and where one particular physiological response is targeted.

The time spent on each phase will depend on the importance of each quality to the race performance (1,500m swimmers will require less anaerobic power than 100m swimmers), the individual condition of the swimmer in each particular area (a 100m swimmer with low anaerobic power will require more time to develop it to a useful degree) and the number of weeks available before the target competition. These decisions cannot be made until the analysis has taken place.

Significant aerobic capacity development takes around two months (although noticeable changes can be observed in as little as 10 days) and anaerobic capacity around four months; for most swimmers this means anaerobic capacity development has to be planned across more than one competitive season because there will not be four clear months available when this can be a priority.

It is clear the extreme edges of the speed spectrum need to be developed before the middle sections. Many training programmes make the mistake of training all the time towards the middle of the speed spectrum in the power modes, with detrimental consequences to recovery, ability to transport oxygen, store glycogen, enervate FTb fibres and the capability to reach high intensity tension levels; most programmes, therefore, do not maximally develop their swimmers.

The precise amount of required change in each area will be determined from the results of the step tests so the number of planned weeks in each phase may change as you go through the operation of the plan ("*Plan for the plan to be disrupted*." Helga Pfeiffer), however, pencil into the annual plan the 4 distinct phases and make an initial assessment of how many weeks you need to spend on each general phase.

Meso	I	II		III		IV		V	VI	VII	
Wk #	*1-3*	*4-6*	*7*	*8-10*	*11*	*12-14*	*15*	*16-18*	*19-21*	*22*	*23*
Comptn						● ●			●		●
Taper										■	■
AnPwr								■	■		
AerPwr						■			■		
AnCap		■		■					■		
AerCap	■	■	■	■	■		■		■		

There is a systematic progression through the various intensity levels designed to bring the swimmer to a peak at the planned time. Three-week groups of emphasis are separated by single weeks of 'regeneration' training. Many coaches use the term 'recovery' instead of regeneration but it has too many relaxed overtones. These weeks are not slow, inconsequential or littered with infrequent swimming but have an extensive aerobic emphasis allowing the organism to 'supercompensate' from the previous training phase. The regeneration weeks presume an essentiality as a result of extremely 'deliberate' and debilitating training during the previous phase; if the swimmer is merely going through the motions regeneration should be replaced by resurrection ('new start').

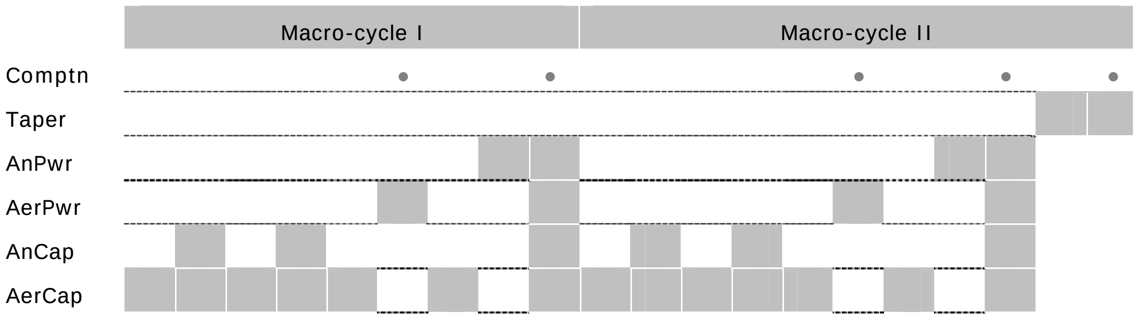
Immediately prior to the taper weeks there is a 3-week block where all training modes are included. Each mode can be 'cycled' throughout each week allowing each to be 'fine tuned' and resulting in the maintenance, consolidation and integration of the qualities of each mode without over-fatiguing the body or allowing the deterioration of any qualities. This inclusion also allows the taper to be shorter as supercompensation will start to occur during the 'cycled' weeks. This design of micro-cycles for these pre-taper weeks has shown excellent results:

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
a.m.	*AnCap or AnPwr*	*AerPwr*	*AerCap*	*AnCap or AnPwr*	-	*AerCap*	-
p.m.	*AnCap or AnPwr*	*AerPwr*	*AerCap*	*AerPwr*	*Regen*	-	-

The example shows a 23-week macro-cycle with generally equal 3-week blocks of emphasis separated by single weeks of regeneration. The total length of the macro and the relative duration of the respective modes of emphasis will vary from swimmer to swimmer and, for a single swimmer, from season to season. All modes will, however, need to be included for all swimmers every season - only the extent of each varies not the choice of inclusion or exclusion.

