



Duckworth-Lewis- Stern Method: *Scenarios & Application*

2022

NSWCUSA CONVENTION, TAMWORTH

Before DLS and DL...

- ▶ 1992 Men's One-Day World Cup, Semi-Final at SCG:
England v South Africa
- ▶ South Africa was chasing and needed 22 to win off 13 balls when rain stopped play
- ▶ After a stoppage of 12 minutes...



Before DLS and DL...

FI		AUSTRALIA				FI	
WESSELS		RUNS	B	HO	FOW	RUNS	WKTS
1	HUDSON	SOUTH AFRICA				1	GOOCH
2	KIRSTEN	TO WIN				2	BOTHAM
3	KUIPER	NEED 22 RUNS				3	STEWART
4	CRONJE	OFF 1 BALL				4	HICK
5	RHODES					5	FAIR' HER
6	MCMILLAN					6	LAMB
7	RICHMOND					7	LEWIS
8	SNELL					8	REEVE
9	PRINGLE					9	DEFR' TAS
10	DONALD					10	IL' WORTH
11	RUSHMORE					11	SMALL
12						12	TUFNELL
10:08		MITSUBISHI ELECTRIC					



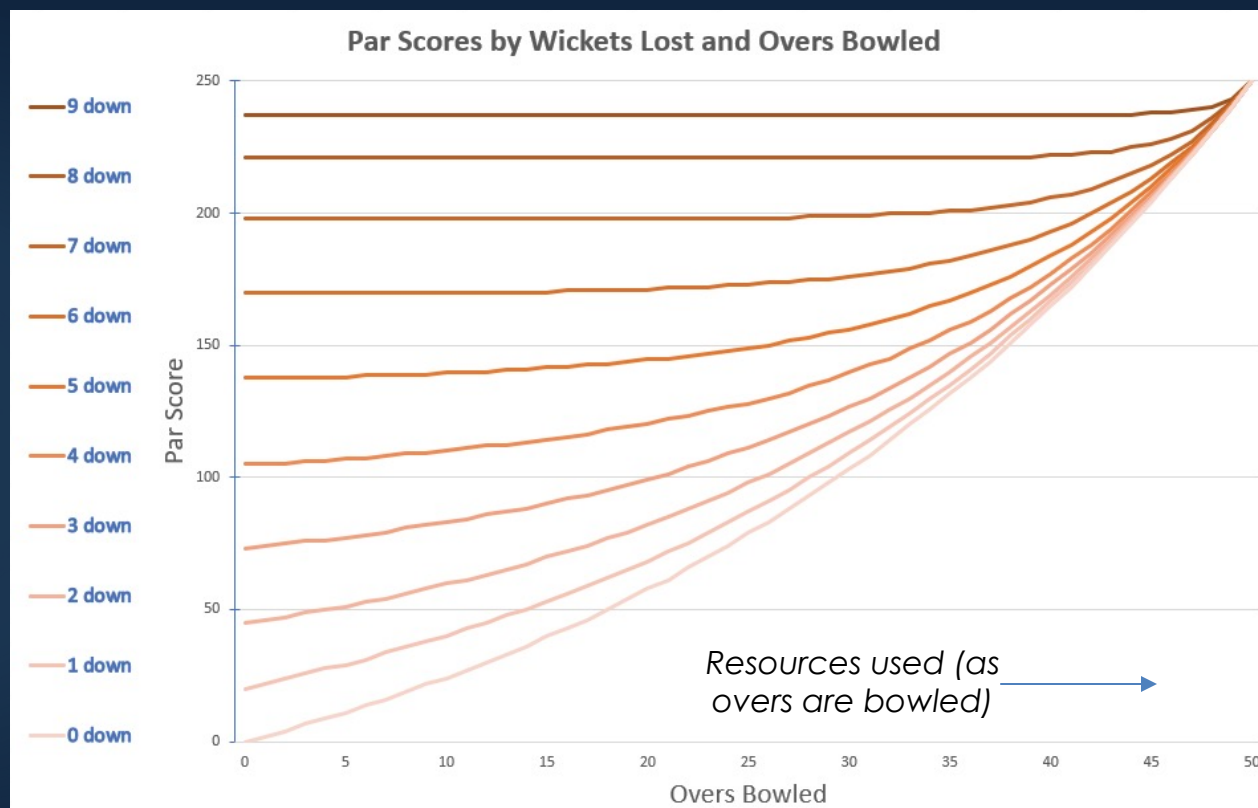
Frank Duckworth, Tony Lewis, Steve Stern

- ▶ First application of D/L in an ODI: 1997, formally adopted 1999
- ▶ A mathematical model based on the progression of recent matches
- ▶ Used to adjust target scores in limited over matches interrupted or ended prematurely after play commences
- ▶ Professor Steve Stern is the current custodian after first introducing refinements in 2014 when D/L became DLS



One slightly technical bit...

