

Scorekeeping with Smart Phones

Mobile Solution for Outdoor Team Sports Tournaments

Finnish Flying Disc Association

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NOKIA
Connecting People

What Kind of Scorekeeping?

- Not this little detail, ...

A hand-drawn scorekeeping diagram on a white background. A horizontal line is drawn across the middle. Above the line, the letter 'H' is written on the left and the letter 'V' is written on the right. A vertical line is drawn in the center, intersecting the horizontal line. Below the horizontal line, there are two groups of vertical lines on the left side of the vertical line and one group on the right side. The left group consists of two sets of three vertical lines, with the first set crossed out by a diagonal line. The right group consists of two sets of three vertical lines.

H	V
 	

What Kind of Scorekeeping?

- Nor this level of accuracy, but...

San Antonio (112)

	POS	MIN	FGM-FGA	FTM-FTA	TGM-TGA	ORB-TRB	AS	ST	BL	TO	PF	TP
Cummings, Terry	F	22	2-10	1- 2	0- 0	6-12	2	0	0	1	0	5
Rodman, Dennis	F	36	4- 5	0- 0	0- 0	3-17	3	1	1	2	1	8
Robinson, David	C	44	26-41	18-25	1- 2	4-14	5	0	2	8	2	71
Del Negro, Vinny	G	26	1- 3	0- 0	0- 0	0- 2	6	4	0	2	2	2
Daniels, Lloyd	G	25	2- 7	0- 0	0- 2	0- 2	1	2	1	3	2	4
Knight, Negele		24	3- 6	0- 0	0- 0	0- 0	5	0	1	0	2	6
Floyd, Sleepy		23	1- 5	1- 4	1- 2	1- 5	6	0	0	4	3	4
Carr, Antoine		24	2- 2	0- 0	0- 0	0- 1	0	1	0	0	1	4
Reid, J.R.		12	2- 6	2- 2	0- 0	3- 4	0	0	0	1	2	6
Haley, Jack		4	1- 2	0- 0	0- 0	0- 1	0	0	0	0	2	2
TOTALS		240	44-87	22-33	2- 6	17-58	28	8	5	21	17	112

FG %: .506 FT %: .667 Three %: .333 Team Rebs: 10 Team TOs: 0

Target Accuracy in Scorekeeping

Score	Time	Scored by	Assisted by
0 - 1	1:17	William Deaver (3)	Jeffrey Eastham-Anderson (4)
0 - 2	3:55	Bartholomew Watson (24)	Michael Namkung (26)
1 - 2	5:36	Anne-Marie Carey (13)	Jeff Cruickshank (19)
2 - 2	8:32	Victoria Chow (99)	Evan Wood (54)
2 - 3	10:43	Chase Sparling-Beckley (7)	William Deaver (3)
2 - 4	14:29	Jeffrey Eastham-Anderson (4)	Joshua Ziperstein (2)
3 - 4	16:51	Su Ning Strube (18)	Derek Alexander (33)
3 - 5	19:34	Bartholomew Watson (24)	Jessica Witt (9)
3 - 6	21:49	Bartholomew Watson (24)	Michael Namkung (26)
Timeout	22:02		
4 - 6	24:40	Andrew Lugsdin (9)	Kirk Savage (91)
Timeout	26:39		

Ultimate in a Nutshell

- Fast-paced, non-contact team sport
- Played with flying disc a.k.a Frisbee
- With 7-player squads
- On a field similar to football field



- Invented in late 60s
- Played in more than 45 countries
 - Latest World Championship tournament (Finland 2004) had national teams from 23 countries

Ultimate Tournaments

- Relaxed atmosphere
- Scorekeeping and reporting often inaccurate, untimely, and disorganized



Ultimate Tournaments Online

Cal States - Microsoft Internet Explorer provided by NOKIA (Europe Configuration)

Address <http://www2.upa.org/scores/tourn.cgi?div=124&id=1365>

Pool A

(2-1) A1: Kaos (1)
 (3-0) A2: Sockeye Y (6)
 (1-2) A3: PBR Streetgang (7)
 (0-3) A4: Journeymen (12)

