

Proposal for multiple small additional math packages for SBML Level 3

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Motivation

Currently SBML restricts the subset of MathML that is deemed 'valid' for use within an SBML model. It was considered that L3 packages that needed additional math would add this as required. However, this limits the use of the additional math to the use of the package - which in some cases may not be necessary. For example the arrays package has suggested including the mathematical operation 'mean' - but it would be perfectly feasible to use 'mean' without using arrays.

Discussions of additional math constructs that should be added to core SBML inevitably introduces difference of opinion as there are varying views on what is considered useful and/or necessary.

It has also been suggested that we relax the restriction and just allow all of MathML to be used within SBML. However, learning from the experience of CellML, this may produce a situation where many software packages do not support all mathematical operations. This can lead to reduced interoperability with some models only being simulatable by one software package.

This proposal attempts to provide a medium ground where we facilitate modelers in their need to use mathematical constructs whilst maintaining a position where software supports this and we continue to have the level of interoperability that SBML has currently achieved.

Proposal

This proposal suggests that we produce a number of small math only packages that group together math constructs that would be added by that package e.g. statistical functions, array functions, linear algebra functions. Each package would have its own sbml namespace and use the required attribute to indicate that it has been used in a fashion consistent with the current use of packages.

```
<sbml xmlns="http://www.sbml.org/sbml/level3/version1/core" level="3" version="1"
```

```
  stats:xmlns="http://www.sbml.org/sbml/level3/math/statistics" stats:required="true">
```

However the package namespace would only be used to indicate the use of additional constructs. The MathML constructs themselves would remain in the MathML namespace in accordance with the current use of MathML within SBML.

Advantages

Any math construct is only defined once and can be used by any package that needs it by declaring a dependency on the particular math package. This reduces the possibility of ambiguity if multiple L3 packages add the same additional math constructs.

Software can choose which math packages to support which reduces the onus on developers and the package namespace and required attribute mechanism enables software to easily determine and report to users whether the constructs are supported.

The additional math would be usable with SBML L3V1 core without the need to support another package or version of SBML.