- ▶ “Par” scores are calculated based on the “resources” a team has remaining
- ▶ The more resources used, the closer the team is expected to be to their final total



Resources used (when wickets are lost)

Resources used (as overs are bowled)



DLS Considers Resources At An Interruption

- ▶ Par score tables are initially calculated at the end of the 1st innings utilising the final team total
- ▶ A team's remaining resources at the time of each interruption that results in a loss of overs (either innings) are also considered by the DLS Method
- ▶ If an interruption ends the match and a result can be declared, refer to the par score at that point
- ▶ If the match is set to resume after an interruption, a new DLS table is calculated – since resources remaining have unexpectedly reduced



Treatment of Penalty Runs

- ▶ Awarded in 1st innings to:
 - ▶ Batting side – included in final total for calculations
 - ▶ Fielding side – use the final total of the batting side, fielding side starts with penalty runs awarded.
- ▶ Awarded in 2nd innings to:
 - ▶ Batting side – added to current total, no impact on a future DLS calculation
 - ▶ Fielding side – no recalculation of DLS tables, all par scores in the latest DLS table and the target to win advance by number of penalty runs
 - ▶ Fielding side – if there are a loss of overs after penalty runs are awarded, use the fielding side's original total, then advance all par scores in the latest DLS table and the target to win by number of penalty runs



