

TimeWrap -

A Method for Automatic Transformation
of Structured Guideline Components into
Formal Process-Representations

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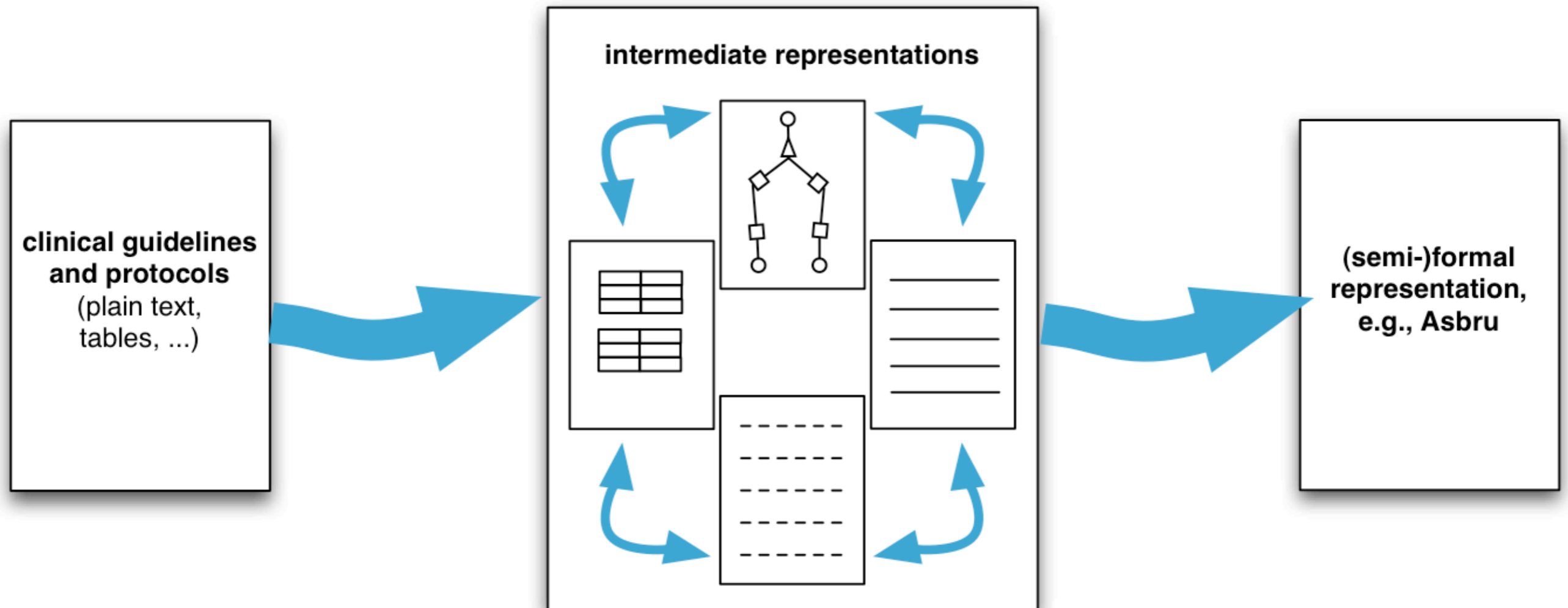
Content

- Motivation
- The Idea
- *Asbru*: Temporal Aspects
- The **TimeWrap** Method
- An Example: *Drug Administration*
- Results, Benefits, Limitations