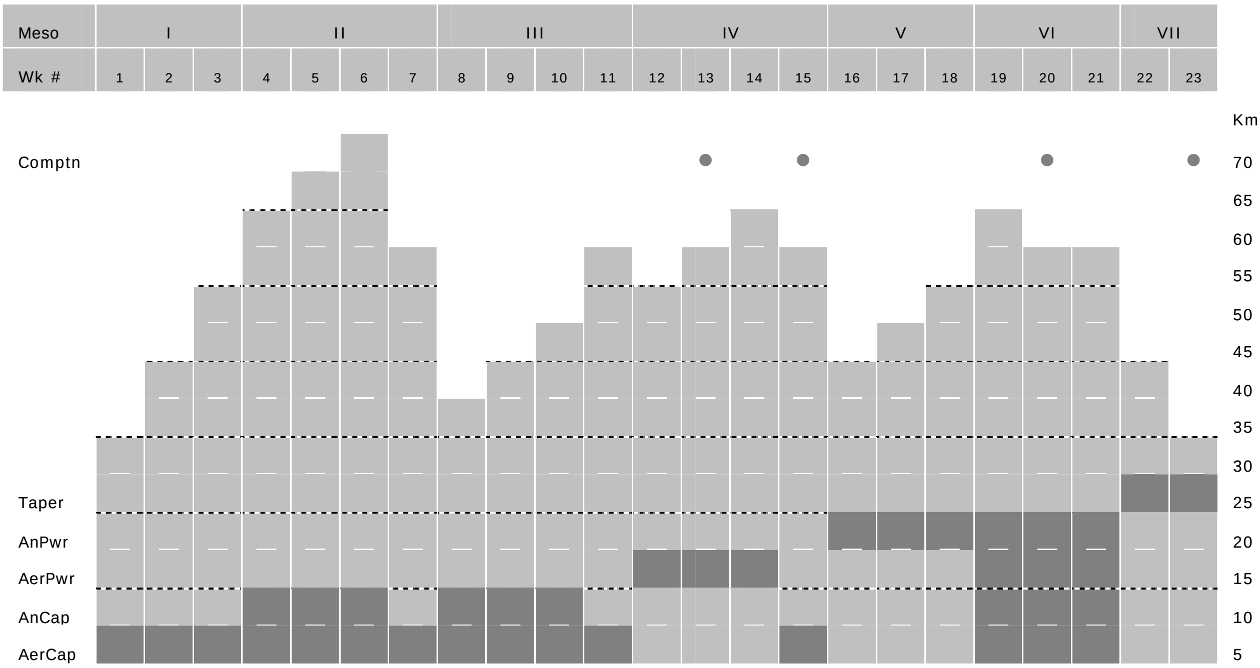
After pencilling in the first draft of a plan the first question is, "Does available time allow the necessary work?" If not you have to prioritise the various changes you plan to make. Go back to the GAP analysis between the goal and current performances and make a note of the most important changes possible in the available time (those which will make the biggest performance change). Leave the ones which will take longer for the time being even though they are important for the future; they can be added into the plan when the basics are in place. It may become clear that you have too many weeks before the goal competition and you do not want to spend too many weeks at a time in one or another specific phase – that could promote familiarity, lower the relative stimulus to the brain, nerves and muscles and invoke the law of diminishing returns – a good rule of thumb is to consider each 10-day period (a week and a half) will produce a distinct training effect and each subsequent 10-day period will produce half the effect of the previous one (“half-life of physiological adaptation”). The 3-week blocks each consist of two lots of 10 days and any further continuation of the same emphasis would produce ever-diminishing results; better overall development can be achieved by changing the emphasis and returning to the original one later.

If the number of available weeks is slightly longer than you require it is good practice to extend phase 1, the general base endurance as that sets the ‘performance footprint’ on which all other training depends. That phase could, therefore be extended from 3 weeks to 4 or 5. If the number of available weeks is significantly longer than desired then the season can be broken into two or more macro-cycles where the patterns of training progression are similar but are repeated, e.g.



Jan Olbrecht (“The Science of Winning”) suggests including three other types of training in the mix for all-round development – technique training, coordination training and race-pace training. However, these training types need not be, and should not be, “additional” types of training – each should be integrated into all other types of training.

