# Issue 480

**MD’ HW, sent 15/02/2021**

Here my homework for CRMarcheo.   
  
<http://cidoc-crm.org/Issue/ID-480-ap14-justified-is-justification-of> [<http://cidoc-crm.org/Issue/ID-480-ap14-justified-is-justification-of>](http://cidoc-crm.org/Issue/ID-480-ap14-justified-is-justification-of)   
  
Here the graphical representation in CRMarcheao:   
  
  
I observe that is is not necessary to connect AP14 to AP13.1 and AP11.1:  
  
The particular instance X of AP13 is determined already for the selected instances of A4, whatever the type U assigned by AP13.1 is. The analogous holds for the particular instance Y of AP11 and the type W assigned by AP11.1. Hence, from X follows U, and from Y follows W. If X is justified by Y, it follows that W was used to infer U in this case (only!).  
  
I maintain that the CRM must NOT produce a model which fixes the physical relation types to specific corresponding stratigraphic relation types, because I regard these correspondances as an open-ended research questions. For instance, that being "on top" justifies "after", holds only for certain undisturbed contexts and microscopic interface features. I can imagine that progress of science may even discard completely the "on top" as argument for certain contexts, such as sedimentation, and refer solely to microscopic interface features in the future.   
  
E.g., the dinosaur footprints in Portugal in a stratigraphic interface, currently on an inclined slope, prove the temporal sequence by being **negative** imprints of the dinosaur feet, whereas the removed stratum constituted **positive** representations of the feet, by filling in the dried footprints with another layer of mud, even if the were inlined upside down. If however the positive representations were petrified feet, we would argue that the same shape on the one side justifies the opposite temporal relation! This exemplifies the potential complexity of involved background knowledge.  
  
Hence, **I propose** that AP14 should be redefined as   
  
**AP13.2 justified (us justification of)**,   
domain: AP13  
range: AP11  
  
I would assume that the cardinality should be (0,1:0,1), not to confuse multiple associations. Otherwise, we would need complex rules about how to combine multiple physical relations to justify one stratigraphic one, or one physical relation to justify more than one stratigraphic one.  
  
We may require that **AP13.1** and **AP11.1** are **necessary**, even though I wonder if more complex interface considerations are adequately represented by a type. Nevertheless, it may be beneficial to require a clear specification, so that one **can always query** what sort of equivalence was used.  I would not restrict the domain cardinality to one, because one may combine multiple types , e.g., "On Top" AND "Negative Imprints Below".  
  
Note, that the use of the type W is relative to the direction of Y, instance of AP11, and the use of the type U is relative to the direction of X, instance of AP13, and the use of AP13.2 must follow this order.   
  
It may in practice be necessary, to have a "twisted" version of AP13.2, which relates AP13i to AP11....😛  
  
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We can interpret AP13.2 as a shortcut of   
  
[I2](about:blank?compose#_S2_Sample_Taking) Belief[("AP14 is TRUE"). J2i](#_J2_concluded_that) was concluded by: I5 Inference Making. [J1](#_J1_used_as) used as premise:  [I2](#_S2_Sample_Taking) Belief [("AP11 is TRUE")](about:blank?compose#_S2_Sample_Taking)  
  
But I would **not** regard this as replacing the need for AP13.2 in CRMarcheo.