P1752 Sleep Schema Subgroup Meeting

Sponsored by IEEE Engineering in Medicine & Biology (EMB) Standards Committee

- 8 Jan 2019
- Teleconference
Attendance

• Put your name and affiliation in the chat window for attendance today.
• If you are joining only via phone, please email charlotte.chen@philips.com with “P1752 Sleep Schema Subgroup call” as subject
• The document shows attendance is under https://ieee-sa.imeetcentral.com/omh/folder/WzIwLDEwMjY4MDg1XQ/.
   --If you attended the call, please verify that your name is listed
   --If you name is not listed, either edit the document above or email charlotte.chen@philips.com
Agenda

1. Attendance
2. Updated deliverables and modified timelines
3. Update from the qualitative schema task group (15 mins)
4. Introduction to Open mHealth survey schema (10 mins)
5. Update from quantitative schema task group
   --- Review the updated list
   --- Review drafted quantitative schemas (30 mins)
5. Action Items
6. Q&A
Sleep Schema Subgroup Deliverables

- Clinically important sleep attributes
- Common sleep attributes of the existing relevant devices and apps
- Standard Comparison Report (Review and mapping)
- Proposed sleep schemas (modified and new) and use cases (quantitative and qualitative)
  
  (1) Quantitative Measurement Schemas (including macrostructure, microstructure and etc.)
  
  (2) Qualitative Measurement Schemas (including subjective sleep experience, other sleep related phenomena and etc.)
Timeline for Stage2

July 23, 2018
Kick Off

-Drafted/Start to review Quantitative Sleep Schemas by Jan 18, 2019
-Prepare Qualitative Measure Schema Development by Jan 14, 2019

-Completed Quantitative Schemas and Use Cases on Feb 1, 2019
-Drafted/Start to review qualitative measure schemas Feb 15, 2019
-All the deliverables are ready by Feb 28, 2019
Qualitative Schema Task Group Updates (Banu)
Status

• Summary of events after meeting with Dr. White
  (Ref: Charlotte Chen, Email dated Dec 9, 2018)
  --- Selected and added common set(s) for each sleep attribute or disease;
  --- Added the use cases provided by Dr. White;
  --- Added questionnaires of ISI (done by Charlotte), OSA, Stop - Bang, RSL, Narcolepsy and FOSQ (done by Banu)
  --- Summarized the commonly used 13 questionnaires
  --- Shortlisted 10 questionnaires as suggested by Dr. White
    (Epworth, SSS, KSSS, PSQI, ISI, OSA, Stop-Bang, RLS-DI, Narcolepsy, FOSQ)
Suggestions from Ida during the last WG meeting:

• ---Our goal is to build generic schema(s) to represent qualitative sleep measures instead of building a schema for each specific questionnaire;

• ---Keep all typical/common sets of questionnaires into a library;
Propose Possible Next Steps

• The possible next steps for this task group:

(a) Identify suitable attributes from the questionnaires.
   1. Alertness (Epworth/SSS/KSS/FOSQ)
   2. Sleep Quality (PSQI/ISI)
   3. OSA Risk (OSA-BQ/SBQ)
   4. RLS Risk (RLS-DI) and
   5. Narcolepsy Risk

   CC: According to Dr. White, FOSQ is used for evaluating “quality of life” as a result of sleep. Should we create a “quality of life” attribute for this set or just include under the attribute “Alertness”?

(b) Building schema for survey results;

   CC: If we build some generic schema(s) to support these qualitative measurements, we might include a field to indicate the specific questionnaire (for example, use Enum) under the “property” of a schema.
Action Items

• Reach consensus on the attributes for qualitative sleep measures

• Reach consensus on the library model: eg. description, identifiers, score entry

• Determine and finalize use cases

• Approach to draft schema
Introduction to Open mHealth
Survey Schema
(Simona)
Quantitative Schema Task Group Updates

- Review the updated list
- Review the drafted quantitative schemas (30 mins)
Overview of Schema Development Tasks

❖ Review and Understand the Existing Work (Open mHealth)
   - Design principles:
     http://www.openmhealth.org/documentation/#/schema-docs/schema-design-principles
   - Existing templates for various schemas:
     http://www.openmhealth.org/documentation/#/schema-docs/write-a-schema
   - Existing sleep schemas:
     http://www.openmhealth.org/schema/omh/sleep-duration-2.0.json
     http://www.openmhealth.org/documentation/#/schema-docs/schema-library/schemas/omh_sleep-episode

❖ Propose Modified and New Sleep Schemas
Review the Updated List
Review the Updated List of Mapping (1)

