

Performance Analysis in Squash

*World Coaches Conference 2018
Gold Coast, Australia*

James Simpson



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Thank-You



Peter Genever



**Podium Squash
Support Team**



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SRAM



**AIS Movement
Science**

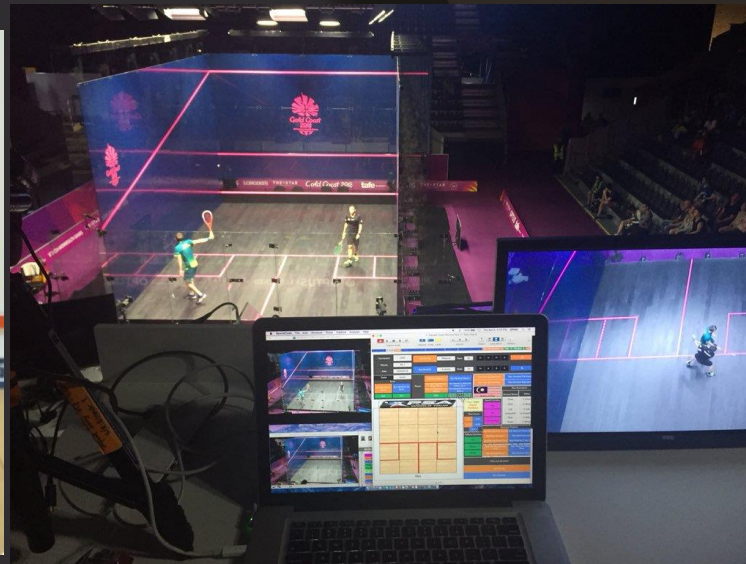


PSA / Squash TV



**Catapult
Sports**

Who am I?



- *Bachelor of Applied Science (Exercise & Sport Science) – RMIT University Bundoora*
- *Master of High Performance Sport – Australian Catholic University*

- *Performance Analyst – Part-time (North Melbourne Football Club)*
- *Performance Analysis Post-Graduate Scholar (Australian Institute of Sport) – Focus on team sports*
- *Senior Performance Analyst (National Sports Institute of Malaysia) – Focus on Squash*

What is Sport Science?



Research in Squash

- **Science of Sport (Squash) - Stafford Murray, 2016**
- **Science and Racket Sports Vol 1-4 - A. Lees, D. Cabello, G Torres (1999-2011)**
- **Squash: Skills, Techniques, Tactics – Peter A. Hirst, 2011**

Validity and Reliability of an on-Court Fitness Test for Assessing and Monitoring Aerobic Fitness in Squash – James, C.A; Vallejo, F.V; Kanfebeen, M; Farra, S. Feb 2018

Analysis of the serve and the serve return in Squash at the men’s elite level - Carbochi, Strand – MAR 2018

Identifying patterns in squash contests using dynamical analysis and human perception. – McGarry, T. 2006

A new method for assessing squash tactics using 15 court areas for ball locations. - Vučković, G., James, N., Hughes, M., Murray, S., Zoran Milanović, Z., Janež Perš, J., Goran Sporiš, G. 2015

A review of the performance requirements of squash - Jones, T. W., Williams, B. K., Kilgallen, C., Horobeanu, C., Shillabeer, B. C., Murray, A., Cardinale, M. – 2015

Using a situation awareness approach to determine decision-making behaviour in squash - Murray, S., James, N., Perš, J., Mandeljc, R & Vučković, G (2018) , Journal of Sports Sciences, 36:12, 1415-1422

Tactical use of the T area in squash by players of differing standard - Vučković, G., Perš, J., James, N & Hughes, M (2009), Journal of Sports Sciences, 27:8, 863-871

Effects of rule changes on physical demands and shot characteristics of elite-standard men’s squash and implications for training - Murray, S., James, N., Hughes, M. D., Perš, J., Mandeljc, R & Vučković, G. (2016) Journal of Sports Sciences, 34:23, 2170-2174

PSA's push into the "Tech Era"

- **iSquash -**
<https://psaworldtour.com/news/view/5742/ps-a-and-interactive-squash-to-bring-live-squash-to-smart-courts-worldwide>
 - **Player tracking (distance covered)**
 - **Shot location**
 - **Number of shots in the rally**
 - **Ball position on the front wall**
- **Heart Rate Monitoring -**
<https://psaworldtour.com/news/view/5721/ps-a-sign-groundbreaking-partnership-with-sports-data-labs>
 - **Live heart rate**
 - **Max heart rate during a match**
 - **Average heart rate**
- **Video Review –**
 - **Hawk Eye**
 - **SquashTV Instant Replay**



[https://www.youtube.com/watch?
v=xv76c6nxFDM](https://www.youtube.com/watch?v=xv76c6nxFDM)

What is Performance Analysis?

