

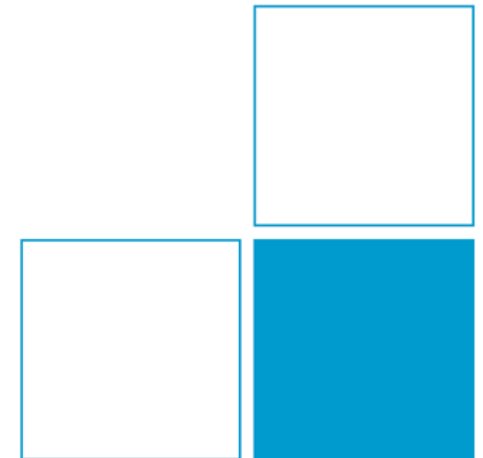
D-SI



The Machine-readable and Digitized International System of Units

BIPM Directors Meeting 18th October 2019

Sascha Eichstädt, Frank Härtig,
Daniel Hutzschenreuter, Joachim Ullrich



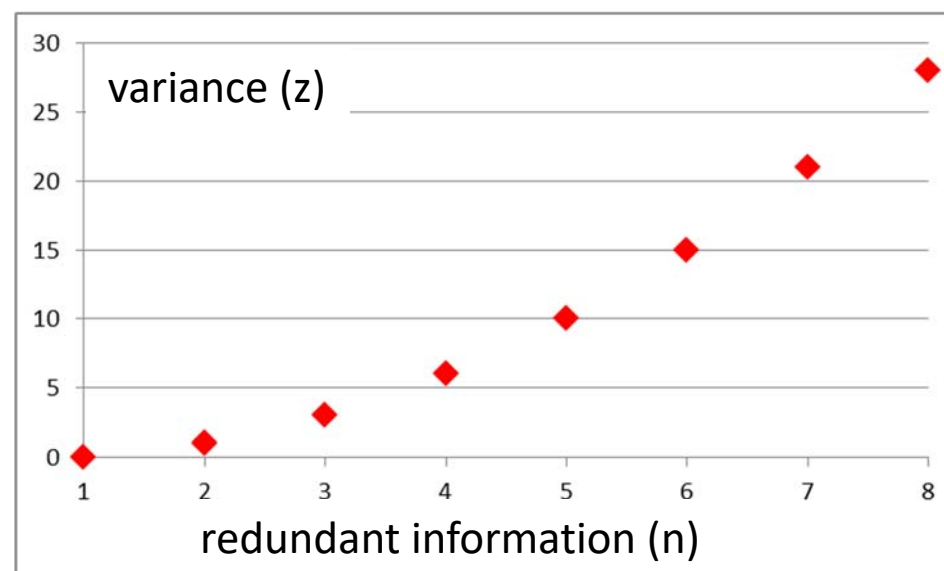
- Problem: There is no unity and clarity in the digital communication
the diversity of data seems to be increasing!

Units: Pfund, Zentner, meter, feet, sea-, land-, air-miles, ...
characters: Ä, Ö, Ü, **كَلِمَاتٌ مُطَابِقَةٌ** 公尺 [公尺] **мётра** ...
number systems: decimal, hexadecimal, binary, ...

...

- Economic disaster due to diversity and redundancies

$$z = \frac{n(n-1)}{2}$$



Digitalization!

„We forgot metrology“

Henning Kagermann

- *Pioneer of Industry 4.0*
- *Former board of SAP*
- *Chancellor's consultant*

...

Numbers have to be

*unambiguous,
efficient,
easy to understand,*

...

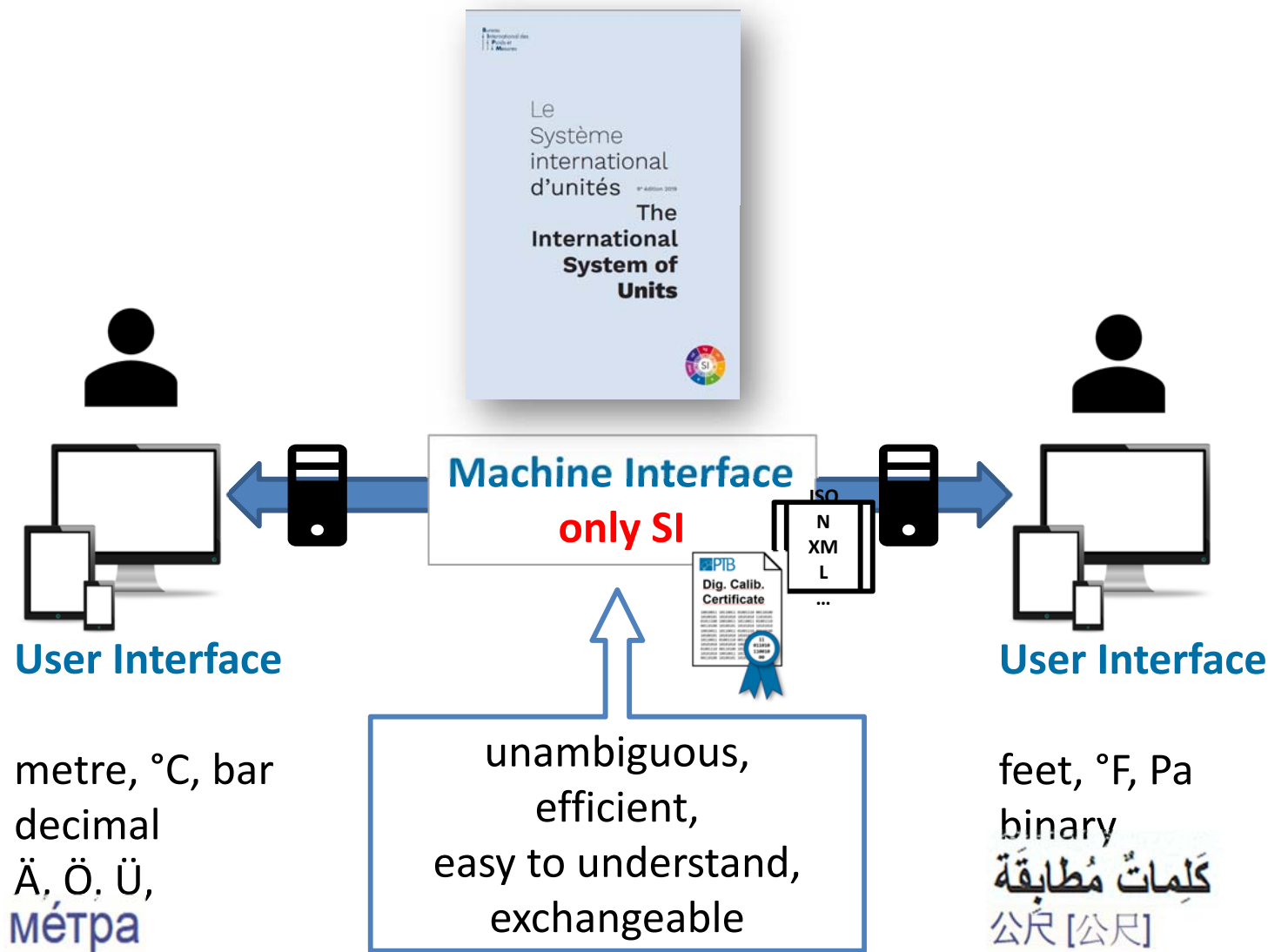
exchangeable



EMPIR

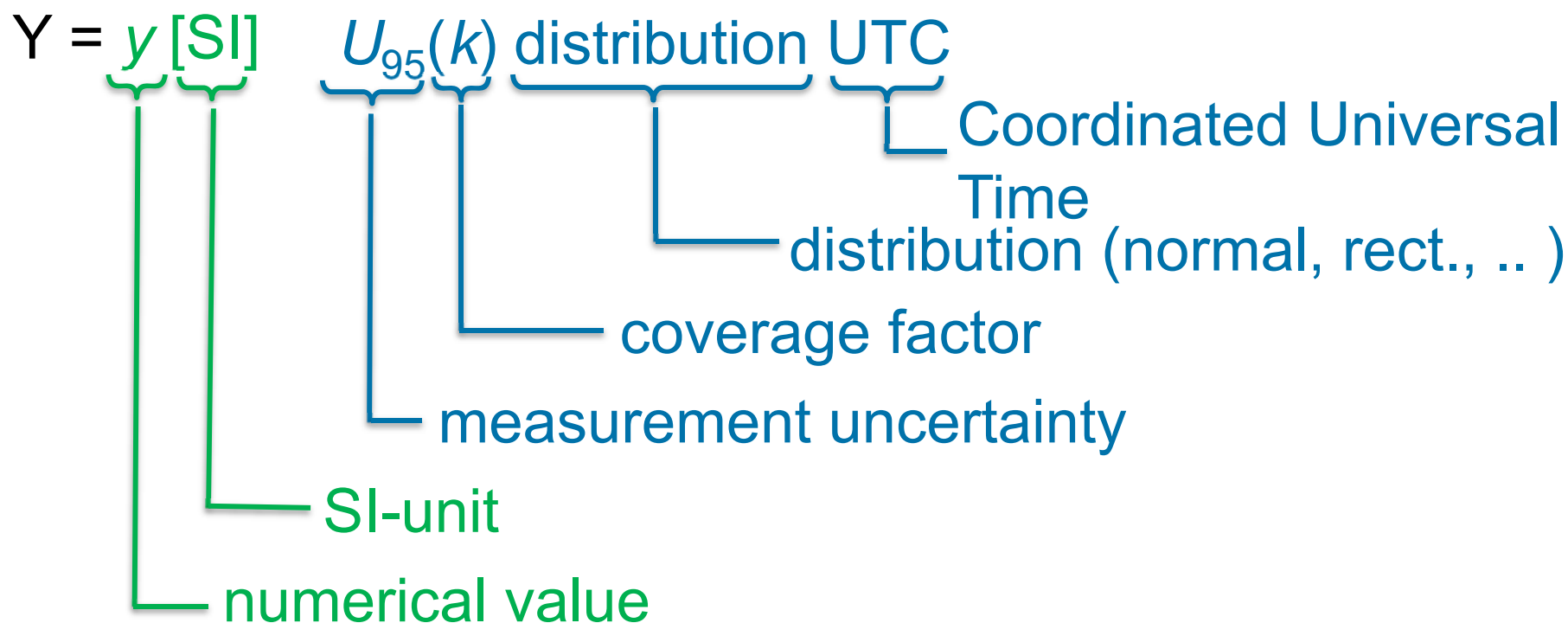


The EMPIR initiative is co-funded by the European Union's Horizon 2020 research and innovation programme and the EMPIR Participating States

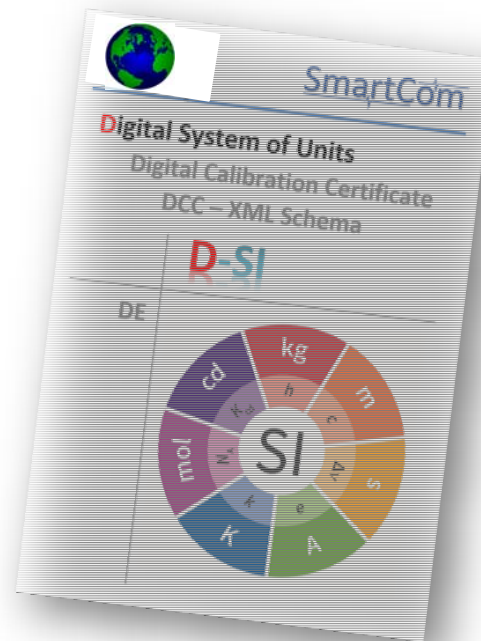
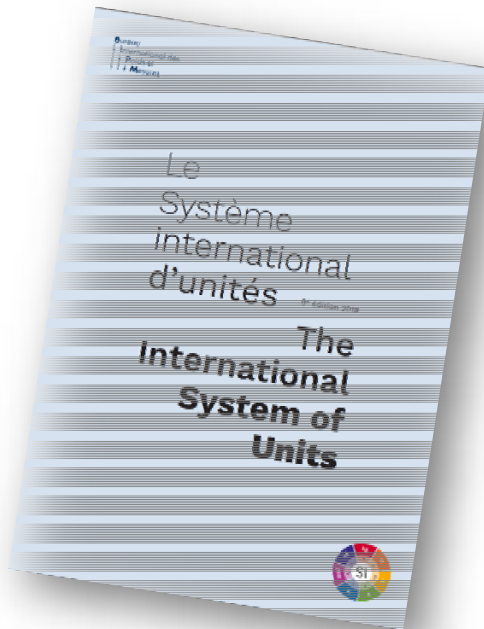


Digital SI & Digital Calibration Certificates

Minimum requirement + Maximum information



Universal, easy to understand, safe und unambiguous data model for the digital exchange of metrological data on the basis of the SI



Latest version XML scheme @ <https://zenodo.org/record/3366902#.Xabbr25uLeV>

Universal machine-readable CODATA constants on basis of D-SI in addition to original CODATA listings

CODATA
2014

```
<si:constant>  
  <si:label>Planck constant</si:label>  
  <si:value>6.626070040e-34</si:value>  
  <si:unit>\joule\second</si:unit>  
  <si:dateTime>2015-06-25T00:00:00Z</si:dateTime>  
  <si:uncertainty>0.000000081e-34</si:uncertainty>  
</si:constant>
```

CODATA
2018

```
<si:constant>  
  <si:label>Planck constant</si:label>  
  <si:value>6.62607015e-34</si:value>  
  <si:unit>\joule\hertz\tothe{-1}</si:unit>  
  <si:dateTime>2019-05-20T00:00:00Z</si:dateTime>  
  <si:uncertainty>0</si:uncertainty>  
</si:constant>
```


CIPM-Working Group

Digital SI

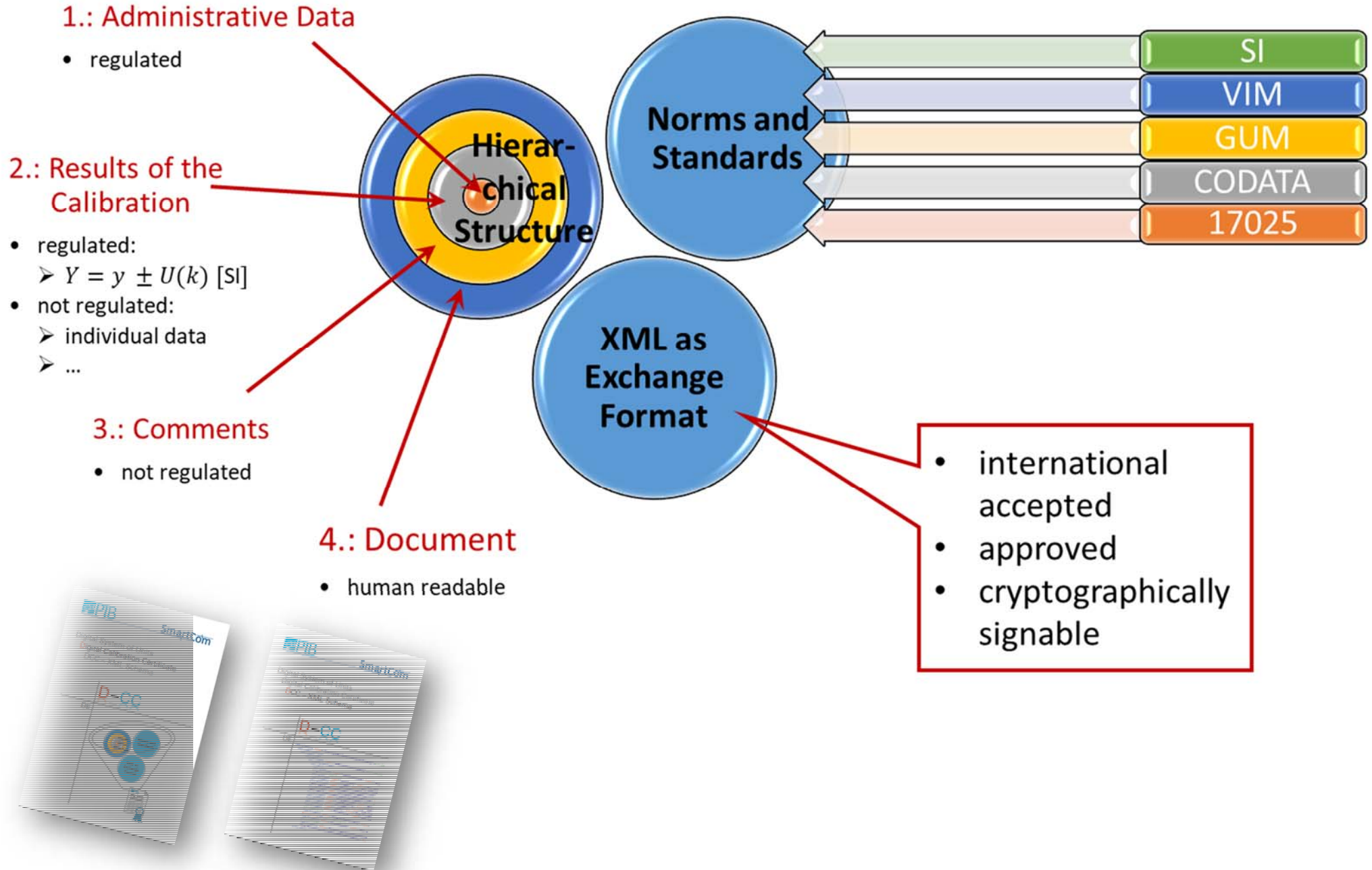
Decision CIPM/108-xx1 (draft)

The CIPM decides to establish a Task Group “Digital SI” to explore and establish suitable liaisons withal relevant stakeholders in order to quickly move towards agreeing on an authoritative document on a meta-data format for SI based data transfer as well as for machine-interpretable, unambiguous digital representation of metrological information and factual data in general.

Members of the Task Group are Jim Olthoff, Ismael Castelazo, Thomas Liew, Alan Steele, Martin Milton and Joachim Ullrich

International Summit “Digitization in Metrology”

Where: BIPM
When: 2020-06-18 to 2020-06-19 ?
Participants: NMI’s; National accreditation agencies



D-SI

“Promote worldwide uniformity of the units”

BIPM

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	 2019-10-18

merci bien