Modelling the Social Practices of an Emergency Room to Ensure Staff and Patient Wellbeing

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My doctor didn’t look at me during my last visit
The emergency room suffers from social problems
Patients and staff take up more time, become unsatisfied and counterproductive.
Patient and Staff are healthier, cooperative and are more satisfied
The emergency room suffers from social problems... how to keep track of this complex system?
Our formal model of the social ER can help management in finding social problems.
Modelling the ER is split in three tasks: a metamodel, model and modelling desirable social properties.
Our model aims to capture the social dimension by using the concept of social practices.
The Social Practice Agent (SoPrA) meta-model focuses on activities as the core of a social system.
The social practice of acute treatment is captured in an activity tree
SoPrA models associations with these activities such as human values
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One might associate the value of security and health to contact an ER.
Agents belief certain activities
Patient1 beliefs (one view one) contact_ER

```
contact_ER: Activity
  +type: (Action, AbstractAction, TopAction)

  RelatedValue
    +isPromoted: true

  Belief

patient1:Agent

  security: Value

  health: Value
```

UML

1

ER
Doctor beliefs a different view on contact_ER
Agent differ in what human values they adhere to
A patient adheres to the value security and health
Modelling the ER is split in three tasks: a meta-model, model and modelling desirable social properties.
Based on empirical observations we formulated social properties management could desire

• The staff understand the needs of the patients.
• A head nurse can cover some of the necessary tasks of the secretary.
• The staff can help each other out, because they know the equipment the others need.
The desirable properties are modelled in terms of the SoPrA meta-model

The staff understand the needs of the patients.

The staff and patients belief the same perspective on an activity, for all activities which promote values that the patient has.
We can express possible models that satisfy this property

The doctor has a different view on contact_ER

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To be able to make inferences we formalize the model in OWL.
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By using OWL we can state rules about the relation of concepts: e.g. the inheritance of values

Modelling the social properties in SPARQL-queries

The staff and patients belief the same perspective on an activity, for all activities which promote values that the patient has.

```
SELECT ?agent ?value ?activity
WHERE {
  a:Patient a:HasValue ?value.
  ?activity a:promotedValue ?value
}
```
Our formal model of the social ER can help management in finding social problems.
Using SPARQL you can query the database and get back a table of possible instances that satisfy the query.

```sparql
SELECT ?agent ?value ?valuedActivity
WHERE {
  a:Patient a:HasValue ?value.
  ? valuedActivity a:promotedValue ?value
}
```

<table>
<thead>
<tr>
<th>?agent</th>
<th>?valuedActivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>patient1</td>
<td>Contact_ER1</td>
</tr>
<tr>
<td>secretary1</td>
<td>Contact_ER2</td>
</tr>
<tr>
<td>doctor1</td>
<td>Contact_ER1</td>
</tr>
</tbody>
</table>
Our formal model of the social ER can help management in finding social problems.
Using the result we infer that the desirable social property is not satisfied in this case

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The staff understand the needs of the patients.
The resulting findings can be used as a hypotheses on where to direct intention of management to solve social problems in the ER
Future Work

• To cross-validate our model we need to ground both the model as well as check the resulting conclusions against empirical data

• We focused on a rough empirical grounding from observations on the ER at Herlev Hospital Denmark, extend this by more rigorous empirical work
  • Process Mining
  • Protocols
  • Interviews
SoPrA differs from other social agent frameworks by capturing the social dimension in shared action associations.

The staff can help each other out, because they know the equipment the others need.