Enabling Self-Reflection with LifelogExplorer:
Generating Simple Views from Complex Data

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Research goal
Information sources

Skin conductance

![Graph showing skin conductance levels over time](image-url)
Information sources

Accelerometer data

![Graph showing accelerometer data with time axes and activity levels.]
Approach

LifelogExplorer tool
Approach - from digital data to meaningful views

External events
- Processing
  - iCal

Physiological signals
- Filtering & labeling
  - CSV

Environmental signals
- Filtering & labeling
  - CSV

Aligning & aggregating
- CSV

Visualizing

* R.Kocienik, N. Sidorova, F.Maggi, J.Westerink, M.Ouwerkerk,
“Smart Technologies for Long-Term Stress Monitoring at Work”, CBMS 2013
Approach – Lifelog views

<table>
<thead>
<tr>
<th>Time of day</th>
<th>Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morning</td>
<td>8-9</td>
</tr>
<tr>
<td></td>
<td>9-10</td>
</tr>
<tr>
<td></td>
<td>10-11</td>
</tr>
<tr>
<td>Afternoon</td>
<td>11-12</td>
</tr>
<tr>
<td></td>
<td>12-13</td>
</tr>
<tr>
<td></td>
<td>13-14</td>
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<td>14-15</td>
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<td>15-16</td>
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<td></td>
<td>16-17</td>
</tr>
<tr>
<td></td>
<td>17-18</td>
</tr>
<tr>
<td>Evening</td>
<td>18-19</td>
</tr>
<tr>
<td></td>
<td>19-20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subject</th>
<th>Location</th>
<th>Attendees</th>
</tr>
</thead>
<tbody>
<tr>
<td>WPF meeting</td>
<td>MF 7.043</td>
<td>John, Kate</td>
</tr>
<tr>
<td>MF 4.034</td>
<td>MF 5.04</td>
<td>Kate</td>
</tr>
<tr>
<td>Library</td>
<td>MF 4.034</td>
<td>Sarah</td>
</tr>
<tr>
<td>MF 7.043</td>
<td>MF 5.04</td>
<td>John, Kate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Activity</th>
<th>Arousal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working</td>
<td>8:00</td>
</tr>
<tr>
<td>Typing</td>
<td>9:00</td>
</tr>
<tr>
<td>Walking</td>
<td>10:00</td>
</tr>
<tr>
<td>Eating</td>
<td>11:00</td>
</tr>
<tr>
<td>Typing</td>
<td>12:00</td>
</tr>
<tr>
<td>Walking</td>
<td>13:00</td>
</tr>
<tr>
<td>Typing</td>
<td>14:00</td>
</tr>
<tr>
<td>Eating</td>
<td>15:00</td>
</tr>
<tr>
<td>Typing</td>
<td>16:00</td>
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<tr>
<td>Eating</td>
<td>17:00</td>
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<tr>
<td>Typing</td>
<td>18:00</td>
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<tr>
<td>Eating</td>
<td>19:00</td>
</tr>
<tr>
<td>Typing</td>
<td>20:00</td>
</tr>
</tbody>
</table>

210 minutes
120 minutes
90 minutes
60 minutes
Example view 1 – 6 weeks data
Example view 2 – 6 weeks data
Example view 3 – preventing clutter
Evaluation

Case studies
Wearable sensor used

Discrete Tension Indicator (DTI-2)[2]

- accelerometers
- skin conductivity
- skin temperature
- band temperature
- ambient illumination


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Case study 1 – University staff members

Study with university staff members
• 9 employees
• 7 weeks of data on average
• Calendar activities extracted from Outlook
  (188 entries on average, 44% with measurements)

Evaluation
• Presented 6 different views
• Semi-structured interviews (purely qualitative)
  • Talk-aloud protocol
  • Specific, open questions about the views
Relating contexts to their own perception: “(...) I actually learned. (...) about the Club meetings. I really learned that the experience I have there is indeed reflected in the stress levels. It is an eye opener for me.”
Case study 1 – Results

Comparing contexts: “I learned that teaching through video conferencing [DTA remote course] is really different from teaching in class [DTA college]”
Relating contexts to their own perception:
“The stress level in job performance evaluations says much more about what the performance evaluation really was like.”
Comparing contexts: “It is interesting to see these differences. It is like the one with [Mark] is completely red! Meetings with [Frank] are relaxed (...)."
Finding own use: “Hours aggregated over all days (...) show when you are **really getting up**, when does your **activity really start** (…).”
Sustainability: “I’d love to have more data, do this over a number of weeks and see whether this pattern reemerges.”
Case study 2 – School teachers

Study with vocational school teachers
• 5 teachers without particular stress problems
  (1 excluded due to bad signal quality)
• 7 weeks of data on average
• Calendar activities provided in custom app
  (165 entries on average, 76% with measurements)

Evaluation
• Presented 10 different views
• Mixed protocol
  • Semi-structured interviews
  • 3 closed questions answered on a 5-point Likert scale
  • 1 categorical question with answers
    Yes/No
Case study 2 – Results

“I think that presented views are useful for me”

“discussing with other people how to avoid stress”

“I feel that the presented views gave me new information”

“I think that I could apply what I have learned to improve some aspects of my life”

“I did not expect that [xx] work can be so stressful”

“Perhaps I should reconsider my involvement in [xx] activity”

Strongly agree
Agree
Neutral
Disagree
Strongly disagree
N/A

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Case study 2 – Results

“I think that presented views are useful for me”

“I feel that presented views gave me new information”

“I feel that this is not necessarily for private use”

“I think that I could apply what I have learned to improve some aspects of my life”

“It mainly confirms what I already know”

“Maybe I should take lunch breaks”

[Diagram with visual representation of responses]

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree
- N/A

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Case study 2 – Results

“\textit{I think that presented views are useful for me}”

“I feel that the presented views gave me new information”

“\textit{improve time management}”

“I think that I could apply what I have learned to improve some aspects of my life”

“It [only] gives a good overview about your work. (…) I don’t want my employer to misuse it”
Self-advice: “Maybe I have to take a [lunch] break”
“hours of the day” and “subject of calendar activities” views were rated as most useful
42.5% of the presented views were considered “useful to learn from”
Conclusions & Future Work

• Views considered informative, useful, and sometimes even revealing.
• For some participants self-reflection lead to self-coaching advices.

We plan to:

- Add zoom in/zoom out functionality
- Compare views for different periods
- Investigate different color scales
Acknowledgements
Thank you for listening

Any questions?