The macro-cycle design identifies the *intensity* of each training phase - the component which causes the training effect. The micro-cycle design (number of sessions each week) identifies the *frequency* of the training stimulus – this component causes the quality of the training effect – ten, one-hour training sessions are more effective than five, two-hour sessions. The third (and least significant) component is training *volume*, usually and conveniently measured by swimming coaches in kilometres per session and per week. It should also be logged in kilometres per year. After designing the training macro (intensity) and the micro (frequency) the volume can be factored into the plan with the three components, intensity, frequency and volume combining to give the *training load*. The volume will be affected, of course, by the intensity; more volume is possible in any given time when training the aerobic capacity than the anaerobic capacity because of the vastly different rest interval requirements. It will also be constrained by the training conditions; if the programme has only 16 available pool hours then less volume is possible than if 24 hours are available.



Note, the volume of work done during the taper – if it falls too low there is a danger of lost conditioning but, more likely, will fall below the total volume to be swum during the competition week! Warm-ups, swim-downs, and multiple races each day mean the total volume will be high so the preceding training volume must allow this to be accomplished without negative effects on the racing. Distance swimmers will 'come down' less than sprinters because a) the distance swimmers have to keep up a high volume of aerobic work and b) the sprinters will require longer rest to allow their muscles to recover from high volumes of high intensity anaerobic work.

Land training

Water work is the primary focus of swimming training. In New Zealand land training is sadly neglected or performed badly in most programmes. The land training should be complementary to the water training – it would be counterproductive to plan land work for power at the same time as water work for capacity – the muscles would not be optimally developed in either area.

Three main types of land training are necessary for swimming development – general conditioning and agility, flexibility, and muscle force development.

General conditioning and agility

This type of training, usually using 'circuits', develops the cardio-vascular system allowing more oxygen to be delivered to the muscles, and promotes 'general athleticism' or agility which adds a 'robustness' of fitness to the swimmer's physical condition resulting in less chance of injury. It should be included all through the season.

Flexibility

Contrary to popular opinion stretching to promote increased flexibility is not necessary for all swimmers. Where the swimmer's joints are hyper-mobile, it can be detrimental even dangerous, as it will preclude stabilization of joints and encourage strain and injury during the cyclical and repetitive swimming movements. Most serious swimmers will rotate each shoulder between 20,000 and 30,000 times, or even more, each week. Many swimmers, however, benefit from a regular and systematically designed stretching programme – it helps them place the hands and feet in positions where maximum force is able to be applied which is not the case where joints are tight, especially shoulders and ankles, and hips and knees in breaststrokers.

Swimmers with tight joints or sore muscles should stretch *before* training. Most swimmers should stretch *after* training where it assists the muscles to recover their elasticity and 'tone'. Stretching should be included throughout the season and designed by a swimming-knowledgable strength and conditioning provider – no land work for swimmers should be designed without the provider being immersed in the stroke-specific movement patterns, event-specific energetic requirements, idiosyncrasies and culture of swimming.

Force production

Three types of strength training to increase force are important for swimming – maximal force strength training (MFST), explosive force (EXST) and endurance force (ENST).

Serious strength programmes should only be included after at least two years of preparation using general conditioning and agility exercises including at least one year of preparatory 'weights' work where the swimmer learns weight lifting *techniques* and lays a sound 'base' within the joints, ligaments, tendons and muscles. Serious strength programmes should then be included; in most cases they are not included or are not serious.