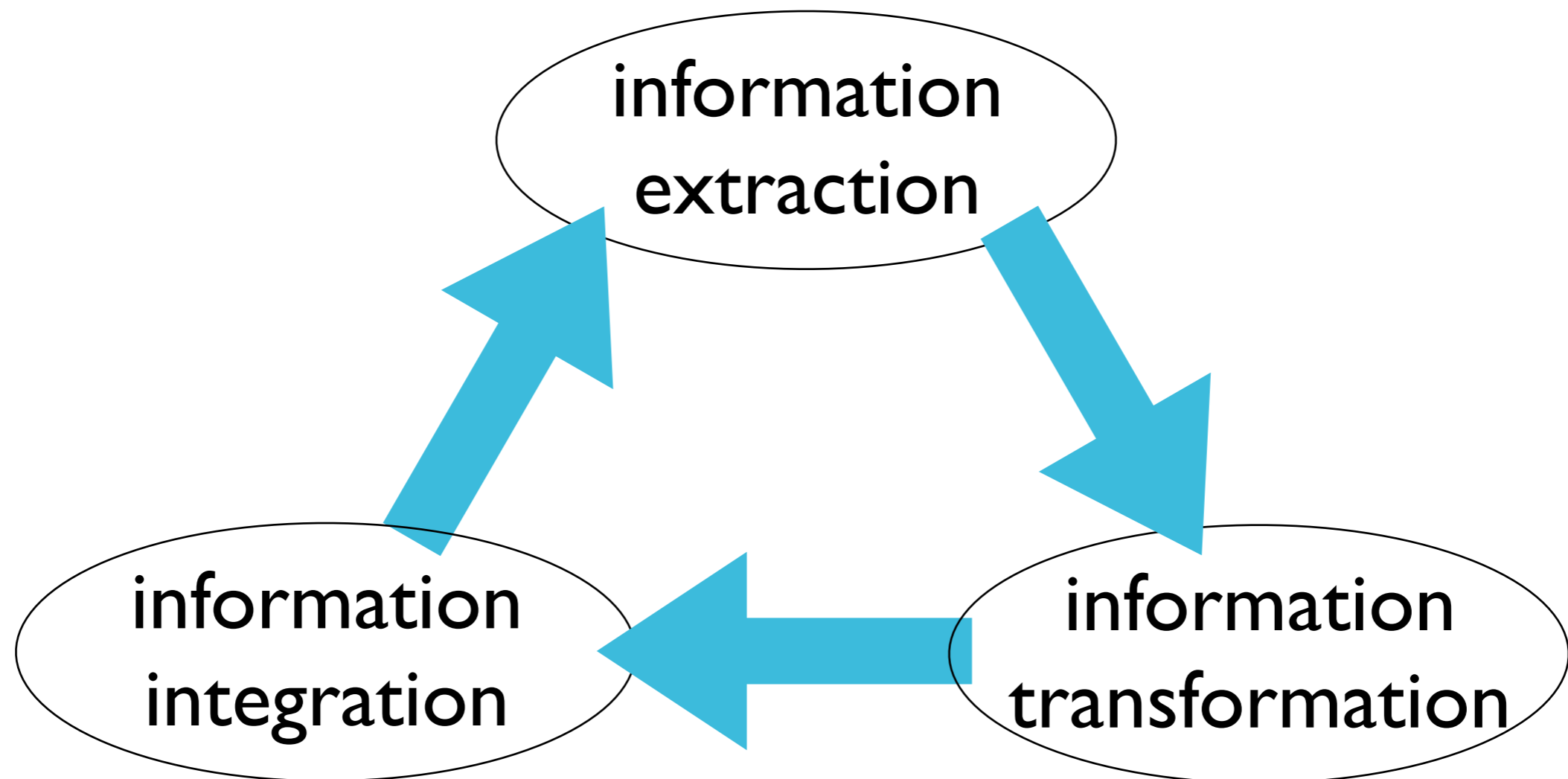
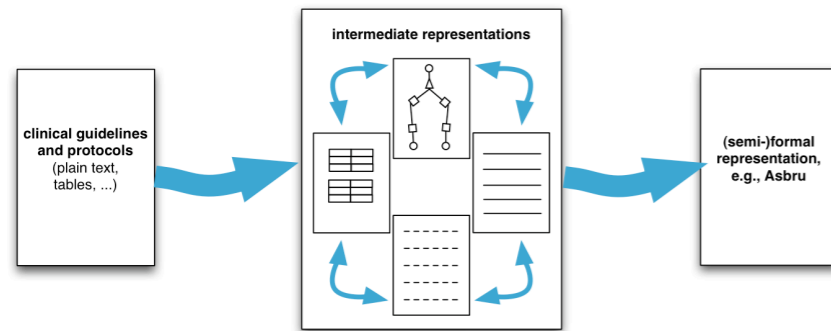
Motivation