“... the practice of recording, processing, and interpreting events that take place in training and/or competition in sport. As such, it can include evaluating the technical, tactical, and behavioural activities of individuals, teams, and/or specific units within teams. It can also incorporate the determination of single or multiple movement patterns completed in relation to the demands of the training and/or competitive performance.”

Drust (2010). J Sport Sci, 28, 921-922

“Performance analysis seeks to explore how the innovative application of technology may help performance. Practitioners aim to provide systematic and objective feedback to athletes and coaches in order to understand, accelerate and develop performance, including optimising existing techniques and learning new skills. It may also be used to analyse competitors for strengths and weaknesses.”

Australian Institute of Sport

Why Do Performance Analysis?

- *To answer key questions the coaches may have*
- *To provide timely and meaningful feedback to the players*
- *To continue building our database of footage and influential key performance indicators on the top players in the world, which assists our players refine and grow their own game*
- *Where possible - to fill gaps in the literature to help the sport continue to grow*

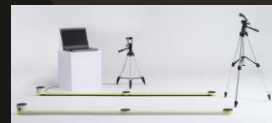
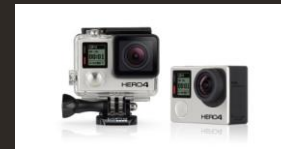


Common Technologies Used Expensive - Free

Software

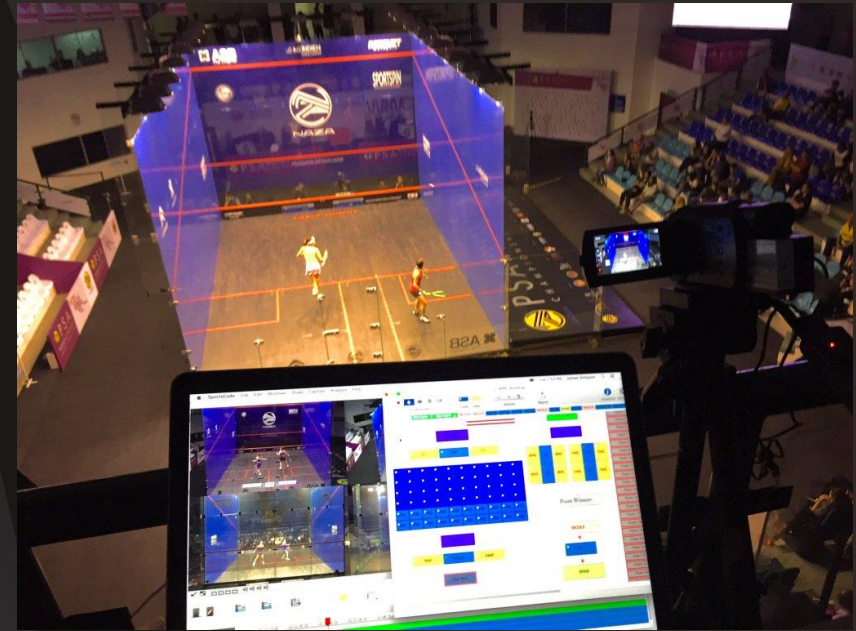


Hardware



Performance Analysis in Malaysia

- **Tournament/match preparation (video clips, reports, etc.)**
- **Matches filmed and coded.**
- **Footage and reports uploaded to Dropbox for coaches/athletes to access remotely.**
- **Match Reports PDF to athletes and coach within 30 minutes of the match.**
- **Ranking Analysis.**
- **Opposition scouting.**
- **Athlete Management System establishment and implementation.**



Performance Analysis in Malaysia



Performance Analysis in Malaysia







Tournament and Game Day Workflow



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PTARISIA

Women's [REDACTED] Tournament Summary



	GAME 1		GAME 2		GAME 3		GAME 4		GAME 5		MATCH	
	WINNERS	ERRORS	WINNERS	ERRORS	WINNERS	ERRORS	WINNERS	ERRORS	WINNERS	ERRORS	TOTAL WINNERS	TOTAL ERRORS
VS [REDACTED]	8	0	7	2	9	1	-	-	-	-	24	3
VS [REDACTED]	6	2	8	1	6	4	6	2	-	-	26	9
VS [REDACTED]	4	5	5	2	4	6	3	3	-	-	16	16
Total	18	7	20	5	19	11	9	5	-	-	66	28