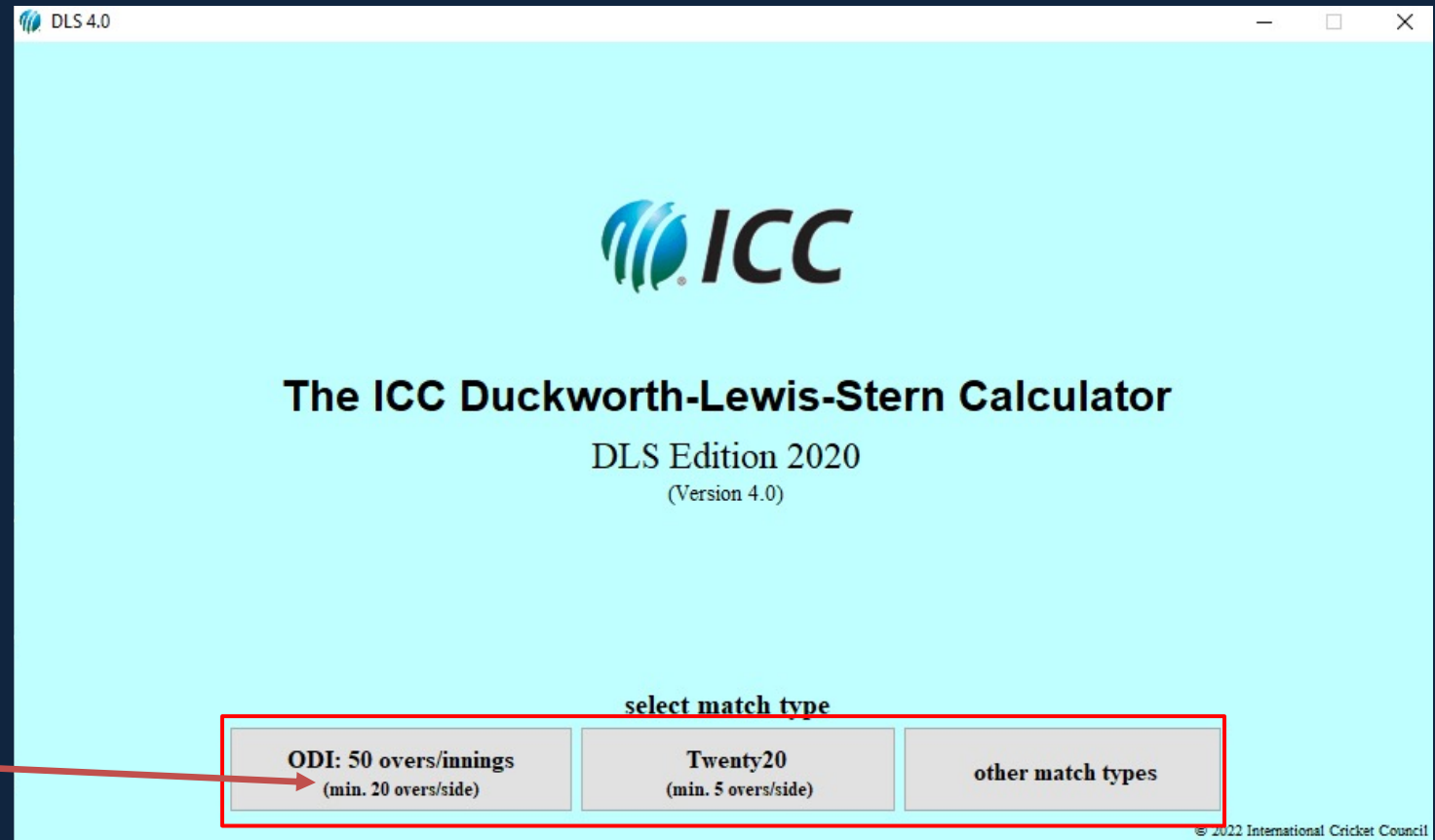
Recording The Result Using DLS Method

- ▶ If a limited overs match has at least one interruption to play with a loss of overs after its commencement, the result must be recorded with a reference to 'DLS Method'
- ▶ Is the winning margin by number of runs or number of wickets?
 - ▶ The margin is by wickets if the chasing team attains their target to win
 - ▶ The margin is by runs if the chasing team:
 - ▶ is dismissed all out for a total less than the score to tie
 - ▶ has a total less than the score to tie at the end of their allotted overs
 - ▶ is behind or ahead of the par score at the point where a match ends due to an interruption



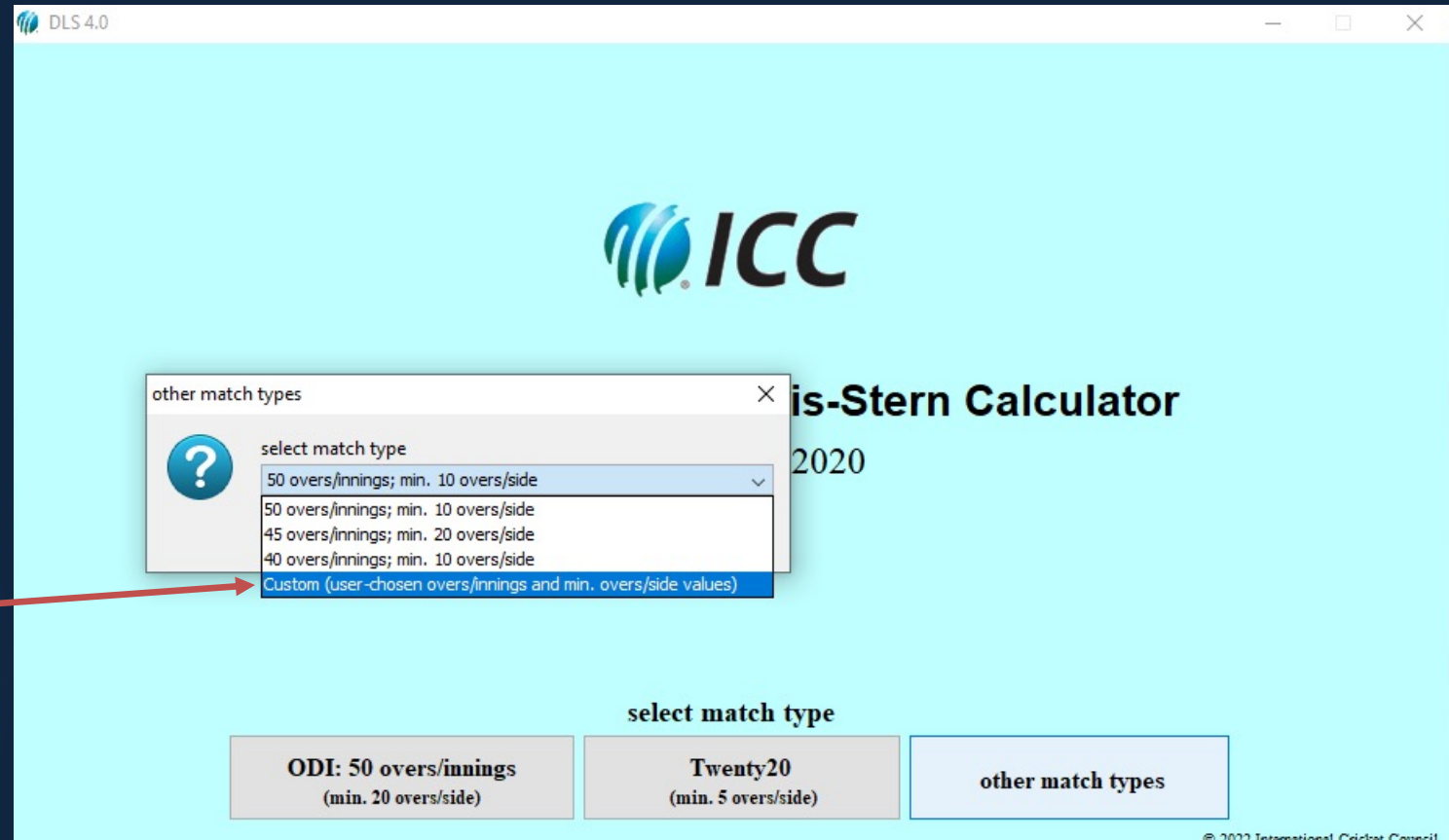
The DLS Calculator v4.0 (Desktop/Laptop)