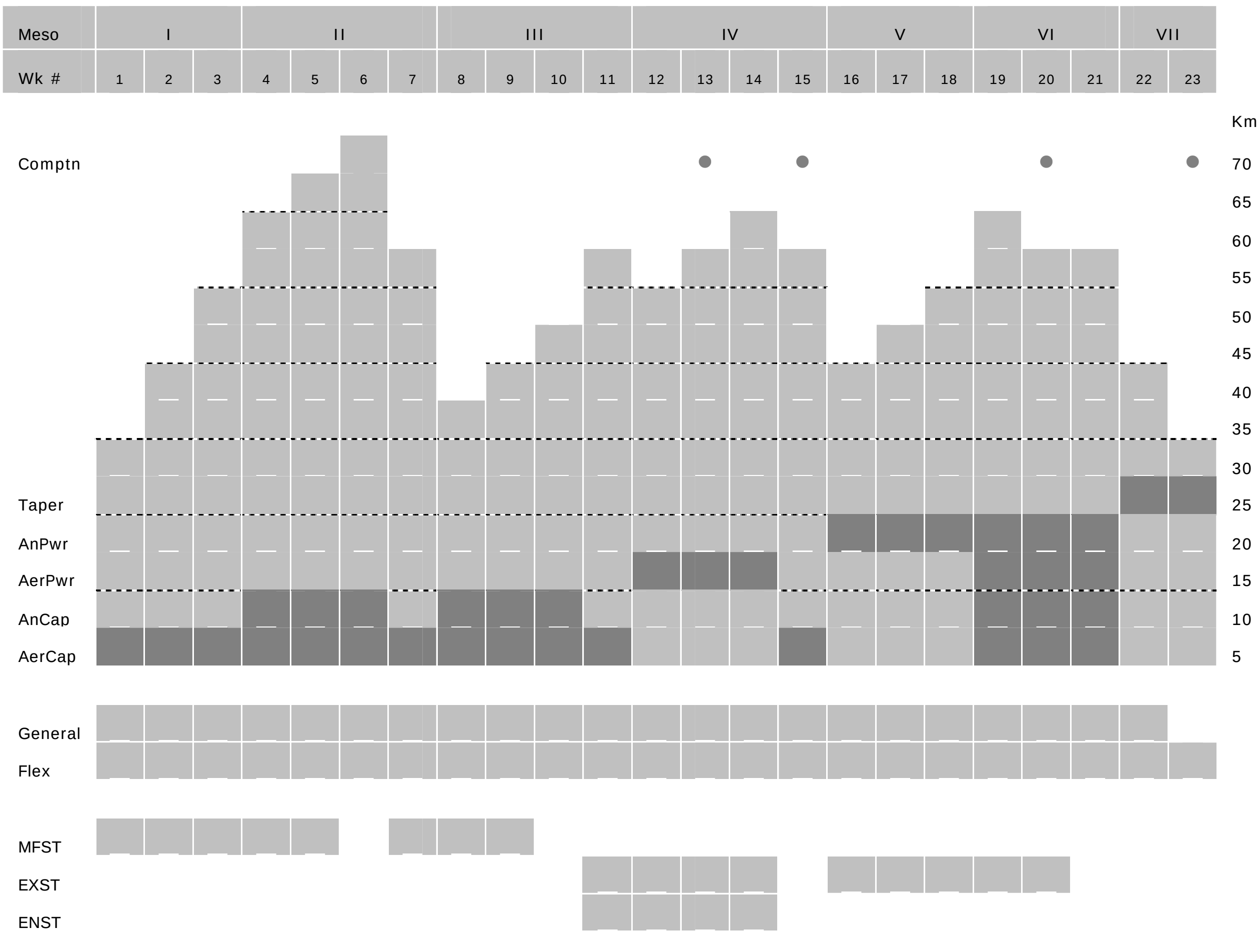
Maximal force is a *capacity* mode of force development and should be included before power development and planned early in the training cycles.

Explosive force and endurance force are *power* modes and should be included during the water-based power phases of training. They can precede the water phases by 1 or 2 weeks as the muscles are 'prepared' for the intensive or extensive stresses of serious strength training. Sprinters would normally concentrate more on explosive force and include endurance force distance swimmers may concentrate exclusively on endurance force.

Strength training should be discontinued early enough before the major competition to allow supercompensation and full recovery but not so early that strength starts to be lost; this timeframe will be very individual and careful note should be made y both swimmer and coach so the periodisation can be fine-tuned from season to season. As a general rule sprinters will reduce and stop weights before distance swimmers and males will reduce weights before females, some of who may continue weights work right up to the major competition.

All strength development programmes should be designed by a swimming-knowledgable strength and conditioning provider <u>and must be approved by the SNZ Lead Provider in this discipline.</u>

Land training components can now be added to the plan. The example given is for a male sprinter with ‘regeneration’ weeks preceding the water regeneration (6/7 and 10/11), together with a cessation of weights work in week 15 - an important ‘test’ competition.



Other support services

Once the physical training plan is completed the ‘support’ can be factored in. NZAS personnel ensure the swimmer has access to world-class services of analysis and they can cope with the training load necessary to achieve success.

Physiology

Step tests around week 3, at the end of the aerobic capacity phase, the end of the power phase and the start of taper are compulsory inclusions in IPP’s.

