Cell Physiology Ontology
http://cybow.astem.or.jp/cpo/

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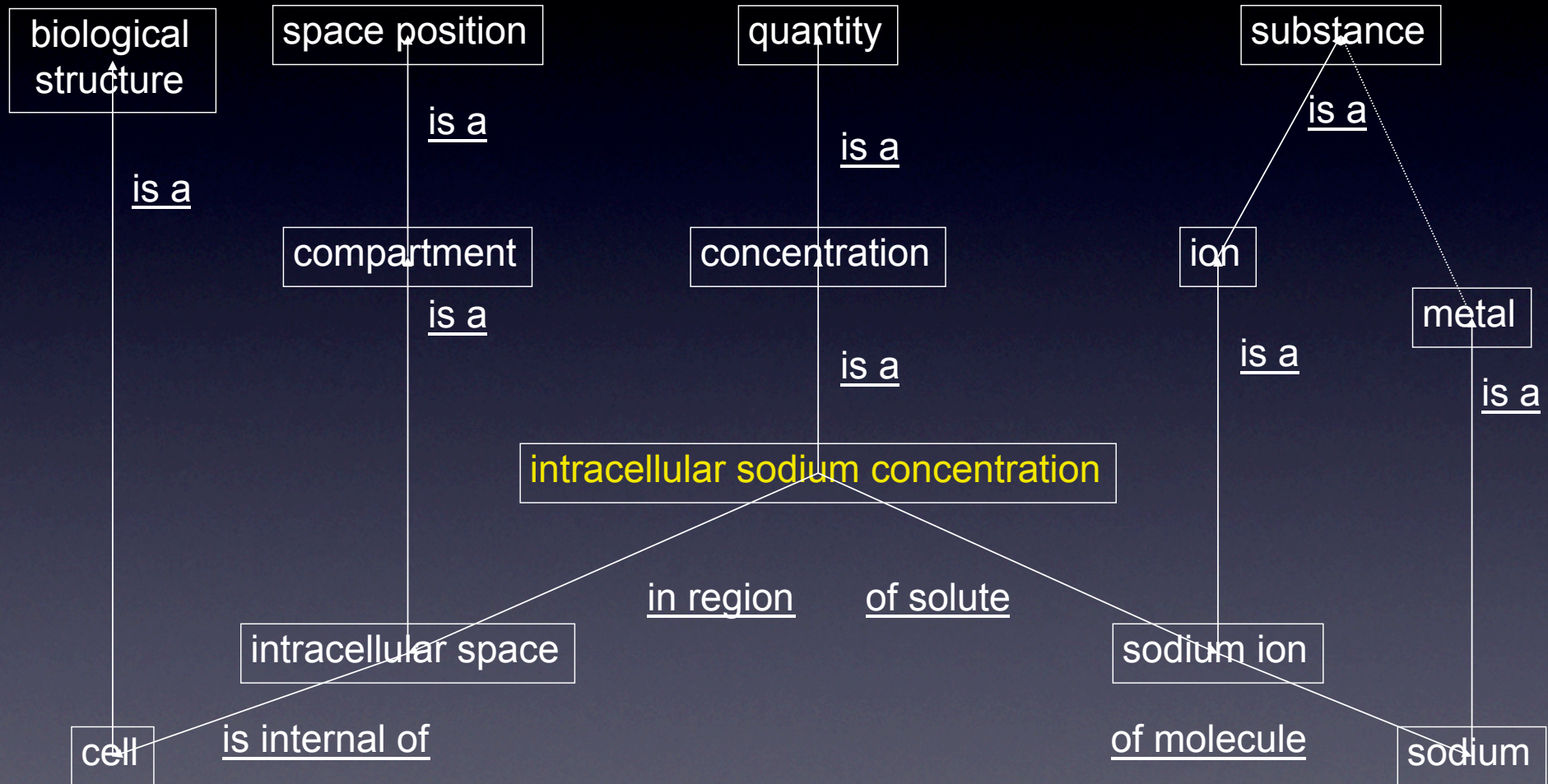2. Ritsumeikan University
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Ontology

- Specification of a conceptualisation
  - Formal representation of knowledge
- A set of concepts and the relationships within a domain
  - Terminology, Taxonomy
    - is-a-kind-of
  - Domain-specific relationships
    - is-a-part-of, is-regulated-by

Domain

- Physical quantities referred in cell physiology, e.g.
  - delayed rectifier potassium current
  - intracellular calcium concentration
  - cellular contractile force
- Concepts to define physical quantities

Example of Structure

Purpose

- For annotation
  - Models
  - Experimental protocols
  - Experimental results
- For application
  - Intelligent assists for model editing
  - Information retrieval
  - Knowledge sharing

