Business Processes Modelling

MPB (6 cfu, 295AA)

Roberto Bruni

http://www.di.unipi.it/~bruni

20 - Workflow modules

Object

We study Workflow modules to model interaction between workflows

Ch.6 of Business Process Management: Concepts, Languages, Architectures

Problem

Not all tasks of a workflow net are automatic:

they can be triggered manually or by a message

they can be used to trigger other tasks

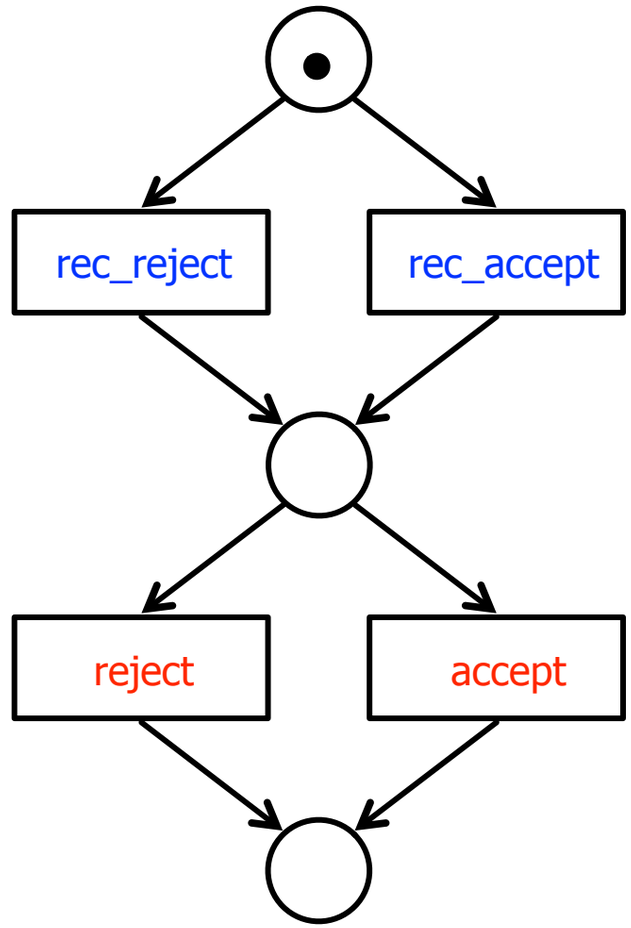
How do we represent this?

