

Preparing for Meta-Research The Work Shift Description (WSD)

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Shift systems differ strongly from one another in terms of a number of their features. An exploratory examination of some papers in this area showed that typically only some of these features were described. Out of a huge number of potentially relevant features, the authors proposed a first draft of a standardized, minimal description at the 15th International Symposium on Night- and Shiftwork. After substantial input from participants and a vote the first version of the Work Shift Description (WSD) is described in this paper. It allows for a concise description of shift systems and (at least to some degree) irregular hours. By this means it aims to improve the information detailed in future research papers to facilitate meta-research in the future.

Introduction

Over the years numerous studies have built up a substantial knowledge of various aspects of night- and shiftwork. Often, studies address a specific research question or closely related issues (e.g., the length of shifts and the effects of this). There is a well established research tradition to control for a number of potentially relevant factors that may contaminate the results with respect to the research question. Two main dimensions of such control (typically done by using statistics) refer to the persons involved (e.g., age, sex) and for the call of a control group.

The control of these two dimensions is already difficult. However, there are further well known factors that may influence the outcome of studies. Thus, for example, with respect to shift length:

1. Average working hours per week will effect the balance between shift length and the number of rest days. (e.g. with a 48h week and 8h shifts there would be only one day off per week compared to 3 days off with 12h shifts. With average working hours well below 40h, the effects on days off might be less dramatic and correspondingly may have a lesser impact).
2. The actual roster changes if shift length or working time changes. This may have an effect of its own
3. Depending on living conditions, going to work may be more or less strenuous. Again this may strongly influence the outcome of research on the length of shifts (due to the number of days off).
4. Variation of times plays an important role (e.g. differences between scheduled and actual times; variations due to demand, notice times).

It would be too much trying to control all such factors within one research project. Given the difficulties of finding control groups under normal settings, this is not possible. However it seems to be reasonable to publish a (not too long) set of data describing the context and central elements of

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the rosters. Such a list of features and issues to be described seems especially reasonable given the various scientific background of researchers in this field that bring the focus to different features of shift schedules considered important when describing a shift schedule. An exploratory review of research papers (Costa et al. 1989; Folkard & Hunt; 2000; Bohle & Tilley 1989) however shows that only some of these features are made explicit in papers and reports.

To facilitate comparison between studies and to allow for meta-analyses we developed the idea of a well defined list of features that should be described in research papers and in reports. Such a list should be a short list (using the abbreviations, a ¼ of a page). This list should facilitate comparison of research & meta-research, meet different research interests: safety, health, fatigue, social issues, pay, scheduling with respect to very different cultural and legal environments.

The proposed list concentrates on the work shift description for regular rosters and (to some degree) irregular hours. Not included (but welcome if additionally described) are data regarding:

- ◆ sleep, time of breaks, behavior, eating & drinking
- ◆ group features - age, education, gender, income & pay
- ◆ industry & work organization
- ◆ industrial relations, participation & process
- ◆ cultural issues, laws, logic of collective agreements, social security
- ◆ geography & location
- ◆ research design
- ◆ changes in these dimensions

Such a list of features to be described relies on the acceptance within a research community. It is not important to have a 'perfect' description (whatever that may be). It is important to have a description that is broadly used. Correspondingly the development of such a list is a participatory issue. A draft version of the list was introduced and refined at the 15th International Symposium on Night and Shiftwork in Hayama, Japan 2001. There, several issues were added and clarified. An improvised voting brought 34 Yes votes for such a list to 2 No votes (90 sheets were distributed at the beginning of an evening session, but with no structured collection process). The authors, reflecting the input from participants, again revised the list. If further questions arise, please send us a proposal for revision via email or make a referendum via SINNET. The authors will add the thoughts to the Web-site of the Shiftwork International Newsletter (SIN). We assume that there will need to be further revisions made in the future to reflect researchers' experiences in using it.

Use of the WSD & which values to take

The WSD should be used in full papers and reports. By using the abbreviations it should be a short list. The full description should be referenced with a citation and/or a reference to the Web-site of the Shiftwork International Newsletter (SIN). Typically two values are collected for each issue within the list

E ... Extreme values refer to the minimum or maximum, earliest or latest etc. depending on the issue under consideration. It should be clear from the context (e.g. breaks = minimum; working hours per day = maximum) which extreme should be entered. Sometimes two extreme values may be needed (e.g. in very irregular systems: the shortest and the longest shifts. If it is reasonable (especially for irregular hours) it might be even better to use two columns: one for minima, one for maxima. A further alternative would be to use standard deviation. If one of these alternatives is chosen it should be noted.

A ... Average or typical values. In most cases one will be able to work with average values.

However, with very irregular they may be very difficult to compute or irrelevant.

Regarding the hours to be described, actual hours of work should be listed (not scheduled hours). If the actual values are not available, please enter estimated values (a single value or a range) and mark them with (*). If needed, separate lists for the weekdays & the weekend should be made (or for summer/winter, high ...low). If values vary very strongly then take an approx. 95% percentile value

as an extreme value or one of the other approaches that seems most reasonable. If values are omitted please shortly state whether N/A ... not applicable (with reasonable effort) or N/V... not known or estimated (building upon best knowledge) and mark it as an estimation (*).

The Work Shift System Description = WSD

The WSD consists of a general description and either a table of shifts & a figure of the roster or (if the first way is not applicable due to the number of shifts, the irregularity etc.) a 2nd list, describing the shifts and the roster.²

The first part of the WSD is a list of features relevant for rather different rosters. Figure 1 describes these features and explains how they are to be understood or which values should be taken. Figure 2 gives an example how this list might be used in research papers.

