

# Meeting IEEE Task Force on Process Mining at BPM 2010

Wednesday, September 15th 2010, 15.30-17.00

Calder Room, Howe Center, 3rd Floor

Stevens Institute of Technology

Hoboken NJ

# Agenda

1. Introduction of participants and Task Force
2. Goals of the Task Force
3. Discussion of activities to promote the topic of process mining
4. Standardization efforts: Discussion of XES format (see also <http://www.xes-standard.org/>)
5. Open discussion of various topics,  
e.g., "tool support for process mining", "lecture material", "earning money with process mining", "role of consulting", "embedding of process mining technology of other tools".
6. Closing

# TF on Process Mining

**Chair:** Wil van der Aalst (The Netherlands)

**Members:**

Aalst, Wil van der	Hofstede, Arthur ter	Sperduti, Alessandro
Blickle, Tobias	Hoogland, John	Stoel, Casper
Brand, Peter van den	Ingvaldsen, Jon Espen	Swenson, Keith
Brandtjen, Ronald	Kuhn, Rudolf	Turner, Chris
Burattin, Andrea	Kumar, Akhil	Vanthienen, Jan
Carmona, Josep	Malerba, Donato	Varvaressos, George
Castellanos, Malu	McCreesh, Martin	Verbeek, Eric
Cook, Jonathan	Mendling, Jan	Verdonk, Marc
Curbera, Francisco	Motahari Nezhad, Hamid	Wang, Jianmin
Dongen, Boudewijn van	Reza	Weber, Barbara
Ferreira, Diogo	Muehlen, Michael zur	Weijters, Ton
Goel, Sukriti	Rozinat, Anne	
Günther, Christian	Sinur, Jim	
Guzzo, Antonella	Soffer, Pnina	
Harmon, Paul	Song, Minseok	

See <http://www.win.tue.nl/ieeetfpm/> for full list and affiliations.

# Composition of TF

- **Software vendors** (Pallas Athena, IDS Scheer/Software AG, Futura Process Intelligence, HP, IBM, Infosys, Fluxicon, Businesscape, Iontas, Fujitsu, Business Process Mining)
- **Consultancy** (Some of the above and ProcessGold, Business Process Trends, Gartner, Deloitte)
- **Universities** (TU/e, University of Padua, University of Catalunya, New Mexico State University, Technical University of Lisbon, University of Calabria, Penn State University, University of Bari, Humboldt-Universität, Stevens Institute of Technology, University of Haifa, Seoul National University of Technology, Cranfield University, K.U.Leuven, Tsinghua University, Innsbruck University)

# Activities thus far (1/2)

- Several process mining tutorials have been given under the IEEE Task Force umbrella, e.g., the “Process Mining meets Data Mining” (PMPM’09) conference in October, various Process Mining courses (ESSCaSS 2009 summerschool, SIKS course, BPM Forum Process Mining Hands-On).
- Workshop on Business Process Intelligence (<http://www.win.tue.nl/bpi2010/doku.php>) at BPM 2010 in New York (co-organized by the IEEE Task Force on Process Mining).
- The “Process Mining: Beyond Business Intelligence” tutorial at the 2010 IEEE WORLD CONGRESS ON COMPUTATIONAL INTELLIGENCE July 18-23, 2010, Barcelona (<http://www.wcci2010.org/>) organized by the IEEE Task Force on Process Mining.
- A tutorial on process mining at the Advanced Course on Petri nets in Rostock (<http://www.petrinet-summerschool.org>), September 2010.

# Activities thus far (2/2)

- A tutorial on process mining at Computational Intelligence in HealthCare (<http://is.ieis.tue.nl/cihc2010>), September 2010.
- Special session on process mining at IEEE Symposium on Computational Intelligence and Data Mining (<http://www.ieee-ssci.org/2011/cidm-2011>), April 2011 (see call for papers!).
- Various other promotional activities.
- Standardization efforts related to MXML and XES.
- Meeting of Task Force at BPM 2010 in New York.