WINNERS:

10	1	3	7
2	2	4	2
4	4	6	10
3	2	2	4

ERRORS:

3	-	-	2
1	-	1	1
3	4	-	3
5	2	1	2

	Target	Previous [REDACTED] Vs [REDACTED]					Tournament Summary
Error Ratio	5:1	-	4:1	5.5:1	4.5:1	1:1	2.2:1
Serve Sidewall	50%	26%	60%	25%	59%	68%	50%
Straight Drives Backwall	50%	43%	39%	41%	38%	37%	38%
Drops No Sidewall	60%	50%	47%	55%	77%	69%	65%



#TEAM138

(2-1) 11-3, 8-11, 11-7



WORLD DOUBLES CHAMPIONSHIPS – MANCHESTER 2017

	GAME 1		GAME 2		GAME 3		MATCH	
	WINNERS	ERRORS	WINNERS	ERRORS	WINNERS	ERRORS	TOTAL WINNERS	TOTAL ERRORS
	5	0	1	4	3	1	9	5
	3	1	4	1	5	1	12	3
	0	0	3	2	1	0	4	2
	1	3	3	1	4	2	8	6

- 1 Stroke
- 1 Opp Stroke
- 30 Let's

WINNERS

ERRORS

2	-	-	-	-	1	-	-
-	-	-	1	-	-	-	-
3	2	2	-	1	2	-	1
-	2	-	-	-	-	-	2

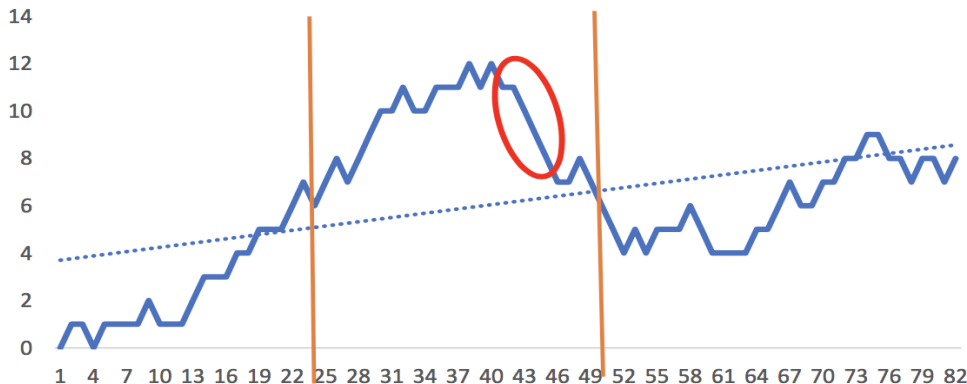
WINNERS

- Straight Drive (3)
- Straight Kill (2)
 - Nick (2)
- CC Drop (2)
- Straight Drop (1)
- V CC Drive (1)
- Boast (1)

ERRORS

- CC Nick/Kill (3)
- CC Drop (2)
- Split Drop (1)
- Straight Drive (1)
 - Boast (1)

Match Momentum



Match Notes:

Solid performance in the first game with good variety, holds, changes of pace and front court play.

A drop in focus at the end of the second contributed to us losing that game although there was still some decent play but perhaps less variety. It is very important to keep a mix of shots in the front court and to get onto the ball early whenever possible. This keeps the opponents guessing and does not allow their confidence and reading of the game to grow.

We still need to keep the pressure on our opponents with more volleys especially after good straight and crosscourt length. This will help us get ahead of the play and allow us to better anticipate where the ball is going in advance.



#TEAMISN

Player 1

Major Games 2018

Tournament Summary



	GAME 1		GAME 2		GAME 3		GAME 4		GAME 5		MATCH	
	WINNERS	ERRORS	WINNERS	ERRORS	WINNERS	ERRORS	WINNERS	ERRORS	WINNERS	ERRORS	TOTAL WINNERS	TOTAL ERRORS
Player 1	21	8	15	11	24	14	14	5	5	3	79	41
All Opponents	14	10	20	9	18	11	7	3	3	6	62	39