- Guideline execution
- Guideline modeling
- Time, (money), knowledge, nerves, ...
- 
- Tool that supports modeling process as automated as possible
- Modeling flows and processes

The Idea



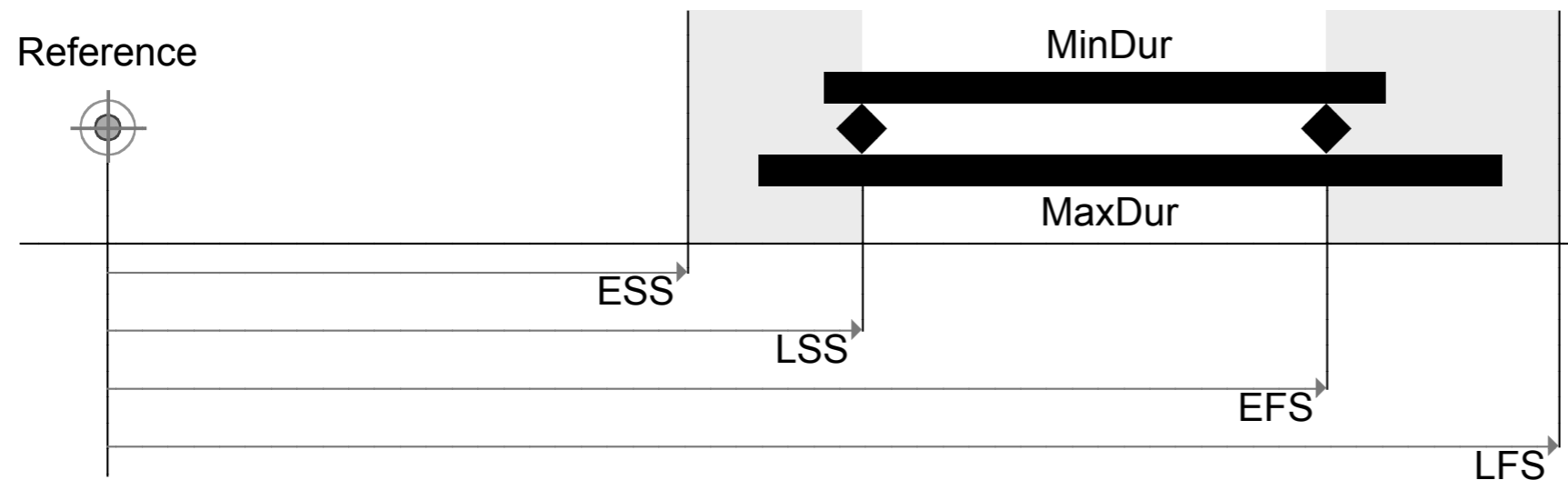
The Idea



Asbru: Temporal Aspects

Definition:

[[ESS, LSS], [EFS, LFS], [MinDur, MaxDur], Reference]



ESS ... Earliest Starting Shift

LSS ... Latest Starting Shift

EFS ... Earliest Finishing Shift

LFS ... Latest Finishing Shift

MinDur ... Minimum Duration

MaxDur ... Maximum Duration

Reference ... Reference Time Point

- Uncertainty
- Incompleteness
- Special plan types: cyclical plan, iterative plan, ...

TimeWrap: The Method

1. Structuring information

- a. Relevant information
- b. Formal base representation

2. Extracting information

- a. Synonyms, numeric values
- b. Temporal information: duration, frequency
- c. Leftover data