Pool B

(3-0) B1: Jam (2)
 (2-1) B2: Sockeye X (5)
 (1-2) B3: Oaks (8)
 (0-3) B4: monster (11)

Pool C

(3-0) C1: Condors (3)
 (1-2) C2: Get It Back (4)
 (2-1) C3: Axe (9)
 (0-3) C4: Damento (10)

Sat	Game	F#	Score	Game	F#	Score	Sat	Game	F#	Score	Game	F#	Score	Sat	Game	F#	Score	Game	F#	Score
-	A1-A3	3	W-L	A2-A4	4	W-L	-	B1-B3	1	15-8	B2-B4	2	15-3	-	C1-C3	1	W-L	C2-C4	2	15-5
-	A1-A4	3	W-L	A2-A3	4	W-L	-	B1-B4	1	15-8	B2-B3	2	15-3	-	C1-C4	1	W-L	C2-C3	2	12-13
-	A1-A2	3	L-W	A3-A4	4	W-L	-	B1-B2	1	16-14	B3-B4	2	15-2	-	C1-C2	1	14-12	C3-C4	2	W-L

A Bracket

Pre-Quarters: A1:Kaos (1), A2:Sockeye Y (6), A3:PBR Streetgang (7), A4:Journeymen (12)
 Quarters: A1:Kaos vs A2:Sockeye Y (9), A3:PBR Streetgang vs A4:Journeymen (15)
 Semis: (A1:A2) vs (A3:A4), (A1:A2) vs (A3:A4)
 Finals: (A1:A2) vs (A3:A4)

A Bracket Consolation

Semis: (A1:A2) vs (A3:A4), (A1:A2) vs (A3:A4)
 Finals: (A1:A2) vs (A3:A4)

Internet

Paper-based Scorekeeping

- More formal tournaments
 - E.g. World Championships
- In some countries
 - E.g. Finland, Sweden
- Varying score sheets
- Manual work required to transfer results to databases
 - Either by volunteer officials or by players themselves
 - Delays not uncommon

World Ultimate Championships 2000 - Official Scoresheet.					
Teams: X			v Y		
Date:		Time:	Division:		Pool:
Starting zone	Pull-Team		End /		
Start Time					
Time Outs	Team X		Team Y		
1					
2					
3					
4					
5					
6					
Half Time (Actual Time)		Start		Finnish	
		Team X		Team Y	
Overtime TO 1					
Overtime TO 2					
End of Game (Actual Time)					
Injury TO's	Team X		Team Y		
1					
2					
3					
4					
5					
6					
FINAL SCORE			SOTG (0-10)		
Team X =			Y=		
			From X		
Team Y =			X=		
			From Y		
CAPTAIN X		SIG:			
CAPTAIN Y		SIG:			
Staff Name					
SOTG Score	Team X		Team Y		
Score	Team X	Team Y			
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
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48					
49					

Other Scorekeeping Systems for Ultimate

- Score-O-Matic (<http://www.scoreomatic.com>)
 - Phone-based scorekeeping system for soccer and ultimate
 - WAP client added recently
 - Limited success because of problems in volunteer recruiting
- UltiStats for Palm devices
 - Intended for game analysis and coaching

The image displays three screenshots of the UltiStats for Palm devices interface, overlaid on a background image of two ultimate frisbee players in action.

Screenshot 1: Offense

Offense	Rippit	3
	Clear the Room	1
	(Note) (Undo)	
	(Timeouts)	
Goal by	Goal by	
Throwaway	Alan	
Dropped by	JT	
½ TO, ½ Drop	Keebler	
Injury sub	Will	
<input checked="" type="checkbox"/> Huck	Aruna	
<input type="checkbox"/> Layout catch	Kate	
<input type="checkbox"/> Sky catch	Sharon	

Screenshot 2: Rippit

Rippit	Rippit	11
	RedFish BlueFish	9
Pts played	20	55.0% on D
Completion %	39%	
Completions	11	1 huck
Throwaways	12.5	
Drops	4.5	
Goals thrown	11	1 huck
Goals caught	11	
Blocks	10.5	4 sky
Handblocks	0	
Efficiency	O .555 D .545 C .550	
	◀ ▶	Done