- 21 Let's
- 14 Stroke's
- 8 Opp Stroke's

WINNERS

ERRORS

4 BH Str Drop (2) BH CC Drop	2 FH Str Drop FH CC Lob	1 FH Str Drive	5 FH Str Drop (3) FH CC Lob (2)	5 BH Str Drop BH CC V Drive/Lift	1 FH Str Drive/Lift	-	4 FH Str Drive FH Str Drop FH CC Lob
4 BH Str Drop (2) BH CC Drive	1 BH Str V Drive	-	2 FH Str Drop FH CC Lob	1 BH Str Drop	-	1 FH CC V Drive/Lift	1 FH Str Drive/Lift
14 BH Str Drop (5/2)	2 BH Str V Drop (2)	9 FH Str Drop (7) FH CC Lob	5 FH CC V Nick (2) FH Str Drop	9 BH Str Drop (5)	1 BH Str Kill	5 FH Str V Drop (2) FH Str V Kill FH Boast	3 FH Str Drive (2)
1 BH Str Drop	2 FH Str Drop FH CC Lob	1 FH Str Kill	1 FH Str Drop	3 BH Str Drop (1/1)	-	1 FH Str Kill	4 FH Str Drive FH Boast



Player 1 Asian Games 2018 Tournament Summary



LET BALL

MAS – 4 OPP – 2	-
MAS – 4 OPP – 2	MAS – 2 OPP – 2

STROKES

MAS – 1 OPP – 6	MAS – 1 OPP – 1
MAS – 2 OPP – 0	MAS – 2 OPP – 1

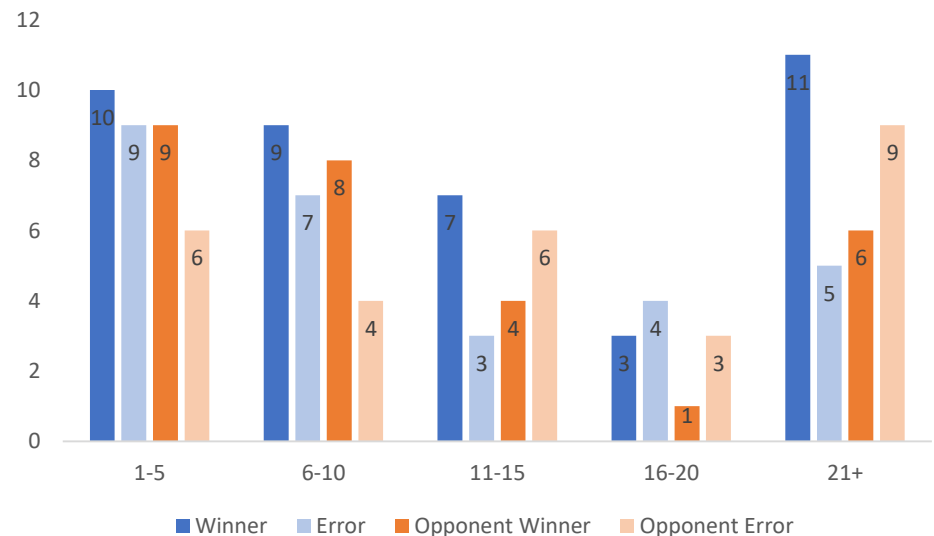
NO LETS

MAS – 4 OPP – 2	MAS – 2 OPP – 1
-	MAS – 0 OPP – 1

Runs of Points Against	2+	Largest
Round 1	1	2
Round 2	3	3
QTR Final	7	5
Semi-Final	8	5
Final	11	4

Runs of Points For	2+	Largest
Round 1	7	9
Round 2	9	7
QTR Final	7	4
Semi-Final	7	3
Final	5	3

SHOT COUNT WINNERS/ERRORS





Player 1

Asian Games 2018

Tournament Summary



What is Next:

China Open
 Wednesday 5th September – 1:00pm
 Malaysia vs Other

- ✓ Recovery: Important to book in physio early, follow the program to ensure you recover well and are ready for your next tournament, particularly due to the intense major games, and short turnaround time between events.
- ✓ Performance Analysis: Performance Analysis/Coach review to be decided by you if required. Your matches from tonight is available on the iPad/Hard Disc should you require.