Implicit interaction

Separately developed workflow

Some activities can input messages

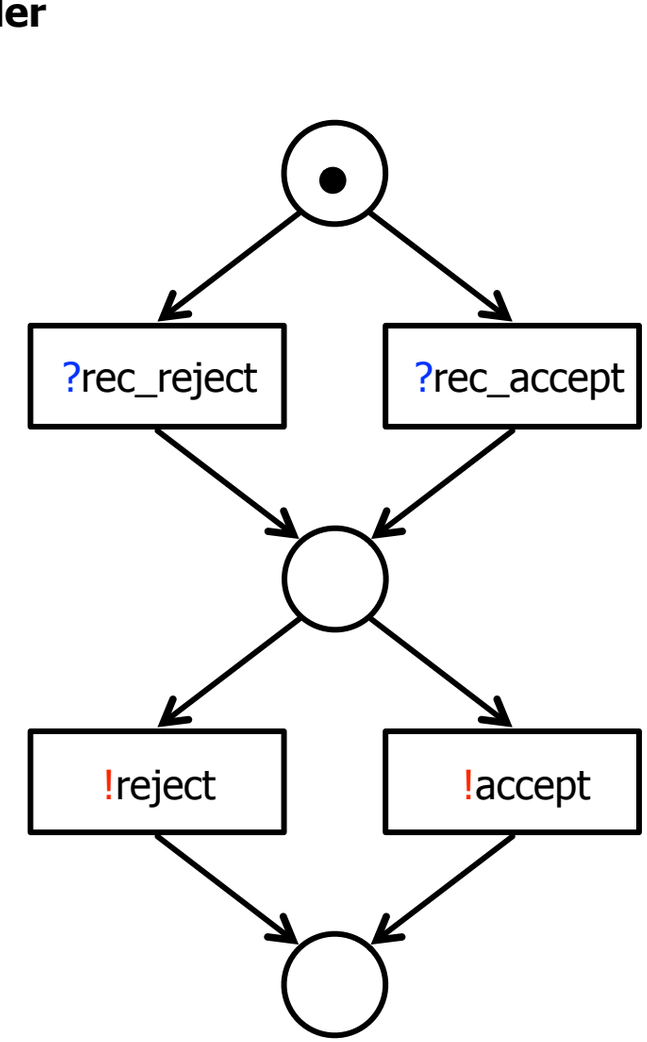
Some activities can output messages



Implicit interaction

Seller can receive (symbol ?) recommendations

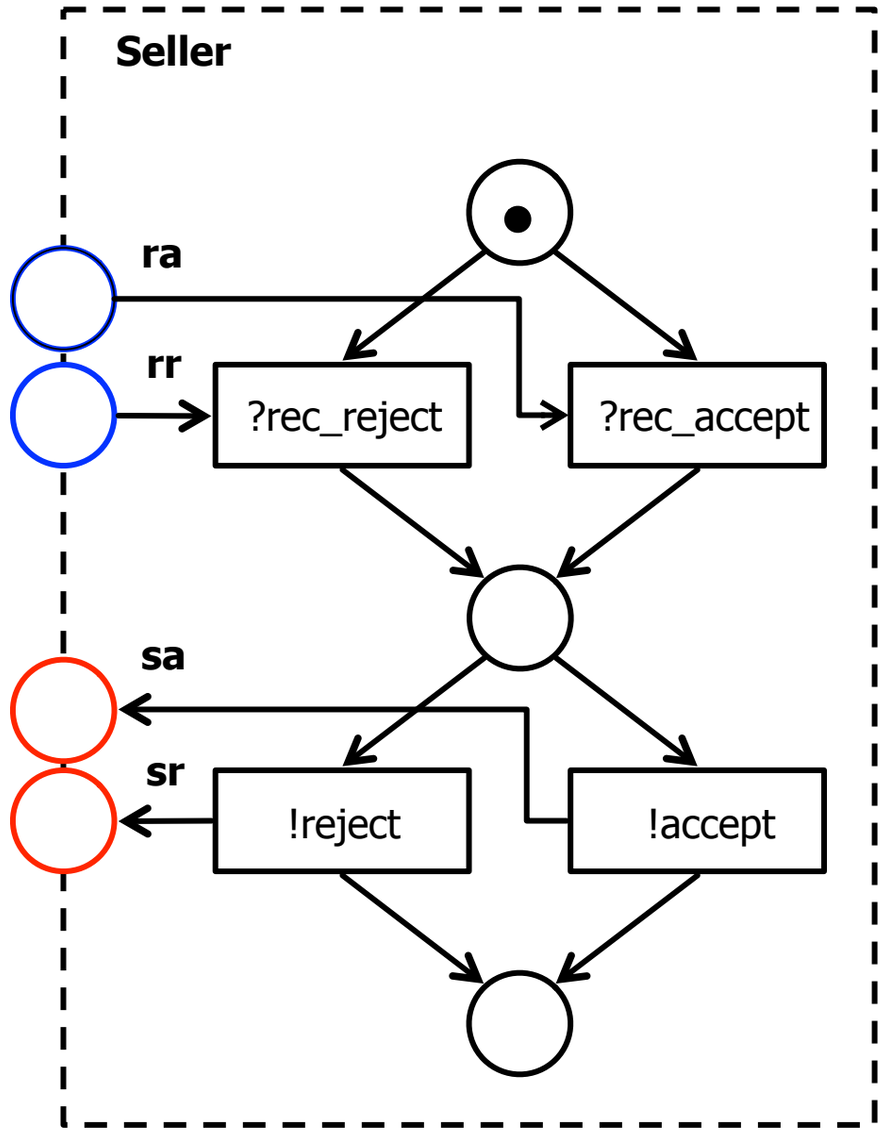
Seller can send (symbol !) decisions



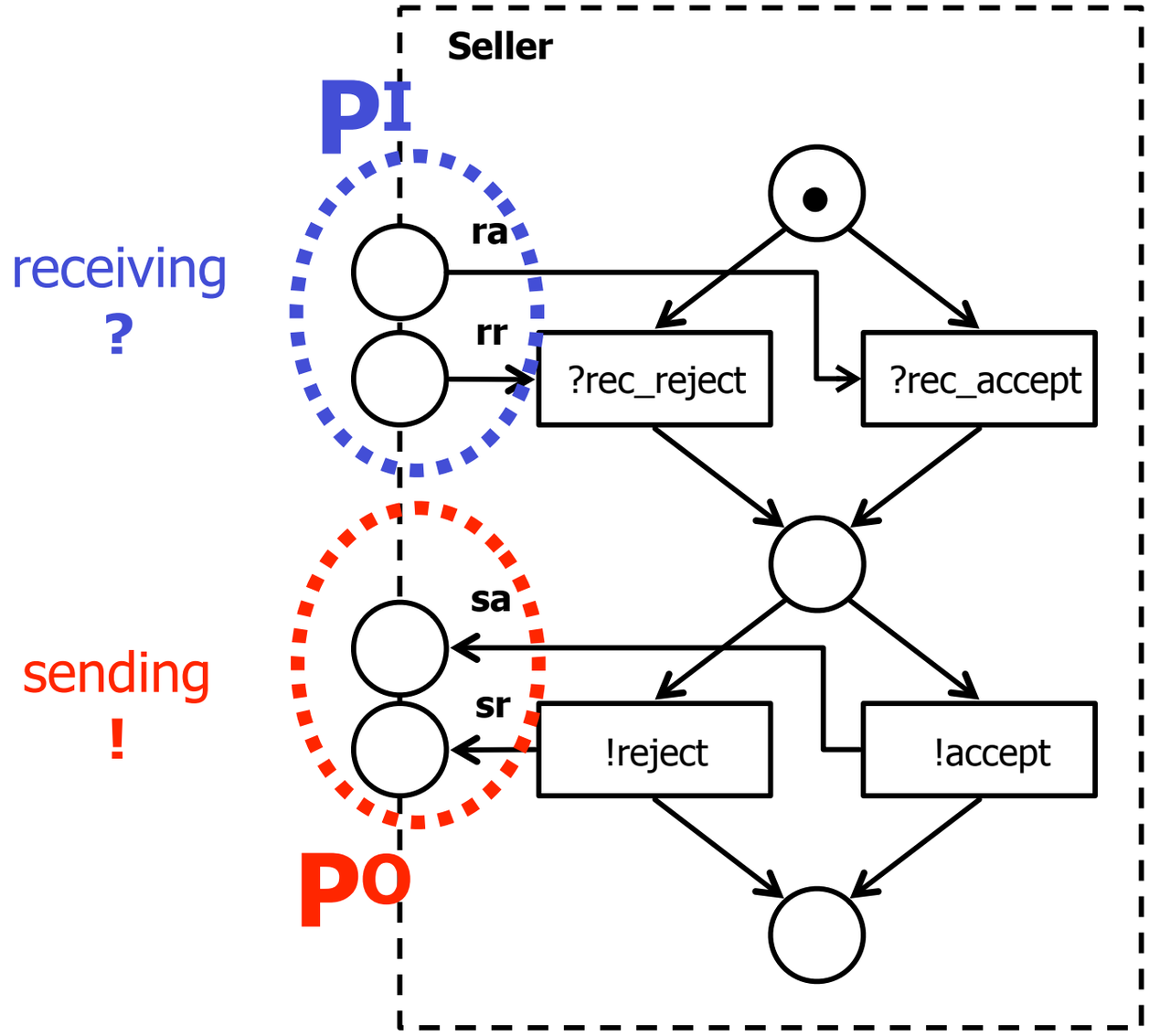
Interface

Seller has an interface for interaction

It consists of some input places and some output places



Interface



Problem

Assume the original workflow net has been validated:

it is a sound (and maybe safe) workflow net

When we add the (places in the) interface
it is no longer a workflow net!

Workflow Modules

Definition: A **workflow module** consists of

a workflow net (P,T,F)

plus a set P^I of incoming places
plus a set of incoming arcs $F^I \subseteq (P^I \times T)$

plus a set P^O of outgoing places
plus a set of outgoing arcs $F^O \subseteq (T \times P^O)$

such that each transition has
at most one connection to places in the interface

Problem

Workflow modules must be capable to interact

How do we check that their interfaces match?

How do we combine them together?

Strong structural compatibility

A set of workflow modules is called
strongly structural compatible
if
for every message that can be sent
there is a module who can receive it,
and
for every message that can be received
there is a module who can send it