Screenshot 3: Play Log

Dave goal to Jen.
12-12
IN: Alan Eric Keebler Tommy
Kate Libby Michelle
Block by Kate!
Kate goal to Keebler.
13-12
IN: Dave Keebler Tommy Kate
Michelle Sarah Will
Block by Tommy! (layout)
Kate throwaway.
They scored.
Ok Cancel

Scorekeeping in Other Sports

- Plenty of stand-alone scorekeeping solutions
 - Score sheets, software (PC, Palm)
 - Baseball, basketball, football, ice hockey, soccer,...
- Large league and tournament systems mostly tailored systems
- Often paid personnel
 - At least well-trained volunteers

TurboStats : c:\basket22\houston.tm - [Game Form]

Games View Players Compile Stats Utilities Help

Game Start 2:46 Save Set

#	Thursday	Time	Team	Final	1st	2nd	3rd	4th	OT	OT	OT
1	06/03/04	6:00 PM	Hawks	59	12	14	22	11	0	0	0
Type	Season		Rockets	73	17	15	17	16	0	0	0

Game List 1 Line Up 2

1: Hawks
2: Warriors
3: Blazers
4: Heat
5: Jammers
6: Steam
7: Hawks
8: Hawks

7:14 Bill Miller
7:14 Don Trifari
2:10 Kevin Miller
2:10 Todd Nicholas
2:10 Pete Johnson
0:5 Hubie
Ed Emerson
Louis Copper
Kevin Zeroski
Mike Mets
Doug Vanderzee
Opponents

Don Trifari vs Hawks 2nd

Create Shots (left-made: right-miss)

