Verification of Systems Biology Research in the Age of Collaborative Competition: Biological Network Models

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sbv IMPROVER

sbv IMPROVER (systems biology verification and Industrial Methodology for PROcess VErification in Research) is a robust methodology that verifies systems biology approaches using double-blind performance assessment and applies the wisdom of crowds to solve scientific challenges [1].

sbv IMPROVER Challenges

The first challenge, the Diagnostic Signature Challenge (DSC), was designed to determine which computational approaches and types of transcriptomic data could be used for phenotype prediction [2].

The second challenge, the Species Translation Challenge (STC), was designed to address whether or not biological events observed in rodents were "translatable" to humans. The outcome of this challenge was shared in an open symposium in Athens at end of October 2013.

The third challenge, the Biological Network Verification Challenge (NVC) aims to verify previously built biological network models [3-9].

Biological Network Verification Challenge
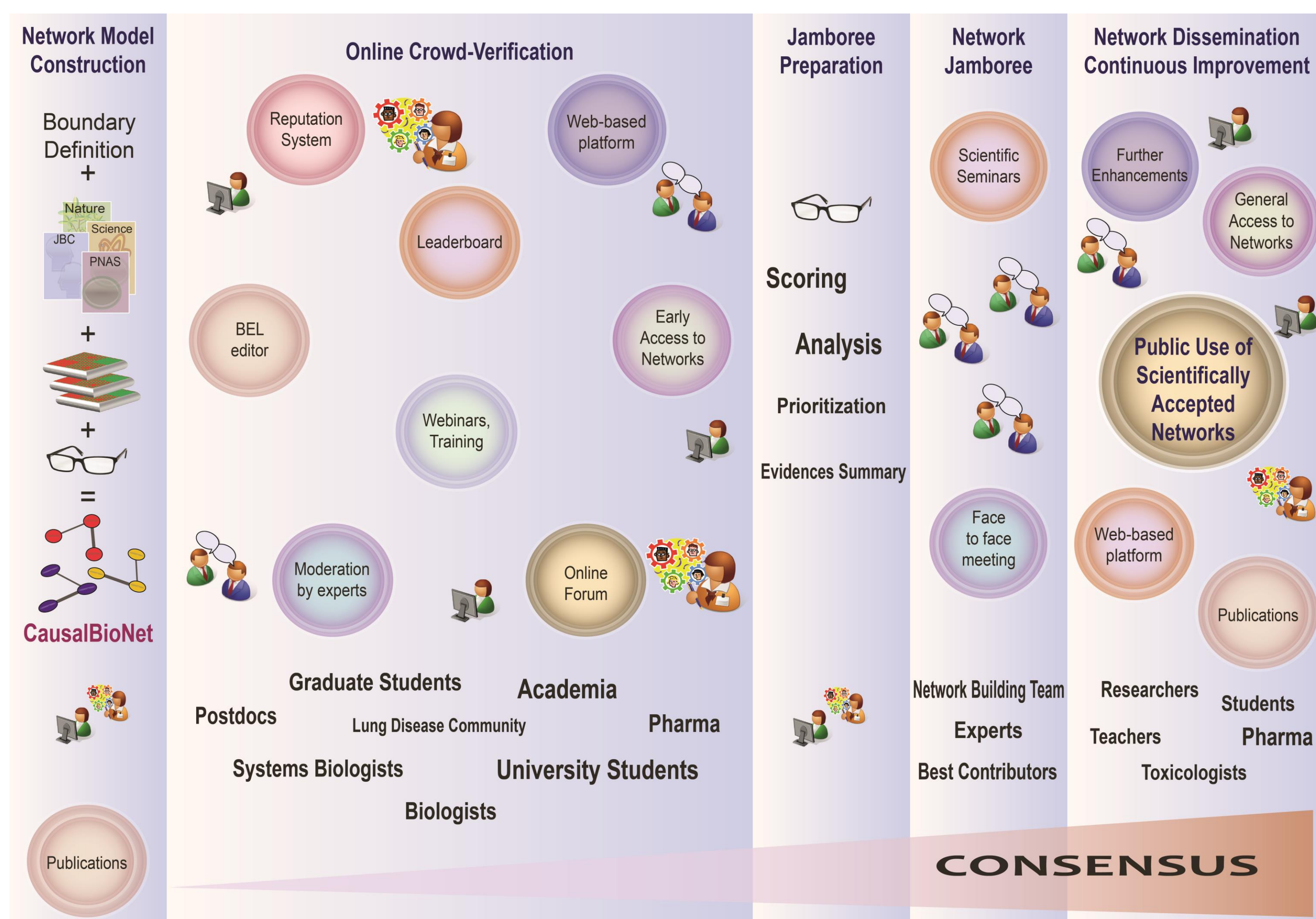
The NVC consists of five phases: 1.) Network models were constructed based on the literature and data-driven hypothesis validation. These were imported into a web-based platform (CausalBioNet). 2.) Experts/researchers/students are encouraged to access and verify/enhance the network models. This process is set up as a reputation-based collaborative competition, where actions on the network are given points that are recorded in a leaderboard (online Crowd-verification). 3.) After the online phase is closed, the results and actions are analyzed. 4.) The most controversial edges are open for discussion during a jamboree that will bring together scientific experts and the best contributors in the online phase. 5.) Based on conclusions from the jamboree, the verified versions of the networks will be released to the scientific community for continued use. [3]