- ▶ Check the minimum number of overs per side to constitute a match and use the 'other match types' option if it does not match the default



The DLS Calculator v4.0 (Desktop/Laptop)

- ▶ After clicking on 'other match types' button, if the match type is not one of the pre-set options, select 'Custom...'



Example 1: Interruptions in Team 1 Innings

- ▶ The match starts with both sides having the opportunity to face 50 overs
- ▶ The side batting first has its innings interrupted by rain after 15 overs with the score on 0-68
- ▶ The innings resumes with the match reduced to 30 overs per side
- ▶ Another interruption in play occurs at 0-120 after 26.1 overs
- ▶ The match is reduced further to 28 overs per side upon resumption
- ▶ The first innings ends on 0-125 after 28 overs
- ▶ *What is the target to win for the chasing side? Assume a minimum opportunity of 15 overs per side to reach a result*



Example 1: Interruptions in Team 1 Innings

- Start of match: 50 overs per side
- Team 1's final total: 125
- Team 1 interruption 1: at 0-68 off 15 overs, resumed with a loss of 20 overs
- Team 1 interruption 2: at 0-120 off 26.1 overs, resumed with a loss of 2 overs
- Team 2 starts innings with: 28 overs
- Target to win: 166

DLS 4.0 - match type: Custom (50 overs/innings; min. 15 overs/side)

Team 1's innings
overs/innings at start of match: 50
Team 1's final score: 125

	overs	balls bowled	runs scored	wickets down	overs lost/side
1	15		68	0	20
2	26.1		120	0	2
3					
4					
5					

add further stoppage row

total overs available: 28

Team 2's innings
overs at start of innings: 28
TARGET: 166 (to win)

	overs	balls bowled	runs scored	wickets down	overs lost
1					
2					
3					
4					
5					

total overs available: 28

Penalty runs awarded to Team 1 while Team 2 are batting:

create Par Score tables:
over-by-over ball-by-ball

reset input fields
change match type
create DLS match report



Example 2: Abandoned Team 1 Innings

- ▶ The match starts with both sides having the opportunity to face 50 overs
- ▶ The side batting first has its innings interrupted and ultimately ended by rain after 47.1 overs with the score on 8-226
- ▶ The chasing side resumes the match with the opportunity to face 33 overs
- ▶ *What is the target to win for the chasing side? Assume a minimum opportunity of 15 overs per side to reach a result*



Example 2: Abandoned Team 1 Innings

- Start of match: 50 overs per side
- Team 1's final total: 226
- Team 1 interruption 1: at 8-226 off 47.1 overs, which ended the innings
- Team 2 starts innings with: 33 overs
- Target to win: 199

DLS 4.0 - match type: Custom (50 overs/innings; min. 15 overs/side)