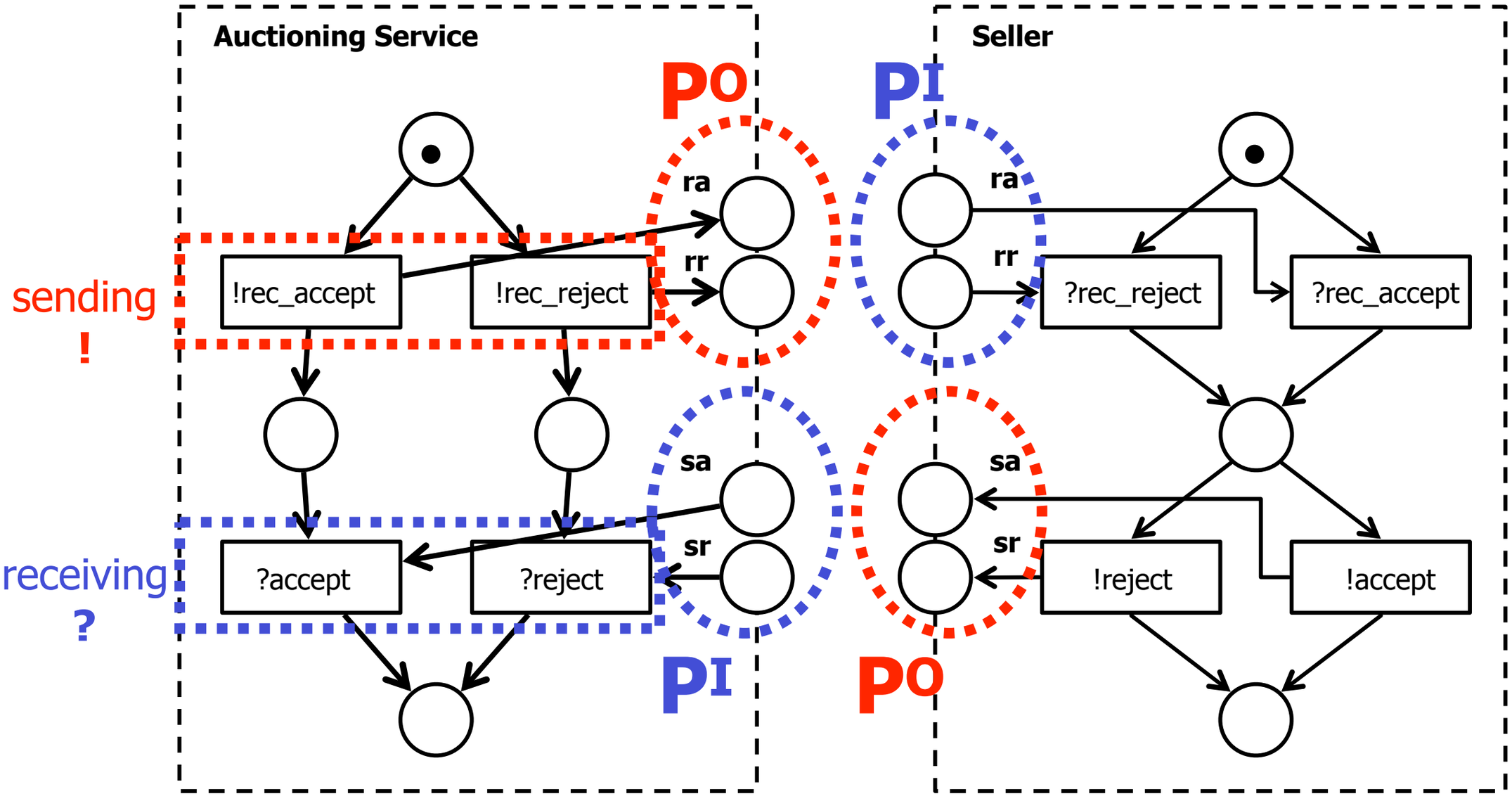
(formats of message data are assumed to match)

Weak structural compatibility

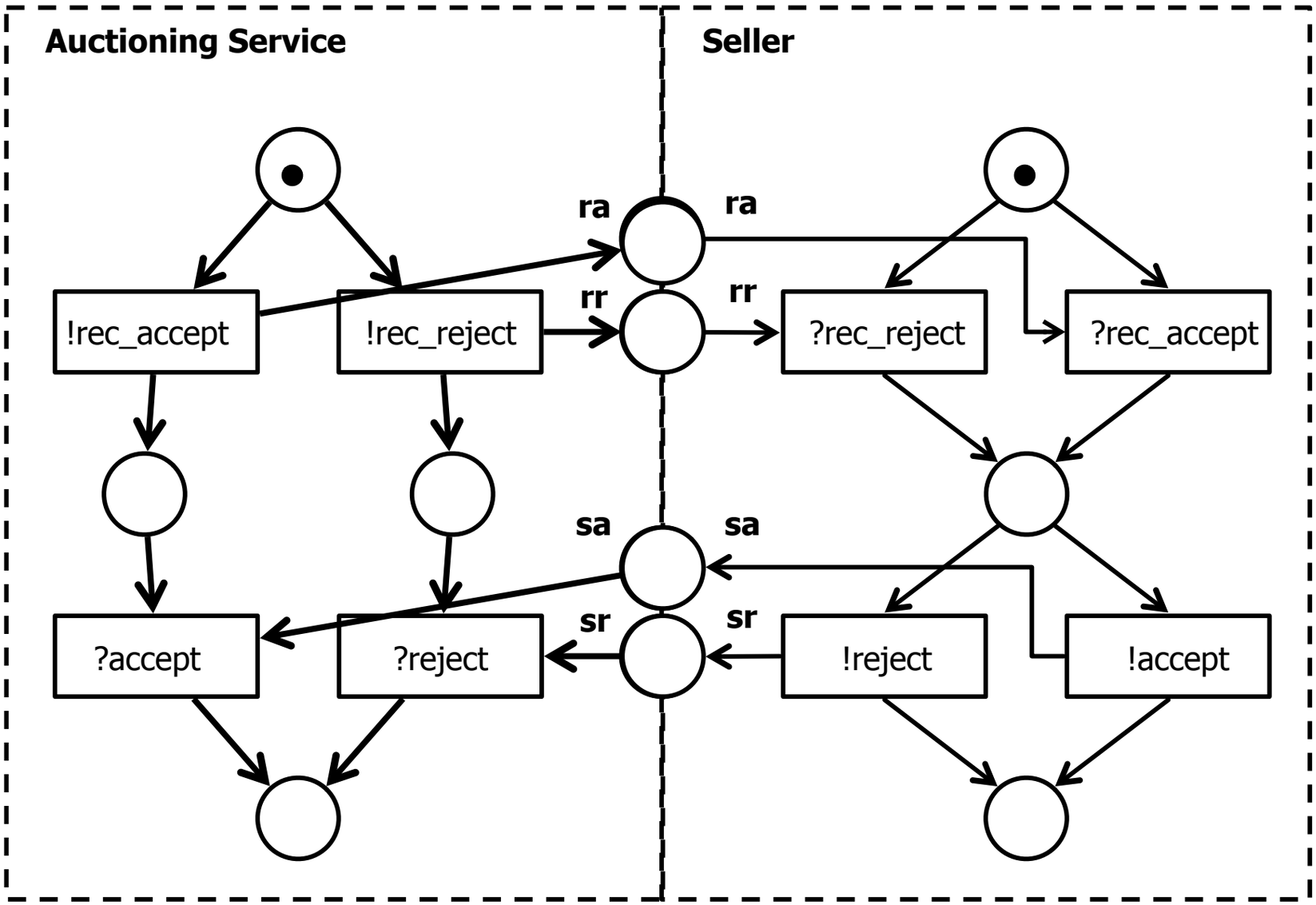
A set of workflow modules is called
weakly structural compatible
if
all messages sent by modules
can be received by other modules

more likely than a complete structural match
(workflow modules are developed separately)

