

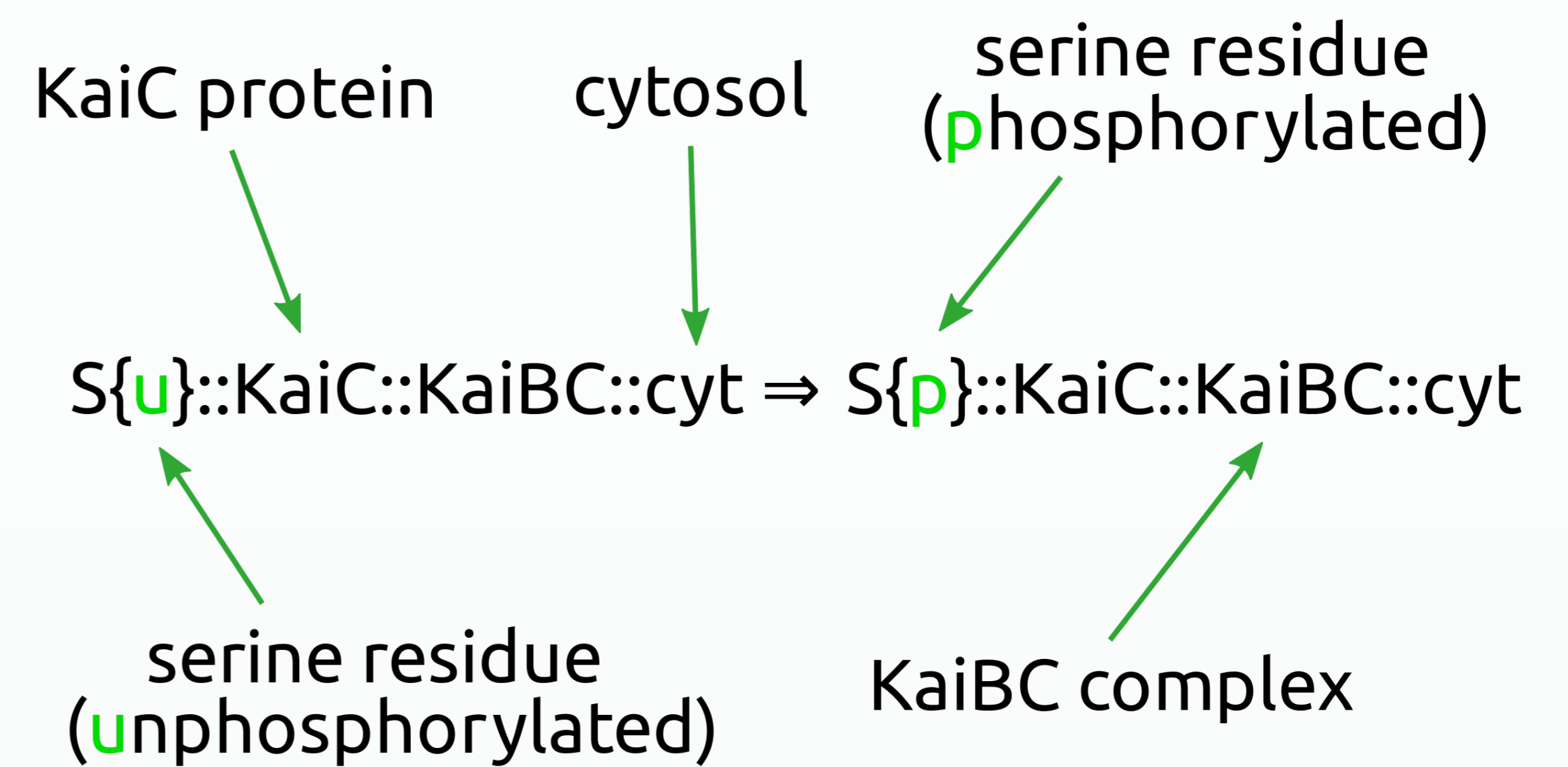
Biochemical Space

A Framework for Formal Description and Annotation of Complex Biological Processes