Team 1's innings

overs/innings at start of match: 50

Team 1's final score: 226

	overs	balls bowled	runs scored	wickets down	overs lost/side
1	47.1		226	8	a
2					
3					
4					
5					

total overs available: 47.1

Team 2's innings

overs at start of innings: 33

TARGET: 199 (to win)

	overs	balls bowled	runs scored	wickets down	overs lost
1					
2					
3					
4					
5					

total overs available: 33

Penalty runs awarded to Team 1 while Team 2 are batting:

add further stoppage row

create Par Score tables:

over-by-over ball-by-ball

reset input fields
change match type
create DLS match report



Example 3: Interruption in Team 2 Innings

- ▶ The match starts with both sides having the opportunity to face 45 overs
- ▶ The side batting first completes its allotted overs at 6-252
- ▶ The chasing side has its innings interrupted after 42.5 overs with the score 6-231, play resumes with 2 overs lost
- ▶ *What is the revised target to win for the chasing side? Assume a minimum opportunity of 15 overs per side to reach a result*



Example 3: Interruption in Team 2 Innings

- Start of match: 45 overs per side
- Team 1's final total: 252
- Team 2 starts innings with: 45 overs
- Team 2 interruption 1: at 6-231 off 42.5 overs, resumes with 2 overs lost
- Target to win: 235 (4 runs off 1 ball)

DLS 4.0 - match type: Custom (50 overs/innings; min. 15 overs/side)

Team 1's innings

overs/innings at start of match: 45

Team 1's final score: 252

	overs	balls bowled	runs scored	wickets down	overs lost/side
1					
2					
3					
4					
5					

total overs available: 45

Team 2's innings

overs at start of innings: 45

Revised Target: 235 (43 overs)
T2 need 4 more runs (0.1 over)

TARGET: 235 (to win)

	overs	balls bowled	runs scored	wickets down	overs lost
1	42.5		231	6	2
2					
3					
4					
5					

add further stoppage row

total overs available: 43

Penalty runs awarded to Team 1 while Team 2 are batting:

create Par Score tables:
over-by-over ball-by-ball

reset input fields
change match type
create DLS match report



Example 4: Previous example with penalty runs

- ▶ Take Example 3 and modify the calculator input if Team 1 was also awarded 5 penalty runs at over 27.6 of Team 2's innings
- ▶ *What is now the revised target to win for the chasing side?*



Example 4: Previous example with penalty runs

- Team 1 awarded 5 penalty runs during Team 2's innings before interruption
- Target is increased by the number of penalty runs awarded to Team 1
- Target to win: 240 (9 runs off 1 ball)

DLS 4.0 - match type: Custom (50 overs/innings; min. 15 overs/side)

Team 1's innings
overs/innings at start of match: 45
Team 1's final score: 252

Team 2's innings
overs at start of innings: 45
Revised Target: 240 (43 overs)
T2 need 9 more runs (0.1 over)
TARGET: 240 (to win)

overs	balls bowled	runs scored	wickets down	overs lost/side
1				
2				
3				
4				
5				

overs	balls bowled	runs scored	wickets down	overs lost
1	42.5	231	6	2
2				
3				
4				
5				

add further stoppage row

total overs available: 45

total overs available: 43

Penalty runs awarded to Team 1 while Team 2 are batting: 5

create Pa Score tables:
over-by-over ball-by-ball

reset input fields
change match type
create DLS match report



Example 5: Match ends due to interruption

- ▶ Take Example 3 and instead of the match resuming after the interruption, the match is called off with no further play
- ▶ *Who won the match and by what margin?*



Example 5: Match ends due to interruption

- Team 2 interruption ends the match
- The calculator provides the result
- *Team 1 won by 1 run (DLS Method)*

DLS 4.0 - match type: Custom (50 overs/innings; min. 15 overs/side)

Team 1's innings
overs/innings at start of match: 45
Team 1's final score: 252

Team 2's innings
overs at start of innings: 45
TARGET: (to win)
TEAM 1 win by 1 run (Par Score at end = 232)

Team 1's innings				Team 2's innings					
overs	balls bowled	runs scored	wickets down	overs lost	overs	balls bowled	runs scored	wickets down	overs lost
1					1	42.5	231	6	a
2					2				
3					3				
4					4				
5					5				

add further stoppage row

total overs available: 45

total overs available: 42.5

Penalty runs awarded to Team 1 while Team 2 are batting:

create Par Score tables:
over-by-over ball-by-ball

reset input fields
change match type
create DLS match report



Exercise 1: 50 Over Match Interruption to Team 1

- ▶ The match started with both sides having the opportunity to face 50 overs
- ▶ Team 1 reached 5-143 after 30 overs when rain stopped play
- ▶ The match resumed with both sides facing a reduced maximum of 40 overs
- ▶ Five penalty runs were awarded to Team 1 at over 32.5
- ▶ Team 1 goes on to be dismissed for 200 on the last ball of their allotted overs
- ▶ *What was Team 2's target to win? Assume a minimum opportunity of 15 overs per side to reach a result*