OPPONENT WINNERS

<p>2 BH CC Drive BH Str Drop</p>	<p>2 FH Str Drop FH CC Drive</p>
<p>7 BH Str V Drop (4) BH Str Kill BH CC V Nick BH Str Drive</p>	<p>2 FH Str Drop FH Str Kill</p>

OPPONENT ERRORS

<p>-</p>	<p>2 FH Str Drop</p>
<p>4 BH Str Drive BH Str V Drop BH CC Drive BH CC V Nick</p>	<p>3 FH CC Drive FH Boast FH CC V Drop</p>

Tournament Summary Notes from the Coach:

Example notes from the coach



#TEAMISK

Player 1 vs Player 2

Major Games 2018 – Singles Round 2

(3-0) 11-9, 11-8, 12-10 – 42 mins



	GAME 1		GAME 2		GAME 3		MATCH	
	WINNERS	ERRORS	WINNERS	ERRORS	WINNERS	ERRORS	TOTAL WINNERS	TOTAL ERRORS
Player 1	7	4	7	3	7	5	21	12
Player 2	4	2	5	2	4	5	13	9

- 7 Let's
- 4 Stroke's
- 2 Opp Stroke's

WINNERS

ERRORS

1 BH Str Drop	-	2 FH Str Drive FH Str Drop	3 FH Str Drop FH Str Drive FH CC Lob	-	-	-	4 FH Str Drop (3) FH Str Drive
3 BH Str Drop (2) BH CC Drive	1 BH Str V Drive	-	-	-	-	-	1 FH Str Drop
3 BH Str Drop (1/2)	2 BH Str V Drop (2)	-	3 FH CC V Nick (2) FH Str Drop	2 BH Str V Drop BH CC V Nick	-	-	2 FH Str V Drop FH CC V Nick
1 BH Str Drop	-	1 FH Str Kill	1 FH Str Drop	2 BH CC Kill BH Str Drop	-	1 FH Str Kill	-