Biomechanics

Effective and efficient stroke technique is essential. Of course the coach will be making technique observations and refinements every day but major interventions - filming, expert analysis and flume visits - should be programmed as early in the season as possible then ‘check points’ made at periodic intervals to ensure continued perfection.

Recovery

Nutrition education is a long-term issue which should be plugged in as fits with the time available. If intensive analysis is recommended it should be early in the season. Massage should be judiciously planned to coincide with periods of high training stress. Massage during national team activities (NT) is not charged against a swimmer’s allowance.

Invisible training

ACE Advisors will assess the ‘performance lifestyle’ of the swimmer and draw up personalized plans to ensure outside stressors do not capsize the performance challenge.

Medical

Pre-season medical screening (Sc) is a compulsory component of IPP’s to ensure there are no insidious underlying issues preventing success. Outcomes of the screen may lead to unplanned services, e.g. iron supplementation in addition to general nutritional education – these will be added to the plan following the screening results. Anthropometry and muscle-balance testing will also identify structural or functional barriers to development and must be included every season. Skinfold measurement (SF) must be included at a minimum of 6-montly intervals.

Illness and injury should not be planned! They will be dealt with through the medical support teams as necessary.

Coach support

<u>The coach is the first source of support in all areas</u> and this aspect of the IPP will be as individual as each swimmer’s plan. Coaches and swimmers should be open and

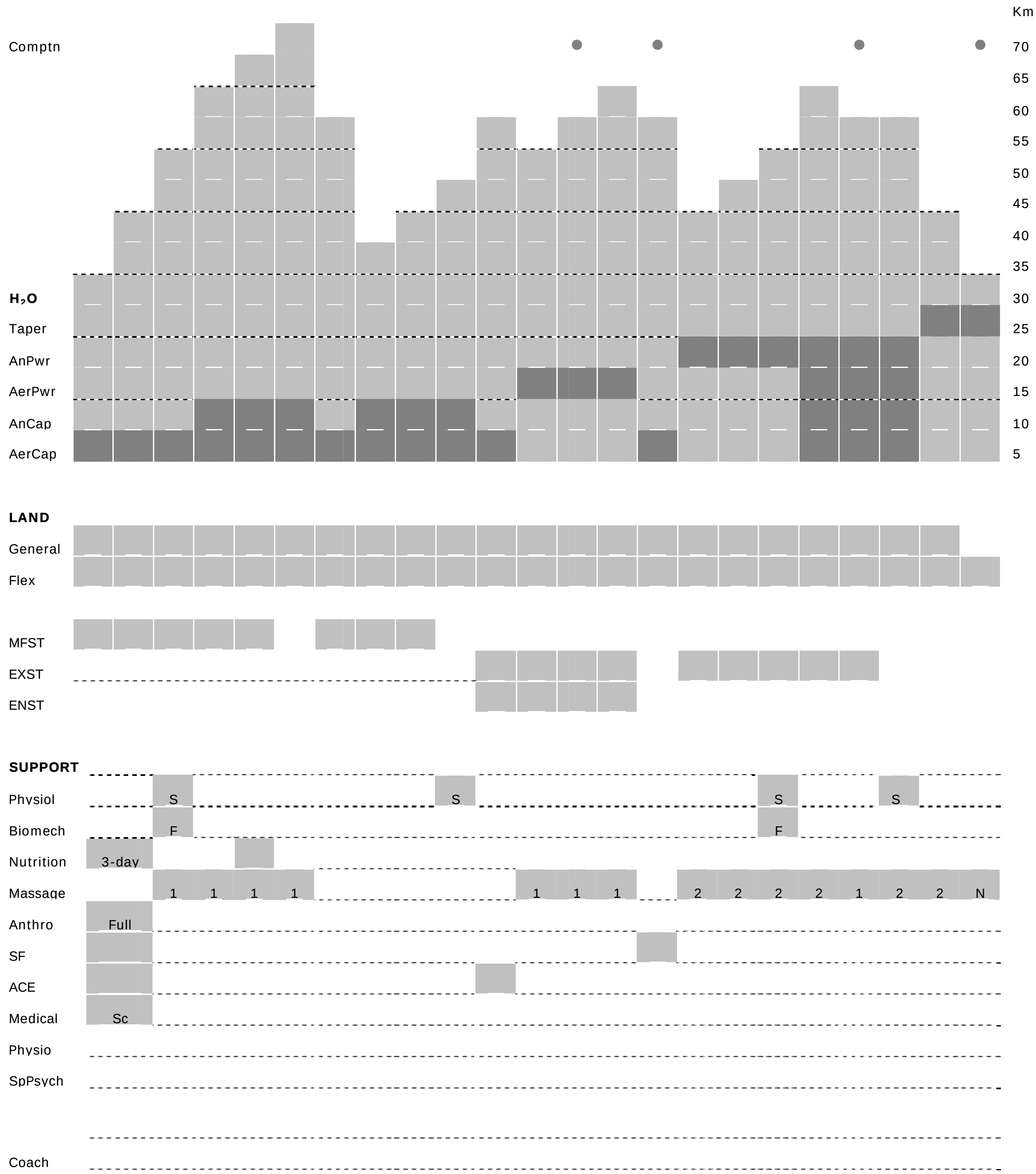
honest with each other and include whatever is necessary for the coach to assist the swimmer in their endeavor. All coach support services must be specially approved by NZAS Coach Support personnel.