**What am I missing?**

(e.g. animation Pallas Athena)

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# Goals

- The goal of this Task Force is to promote the research, development, education and understanding of process mining.
- More concretely, the goal is to:
  - make end-users, developers, consultants, and researchers aware of the state-of-the-art in process mining,
  - promote the use of process mining techniques and tools and stimulating new applications,
  - play a role in standardization efforts for logging event data,
  - the organization of tutorials, special sessions, workshops, panels,
  - the organization of Conferences/Workshop with IEEE CIS Technical Co-Sponsorship, and
  - publications in the form of special issues in journals, books, articles (e.g., in the IEEE Computational Intelligence Magazine).
- Note that process mining includes (automated) process discovery (extracting process models from an event log), conformance checking (monitoring deviations by comparing model and log), social network/organizational mining, automated construction of simulation models, case prediction, and history-based recommendations.



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# CIDM special session on Process mining

- 2011 IEEE Symposium on Computational Intelligence and Data Mining (CIDM 2011) in Paris, April 11-15, 2011.
- Deadline for papers: October 31, 2010.
- See <http://www.ieee-ssci.org/2011/cidm-2011>



Call for Papers



**Special Session on Process Mining**

at the 2011 IEEE Symposium on Computational Intelligence and Data Mining

**CIDM 2011**

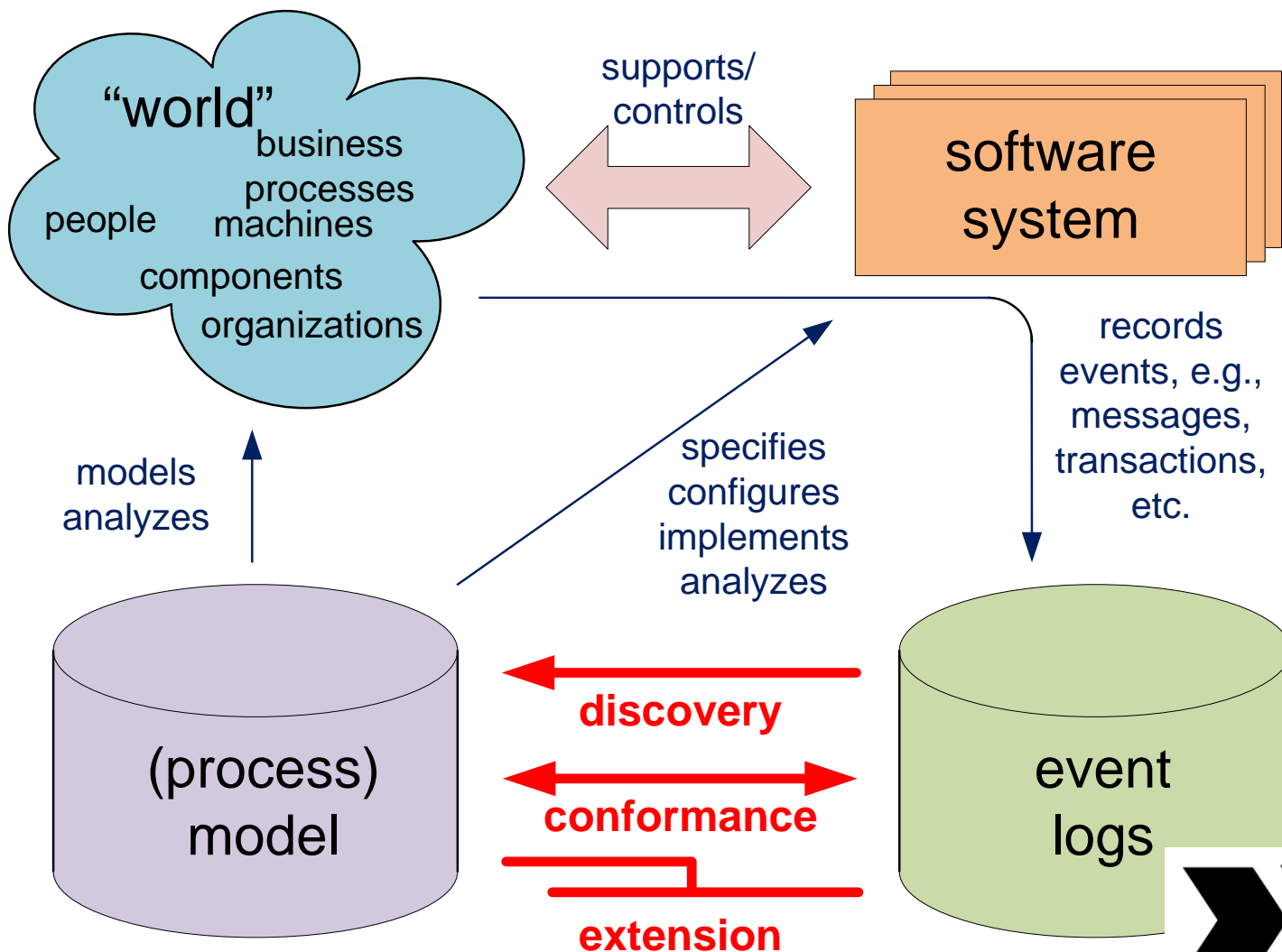
April 11–15, 2011 Paris, France



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# Event logs: XES format proposal



# Motivation

- Existing formats:
  - MXML (Mining XML format)
  - SA-MXML (Super)
  - CSV
  - Business Process Analytics Format (BPAF)
  - ...
- XES:
  - Dedicated format for process mining.
  - Based on lessons learned from (SA)MXML.
  - Conversions from existing formats.
  - Extensible (avoiding ad-hoc conventions).

# Guiding principles

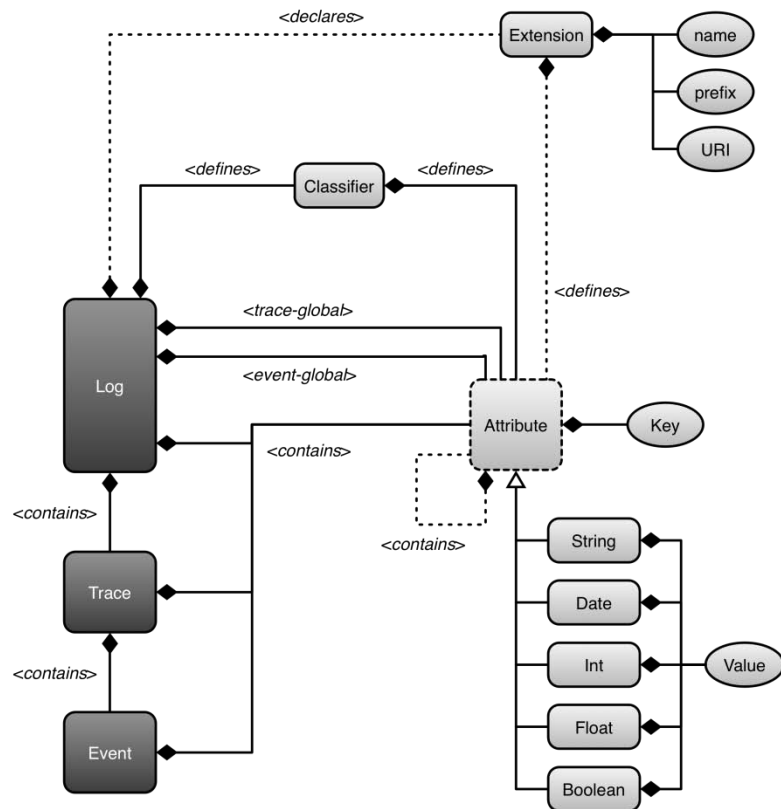
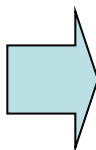
- **Simplicity**: easy to parse and generate; human readable.
- **Flexibility**: generic and not tailored towards a particular set of applications or domain.
- **Extensibility**: add domain/application specific features without modifying the basic format; shareable extensions.
- **Expressivity**: no loss of semantics / information.