3. Integrating information into an intermediate format

Example: Drug Administration (1)

cause		drug of choice	dosage	
Adults	Gonococcus	Ceftriaxone	1g IM, single dose	
			lavage infected eye	
	Chlamydia	Azithromycin	1g orally single dose	
		or		
	Doxycycline	100 mg orally twice a day for 7 days		
Children	Gonococcus	Children who weigh < 45 kg	Ceftriaxone	125 mg IM, single dose
		Children who weigh > 45 kg		same treatment as adults
	Chlamydia	Children who weigh < 45 kg	Erythromycin base	50 mg/kg/day orally in 4 divided doses for 10-14 days
		Children under 8 years old who weigh > 45 kg	Azithromycin	1 gm orally, single dose
		Children 8 years old or older	Azithromycin	1 gm orally, single dose
	or			
		Doxycycline	100 mg orally, twice a day for 7 days	

Example: Drug Administration (2)

```
<cause name="Gonococcus" person="adult">  
  <drug dosage="1g IM, single dose"  
    name="Ceftriaxone" />  
</cause>
```

- **Synonyms, numeric values:** *'single'* -> *'1'*
- **Temporal information:**
Duration, frequency?
- ***'1 dose'* -> nonrecurring plan**

```
<plan name="Ceftriaxone: 1g IM, single dose"  
  plan-id="plan55131512" />
```

Example: Drug Administration (3)

```
<cause name="Chlamydia" person="adult">  
  <drug dosage="100 mg orally twice a day for  
    7 days" name="Doxycycline"/>  
</cause>
```

- **Synonyms, numeric values:** 'twice' -> '2/', 'days' -> 'day'
- **Temporal information:**
 - Duration: 7 day
 - Frequency: 2/ day -> 12 hour
- **Dose rate:** 100 mg orally

Example: Drug Administration (3)

```
<plan name="Doxycycline: 100 mg orally  
      twice a day for 7 days"  
      plan-id="plan52769441">  
  <cyclical-plan plan-id="plan54675512">  
    <frequency value="12" unit="hour"/>  
  </cyclical-plan>  
  <duration>  
    <min value="7" unit="day"/>  
    <max value="7" unit="day"/>  
  </duration>  
</plan>  
  
<plan name="Doxycycline: 100 mg orally"  
      plan-id="plan54675512"/>
```

Example: Drug Administration (4)

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```
<?xml version="1.0" encoding="UTF-8" ?>
- <plan-library>
- <plans>
- <plan-group>
- <plan name="Ceftriaxone: 1g IM, single dose">
- <plan-body>
  <user-performed />
</plan-body>
</plan>
- <plan name="Doxycycline: 100 mg orally twice a day for 7 days">
- <defaults>
- <time-annotation>
- <time-range>
- <duration>
- <minimum>
  <numerical-constant value="7" unit="day" />
</minimum>
- <maximum>
  <numerical-constant value="7" unit="day" />
</maximum>
</duration>
</time-range>
<now />
</time-annotation>
</defaults>
- <plan-body>
- <cyclical-plan>
- <start-time>
- <time-annotation>
  <now />
</time-annotation>
</start-time>
- <cyclical-plan-body>
- <plan-activation>
  <plan-schema name="Doxycycline: 100 mg orally" />
</plan-activation>
</cyclical-plan-body>
- <cyclical-time-annotation>
  <time-range />
- <set-of-cyclical-time-points>
- <time-point>
  <numerical-constant value="0" />
</time-point>
- <offset>
  <numerical-constant value="0" />
</offset>
- <frequency>
  <numerical-constant value="12" unit="hour" />
</frequency>
</set-of-cyclical-time-points>
</cyclical-time-annotation>
</cyclical-plan>
</plan-body>
```

file://localhost/Users/kathi/Documents/Conferences/cgp04/asbru-part.xml

Seite 1 von 2

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```
</plan>
- <plan name="Doxycycline: 100 mg orally">
- <plan-body>
  <user-performed />
</plan-body>
</plan>
</plan-group>
</plans>
</plan-library>
```

file://localhost/Users/kathi/Documents/Conferences/cgp04/asbru-part.xml

Seite 2 von 2

Results, Benefits, Limitations

- Semi-automatic method for modeling simple processes
- Easy transformation into Asbru
- Better structuring, overview, and comprehension
- Prevention of troublesome and time-consuming generation of Asbru plans
- Generation of components, not of the entire plan
- Complex processes, parameters, ... ?