Documents for IDEAL.phosphorylation

IDEAL.phosphorylation is a collection of data to describe biological events triggered by or related to phosphorylation of phosphoproteins.

The information is summarized in the four tables below:

1. Process Table:
The table describes biological processes by a set of operand, operator, and result.

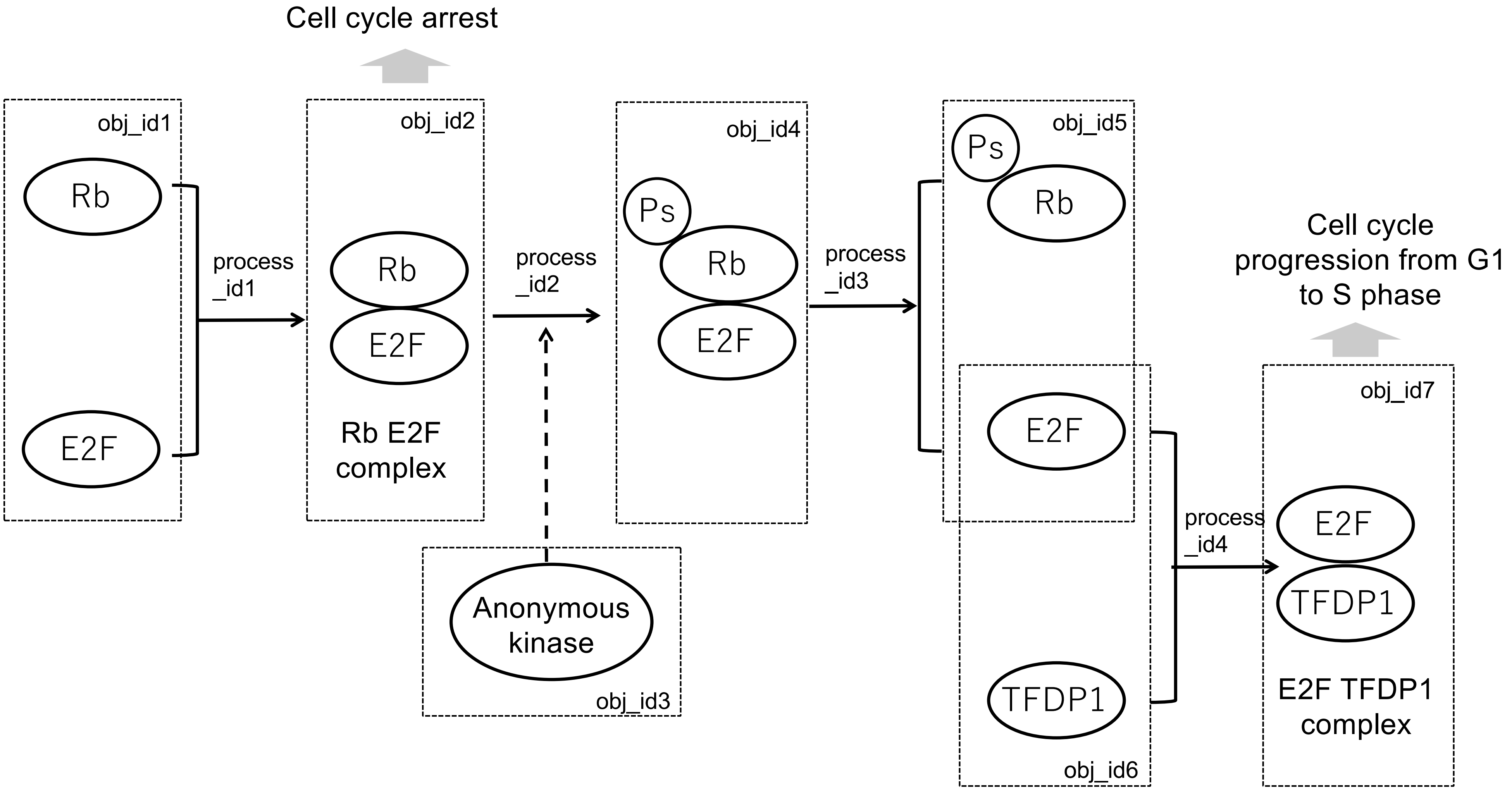
2. Property Table:
The table describes other properties not included in Process Table, such as functions and subcellular locations.