Nr.	DESCRIPTION		Vote
	Issue	Further explanations / values	75%-90%
1	weekly working hours	<i>Actual hours! – excluding breaks</i>	
2	days of annual leave	<i>including public holidays (taken)</i>	<i>o</i>
3	How much control do employees have over the specific shifts they work?	<i>none / not very much/ a fair amount/ quite a lot/ complete</i>	<i>o</i>
4	How much control do employees have over the specific start and finish times?	<i>none / not very much/ a fair amount/ quite a lot/ complete</i>	<i>o</i>
5	How many days ahead do workers know the roster in advance (in days)?	<i>The shifts should be known. Only changes of starting times or end times of +/- 1 hour are considered.</i>	<i>o</i>
6	hours of on call duties a week		<i>o</i>
7	hours of unscheduled overtime a week	<i>(not already planned one week in advance)</i>	<i>o</i>

Figure 1: Features of the first part of the WSD with a description of the features.

Nr.	EXAMPLE		
	Abbreviation to be used in table within paper/report	Ex-treme	Average/ Typical
1	Actual working hours p.W.	56:00	42:00
2	Annual leave		30
3	Empl. Contr. Shifts	none	a fair amount
4	Empl. Contr. Times	none	a fair amount
5	Changes known in advance	1	5
6	Hours on call pW	16:00	6:00
7	Unscheduled overtime pW	3:00	1:00

Figure 2: Example of the use of the first part of the WSD.

It was consensus that if applicable the list of shifts (figure 3) and a figure of the roster (figure 4) should be included. Reasons that might make such a list or figure impossible or un-informative might be differences between the actual and scheduled working hours, rosters that are extremely long, rosters with a high number of groups or a very high number of shifts, and irregular work hours.

² Items that had less than 90% support in the voting are marked with a "o" in the most right column. No item had less than 75% support.

TABLE OF SHIFTS		Break (s)			
Name	Start	End	Start	End	
e.g. M	07:00	15:00	11:45	12:15	
...					

Figure 3: Structure of the list to describe shifts.

FIGURE OF ROSTER						
M	Tu	W	Th	Fr	Sa	Su
A	D	D			D	D
M						

Figure 4: Structure of the figure to describe the roster.

It was strongly felt that the following list should only be applied if the table of shifts and a figure of the roster can not be applied (e.g. due to irregular hours).

Nr.	DESCRIPTION		Vote
	Issue	Further explanations / values	75%-90%
8	daily working hours	hours after a daily break	
9	start of morning shift(s)	No distinction between morning & day shifts. Net hours. Start between 5:00 & 11:00.	
10	end of night shift(s)	Night shifts have more than 3 hours of work between 22:00 & 6:00	
11	hours of work before a break(s)	If several breaks, list them	
12	length of break (s)	If several breaks, list them. If applicable distinguish whether real break or just stop of work.	
13	length of Morning or Day shift(s)	No distinction morning & day. Net hours. Start between 5:00 & 11:00.	
14	length of afternoon or evening shift(s)	Afternoon shifts start after 11:00 and end before 1:00.	
15	length of night shift(s)		
16	Percentage of weekends off	Friday 22:00 to Sunday Monday 6:00 within 5 weeks (rolling average)	
17	length of cycle	if applicable	
18	length of daily rest	in hours	o
19	length of longest weekly break	in hours	o
20	days of morning or day shift(s)	change to different shift or rest days	
21	days of afternoon shift(s) before changing	change to different shift or rest days	
22	days of night shift(s) before changing	change to different shift or rest days	
23	Days off in row after a period of work in days		
24	Successive days of work	a sequence of duties (of any kind) before at least 36:00 hours off	
25	Direction of rotation	Fixed/forward/mostly forward/ mixed/mostly backward/backward	o

Figure 5: 2nd part of the WSD to be used if the list of shifts and the figure of the roster can not be applied.

The abbreviations and an example

EXAMPLE			
Nr.	Abbreviation to be used in table		
	within paper/report	Ex- trem	Average/ Typical
8	Daily working hours	12:00	9:00
9	Start morning shift	5:00	6:00
10	End of night shifts	10:00	6:00
11	Hours before break	8:00	5:00
12	Length of breaks(s)	0:00	0:30
13	Length of morning shift(s)	12:00	8:00
14	Length of afternoon shift(s)	11:00	8:00
15	Length of night shift(s)	12:00	8:00
16	Weekends off	0%	25%
17	Cycle length	6	3
18	Daily rest	8:00	15:00
19	Weekly rest	26:00*	48:00*
20	Morning shifts in a row	5	3
21	Afternoon shifts in a row	4	2
22	Night shifts in a row	4	2
23	Days off	1	2
24	Duties in a row	9	6
25	Direction of rotation	Mixed	Forward

Figure 6: Example of the use of the second part of the WSD to be used if the list of shifts and the figure of the roster can not be applied.

Conclusions

The proposed list for the description of work shift systems is a first attempt at allowing for a concise description of such systems. If the list is used further versions are to be expected and will be published on the Web-site of the Working Time Society (WTS)³. Such versions may help to clarify notions (e.g. what is meant by ...) and allow for better understanding and description of research accomplished and thereby allow for meta-research.

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³ See also: <http://time.iguw.tuwien.ac.at> ... the web-site of the Shiftwork International Newsletter (SIN)