Shot # Period Team Redraw

Game Stats Shot Chart Game Notes Game Assistant

Click to set the current period. Game mode will automatically add points

ScorePad 1:51

Warriors 2 River Dogs 0

0:29

H 48 Sandler Player In

Visitor Home

P 2 P 13
P 8 P 21
P 16 P 26
P 17 P 38
P 22 P 48
P 24 P 1
P 33 P 29
P 37 P 34
P 46 P 45
P 50

ScorePad 2:34

Warriors 0 River Dogs 0

0:17

V 22-Quirk Shot

ScorePad 2:34

Warriors 0 River Dogs 0

1:07

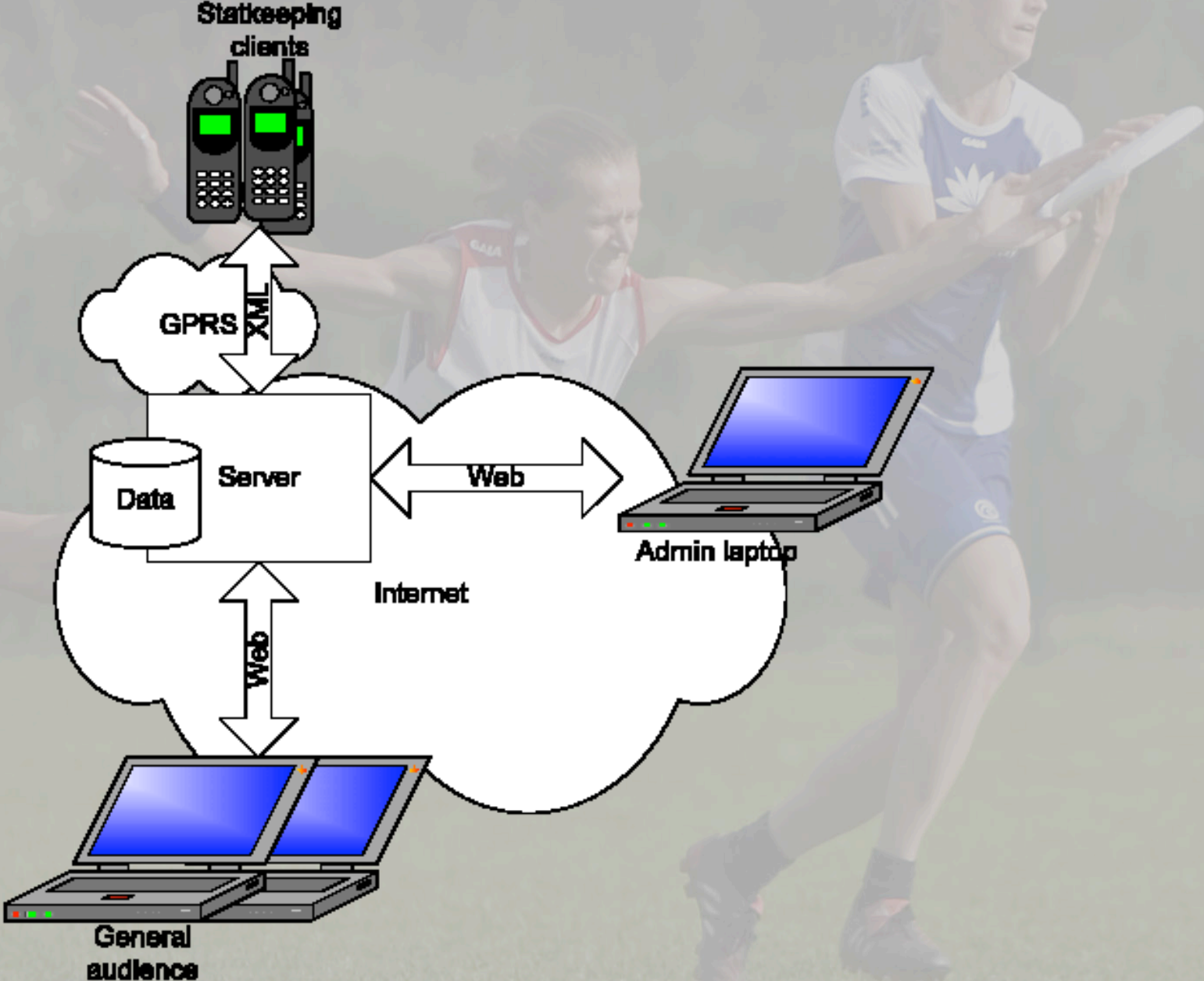
Goal

Problem Setting

- World Ultimate Championships in Finland
- About 400 games, spread...
 - Over one week
 - Over 20 fields at 5+ sites
- Volunteer officials (parents, friends, local players, etc.)
- Handset donation -> smart phone use
 - Deal with local carrier on data traffic
- 3rd party developing back-end server



General Architecture



Design Constraints for WUGC Scorekeeping System

- Volunteers only – no hired guns
 - Limited training
 - Varied experience in scorekeeping / hand-held devices
- Outdoor use
 - Lack of electricity
 - Weather (rain, sun)
 - (Lack of connectivity)
- Officials sitting / standing
 - Cannot rely on table availability – one hand use
- Development platform: Phone / Java (J2ME)
 - Strict timetable
- Development without working back-end server

Requirements for WUGC Scorekeeping System

- Reliability and timeliness
- Undo capability
- Scorekeeping
 - Score
 - Time-outs
 - Scorers
- Timekeeping
 - Game
 - Half-time break
 - Time-outs
 - Time between points

Our Smart Phone Platform

- Series 60 phone (Nokia 6600)
 - With 2 softkeys
- Application runs also on other J2ME phones



UI Drafts

UltiStatKeeper
Mon, Aug 2, 2004

Game clock: **0:38:44**

Point timer: **:34**

Time Outs available:

0	1
----------	----------

Score:

11	12
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Pull **Furious**

UltiStatKeeper
Mon, Aug 2, 2004

Game clock: **0:38:02**

Time Outs available:

Goal
Time Out
Cancel

Condors **Furious**

Scorer: Condors

Enter the number of the player scoring the goal:

Ok **No score**

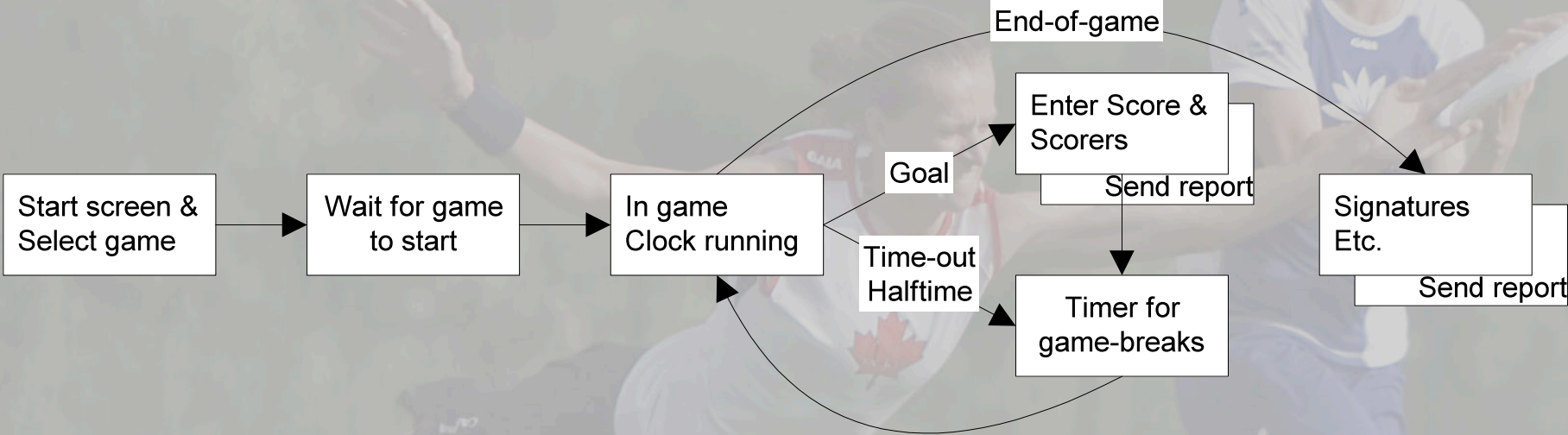
Assist: Condors

Scorer is no 23.

Enter the number of the player assisting the goal:

Ok **No score**

Program Flow in General



Select a field

- Kupittaa 1 (0)
- Kupittaa 2 (1)
- Paavo Nurmi 1 (2)

Options Back

WUGC 2004 / Kupittaa 1

0:01:16 (1:38:44)
Australia vs. Canada
1 - 1

Time-outs left:
H: 2 - V: 2

Last event
[0:00:44] V: Goal, 5->6

Time to resume:
0:00:28

Options Undo

Goal:Canada

Assist by?

Goal by?

Options Back

Game details

Australia vs. Canada
Kupittaa 1 / 5645674
at:01.08.2004 09:00:00

Game events:

- 1 - 0 [0:00:05] H: Goal, 2->3
- 1 - 1 [0:00:44] V: Goal, 5->6
- 1 - 2 [0:06:55] V: Goal, 6->7
- 2 - 2 [0:20:57] H: Goal, 2->9
- 3 - 2 [0:21:25] H: Goal, 9->13
- 4 - 2 [0:21:58] H: Goal, 9->2

Options Back

Testing and Use

- Extensive client-side testing during development
- Limited system-level testing
 - Back-end server was available 4 days before tournament
- First large scale testing at training session
 - 16-page user manual handed (not read by volunteers...)
- Officials in pairs (30 pairs)
 - One with phone & whistle
 - One with paper, pen, and stopwatch (back-up)

Results and Feedback

- Only 3 games (out of 395) reported by hand
- Feedback (response rate 28%) from volunteer officials supportive, but
 - Many crashes reported
 - Sluggishness of Series 60 implementation
- Same client used in World Games 2005
 - Back-end server updated

Further Work

- UI and reliability tuning
 - E.g. MIDP Canvas instead of MIDP Form
- More functionality
 - Better handling of unexpected situations
 - Roster editing
 - Bluetooth transfers
- More general set-up process
 - Including other sports?
- Data gathering tools for (notational) game analysis
 - Initial pen-base tests carried out

In Conclusion

- Smart phones are a good platform for scorekeeping system
 - Especially distributed tournaments and leagues
 - Reasonably low-cost, weather-resistant, and reliable deployment
- Benefits compared to paper-based solutions
 - One person can handle both stat keeping and time keeping!
 - Mobility, official is able to get closer to the players (better recognition)
 - Real-time score service