3. Process and Property Table:
The table provides all of the information presented in Process and Property Tables.

4. Reference Table
The table provides reference information of proteins in Tables.

October 2019 by YK, SF, MO

An example of biological events. Retinoblastoma-associated protein (Rb) and transcription factor E2F regulate the cell cycle



In this example, the following processes occur,

- process_id1 : Rb and E2F make a complex, Rb/E2F
- process_id2 : Anonymous kinase phosphorylates Rb in Rb/E2F complex
- process_id3 : Phosphorylation of Rb induces dissociation of Rb(Ps)/E2F
- process_id4 : Free E2F and TFDP1 make a complex, E2F/TFDP1

Process Table

protein_id	ideal_id	process_id	operand		operator		result	
			obj_id	object	obj_id	object	obj_id	object
P06400	IID00017	1	1	Rb,E2F			2	Rb/E2F
		2	2	Rb/E2F	3	anonymous kinase	4	Rb(Ps)/E2F
		3	4	Rb(Ps)/E2F			5	Rb(Ps),E2F
		4	6	E2F,TFDP1			7	E2F/TFDP1

A biological event is described by a series of processes, and a process is described by a set of “operand”, “operator”, and “result”. Each of them corresponds to a “object”: a protein(s) or a protein complex(s) (materials) involved in the process, and the triple indicates three elements comprising the process, for example, ligand, catalyst and product. In some cases, a number of proteins bind and make a complex in a reaction. In other cases, a protein complex translocates from cytoplasm to nucleus. In Process Table, the events with a change of the materials (in operand and result) are only described. When subcellular locations, or functional properties change, we describe them in the Property Table. Each of the columns in Process Table are as follows.

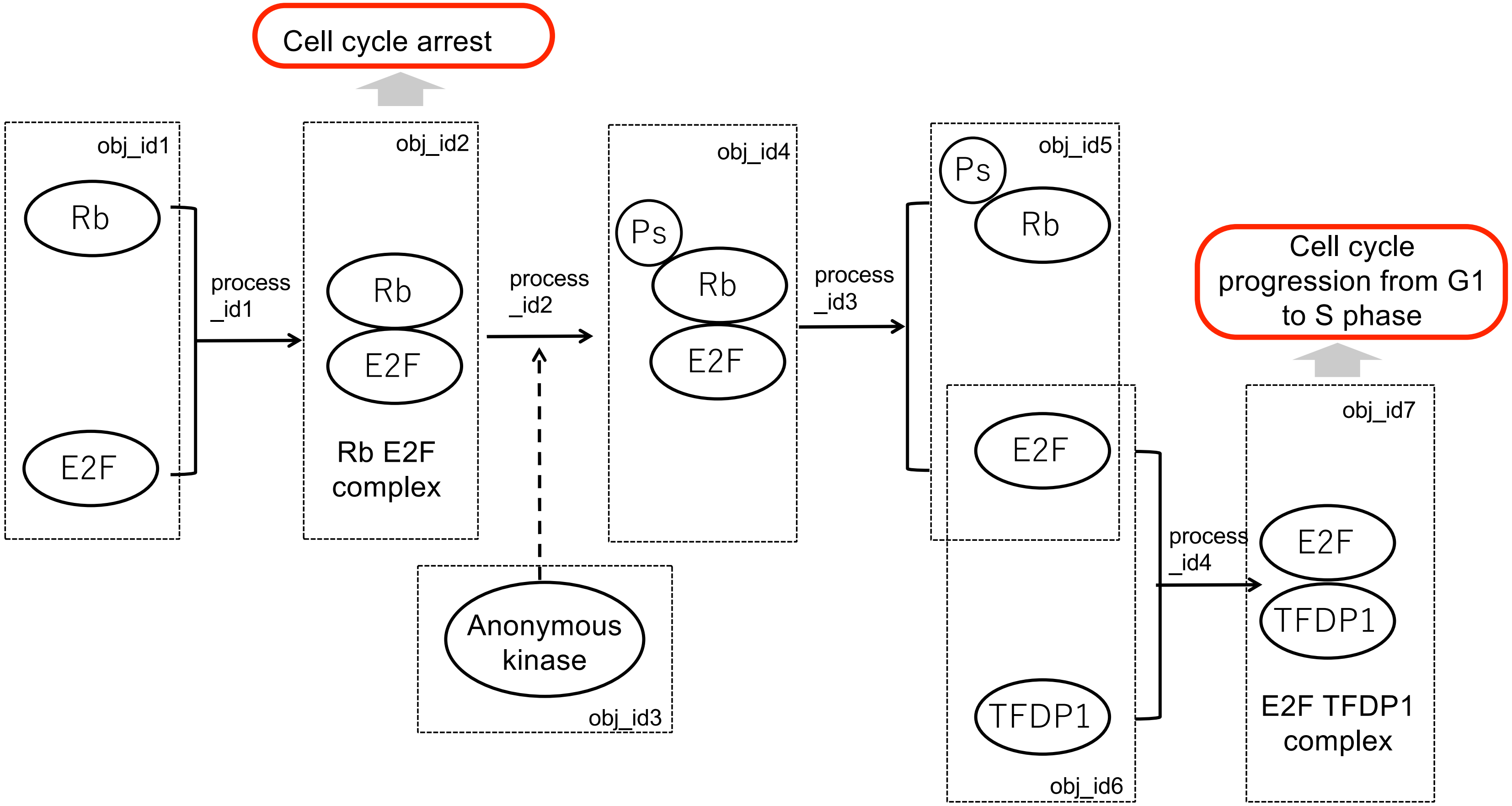
protein_id: Uniprot accession (the accession for Rb in the example)
ideal_id: IDEAL identifier
process_id: Order of the process
operand: Materials starting from
operator: Materials operating the process, if exist
result: Materials resulting in by the process
(obj_id: object identifier, object: symbol of the object)

* Rules to describe objects:
When proteins A and B exist in a monomeric state, the object is described as A,B
When proteins A and B exist in a complex, the object is described as A/B
When protein A is phosphorylated with a single phosphosite, it is described as A(P)
When protein A is phosphorylated with multiple phosphosites, it is described as A(Ps)

Property Table (1)

Property Table provides additional information that cannot be included in the form of Process Table. In this example, Rb/E2F and E2F/TFDP1 induce “cell cycle arrest” and “cell-cycle progression from G1 to S phase”. We describe these functions as “property” in Property Table.

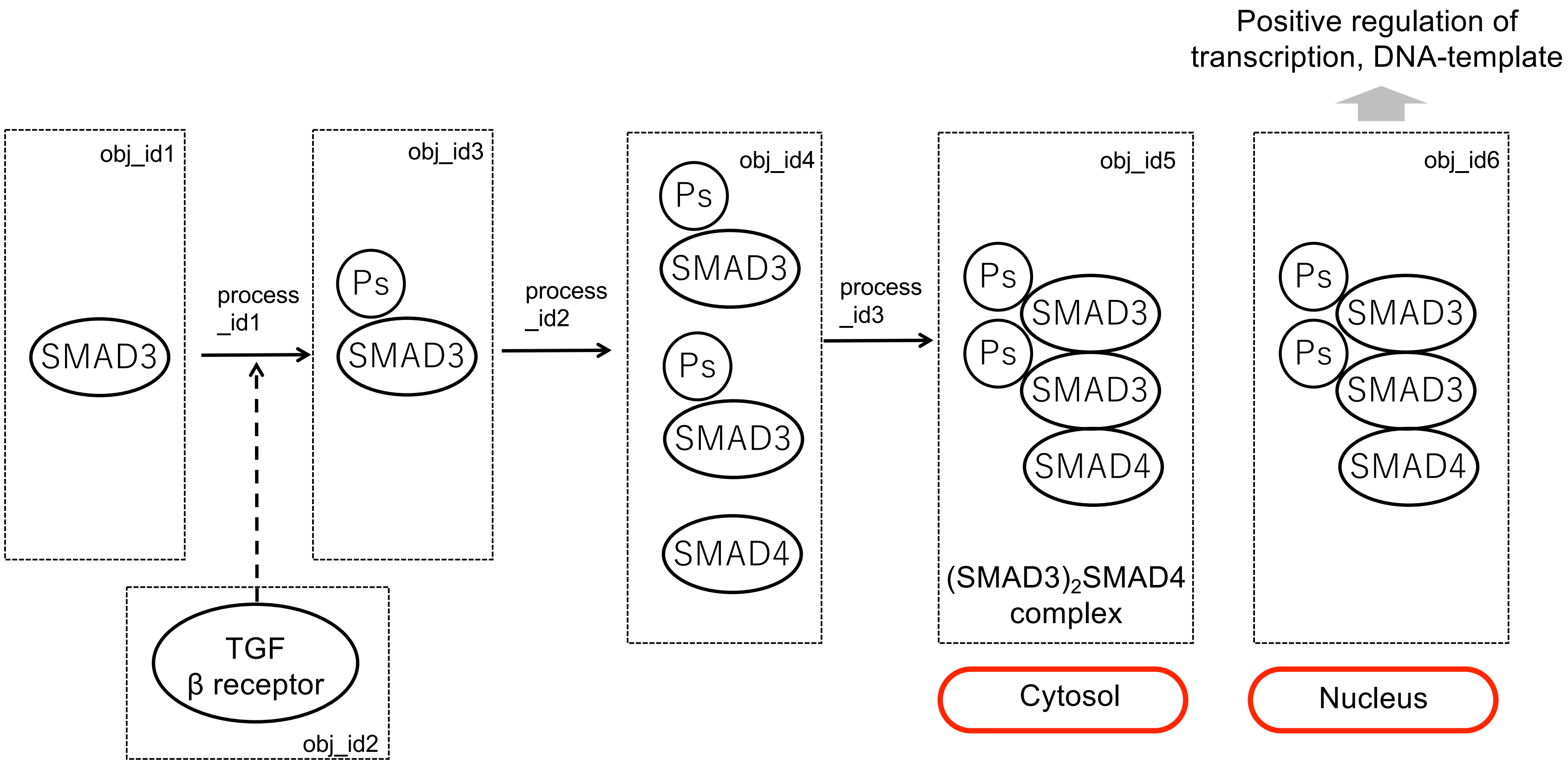
protein_id	ideal_id	obj_id	object	location	property
P06400	IID00017	2	Rb/E2F		cell cycle arrest
		7	E2F/TFDP1		cell-cycle progression from G1 to S phase



Property Table (2)

When an object changes its subcellular location, it is also described in Property Table. In this example, the materials of object 5 and object 6 are the same. However, the object 5 in Cytosol translocates to Nucleus and becomes the object 6. This is described in the location column in Property Table.

protein_id	ideal_id	obj_id	object	location	property
P84022	IID00113	5	SMAD3(Ps)/SMAD3(Ps)/SMAD4	Cytosol	
		6	SMAD3(Ps)/SMAD3(Ps)/SMAD4	Nucleus	positive regulation of transcription, DNA–templated



Positive regulation of transcription, DNA-template

$(SMAD3)_2SMAD4$ complex

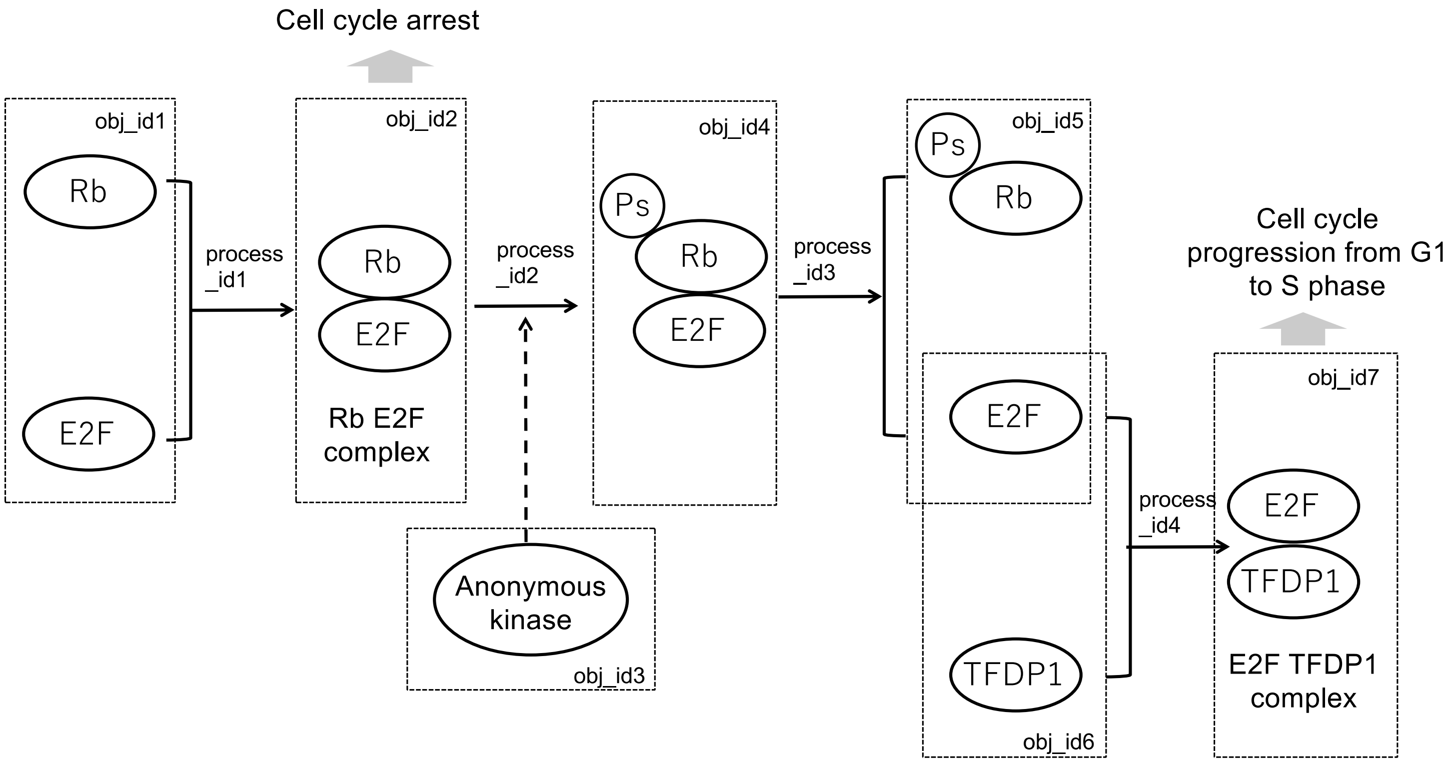
Cytosol

Nucleus

Process and Property Table

This table is a concatenate form of Process and Property Tables.

id			Process Table						Property Table			
protein_id	ideal_id	process_id	operand		operator		result		obj_id	object	location	property
			obj_id	object	obj_id	object	obj_id	object				
P06400	IID00017	1	1	Rb,E2F			2	Rb/E2F	2	Rb/E2F		cell cycle arrest
		2	2	Rb/E2F	3	anonymous kinase	4	Rb(Ps)/E2F				
		3	4	Rb(Ps)/E2F			5	Rb(Ps),E2F				
		4	6	E2F,TFDP1			7	E2F/TFDP1	7	E2F/TFDP1		cell–cycle progression from G1 to S phase



Reference Table

Process Table

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			obj_id	object	obj_id	object	obj_id	object
P06400	IID00017	1	1	Rb,E2F			2	Rb/E2F
		2	2	Rb/E2F	3	anonymous kinase	4	Rb(Ps)/E2F
		3	4	Rb(Ps)/E2F			5	Rb(Ps),E2F
		4	6	E2F,TFDP1			7	E2F/TFDP1

Reference Table provides reference information of proteins in Tables. Protein_id and ideal_id indicate the Uniprot accession and the IDEAL identifier, respectively.

Reference Table

Object (in Symbol)	protein_id	ideal_id
anonymous kinase		
E2F	Q01094	IID00064
Rb	P06400	IID00017
TFDP1	Q14186	IID00076