9 Individual Performance Plan

Name: ______________________ Start date: ______________________

Coach: ______________________ Finish date: ______________________

Meso	I			II				III				IV				V			VI			VII	
Wk #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23



10

Checking the integrity of the idea-flow

			Sign-off		
			Athlete	NZAS	SNZ
1	Target competition, performance goal, GAP analysis, and time available for change.	Is the goal realistic, achievable and of a high enough standard to justify investment?			
2	Target splits (race segments)	Do the target splits ensure an effective goal strategy and efficient metabolic processing?			
3	Race analysis components (partial performance parameters)	Do the race components ensure stroke length and stroke rate are within suitable and complementary ranges, and start, turn and finish components do not put the swimmer at a competitive disadvantage?			
4	Test results (complex performance diagnostics)	Are the compulsory swim-specific tests included?			
		Do the test targets ensure the metabolic factors underlying performance combine to *allow* the goal performance?			
5	Multiple events and multi-day competitions	Do the planned training components prepare the swimmer's body for multiple high-quality swims across multi-day competitions?			
6	Recovery strategies	Do the recovery strategies ensure the body can continue high volume, high frequency and high intensity training throughout the season?			
7	'Invisible' training	Do the strategies surrounding 'invisible' training ensure all distractions and outside mental and emotional stressors are removed?			
8	Staying healthy	Are the compulsory medical components of the IPP included?			
		Is the medical monitoring sufficient to ensure the swimmer will be in an ongoing structural and functional state to ensure barriers to effective training are removed or controlled?			
9	Consolidating the Plan	Are all necessary and required services and components included?			
		Is 'no stone unturned'; are all stones turned over and the underneath thoroughly examined? When bugs and surprises are discovered are strategies in place to cope? Have you planned for the plan to be disrupted?			
10	Checking the logical flow and ensuring [from the swimmer and coach viewpoint] 'no stone unturned' and [from SNZ/NZAS viewpoint], 'no turn unstoned'	Are all questions answered satisfactorily?			

Testing and Monitoring Model

Swimming NEW ZEALAND

Training Macro-cycle (2 or 3 per year)

General Base Training					Aerobic Development	Race-specific Training	Pre-taper		Taper			Race
Wk 1	2	3	4	5+	End	End	5	4	3	2	1	

"50/50" Individual Stroke-length Test

8 x 50 Main Stroke on 60 holding 50 seconds (1m/s)
Record SC

Step Test

50m and 100m Swimmers: 7x100 on 4 mins (BR on 4:30)
200m and 400m Swimmers: 7x200 on 6 mins (BR on 7:00)

	Periodisation						S4			
Step #	A	PB+' target 100	200	B	C	D	2nd min	4th	6th	8th
				Targets prescribed from test A						
1	●	18	30	●			Glu + La			
2	●	15	25	●		●	Glu + La			
3	●	12	20	●	●		Glu + La			
4	●	9	15		●	●	Glu + La			
5	●	6	10		●	●	Glu + La			
6	●	3	6				Glu + La	La		
	Plus at least an additional 2 minutes prior to the last step.									
7	●	Max		●	●	●	Glu + La	La	La	La

Responsibilities and measures

	200	400	All	Swimmer	Coach
Step "Go!"				●	
SC	2nd 50	4th 50	last 50	●	●
SR	2nd 50	4th 50	last 50		●
Splits			50's		●
Total time				●	●
HR				●	
RPE				●	