Exercise 1: 50 Over Match Interruption to Team 1

- Start of match: 50 overs per side
- Team 1's final total: 200
- Team 1 interruption 1: at 5-143 off 30 overs, resumed with a loss of 10 overs
- Team 2 starts innings with: 40 overs
- Target to win: 204

DLS 4.0 - match type: Custom (50 overs/innings; min. 15 overs/side)

Team 1's innings
overs/innings at start of match: 50
Team 1's final score: 200

	overs	balls bowled	runs scored	wickets down	overs lost/side
1	30		143	5	10
2					
3					
4					
5					

add further stoppage row

total overs available: 40

Team 2's innings
overs at start of innings: 40
TARGET: 204 (to win)

	overs	balls bowled	runs scored	wickets down	overs lost
1					
2					
3					
4					
5					

total overs available: 40

Penalty runs awarded to Team 1 while Team 2 are batting:

create Par Score tables:
over-by-over ball-by-ball

reset input fields
change match type
create DLS match report



Exercise 2: Interruption ends the match

- ▶ Continue with the match from Exercise 1
- ▶ In Team 2's innings, play was stopped due to nearby lightning with the score on 1-38 after 12.2 overs
- ▶ The match resumed with Team 2's innings reduced to a maximum of 35 overs
- ▶ Five penalty runs were awarded to Team 1 at over 20.3
- ▶ After 23 overs with Team 2 on 3-113, play is stopped again due to a heavy storm and the umpires decide that no further play is possible after the storm
- ▶ *Who won the match and what result was recorded?*



Exercise 2: Interruption ends the match

- Team 2 interruption 1: at 1-38 off 12.2 overs, resumed with a loss of 5 overs
- Team 2 interruption 2: at 3-113 off 23 overs, no further play
- Team 1 awarded 5 penalty runs during Team 2's innings between interruption 1 and 2
- The calculator provides the result
- *Team 2 won by 3 runs (DLS Method)*

DLS 4.0 - match type: Custom (50 overs/innings; min. 15 overs/side)

Team 1's innings
overs/innings at start of match: 50
Team 1's final score: 200

	overs.balls bowled	runs scored	wickets down	overs lost/side
1	30	143	5	10
2				
3				
4				
5				

total overs available: 40

Team 2's innings
overs at start of innings: 40
TARGET: (to win)
TEAM 2 win by 3 runs (Par Score at end = 110)

	overs.balls bowled	runs scored	wickets down	overs lost
1	12.2	38	1	5
2	23	113	3	a
3				
4				
5				

add further stoppage row

total overs available: 23

Penalty runs awarded to Team 1 while Team 2 are batting: 5

create Par Score tables:
over-by-over ball-by-ball

reset input fields
change match type
create DLS match report



Exercise 3: T20 Interruption to Team 2

- ▶ The match started with both sides having the opportunity to face 20 overs
- ▶ Team 1 was dismissed for 102 after 17.6 overs
- ▶ Team 2 reached 4-50 in 6.4 overs when rain stopped play
- ▶ The match resumed with 7 overs lost
- ▶ *What was the par score when play was stopped? What was the revised target to win? Assume a minimum opportunity of 5 overs per side to reach a result*



Exercise 3: T20 Interruption to Team 2

- Start of match: 20 overs per side
- Team 1's final total: 102
- Team 2 starts innings with: 20 overs
- Team 2 interruption 1: at 4-50 off 6.4 overs, resumes with 7 overs lost
- Par score at interruption: 41
- Target to win: 78

DLS 4.0 - match type: Twenty20 (20 overs/innings; min. 5 overs/side)