# Overview XES

**XES**  
Extensible Event Stream



event logs, audit trails,  
databases, message  
logs, etc.



[www.xes-standard.org](http://www.xes-standard.org)

# XES (compatible with MXML)

Event log consists of:

- traces (process instances)
  - events
- Standard extensions:
  - concept (for naming)
  - lifecycle (for transactional properties)
  - org (for the organizational perspective)
  - time (for timestamps)
  - semantic (for ontology references)
- Possible extensions/extensions under development:
  - costs (QUT)
  - security
  - ...





```
<event>
  <string key="orgresource" value="Anne"/>
  <date key="time.timestamp" value="2009-06-23T01:00:00.000+02:00"/>
  <string key="conceptname" value="accept"/>
  <string key="lifecycle.transition" value="start"/>
</event>
```

end of trace (i.e. process instance)

```
<event>
  <string key="orgresource" value="Anne"/>
  <date key="time.timestamp" value="2009-06-28T01:00:00.000+02:00"/>
  <string key="conceptname" value="accept"/>
  <string key="lifecycle.transition" value="complete"/>
</event>
```

start of trace

```
<trace>
  <string key="conceptname" value="68"/>
  <string key="description" value="Simulated process instance"/>
</trace>
```

name of trace

```
<event>
  <string key="orgresource" value="Mike"/>
  <date key="time.timestamp" value="2006-10-14T01:00:00.000+02:00"/>
  <string key="conceptname" value="invite reviewers"/>
  <string key="lifecycle.transition" value="start"/>
</event>
```

resource

timestamp

name of event (activity name)

```
<event>
  <string key="orgresource" value="Mike"/>
  <date key="time.timestamp" value="2006-10-14T01:00:00.000+02:00"/>
  <string key="conceptname" value="invite reviewers"/>
  <string key="lifecycle.transition" value="complete"/>
</event>
```

