TimeMapper

extending WMS with time series data in animated, interactive vector maps

EDC Entwickelerforum

Münster, 17 March 2011

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real-world phenomena are
dynamic

real-world phenomena are *dynamic*

we need tools to visualise and disemminate them *dynamically*

our goal:

vector animated maps

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vector animated maps

from spatio-temporal data
to a format suitable for
internet dissemination

our goal:

vector animated maps automatically and directly from spatio-temporal data to a format suitable for internet dissemination

automatically and directly

from standardised data sources (SDI nodes)

automatically and directly

in a geo-webservice environment (WMS)

Prototype:

moving object data

Prototype:

Prototype:

moving object data case-study on icebergs movements in Antarctica

Prototype based on:

ITC SDI^{light} OSGEO stack

RIMapperWMS

SDI light

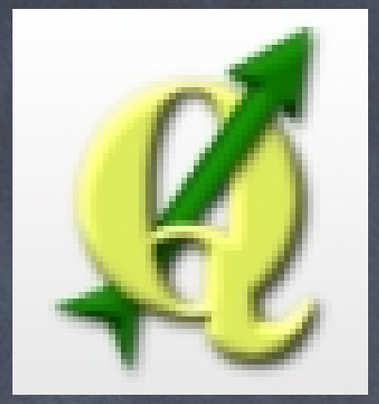
.....?

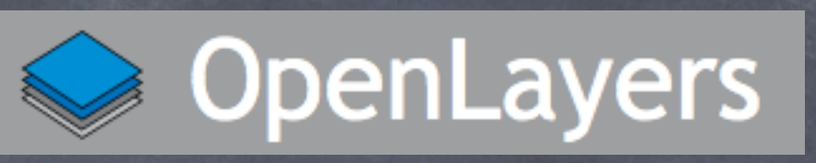
SDI

St

SDI light


ILWIS
open
3.6
52north




OpenLayers


GeoServer


MapServer


Java

stack

RIMapperWMS

RIMapperWMS

spatial database back-end (postGIS):

spatial and attribute data

Web Mapping Service configuration

RIMapperWMS

spatial database back-end (postGIS):

spatial and attribute data

Web Mapping Service configuration

server application (Java):

responds to WMS compliant requests

provides output in SVG

visualisation:

visualisation:

visualisation:
Scalable
Vector
Graphics

SVG:

XML / Open Web

SVG:

XML / Open Web Open Standard (W3C)

SVG:

XML / Open Web Open Standard (W3C) supported by all major browsers now (IE9!)

SVG:

standard includes
SMIL
declarative animation

(Opera +, Webkit/FireFox ±)

TIMEMAPPER

External WMS's
External WMS's
External WMS's
Mapserver, Geoserver, etc...

TimeMapper Servlets
WMSGetMap,WMSGetCapabilities,
MakeSVG, MakeGUI, DBConn, etc...

gui.js

JavaScript for standard
WMS gui:
zoom pan, etc...
layers on/off
identify

(from RIMapperWMS)

anim.js

JavaScript for **animation**:
speed- and timeslider
time legends

(re)generation of SMIL attributes
begin / end / dur

SVG file

```
<svg id="completeEnv" >
   <scripts>
  </scripts>

      ... standard gui svg elements ...
      ... anim gui elements ...

   <svg id="MapWindow">
      <image src="external WMS layers" />
      <svg static SVG layer" />
      <svg  animated SVG layer />
   </svg>
</svg>
```

workflow:

Storing temporal data
Designing SMIL animations
Converting temporal component
Developing animated mapping GUI

workflow:

Storing temporal data

Icebergs			
ID	TIME_ISO	TIME_SECs1970	GEOM
string	wkt	integer	wkt
A35B	2009-01-08	3440534400	POINT(-56,-34.2)
A35B	2009-01-15	3441139200	POINT(-55,-32.3)
A35B	2009-01-17	3441312000	POINT(-53.7,-35)
A35B	2009-02-11	3443472000	POINT(-51.7,-31.6)
A36	2008-12-07	3438892800	POINT(-70.4,-62.3)
A36	2008-12-20	3437769600	POINT(-73.7,-61.4)