Interaction



Interaction



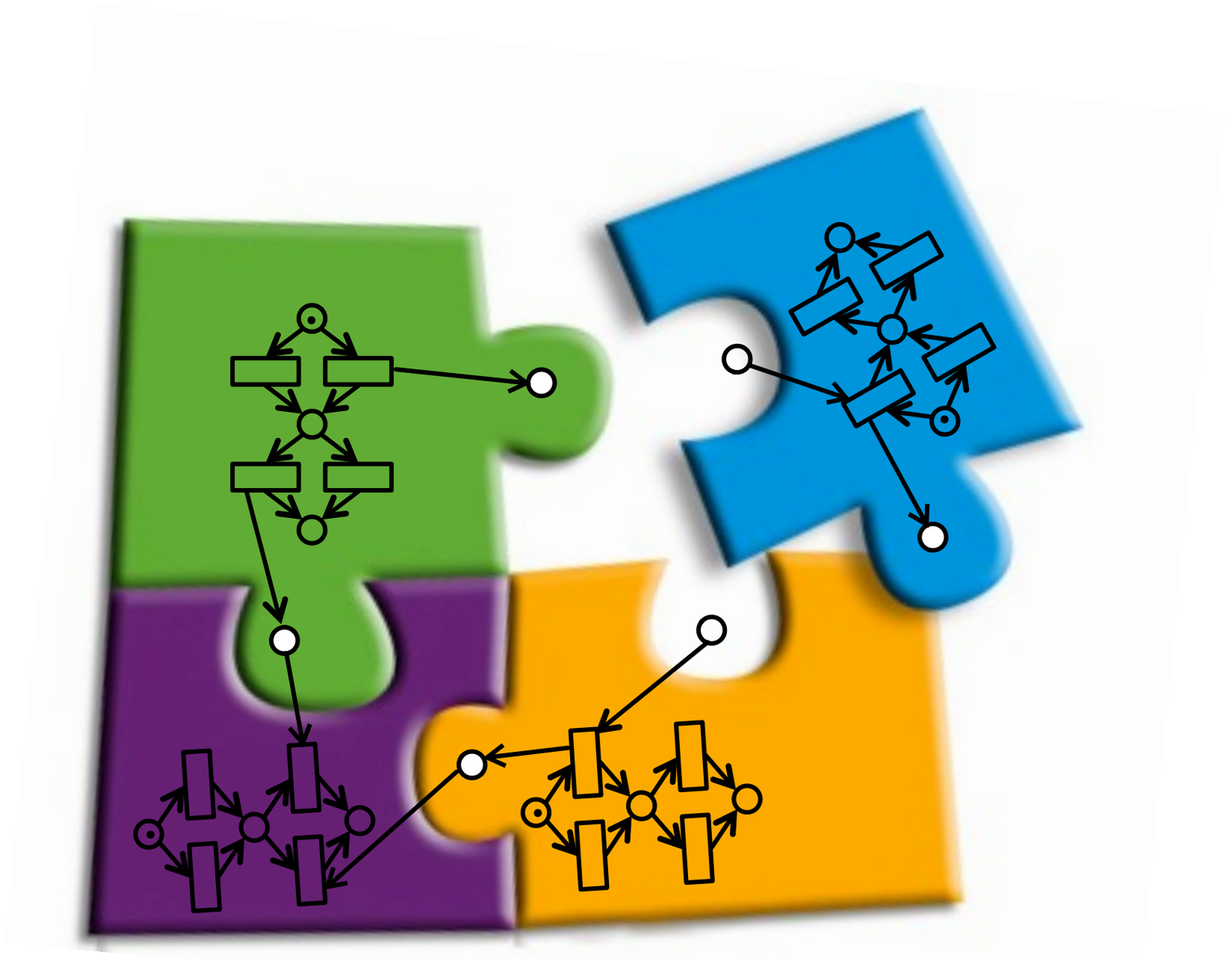
Problem

We have added places and arcs to single nets
We have joined places of different nets
We have paired their initial markings

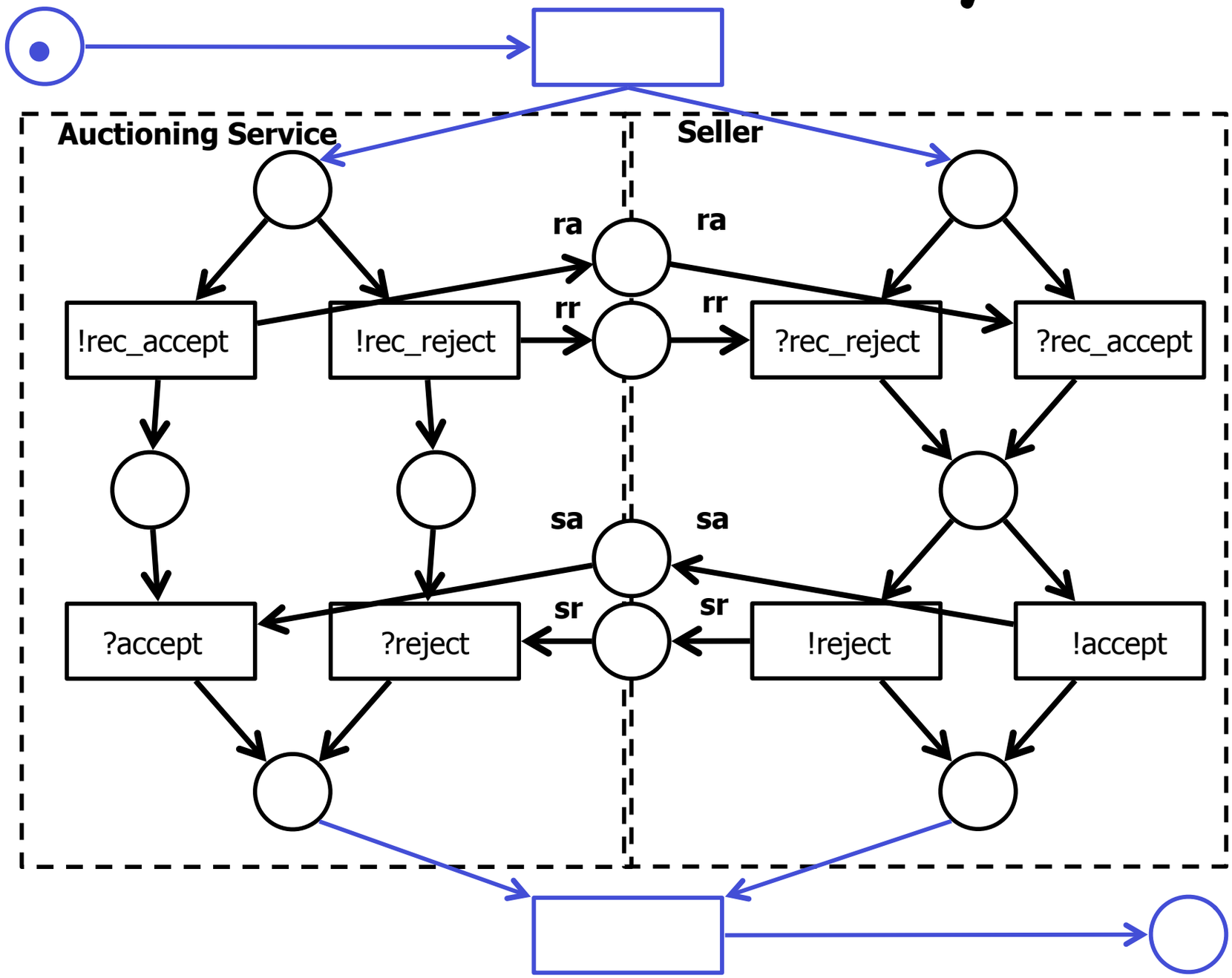
How do we check that the system behaves well?