(+)

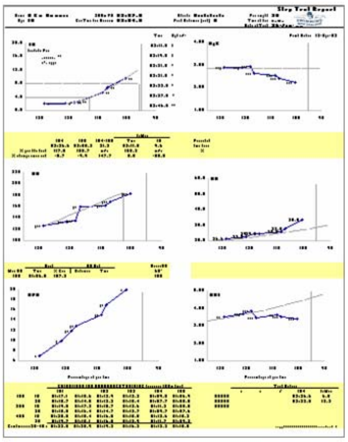
800m and 1500m swimmers:
5 x 400m on 7 minutes + 1 x 100m maximum

Step #	A	PB+' target	B	C	D	2nd min	4th	6th	8th
1	●	32			●	Glu + La			
2	●	24	●	●	●	Glu + La			
3	●	16			●	Glu + La			
4	●	8	●	●	●	Glu + La	La		
5	●	Max			●	Glu + La	La		
	Plus at least an additional 2 minutes prior to the last step.								
100m	●	Max	●	●	●	Glu + La	La	La	La

3-step Lactate Dynamics test
(recommended)

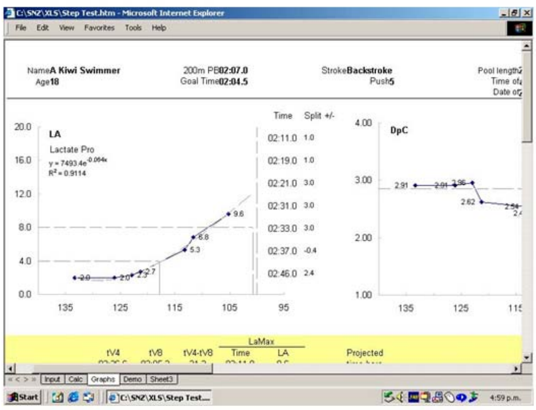
Post Step Test and pre all partial distance tests:
200-300 regeneration + 10x50 +10" @ HR <=140

	Step Test Distance			Record	
Step	100	200	400	2nd min	
1	25	50	100	Glu + La	All other measures same as Step Test
2	50	100	200	Glu + La	
3	75	150	300	Glu + La	



Race Analysis
Film analysis + post-race LaMax

		O.G. 1st			NZL		
Reaction							
	15m	6.62			7.91		
Turn	1	8.68			9.32		
	2	9.08			9.84		
	3	9.24			9.92		
	Finish	3.38			3.21		
SL	50	1.7	1.81		1.64	1.61	
	100	1.78	1.8		1.63	1.62	
	150	1.75	1.77		1.62	1.59	
	200	1.71	1.68		1.58	1.54	
SR	50	56.3	52.9		57.7	56.6	
	100	51.7	50.9		55.3	55.0	
	150	51.7	50.3		54.5	54.9	
	200	51.4	52.0		55.0	55.6	
SEI	50	2.72	2.91		2.59	2.44	
	100	2.74	2.75		2.45	2.42	
	150	2.63	2.63		2.39	2.33	
	200	2.52	2.46		2.30	2.20	
Split	50	12.90	15.48	28.38	14.25	16.19	30.44
	100	15.51	16.02	31.53	15.83	17.34	33.17
	150	15.94	16.59	32.53	16.90	16.79	33.69
	200	16.35	17.09	33.44	17.17	17.21	34.38
				02:05.88			02:11.68
						Race LaMax	14.9
						Known LaMax	16.3



Data measures

Name, age, stroke, pool length, date, time of test
PB, goal time for season, estimated push distance
Test results for time, lactate, HR, RPE, DpC, SR,SEI, each graphed against optimum results and goal target
Scientific analysis of lactate results plus projection and test history.
Endurance training guidelines
VCrit. and HR set calculations for total set distance, optimum repetition distance and
Critical performance indicators and % change since last test
Total # of displayed data measures is > 600

Competition details

Current		Target Competition			Weeks available
Date	Week #	Name, venue	Date	Week #	
e.g. 3-jul-2006	27	World Champs Trials, AKL	12-Dec-2006	50	33

Performance goal

e.g. Win the final at the World Championship Trials by swimming at least 0:59.0

Time and percentage differences between current and goal performance level.