Building of the Biological Network Models
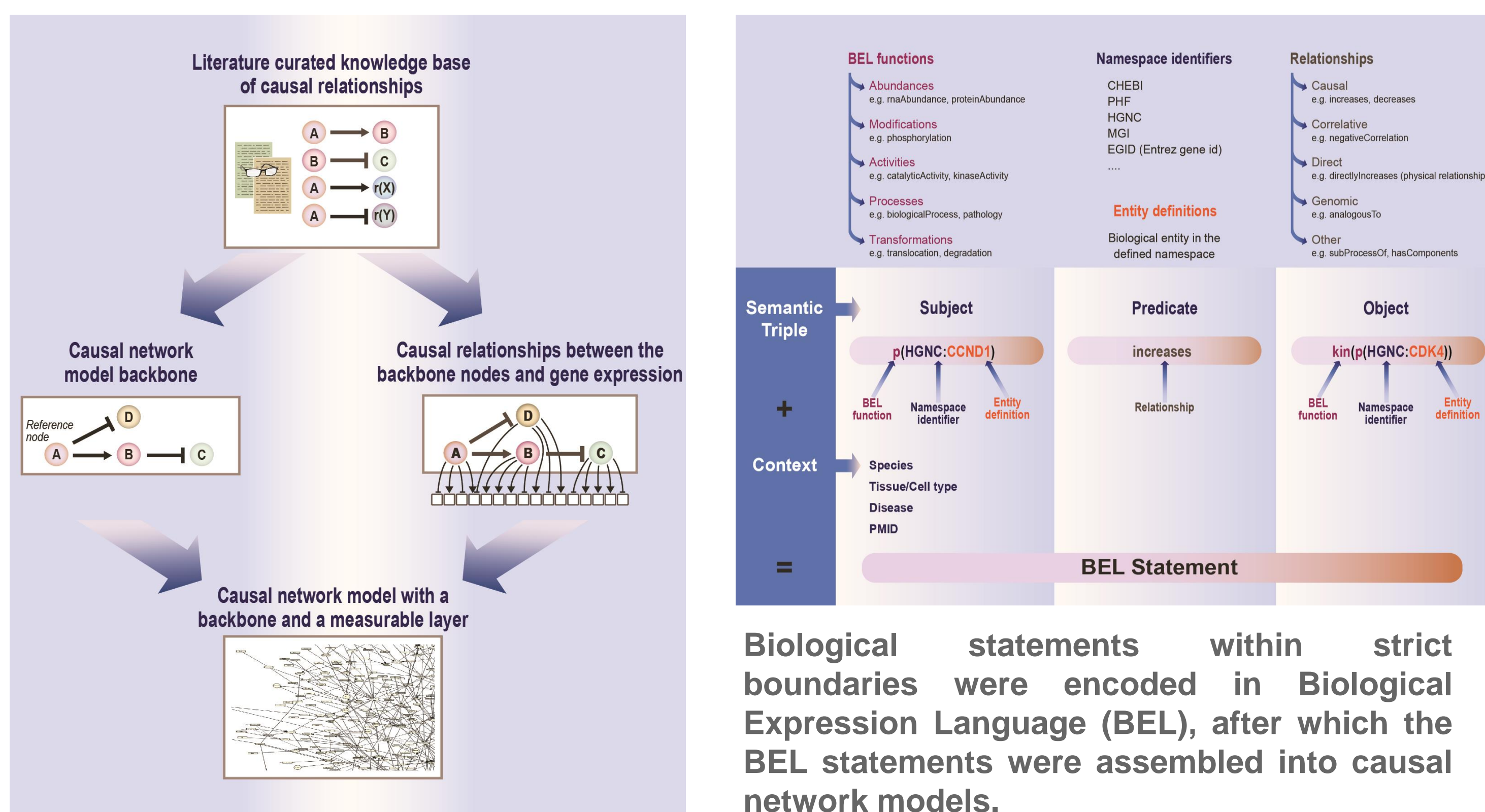
Biological statements within strict boundaries were encoded in Biological Expression Language (BEL), after which the BEL statements were assembled into causal network models.

Network Verification Platform

We have designed a powerful web platform to navigate and interact with each of these biological networks. Please visit it at **https://bionet.sbvimprover.com**.

Network Edge Verification
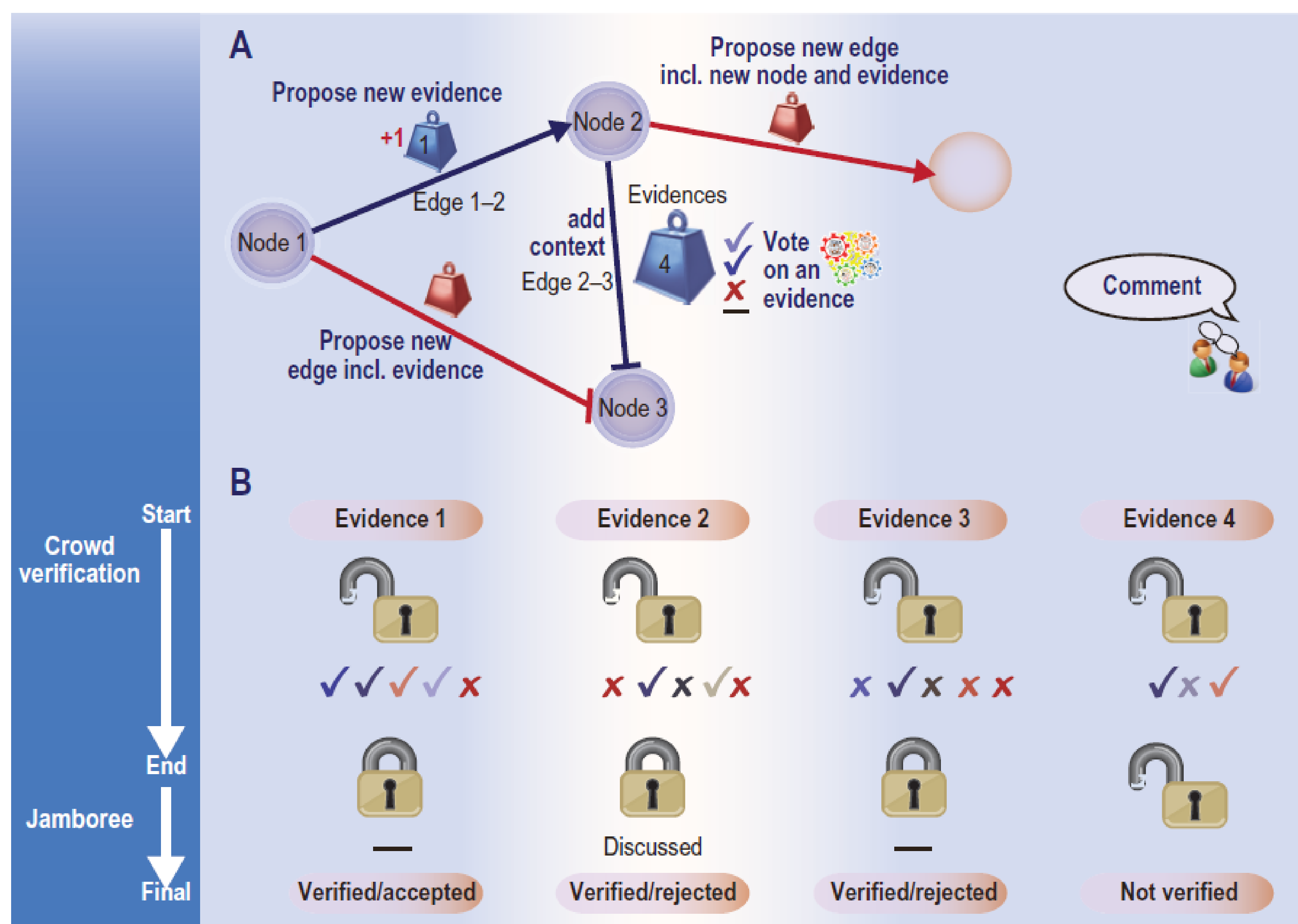
(A) Each edge is based on a BEL statement and is supported by a number of evidences. Participants can submit new evidence to create new edges or add them to existing edges. All evidences are available for voting (accept/reject). (B) Examples of possible verification outcomes: Once an evidence reaches the maximum number of votes, it will be locked and marked accepted, rejected or ambiguous, depending on the kind of votes received. [3]

Call for Action

- Join the sbv IMPROVER community
- Participate in the Network Verification Challenge
- Explore the networks at **https://bionet.sbvimprover.com**
- Watch our online training videos and attend the free tutorials
- Gain early access to high-quality, well-curated networks
- Become a contributor in network biology for toxicology and drug and biomarker discovery
- Have the opportunity to travel to Switzerland and be a part of the Jamboree in March 2014

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