

# **Systems Biology Graphical Notation:**

## **Process Description language Level 1 Version 2.0**

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## **Abstract**

The Systems Biology Graphical Notation (SBGN) is an international community effort that aims to standardise the visualisation of pathways and networks for readers with diverse scientific backgrounds as well as to support an efficient and accurate exchange of biological knowledge between disparate research communities, industry, and other players in systems biology. SBGN comprises the three languages Entity Relationship, Activity Flow, and Process Description (PD) to cover biological and biochemical systems at distinct levels of detail. PD is closest to metabolic and regulatory pathways found in biological literature and textbooks. Its well-defined semantics offer a superior precision in expressing biological knowledge.

PD represents mechanistic and temporal dependencies of biological interactions and transformations as a graph. Its different types of nodes include entity pools (e.g., metabolites, proteins, genes and complexes) and processes (e.g., reactions, associations and influences). The edges describe relationships between the nodes (e.g., consumption, production, stimulation and inhibition).

This document details Level 1 Version 2.0 of the PD specification, including several improvements, in particular: 1) the addition of the equivalence operator, subunit, and annotation glyphs, 2) modification to the usage of submaps, and 3)

updates to clarify the use of various glyphs (i.e., multimer, empty set, and state variable).

**Keywords:** biological network, circuit diagram, SBGN, standard, systems biology, visualisation.