James Simpson – Performance Analyst
jsimpson7877@gmail.com



#TEAMISN

Player 1 vs Player 2

Asian Games 2018 – Singles Round 2

(3-0) 11-9, 11-8, 12-10 – 42 mins



LET BALL

MAS – 1 OPP – 0	-
MAS – 2 OPP – 3	MAS – 1 OPP – 0

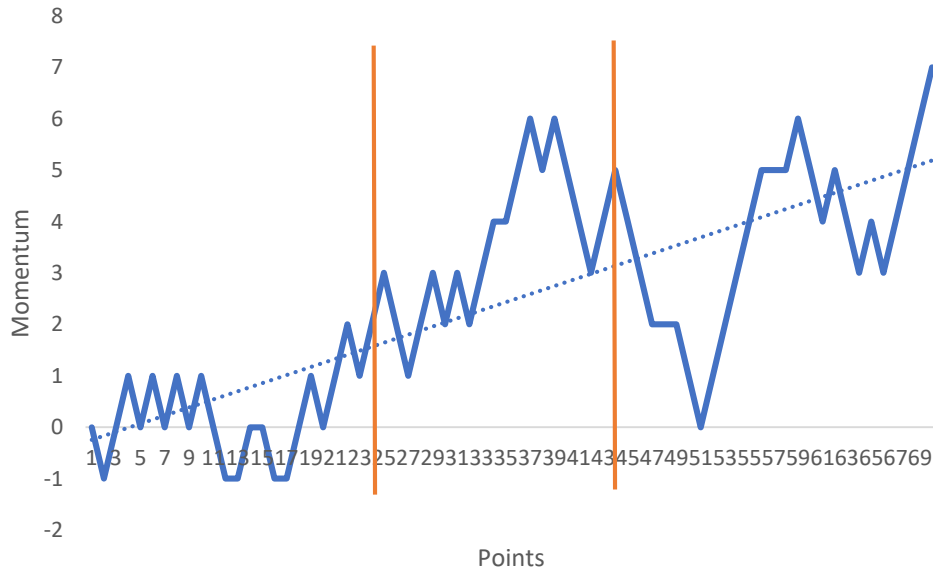
STROKES

MAS – 2 OPP – 2	-
MAS – 2 OPP –	-

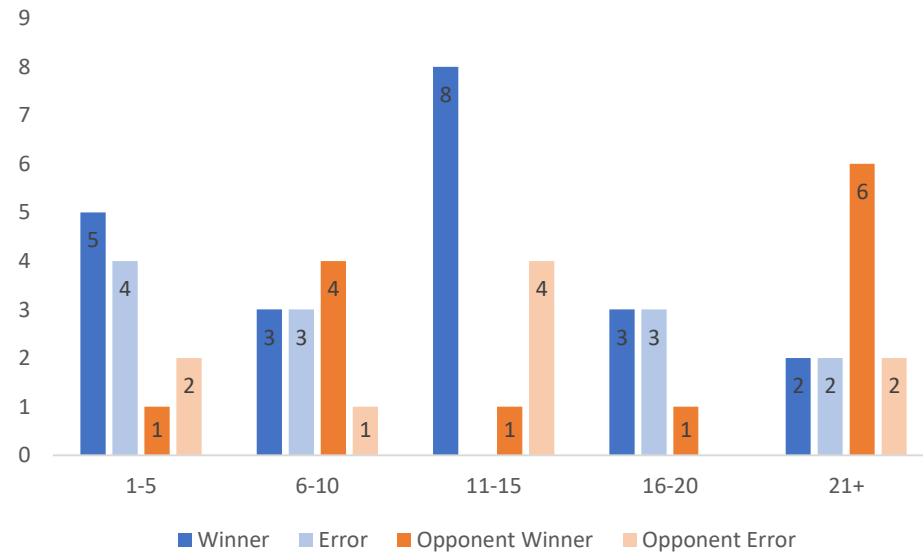
NO LETS

-	MAS – 0 OPP – 2
-	-

MATCH MOMENTUM



SHOT COUNT WINNERS/ERRORS





#TEAMISK

Player 1 vs Player 2

Major Games 2018 – Singles Round 2

(3-0) 11-9, 11-8, 12-10 – 42 mins



OPPONENT WINNERS

<p>2 BH CC Drive BH Str Drop</p>	<p>2 FH Str Drop FH CC Drive</p>
<p>7 BH Str V Drop (4) BH Str Kill BH CC V Nick BH Str Drive</p>	<p>2 FH Str Drop FH Str Kill</p>

OPPONENT ERRORS

<p>-</p>	<p>2 FH Str Drop</p>
<p>4 BH Str Drive BH Str V Drop BH CC Drive BH CC V Nick</p>	<p>3 FH CC Drive FH Boast FH CC V Drop</p>

*Opposition winners to be reviewed during performance analysis session

Heart Rate



What is Next:

REST. RECOVER. PREPARE

Friday 24th August 3:00pm Court 2

Player 1 vs Player 3

- ✓ Recovery: Physiotherapy / Recovery Boots immediately after your match, follow Victoria's program to ensure you are ready for tomorrow's match. Remember your 100 points.
- ✓ Performance Analysis: Performance Analysis/Coach review if you require. Your match from today is available on the iPad/Hard Disc.

Notes from the Coach:

- Example Coach notes to go here.

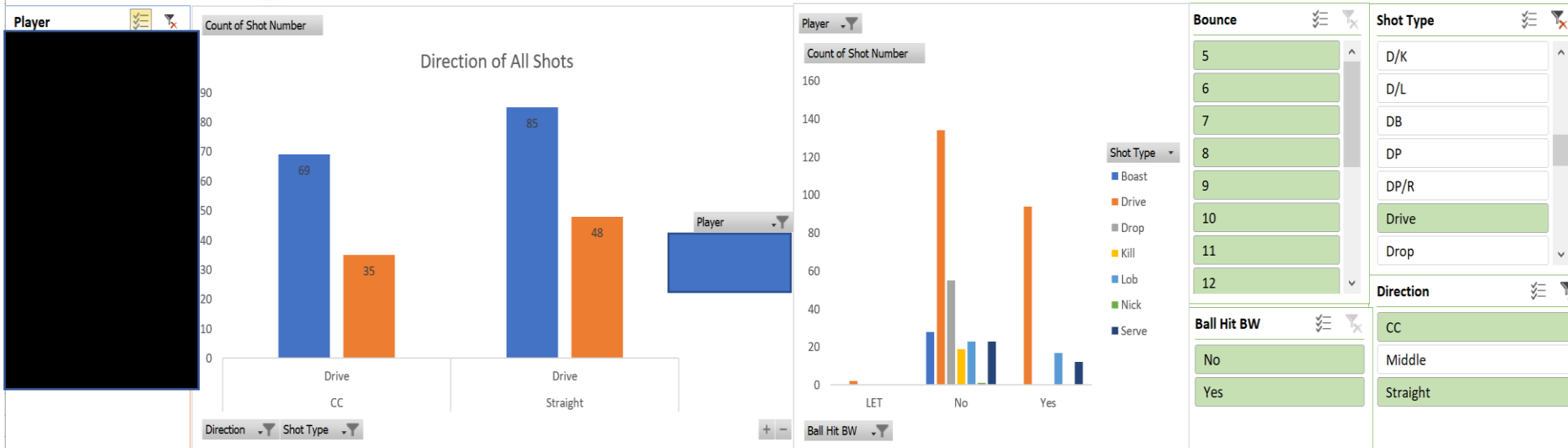
Post Process Workflow



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Match Analysis



Game Result

- Win
- Loss

Final Shot

- Error
- Let
- Stroke
- Winner

- By analyzing every detail around each shot throughout an entire match, we are able to get a better picture of the events occurring within that match.
- From here we can analyze what Malaysian athletes and their opponents are doing in given situations and better advise on training/match strategy.
- This database contains over 20,000 individual shots against key Commonwealth Games opponents
- Shot Direction can be simplified too...