What has this check to do with WF net soundness?

Workflow systems



Workflow system



Workflow system

Definition: A **workflow system** consists of

a set of n structurally compatible workflow modules
(initial places $i_1,\ldots,i_n$, final places $o_1,\ldots,o_n$)

plus an initial place **i**
and a transition t_i from **i** to $i_1,\ldots,i_n$

plus a final place **o**
and a transition t_o from $o_1,\ldots,o_n$ to **o**

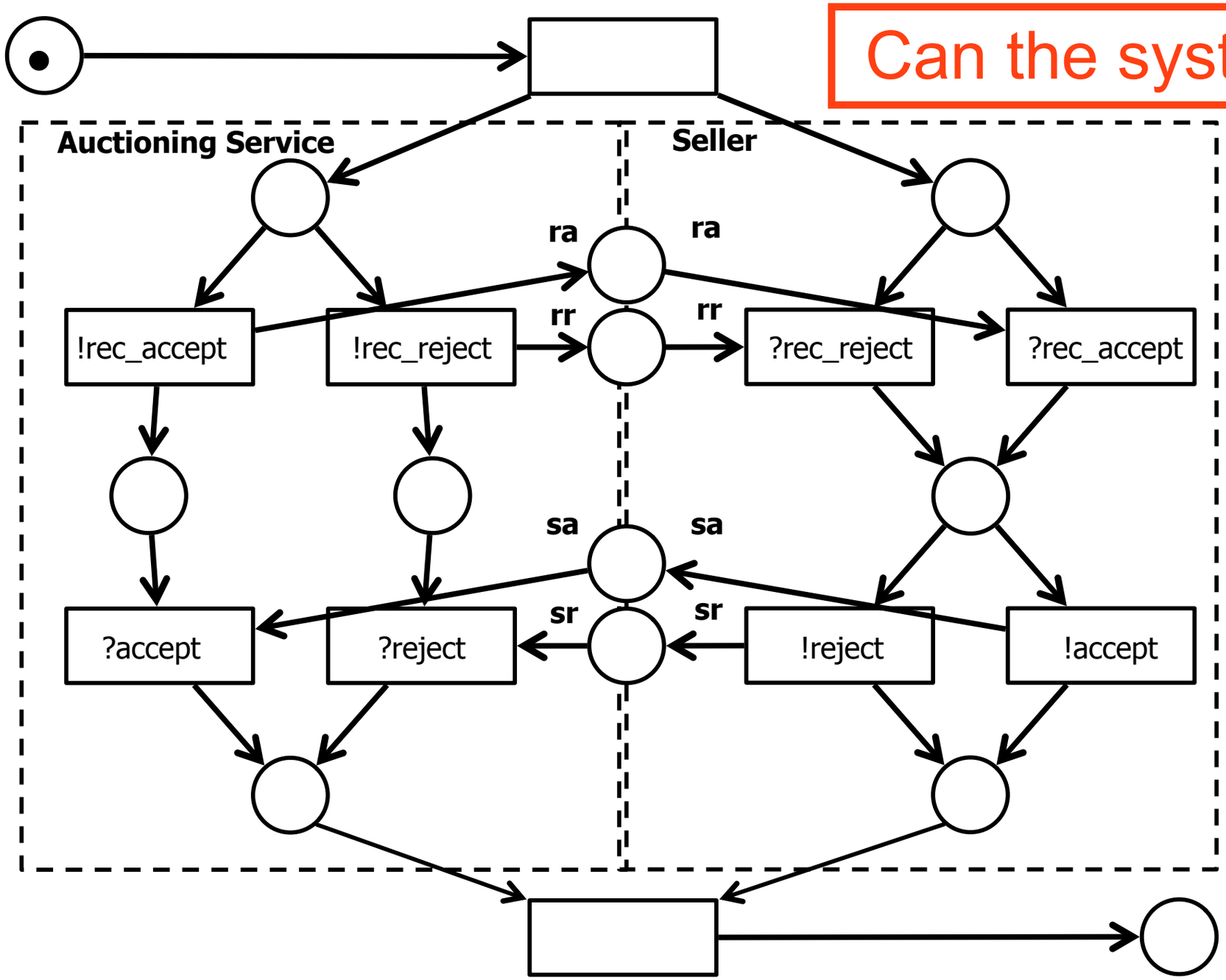
Soundness of workflow systems

A workflow system is just an ordinary workflow net