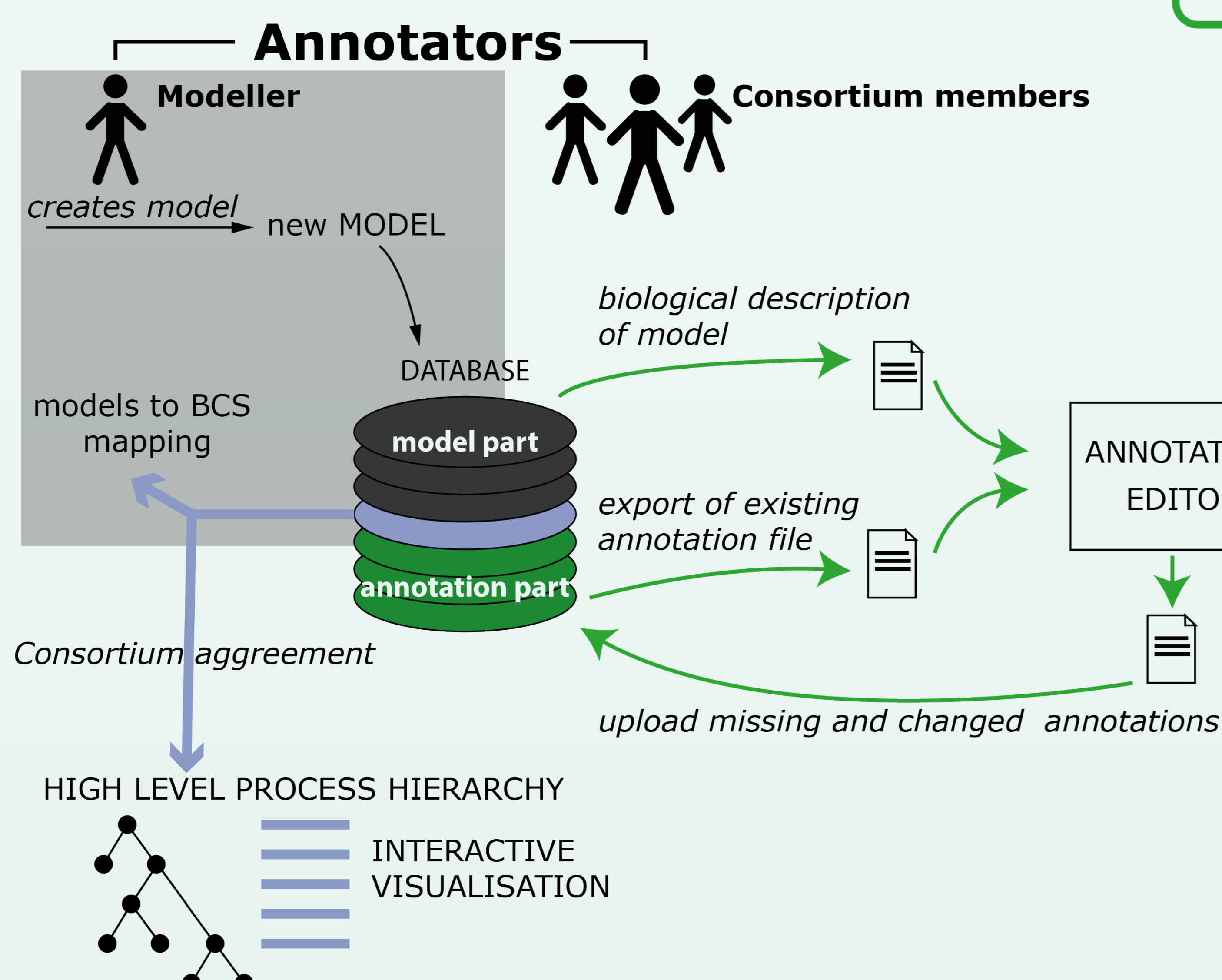
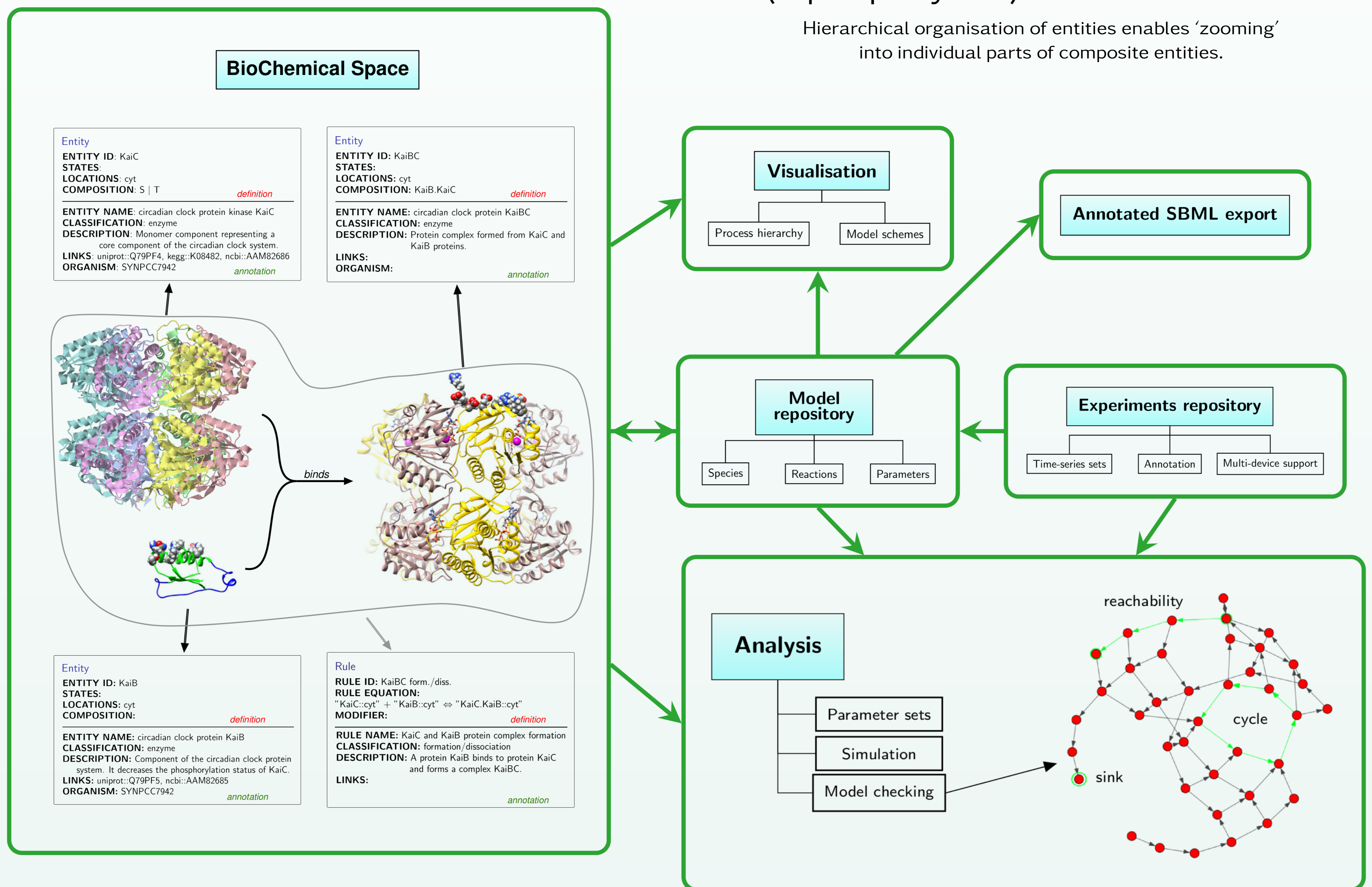
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Biochemical Space (BCS) is a web-based framework for modelling and analysis of biological processes. The concept of BCS forms a crucial part of **Comprehensive Modelling Platform (CMP)** – a general platform for computational modelling and analysis of biological processes. The main goal of BCS is to simplify model-building tasks by providing a simple and clear notation easily understandable by modellers and biologists.

In the context of the platform, Biochemical Space assembles complicated quantitative models with an easy-to-understand, yet formal and compact qualitative description. It allows to specify formal and well-annotated reaction networks of chemical entities and elemental reactions. It forms a basis for formal annotation of mathematical models.



Hierarchical organisation of entities enables 'zooming' into individual parts of composite entities.



The rigorous core of BCS is called **Biochemical Space Language (BCSL)** and is made by declaration of chemical entities and reaction rules. It combines state-of-the-art rule-based techniques with metadata formats developed in well-known annotation databases. The language is formally defined including operational semantics. BCS reflects SBML level 3 in generalization of compartments in terms of a hierarchy of locations, introducing entity states, and dealing with related combinatorial explosion.

An example of existing application of BCS is available at a website for modelling of cyanobacteria processes (<https://www.e-cyanobacterium.org>). The following processes of cyanobacteria are covered: environmental processes, respiration and photosynthesis, carbon concentrating mechanism, circadian clock, and metabolism.