Team 1's innings
overs/innings at start of match: 20
Team 1's final score: 102

	overs	balls bowled	runs scored	wickets down	overs lost/side
1					
2					
3					
4					
5					

total overs available: 20

Team 2's innings
overs at start of innings: 20
TARGET: 78 (to win)
Revised Target: 78 (13 overs) (28 further runs in 6.2 overs)

	overs	balls bowled	runs scored	wickets down	overs lost
1	6.4		50	4	7
2					
3					
4					
5					

add further stoppage row

total overs available: 13

Penalty runs awarded to Team 1 while Team 2 are batting:

create Par Score tables:
over-by-over ball-by-ball

reset input fields
change match type
create DLS match report



Exercise 4: BBL | 10 Heat v Stars

- ▶ The start of play was delayed by rain and the match commenced with both sides having the opportunity to face 17 overs
- ▶ The Heat batted first and its innings was interrupted by rain after 7.5 overs with the score on 2-72, play resumes with the match reduced to 14 overs per side
- ▶ Another interruption to the Heat's innings occurred at over 8.2 with the score on 2-85, play resumed with the match reduced to 10 overs per side
- ▶ The Heat completed its 10 overs at 3-115
- ▶ *What was the target to win for the Stars if there were no further interruptions?
Assume a minimum opportunity of 5 overs per side to reach a result*



Exercise 4: BBL | 10 Heat v Stars

- Start of match: 17 overs per side
- Team 1's final total: 115
- Team 1 interruption 1: at 2-72 off 7.5 overs, resumed with a loss of 3 overs
- Team 1 interruption 2: at 2-85 off 8.2 overs, resumed with a loss of 4 more overs
- Team 2 starts innings with: 10 overs
- Target to win: 130

DLS 4.0 - match type: Twenty20 (20 overs/innings; min. 5 overs/side)

Team 1's innings
overs/innings at start of match: 17
Team 1's final score: 115

	overs.balls bowled	runs scored	wickets down	overs lost/side
1	7.5	72	2	3
2	8.2	85	2	4
3				
4				
5				

add further stoppage row

total overs available: 10

Team 2's innings
overs at start of innings: 10
TARGET: 130 (to win)

	overs.balls bowled	runs scored	wickets down	overs lost
1				
2				
3				
4				
5				

total overs available: 10

Penalty runs awarded to Team 1 while Team 2 are batting:

create Par Score tables:
over-by-over ball-by-ball

reset input fields
change match type
create DLS match report



What needs to be entered in the boxes?

DLS 4.0 - match type: Custom (50 overs/innings; min. 15 overs/side)

Team 1's innings

overs/innings at start of match:

Team 1's final score:

	overs.balls bowled	runs scored	wickets down	overs lost/side
1	<input type="text" value="C"/>	<input type="text" value="D"/>	<input type="text" value="E"/>	<input type="text" value="F"/>
2	<input type="text" value="G"/>	<input type="text" value="H"/>	<input type="text" value="I"/>	<input type="text" value="J"/>
3	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
4	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
5	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

add further stoppage row

total overs available:

Team 2's innings

overs at start of innings:

TARGET: (to win)

	overs.balls bowled	runs scored	wickets down	overs lost
1	<input type="text" value="L"/>	<input type="text" value="M"/>	<input type="text" value="N"/>	<input type="text" value="O"/>
2	<input type="text" value="P"/>	<input type="text" value="Q"/>	<input type="text" value="R"/>	<input type="text" value="S"/>
3	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
4	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
5	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

total overs available:

Penalty runs awarded to Team 1 while Team 2 are batting:

create Par Score tables:



What needs to be entered in the boxes?

DLS 4.0 - match type: Twenty20 (20 overs/innings; min. 5 overs/side)

Team 1's innings

overs/innings at start of match:

Team 1's final score:

	overs.balls bowled	runs scored	wickets down	overs lost/side
1	<input type="text" value="C"/>	<input type="text" value="D"/>	<input type="text" value="E"/>	<input type="text" value="F"/>
2	<input type="text" value="G"/>	<input type="text" value="H"/>	<input type="text" value="I"/>	<input type="text" value="J"/>
3	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
4	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
5	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

add further stoppage row

total overs available:

Team 2's innings

overs at start of innings:

TARGET: (to win)

	overs.balls bowled	runs scored	wickets down	overs lost
1	<input type="text" value="L"/>	<input type="text" value="M"/>	<input type="text" value="N"/>	<input type="text" value="O"/>
2	<input type="text" value="P"/>	<input type="text" value="Q"/>	<input type="text" value="R"/>	<input type="text" value="S"/>
3	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
4	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
5	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

total overs available:

Penalty runs awarded to Team 1 while Team 2 are batting:

create Par Score tables:

