

9. Discussion on the SI in the digital world

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SI in the digital world

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- The SI is a result of cultural, political and historical compromises
- It is a practical system used by humans able to interpret context
- The corollary is that the SI is not systematic, unambiguous or rigorous
- These qualities are needed by computer science for easy parsing and interpretation

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Issues of semantics:

• Description of quantities of objects, formalisation of metrology concepts

Issues of definition:

 Relationship between base units and base quantities, inconsistent rules and concepts, dimension and unit 1

Issues of utility:

• ambiguous notation, angle problem, concept of dimension, rules of use

Issues of usability:

 non-systematic, inconsistent or inconvenient notation



Informatics levels for units of measurement

MP Foster, Computer Standards & Interfaces 35 (2013) 529–535

Hierarchy of standards for metrology entities





Fit for purpose?



- Balance between stability and utility to be struck
- Big changes to the SI to accommodate digitation would not be accepted
- Resolved by externally agreed convention(s) and local implementation
- For instance software can use complete equations and other local solutions
- Work with user communities to establish unit ontologies & agreed, clear implementations



stability

Relevant NPL activities: near term

- WP leaders in EMPIR SmartCom project
- WP leader on Quality Management Framework for Software and Data in MATHMET JNP
- Task leaders in EURAMET TC-IM projects
 - > 1448: Digital calibration certificates
 - 1449: Research data management and the European Open Science Cloud
- Characterisation of the uncertainty contribution arising from numerical computation
- Uncertainty quantification for new measurement modalities
 - Imaging

Sensor networks







Interdisciplinary Metrology



Relevant NPL activities: medium term



- Reduction in confusion through replacement of *ad hoc* units and other references by machine-readable knowledge representation:
 - > Dynamic, digital traceability chains
 - > Characterisation of material properties
 - > Chemical engineering, pharmaceutical manufacture
 - Imaging data and meta-data in life sciences and health