We can check its **soundness** as usual

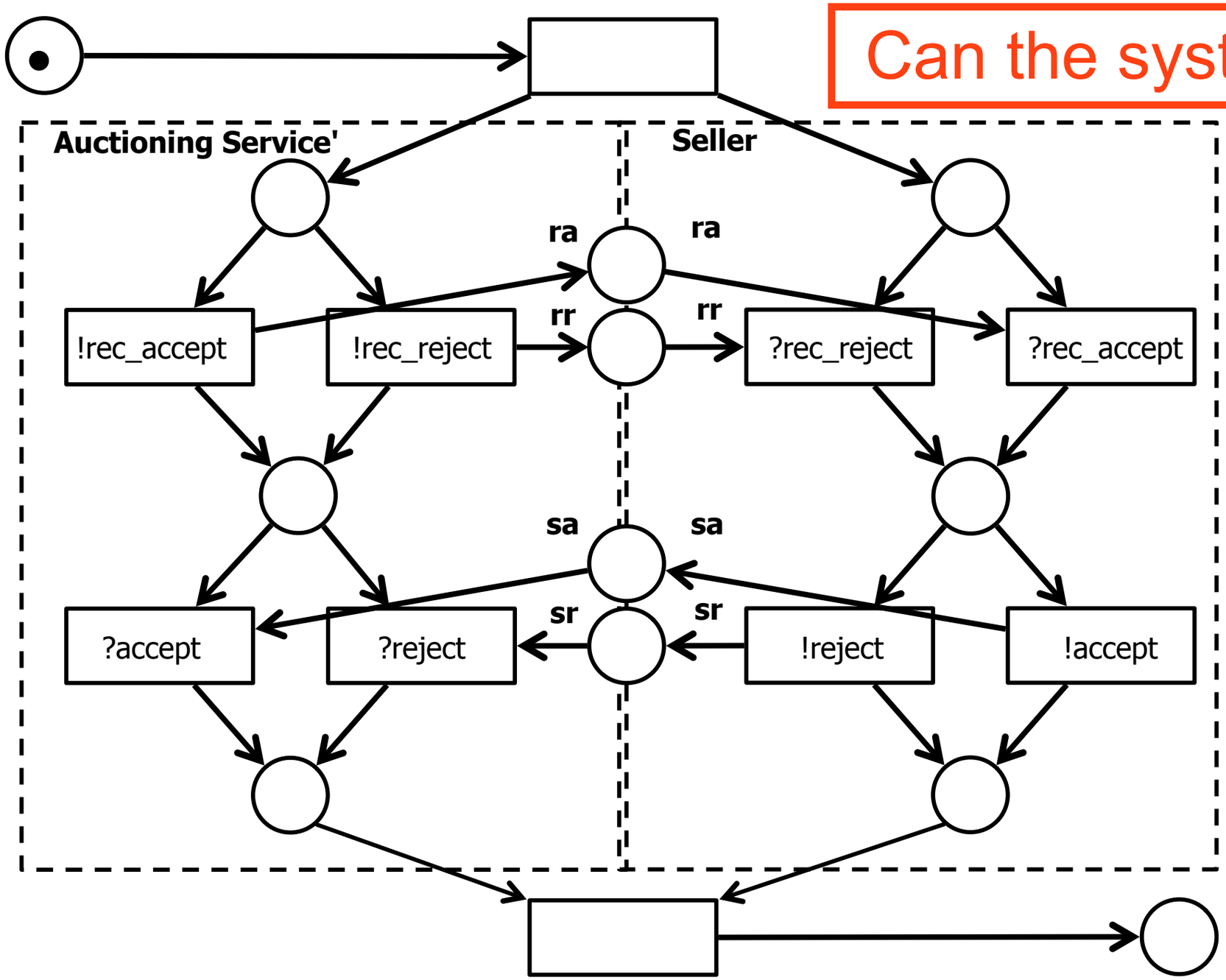
Exercise

Can the system deadlock?



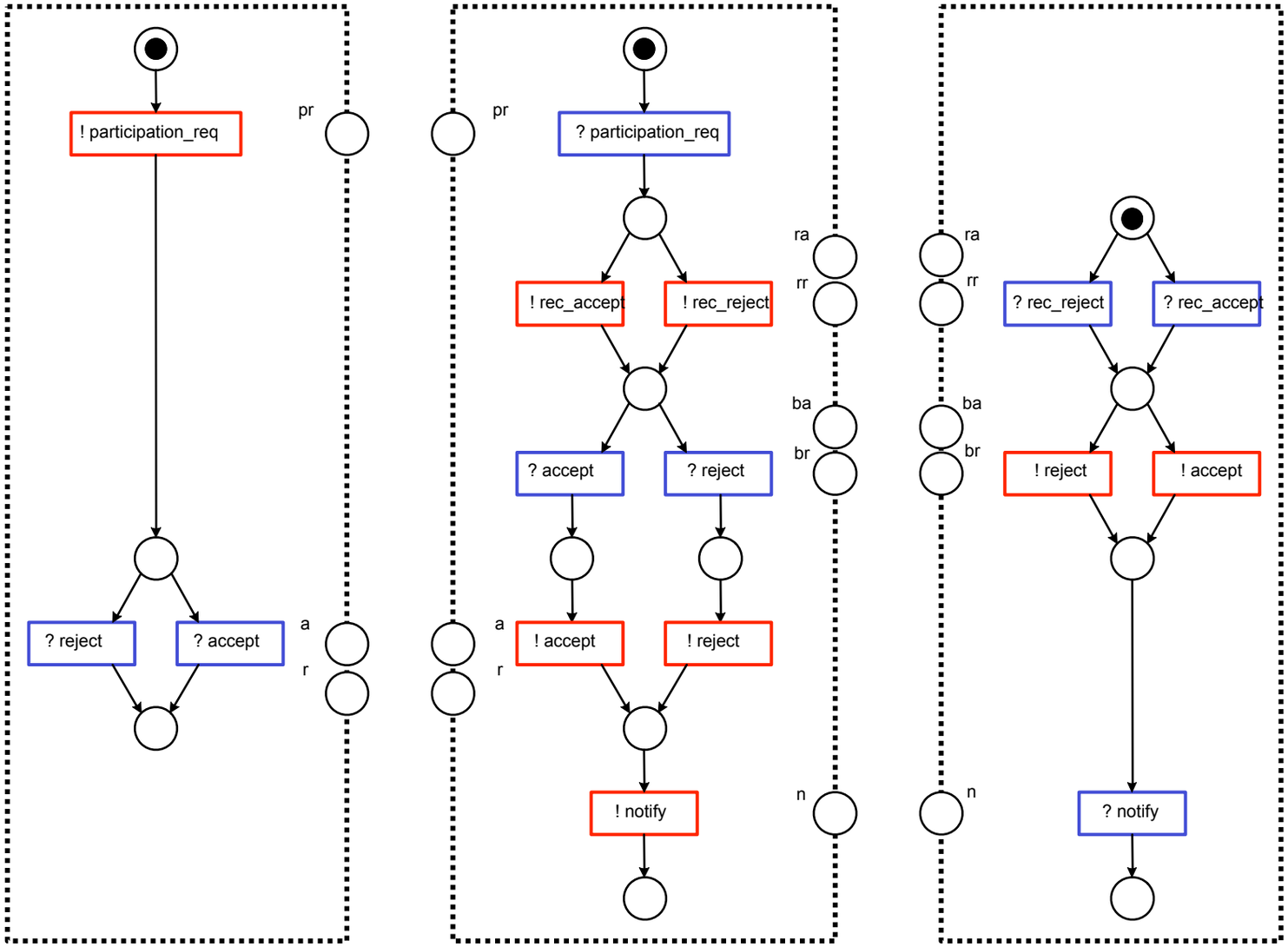
Exercise

Can the system deadlock?



Exercise

Complete with missing arcs the following behavioural interfaces and check their compatibility



Weak soundness

Problem

When checking behavioural compatibility
the soundness of the overall net
is a too restrictive requirement

Workflow modules are designed separately,
possibly reused in several systems
It is unlikely that every functionality they offer is
involved in each system