Description

- OWL

- Based on the open world assumption

  - absence of a concept or a relationship between concepts in CPO does not mean nonexistence of that
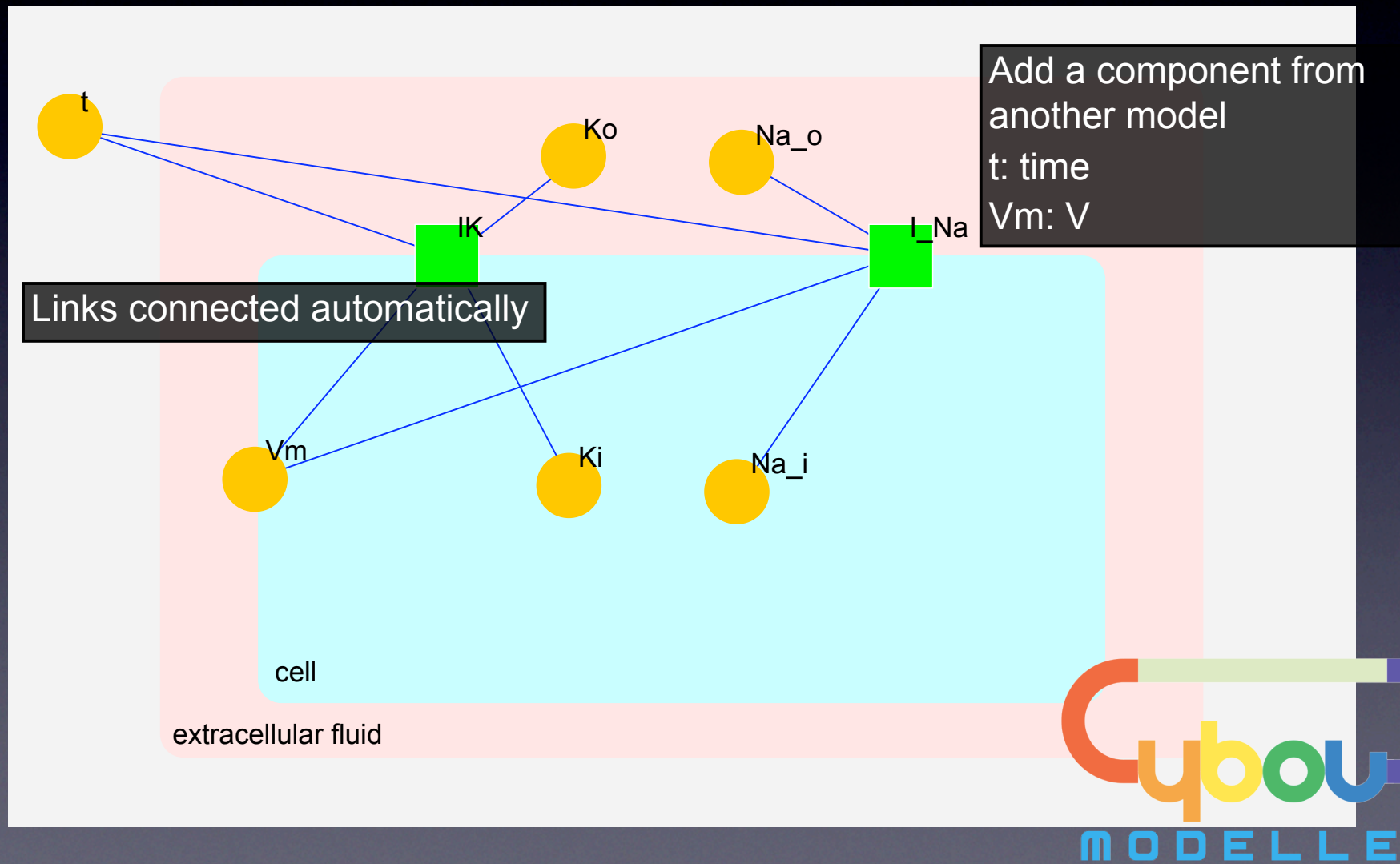
Base Concepts

- Quantity
  - Capacitance, Chemical_Constants, Probability, ...
- Physical_Constants
  - Faraday_constant, gas_constant, ...
- Substance
  - Ion, Molecule
- Space_Position
  - Space_Point, Space_Region
- Biological_Structure
  - cell, Membrane, Ogranelle
- Chemical_Process
  - Chemical_Reaction, Chemical_Recation_System

Example of Definition

- rapidly activating delayed rectifier potassium current
  - *is-a-subclass-of:*
    - current by ion channel
  - *is-a-current-component-of:*
    - delayed rectifier potassium current
  - *is-carried-through:*
    - Kv11.1

Assists for Modelling

PEPML

Physiological Experimental Protocol Markup Language

- XML-based format for semantic representation of experimental protocols

- A protocol is described procedurally as a list of events

  - condition: *time* mod 500 < 2 [ms]

  - action: *stimulation current* := -4000 [pA]

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Current Status

- Available at http://cybow.astem.or.jp/cpo/
  - OWL file downloadable
  - Browsable with OWLDoc
- Still a prototype
- Limited numbers of concepts referred in a cardiac myocyte model are registered
- Independent of other ontologies