Bounce

- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

Shot Type

- D/K
- D/L
- DB
- DP
- DP/R
- Drive
- Drop

Direction

- CC
- Middle
- Straight

Ball Hit BW

- No
- Yes

Volley

- No
- Yes

Side of the body

- BH
- FH

Simple Shot Type and Direction Analysis

Shot Direction	L1	L2	L3	R1	R2	R3
Str Short	27%	21%	7%	28%	20%	8%
Str Long	20%	54%	63%	13%	41%	42%
CC Short	44%	19%	24%	38%	34%	38%
CC Long	10%	6%	5%	22%	5%	13%
Total	100%	100%	100%	100%	100%	100%

Shot Type	L1	L2	L3	R1	R2	R3
Boast	2%	1%	5%	6%	4%	13%
Drive	15%	38%	76%	16%	39%	71%
Drop	32%	2%	4%	34%	8%	4%
Lob	46%	1%	12%	19%	7%	4%
Smash/Kill	2%	3%	4%	22%	3%	8%
Nick	0%	0%	0%	0%	0%	0%
V. Boast	0%	2%	0%	0%	0%	0%
V. Drive	0%	36%	0%	3%	34%	0%
V. Drop	2%	14%	0%	0%	4%	0%
V. Lob	0%	1%	0%	0%	0%	0%
V. Nick	0%	0%	0%	0%	0%	0%
V. Smash/Kill	0%	2%	0%	0%	2%	0%

That's great but...How do you use it?

- **Routine!**
 - *Watching video and reviewing performance to continue to improve as a player*
- **Training**
 - *Identifying strengths and weaknesses*
 - *Running through the footage with the coaches and support team*
 - *Over time we can periodise a training program backed up by numbers and vision*
- **Tournament Preparation**

Video Storage Options and Considerations

Common capturing methods:

- *iPhone / iPad*
- *Video Camera*
- *GoPro*
- *Squash TV*
- *Live Stream (Can take this post match)*

Video Storage Options and Considerations

- **Cloud storage options:**
 - **DropBox – Squash Malaysia**
 - **Google Drive**
 - **iCloud**
 - **Hudl**
 - **Amazon**
 - **+Many more**
- **Hard Drives**
- **Laptops**
- **Local Server**
- **Phone / iPad**

Video Storage Options and Considerations

Considerations with Video:

- *File formatting*
- *Software it will be shown on*
- *Naming convention – BE CONSISTENT*
- *Distribution to players*
- *Communication platforms with athletes*



- Files
- My files
- Sharing
- File requests
- Deleted files

<input type="checkbox"/> Name	Modified	Members	
Asian Games 2018	--	Only you	...
Asian Games Opponents	--	Only you	...
Asian Games Training Camp	--	Only you	...
British Junior Open	--	Only you	...
British Open 2018	--	Only you	...
Chicago 2018	--	Only you	...
Commonwealth Games 2018	--	Only you	...
El Gouna 2018	--	Only you	...
Irish Open 2018	--	Only you	...
Malaysian Open 2018	--	Only you	...
Nationals 2018	--	Only you	...
New Zealand Tour 2018	--	Only you	...
Training	--	Only you	...

- Upload
- New shared folder
- New folder
- Create new file
- Show deleted files

Personal Only you

Uploading 20180901_AsianGames_Adnan_Lee.mp4 - 53 mins left 3 files left

Privacy ?

What Else Can We Look At?

Wellness

	5	4	3	2	1	Record Score
FATIGUE	Very fresh	Fresh	Normal	More tired than normal	Always tired	
SLEEP QUALITY	Very restful	Good	Difficulty falling asleep	Restless sleep	Insomnia	
GENERAL MUSCLE SORENESS	Feeling great	Feeling good	Normal	Increase in soreness/tightness	Very sore	
STRESS LEVELS	Very relaxed	Relaxed	Normal	Feeling stressed	Highly stressed	
MOOD	Very positive mood	A generally good mood	Less interested in others &/or activities than usual	Snappiness at teammates, family and co-workers	Highly annoyed/irritable/down	

Squash Hub

+ New Squash Hub

No Data Found

Admin

Appointments

Athlete Planning

Athletic Development

Coach

Diving

Finance

Z_STATSports

Z_A_Medical Consultation

Medical (6)

Monitoring

Nutrition

Physical Therapies

Podium Performance

Lifestyle (1)

▼ Athlete Diary

▼ Individual Session

▼ Podium Performance Lifestyle Hub

▼ Weekly Goals

▲ Workshop (1)

+ New Workshop

Export

Hide Instructions

Delete

On Date

from

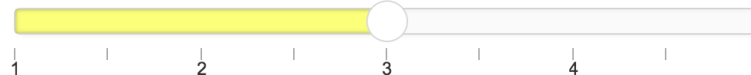
to

Wellness

How are you feeling today?

Sport

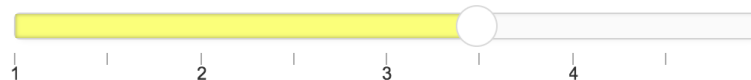
Fatigue



Please enter the level of fatigue you are currently experiencing at this moment

- 1 - Very fatigued
- 2 - Quite fatigued
- 3 - Ok
- 4 - Feel fresher than normal
- 5 - Very fresh

Sleep Quality



How would you rate your sleep from last night?

- 1 - Very poor sleep
- 2 - Difficulty sleeping
- 3 - Ok
- 4 - Good sleep
- 5 - Very restful

Stress Levels



How stressed are you this morning?

- 1 - Very stressed
- 2 - More stressed than normal
- 3 - Ok



STAKETHEPODIUM
PERFORMA



HAVE YOU GOT YOUR 100 POINTS FOR RECOVERY?

If not, why not?

Finish training



Begin recovery through
nutrition ASAP

Nutrition:

- Balanced meal (35 pts)
- Recovery bar (20 pts)
- Protein shake (20 pts)
- 1 sports drink (15 pts)



Now complete some
active recovery

Active:

- Ice bath (35 pts)
- Cold bath (20 pts)
- Bike spin (30 pts)
- Run 10/5 min (30/25 pts)
- Static stretching (15 points)



Later, complete some
passive recovery

Passive:

- Massage (30 pts)
- Electrotherapy (30 pts)
- Compression wear night (30 pts)
- Compression wear 2 hours (25 pts)
- Foam rolling (25 pts)
- Power nap (20 pts)



If you train twice today, **Nutrition** and **Active** recovery only give you half points....
this is because you should **complete these after every session**

#100points #trainingiscompetition #teamMAS #lookafteryourbody

What Else Can We Look At? Recovery

Slide: Carl James
carlos_james@hotmail.co.uk

Google Drive / Office Stack

QUESTIONS RESPONSES 40

Opposition Player Name
Short-answer text

Playing Style
Short-answer text

Player intensity
Long-answer text

After section 1 Continue to next section

Section 2 of 3

Performance Rating
Description (optional)

Technical

	1	2	3	4	5	6	7	8	9	10	
Very Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Exceptional

Tactical

	1	2	3	4	5	6	7	8	9	10	
Very Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Exceptional

Fitness

Type of Squash Played? *

1. Competition
2. Competition - Drills
3. Practice Game
4. Drills/Conditioned Games
5. Solo Practice
6. Coach - Feeding
7. Coach - Pressure Feeding

After section 1 Continue to next section

Section 2 of 6

Training Phase 2 (Oct-Dec)

The five key elements we have agreed to be our focus up until the end of the year.

Square (Straight Lines) *

	1	2	3	4	5	6	7	8	9	10	
Extremely Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Perfect

Impact (Racket Head Speed) *

	1	2	3	4	5	6	7	8	9	10	
Extremely Poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Perfect

Hold (Hold and Variety) *

	1	2	3	4	5	6	7	8	9	10	
--	---	---	---	---	---	---	---	---	---	----	--

What Else Can We Look At?

- **Communication Platforms**
- **Specific tactical / technical ratings by coach / athlete**
- **Athlete training attendance and session frequency (particularly at competition)**
- **Monitoring and constantly evolving strength and conditioning sessions**
- **Nutrition**
- **Recovery**
- **Biomechanical Analysis (technique, movement patterns, ball speed)**

Opportunities are endless and as the sport continues to go from strength to strength, so will our understanding of the game and our ability to answer key coach questions in an efficient and meaningful way.



Thank-You