Problem

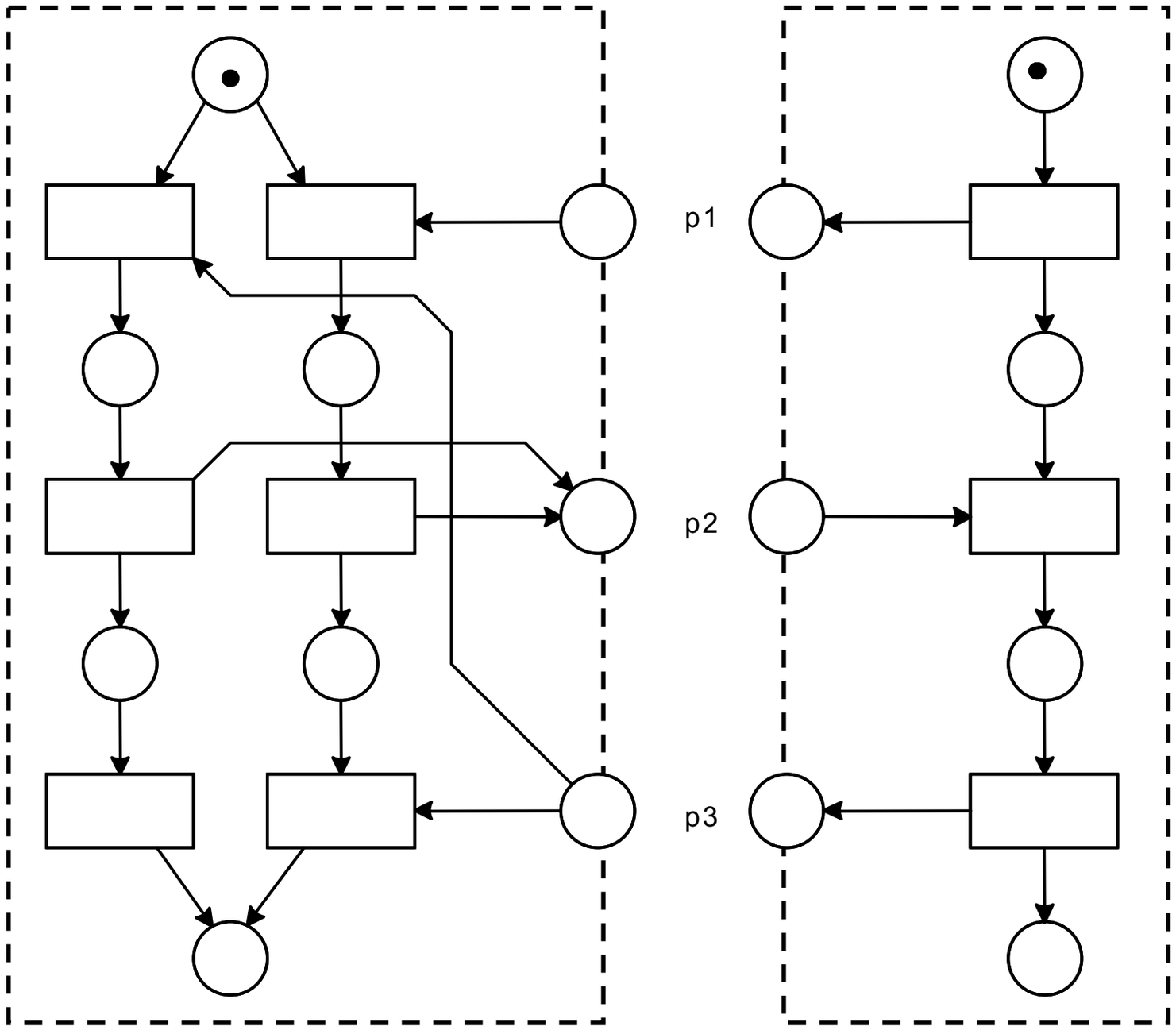
Definition: A workflow net is **weak sound** if it satisfies “option to complete” and “proper completion”

(dead tasks are allowed)