<table>
<thead>
<tr>
<th>Schema ID</th>
<th>Schema Name</th>
<th>Priority</th>
<th>Complexity</th>
<th>Assignment</th>
<th>Sleep Attribute1 (unit)</th>
<th>Sleep Attribute2 (unit)</th>
<th>Sleep Attribute3 (unit)</th>
<th>Sleep Attribute4 (unit)</th>
<th>Sleep Attribute5 (unit)</th>
<th>Associated Sleep Attribute(s)</th>
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<td>SC</td>
<td>SOL (hrs, mins, secs)</td>
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<td>WASO, Self-report</td>
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<td>JS</td>
<td>TST (hrs, mins, secs)</td>
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<td>PH</td>
<td>TIB (hrs, mins, secs)</td>
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<td>TST, SOL, WASO, Self-report</td>
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<td>SOL, AI, Self-report</td>
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<td>AI (total counts/hr of sleep)</td>
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<td>DDS (hrs, mins, secs)</td>
<td>DLS (hrs, mins, secs)</td>
<td>TST (hrs, mins, secs)</td>
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<td>CC</td>
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<td>TST (hrs, mins, secs)</td>
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<td>Assignment</td>
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<td>Sleep Attribute 3 (unit)</td>
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<td>wavelength (nm)</td>
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<td></td>
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<td>TST, SOL, WASO, Al, WAK, DDS, DLS</td>
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<td>PH</td>
<td>Snd (dB)</td>
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<td></td>
<td></td>
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</tbody>
</table>
Review Drafted
Quantitative Schemas
--Ambient_Light
--Deep_Sleep_Amount
--Light_Sleep_Amount
--Body_Movement (Paul)
According to Open mHealth, each schema includes at least the following sections:
- schema header ("reference" section: SNOMED, LOINC, RxNORM, or UCUM)
  - "definitions"
  - "properties"
  - "required"

Suggest the following:
- Start with these fields for developing a new schema;
- During schema development, we could create new/modify existing fields as needed;
Ambient Light Schema (1)
Ambient_Light Schema (2)

aggregated measurements over the time",

t to a person and its intensity might affect the degree of the specific impact."
Ambient_Light Schema (3)
Deep_Sleep_Amount (1)

```json
{
    "$schema": "http://json-schema.org/draft-04/schema#",
    "type": "object",
    "description": "This schema represents the deep sleep amount in a sleep session (main sleep or nap), i.e., the percentage of time in deep sleep (N3) out of total asleep time.

    "definitions": {
        "duration_unit_value": {
            "$ref": "#/definitions/duration_unit_value.json"
        },
        "unit_value": {
            "$ref": "#/definitions/unit_value.json"
        },
        "time_frame": {
            "$ref": "#/definitions/time_frame.json"
        },
        "descriptive_statistic": {
            "$ref": "#/definitions/descriptive_statistic.json"
        },
        "descriptive_statistic_denominator": {
            "$ref": "#/definitions/descriptive_statistic_denominator.json"
        }
    },

    "properties": {
        "deep_sleep_duration": {
            "allOf": [
                {
                    "$ref": "#/definitions/duration_unit_value"
                },
                {
                    "properties": {
                        "unit": {
                            "enum": [
                                "sec",
                                "min",
                                "h"
                            ]
                        }
                    }
                }
            ]
        }
    }
}
```
Deep_Sleep_Amount (2)

It can be used for a single measurement, or for the result of aggregating measurements over time. However, the result of aggregating measurements would only be meaningful if they have the same type of sleep.
Deep Sleep Amount (3)
Deep_Sleep_Amount (4)

Individual measurement, this is the interval of time between when a person gets into deep sleep and when gets out of deep sleep. For a summary measurement in a sleep session (main sleep or nap), this is the summation of all such intervals."
"description": "If the value needed is a standard unit of duration, select from the duration-unit-value value set."
"type": "string"

"required": [
  "deep_sleep_amount",
  "effective_time_frame"
]
Light_Sleep_Amount Schema (1)
It can be used for a single measurement, or for the result of aggregating measurements over time. However, the result of aggregating measurements would only be meaningful if they have the same type of sleep.
Light_Sleep_Amount Schema (3)

```json

```
```
```
For an individual measurement, this is the interval of time between when person gets into light sleep and gets out of light sleep. For a summary measurement for a sleep session (main sleep or nap), this is the summation of all such intervals."
Light_Sleep_Amount Schema (5)

```
81  "description": "If the value needed is a standard unit of duration, select from the duration-unit-value value set. ",
82  "type": "string"
83  }
84  },
85  
86  "required": [
87    "light_sleep_amount",
88    "effective_time_frame"
89  ]
90 }
```
```json
{  
  "$schema": "http://json-schema.org/draft-04/schema#",  
  "type": "object",  
  "description": "This schema represents body movement during sleep, a simple count of the number of times movement was detected during a sleep session.",  
  "definitions": [    
  
    "movement_count_value": {      
      "$ref": "movement-count-value-1.x.json"    
    },
    
    "time_frame": {      
      "$ref": "time-frame-1.x.json"    
    },
    
    "descriptive_statistic": {      
      "$ref": "descriptive-statistic-1.x.json"    
    }  
  ],

  "properties": {  
    "movement_count": {      
      "$ref": "#/definitions/movement_count_value"
    },
    
    "effective_time_frame": {      
      "description": "Effective time frame is restricted to be a time interval. For an individual measurement, this is the interval of time between      
      "allOf": [        
        {          
          "$ref": "#/definitions/time_frame"
        }      
      ]
    }
  }
}
```
This may be construed as an indicator of restlessness or sleep quality.

when the person began a sleep session and when it ended. For a summary measurement, this is the interval of time between the beginning of the first measurement and the
Body_Movement Schema (3)

```json
{
    "required": ["time_interval"]
}

"is_main_sleep": {
    "type": "boolean"
},

"descriptive_statistic": {
    "$ref": "/definitions/descriptive_statistic"
},

"required": ["movement_count", "effective_time_frame"
```
Action Items

- Draft quantitative schemas done by Jan. 18, 2019
- Prepare subjective schema development by Jan. 14, 2019
Future Meetings

• Continue with Tuesdays at 8:30 AM Pacific / 11:30 AM Eastern
• Upcoming meetings
  • Feb 5, 2019
Adjournment