ISO 8601 extended format:

Schema: ccyy-mm-ddThh:mm:ss.sssZ
Example: 2009-01-28T13:53:41.007Z

Icebergs			
ID	TIME_ISO	TIME_SECs1970	GEOM
string	wkt	integer	wkt
A35B	2009-01-08	3440534400	POINT(-56,-34.2)
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workflow:

Designing SMIL animations

workflow:

Designing SMIL ani

```
<circle id="IB_A35B" r="25">
  <animate id="XanimIB_A35B_0"
     attributeName="cx"
     from=" 56.4" to=" 51.3"
     begin="2.56s"
     dur="1.41s"
     calcMode="discrete"
     repeatCount="none"
     fill="freeze" />

  <animate id="YanimIB_A35B_0"
     attributeName="cy"
     from="-76.6" to="-84.2"
     begin="2.56s"
     dur="1.41s"
     calcMode="discrete"
     repeatCount="none"
     fill="freeze" />
</circle>
```

workflow:

Designing SMIL ani

movement

```
<circle id="IB_A35B" r="25">
  <animate id="XanimIB_A35B_0"
     attributeName="cx"
     from=" 56.4" to=" 51.3"
     begin="2.56s"
     dur="1.41s"
     calcMode="discrete"
     repeatCount="none"
     fill="freeze" />

  <animate id="YanimIB_A35B_0"
     attributeName="cy"
     from="-76.6" to="-84.2"
     begin="2.56s"
     dur="1.41s"
     calcMode="discrete"
     repeatCount="none"
     fill="freeze" />
</circle>
```

workflow:

Designing SMIL ani

timing

```
<circle id="IB_A35B" r="25">
  <animate id="XanimIB_A35B_0"
     attributeName="cx"
     from=" 56.4" to=" 51.3"
     begin="2.56s"
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     begin="2.56s"
     dur="1.41s"
     calcMode="discrete"
     repeatCount="none"
     fill="freeze" />
</circle>
```

workflow:

Converting temporal component

workflow:

Converting temporal component

OGC

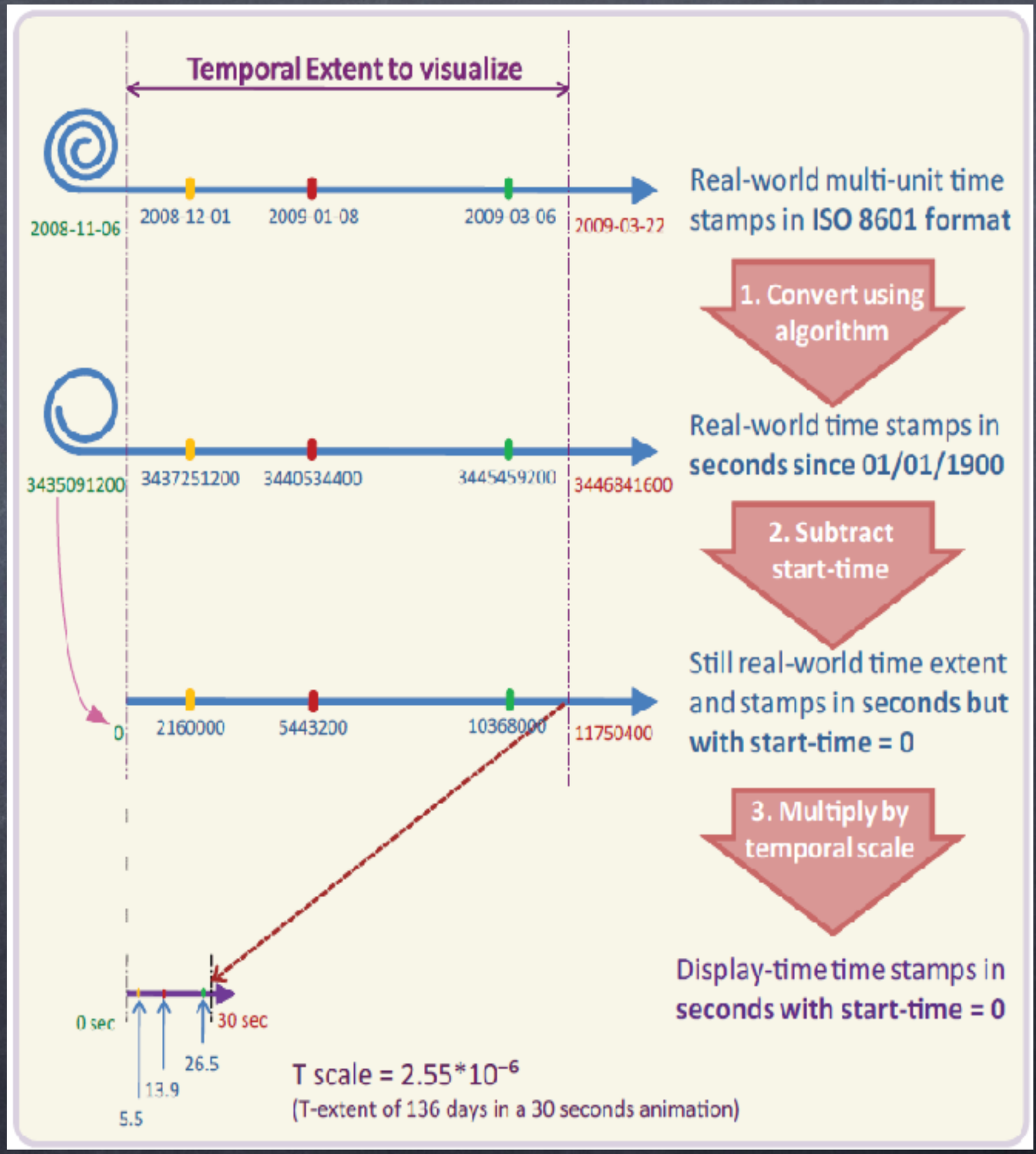
2009-01-28T13:53:41Z

SMIL

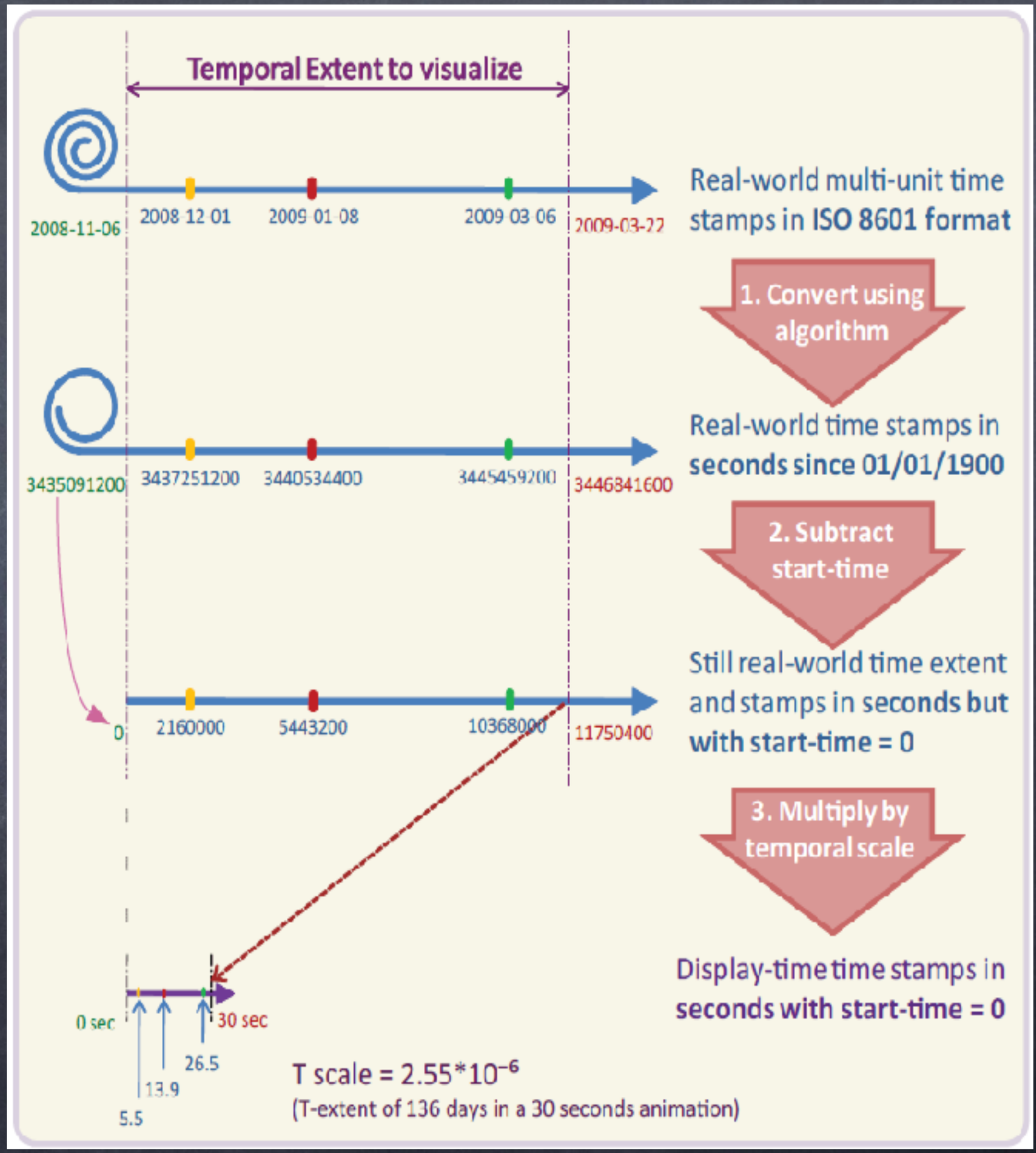