		Difference	
Goal performance	Current performance	Time	Percentage
		1:00.36 minus 0:59.0	MSExcel:=1.36/60.36%
e.g. 0:59.0	1:00.36	0:01.36	2.25
Event 1			
Event 2			
Event 3			
Event 4			

Honestly if the goal is attainable in the available time.

Yes	No

Target splits for your goal and the world record performance.

Target		Word record		% difference
0:59.0		0:56.61		
Target spit	% of total	World record split	% of total	Difference in %
0:27.5	46.6	0:26.67	47.1	+0.5
0:31.5	53.4	0:29.94	52.9	-0.5
	MSWord =31.5/59.0%			53.4-52.9

Comparison of target and PB splits.

PB		Target		% difference
1:00.36		0:59.0		
PB spit	% of total	Split	% of total	Difference in %
0;29.07	48.2	0:27.5	46.6	-1.6
0:31.29	51.8	0:31.5	53.4	+1.6

	Current Status		World Record		
	Time	% of total	Time	% of total	Difference in %
Start (15)					
1st 25m					
Finish					
Avg turn (5+10)					
Avg CSS (m/s)					
Avg SL (m)					
Avg SR (s/min)					

Time = distance (m) / average velocity across the whole race (m/s). e.g. 60.36 = 100/1.6567

Velocity = SR in strokes/minute / 60 * stroke length in m/cycle. e.g. 1.6567 m/s = 55.3 / 60 * 1.74

SR = velocity in m/s* 60/ stroke length in m/cycle. e.g. 55.3 strokes/minute = 1.6567 * 60 / 1.74

SL = velocity in m/s * 60/ stroke rate in cycles per minute. e.g 1.74 m/cycle = 1.6567 * 60 / 55.3

Highlight statements applying to this swimmer.

Aerobic Capacity \ Anaerobic Capacity	Low Anaerobic Capacity	High Anaerobic Capacity
High Aerobic Capacity	• No better competition performances after intense or extensive and voluminous work • No real feeling of exhaustion after races and impression of being able to swim faster • Swimmer performs best in competition shortly (4-6 days) after voluminous training • Swimmer does not like short interval workouts or fartlek exercises • No clear improvement of competition results if taper lasts longer than 1 week • No high lactates after maximal short as well as distance events • Competition best times on long distances are relatively better than on short events • Best times in long and short course pools are nearly the same	• Performs very good even when not tapered • Several best times during successive days of competitions • Very fast recovery from training and competition • Reaches high lactates after short and long events • Is fast on short and long events
Low Aerobic Capacity	• Develops over-use injuries easily • No high lactates after maximal short events, but high values possible after long events • Bad results on long events and moderate performances in short competitions • Slow recovery from training and competition	• Reaches high lactates after short and rather low values after long events • Swimmer ‘dies’ in the last part of the event • Only 1 (or 2) good events in competitions of more than 1 day • Bad results on long events but very good in short races • Best performances after long rest

Number of weeks required on each general phase.

Meso	I	II		III		IV		V	VI	VII	
Wk #											
Comptn											
Taper											
AnPwr											
AerPwr											
AnCap											
AerCap											

Weekly micro-cycle for each phase.

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
a.m.							
p.m.							

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
a.m.							
p.m.							

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
a.m.							
p.m.							

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
a.m.							
p.m.							

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
a.m.							
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	Mon	Tue	Wed	Thu	Fri	Sat	Sun
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	Mon	Tue	Wed	Thu	Fri	Sat	Sun
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	Macro-cycle I									Macro-cycle II										
Comptn																				
Taper																				
AnPwr																				
AerPwr																				
AnCap																				
AerCap																				

Meso																								
Wk #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Km
Comptn																								70
																								65
																								60
																								55
																								50
																								45
																								40
																								35
																								30
Taper																								25
AnPwr																								20
AerPwr																								15
AnCap																								10
AerCap																								5

Individual Performance Plan

Name: ______________________ Start date: ______________________

Coach: ______________________ Finish date: ______________________

Meso																								Km
Wk #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Comptn																								70
																								65
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																								50
																								45
																								40
																								35
H_2O																								30
Taper																								25
AnPwr																								20
AerPwr																								15
AnCap																								10
AerCap																								5

LAND																							
General																							
Flex																							
MFST																							
EXST																							
ENST																							

SUPPORT																							
Physiol																							
Biomech																							
Nutrition																							
Massage																							
Anthro																							
SF																							
ACE																							
Medical																							
Physio																							
SpPsych																							
Coach																							