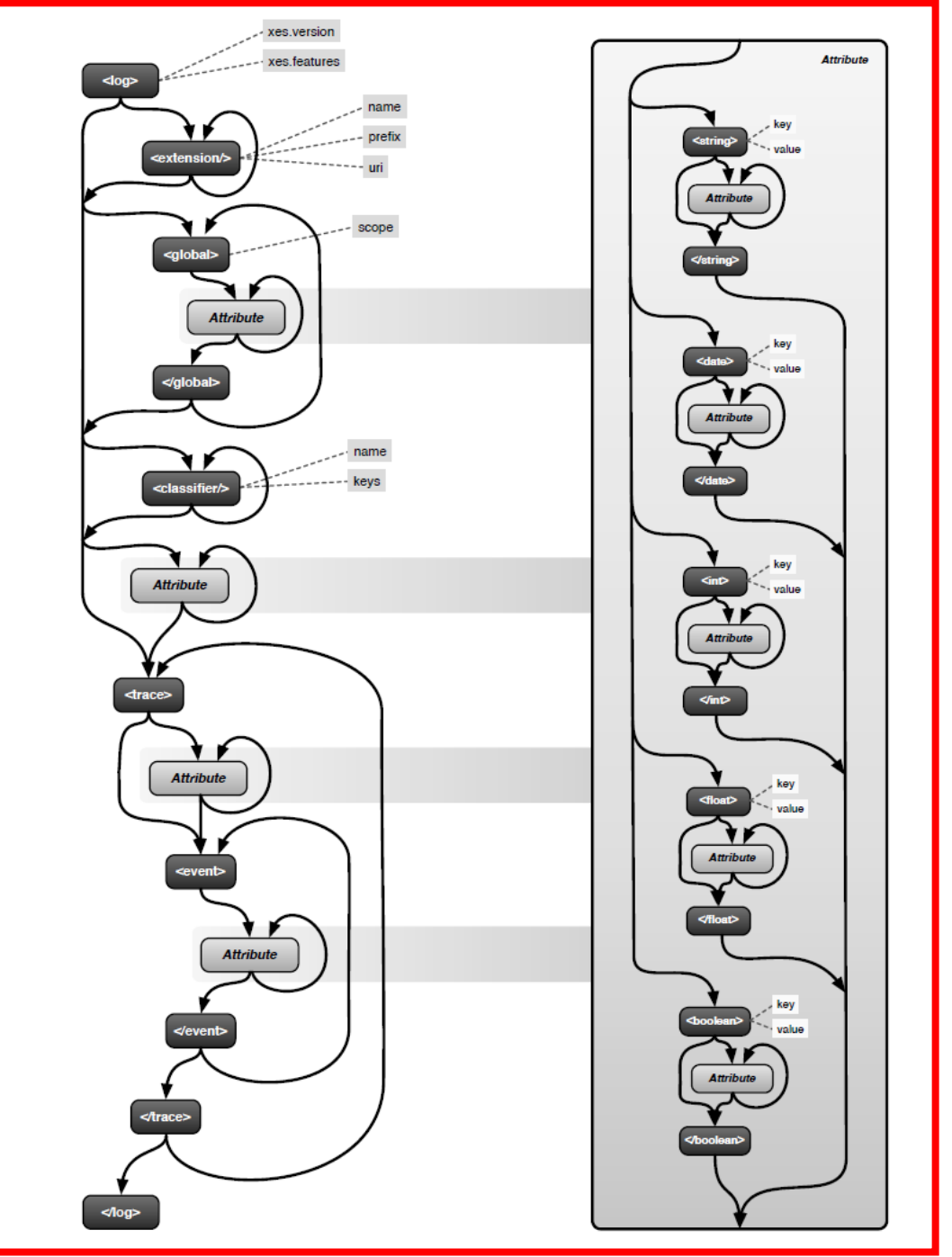
data associated to event

```
<event>
  <string key="orgresource" value="Pam"/>
  <date key="time.timestamp" value="2006-10-14T01:00:00.000+02:00"/>
  <string key="lifecycle.transition" value="complete"/>
  <string key="Result by Reviewer A" value="reject"/>
  <string key="conceptname" value="get review 1"/>
</event>
```

```

<event>
  <string key="orgresource" value="Anne"/>
  <date key="time.timestamp" value="2009-06-23T01:00:00"/>
  <string key="conceptname" value="accept"/>
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  <string key="lifecycle.transition" value="complete"/>
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- <trace>
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  <string key="description" value="Simulated process instance"/>
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</event>

```



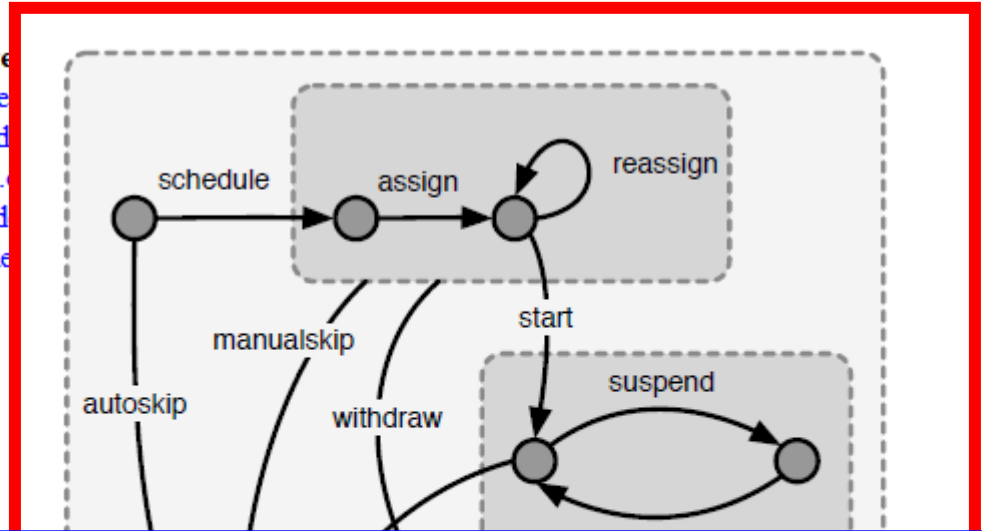
# Example: Lifecycle extension

```
<log xes.version="1.0" xes.features="nested-attributes" openxes.ver
  <extension name="Concept" prefix="concept" uri="http://code.de
  <extension name="Semantic" prefix="semantic" uri="http://code.d
  <extension name="Time" prefix="time" uri="http://code.deckfour.
  <extension name="Organizational" prefix="org" uri="http://code.d
  <extension name="Lifecycle" prefix="lifecycle" uri="http://code.de
```

```
-<global scope= trace >
  <string key="conceptname" value="__INVALID__"/>
</global>
-<global scope="event">
  <string key="conceptname" value="__INVALID__"/>
  <string key="lifecycle.transition" value="complete"/>
```

```
</global>
<classifier name="MXML Legacy Classifier"
<classifier name="Event Name" keys="conce
<classifier name="Resource" keys="org:reso
<string key="source" value="CPN Tools sim
<string key="conceptname" value="reviewing
<string key="lifecycle.model" value="standard
<string key= description value= Simulated p
```

```
-<trace>
  <string key="conceptname" value="1"/>
  <string key="description" value="Simulated
-<event>
  <string key="org:resource" value="Mike
  <date key="time.timestamp" value="200
  <string key="conceptname" value="ini
  <string key="lifecycle.transition" value="
</event>
-<event>
```



```
<?xml version="1.0" encoding="UTF-8" ?>
```

```
- <xesextension name="Lifecycle" prefix="lifecycle" uri="http://code.fluxicon.
```

```
- <log>
```

```
- <string key="model">
```

```
<alias mapping="EN" name="Lifecycle Model" />
```

```
<alias mapping="DE" name="Lebenszyklus-Modell" />
```

```
<alias mapping="FR" name="Modèle du Cycle Vital" />
```

```
<alias mapping="ES" name="Modelo de Ciclo de Vida" />
```

```
<alias mapping="PT" name="Modelo do Ciclo de Vida" />
```

```
</string>
```

```
</log>
```

```
- <event>
```

```
- <string key="transition">
```

```
<alias mapping="EN" name="Lifecycle Transition" />
```

```
<alias mapping="DE" name="Lebenszyklus-Transition" />
```

```
<alias mapping="FR" name="Transition en Cycle Vital" />
```

```
<alias mapping="ES" name="Transición en Ciclo de Vida" />
```

```
<alias mapping="PT" name="Transição do Ciclo de Vida" />
```

```
</string>
```

```
</event>
```

# Tool support

- **OpenXES library**: reference implementation of the XES standard in Java (<http://www.openxes.org/>)
- **ProM 6** (<http://prom.win.tue.nl/tools/prom6/>): loads and analyzes XES files.
- **XESame** (<http://prom.win.tue.nl/research/wiki/xesame/>): conversion from non-event log data sources.
- **Nitro** (<http://www.fluxicon.com/nitro/>): easy conversion from CSV/XLS-like formats.

# More information

[www.xes-standard.org](http://www.xes-standard.org)

[www.openxes.org](http://www.openxes.org)

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# Thanks!