```
begin="2.56s"

dur="1.41s"
```

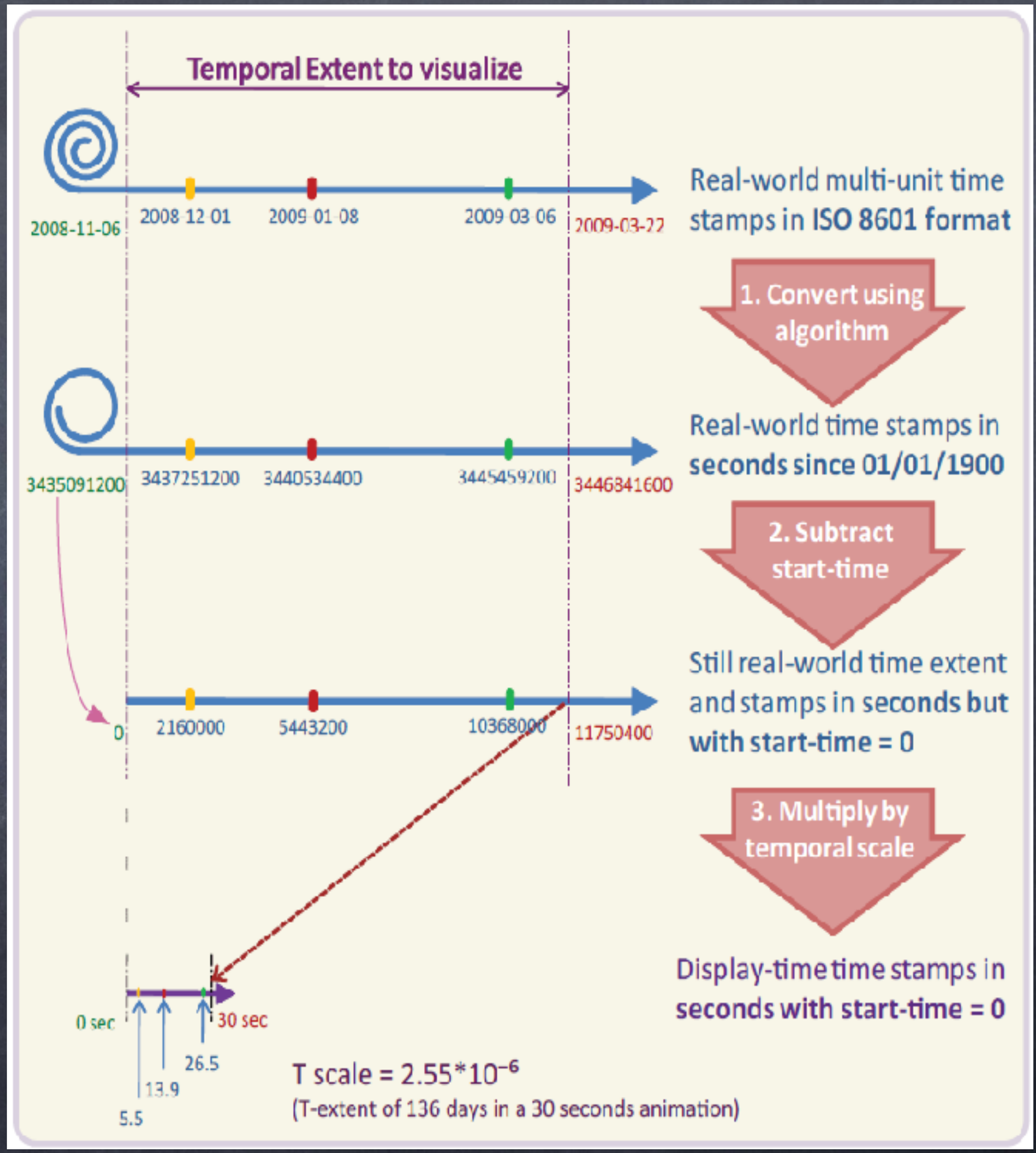
- ISO 8601 to seconds since epoch



- ISO 8601 to seconds since epoch
- subtract start-time



- ISO 8601 to seconds since epoch
- subtract start-time
- multiply by temporal scale



workflow:

Developing animated mapping GUI

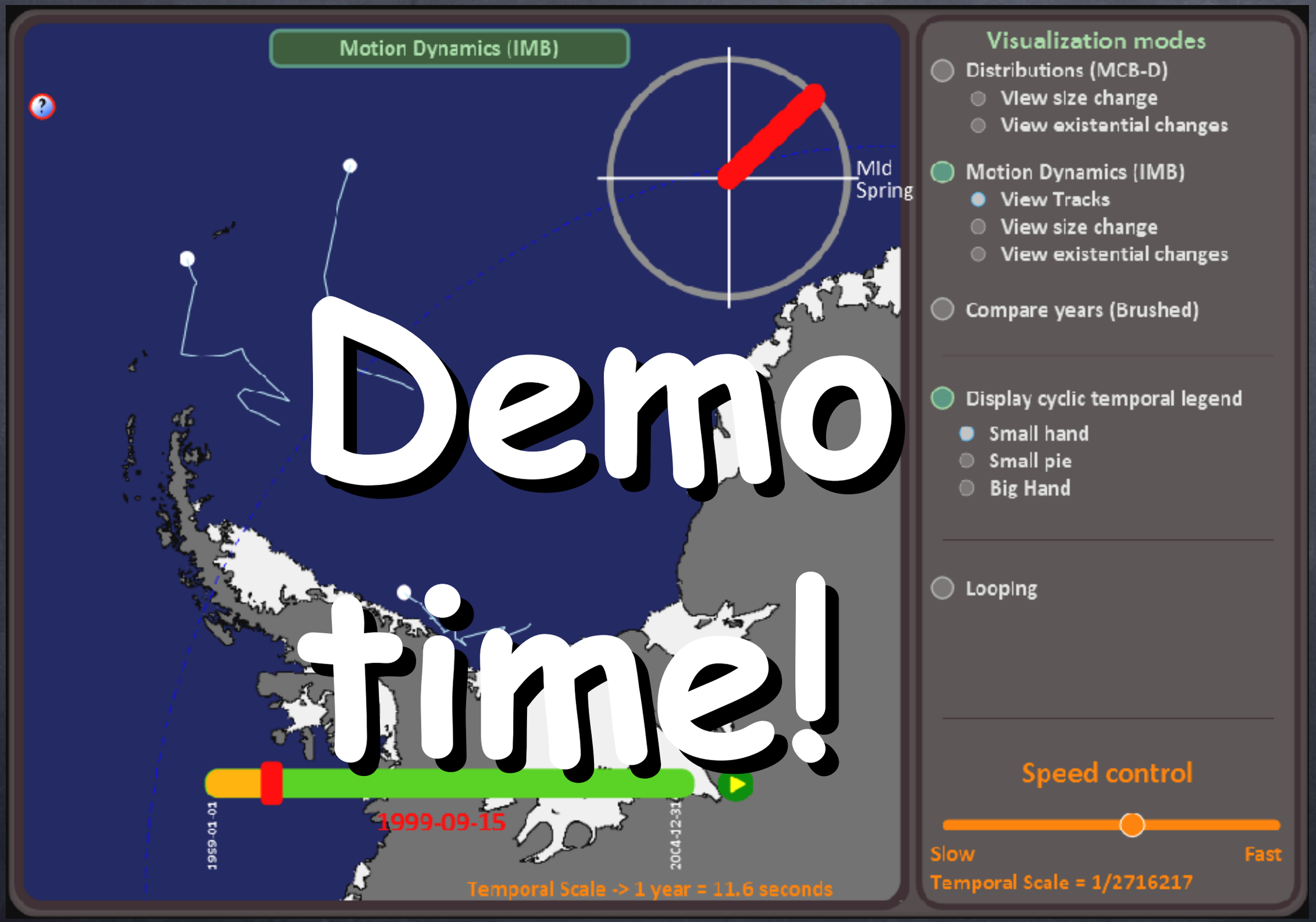
Animated mapping GUI

Temporal legends

- Cyclic
- Digital clock
- Time-bar

Interactive functionalities

- User choices
- Functions to control the temporal dimension
  - Play/Pause
  - Time-slider
  - Looping
  - Speed-slider


Motion Dynamics (IMB)
Mid Spring
Demo time!
1999-09-15
1959-01-01
2004-12-31
Temporal Scale -> 1 year = 11.6 seconds
Visualization modes
Distributions (MCB-D)
View size change
View existential changes
Motion Dynamics (IMB)
View Tracks
View size change
View existential changes
Compare years (Brushed)
Display cyclic temporal legend
Small hand
Small pie
Big Hand
Looping
Speed control
Slow
Fast
Temporal Scale = 1/2716217

Acknowledgments:

Thimothée Becker
Conny Blok
Dita Anggraeni
Erik Dahlström
Helder Magalhaes
David Dailey
Frank Bruder

Questions?

http://geoserver.itc.nl/TimeMapper/
http://kartoweb.itc.nl/RIMapper/

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