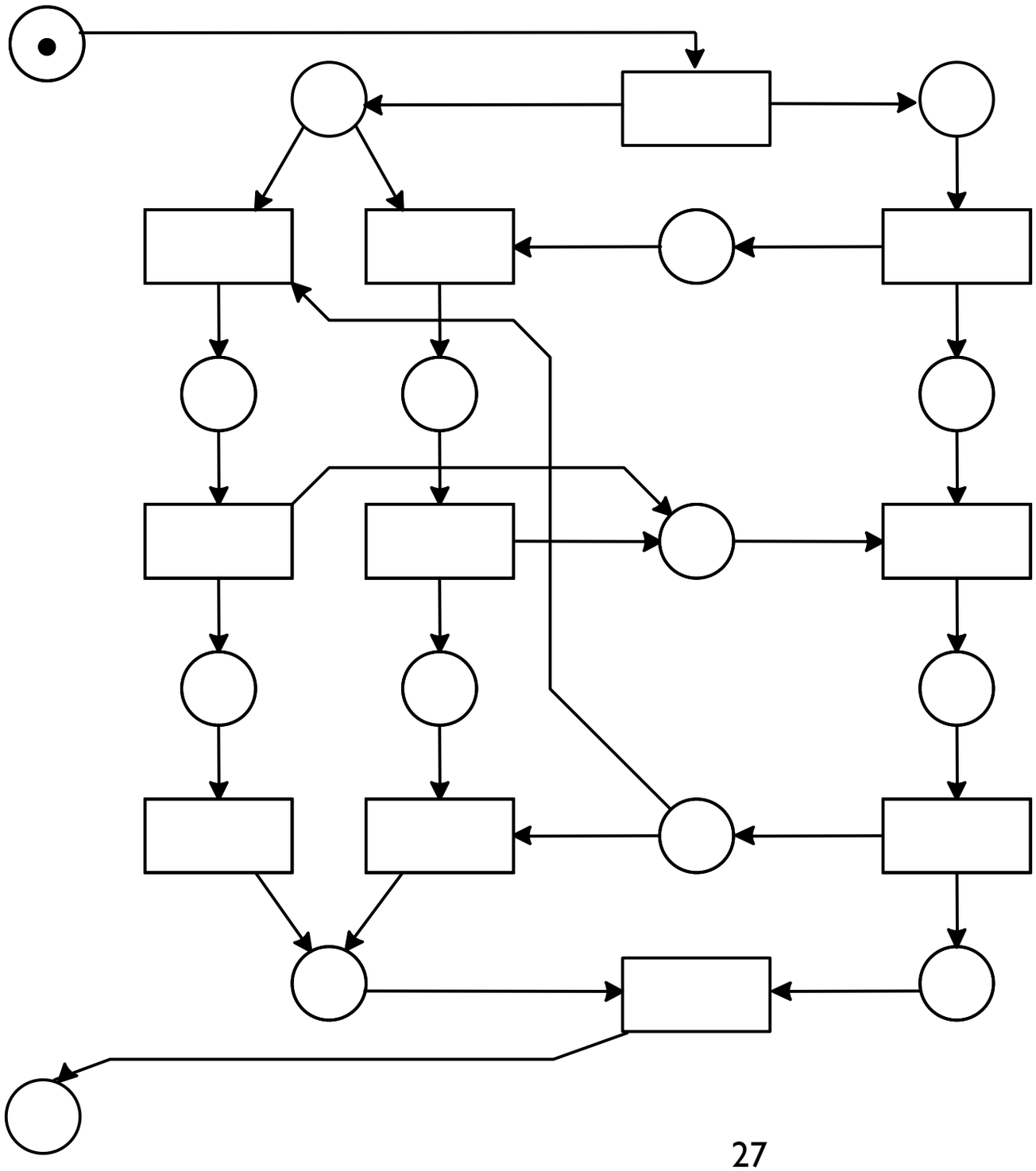
Weak soundness can be checked on the RG

It guarantees deadlock freedom and proper termination of all modules

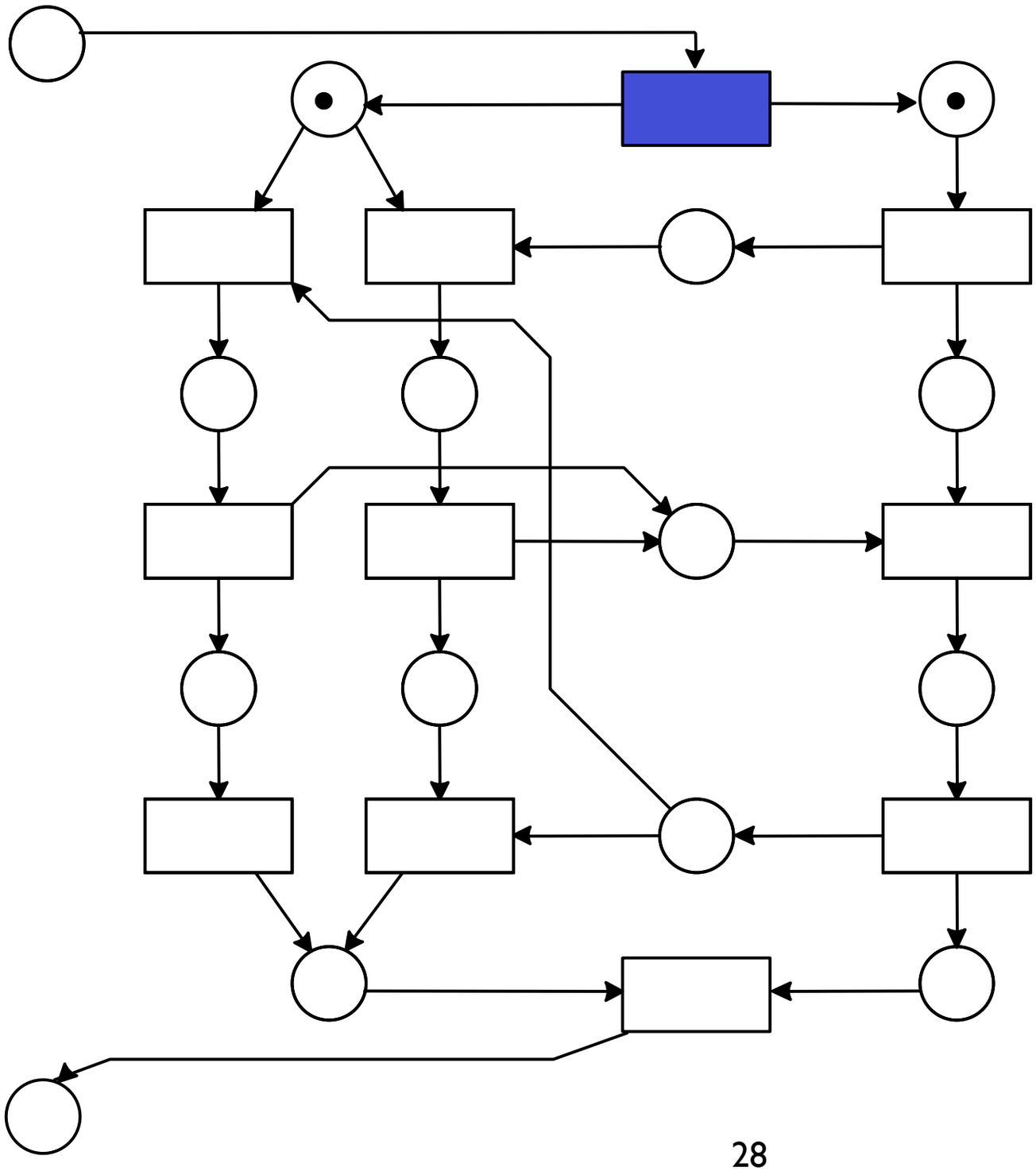
Sound + Sound = ?



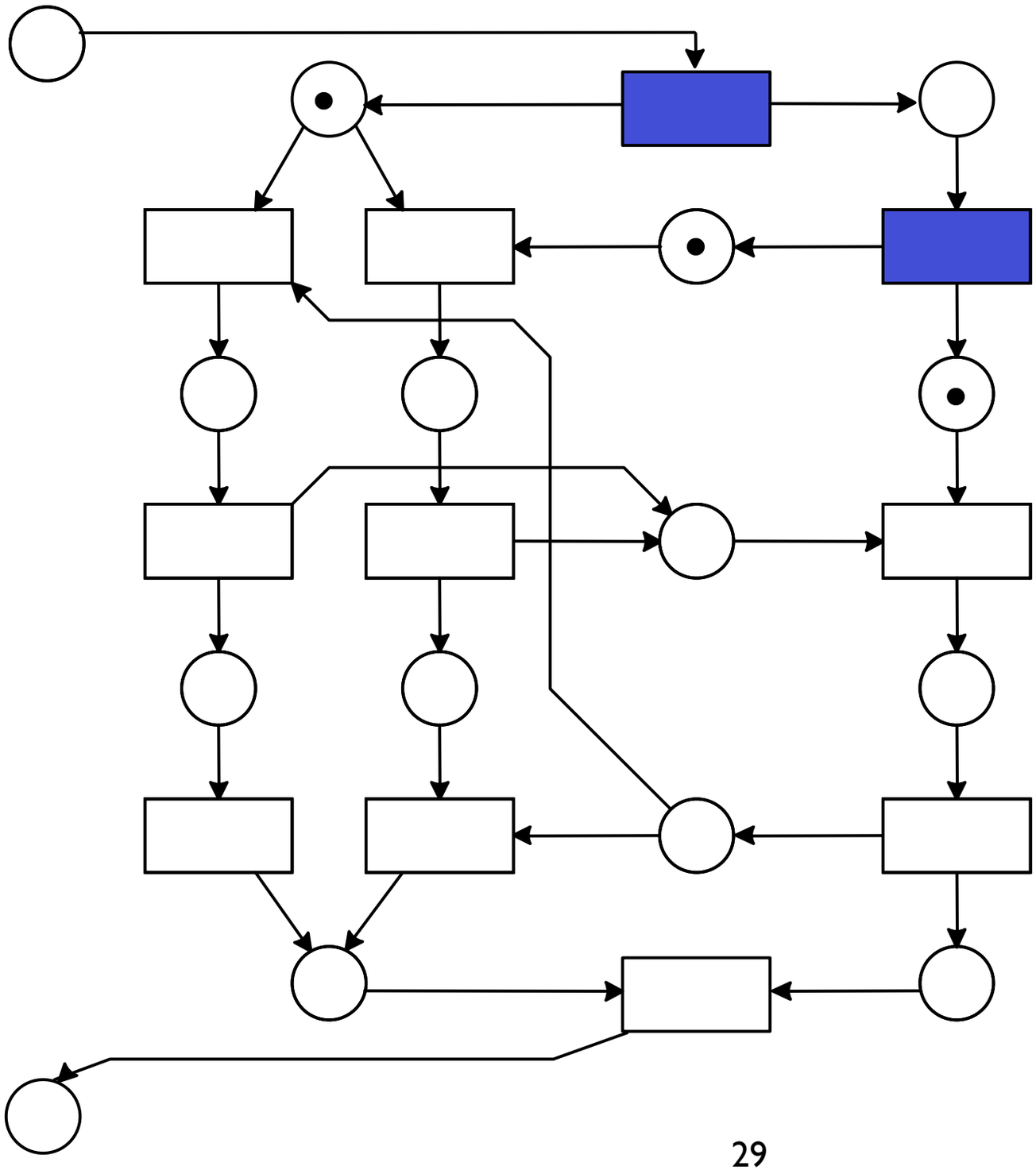
Sound + Sound = not sound



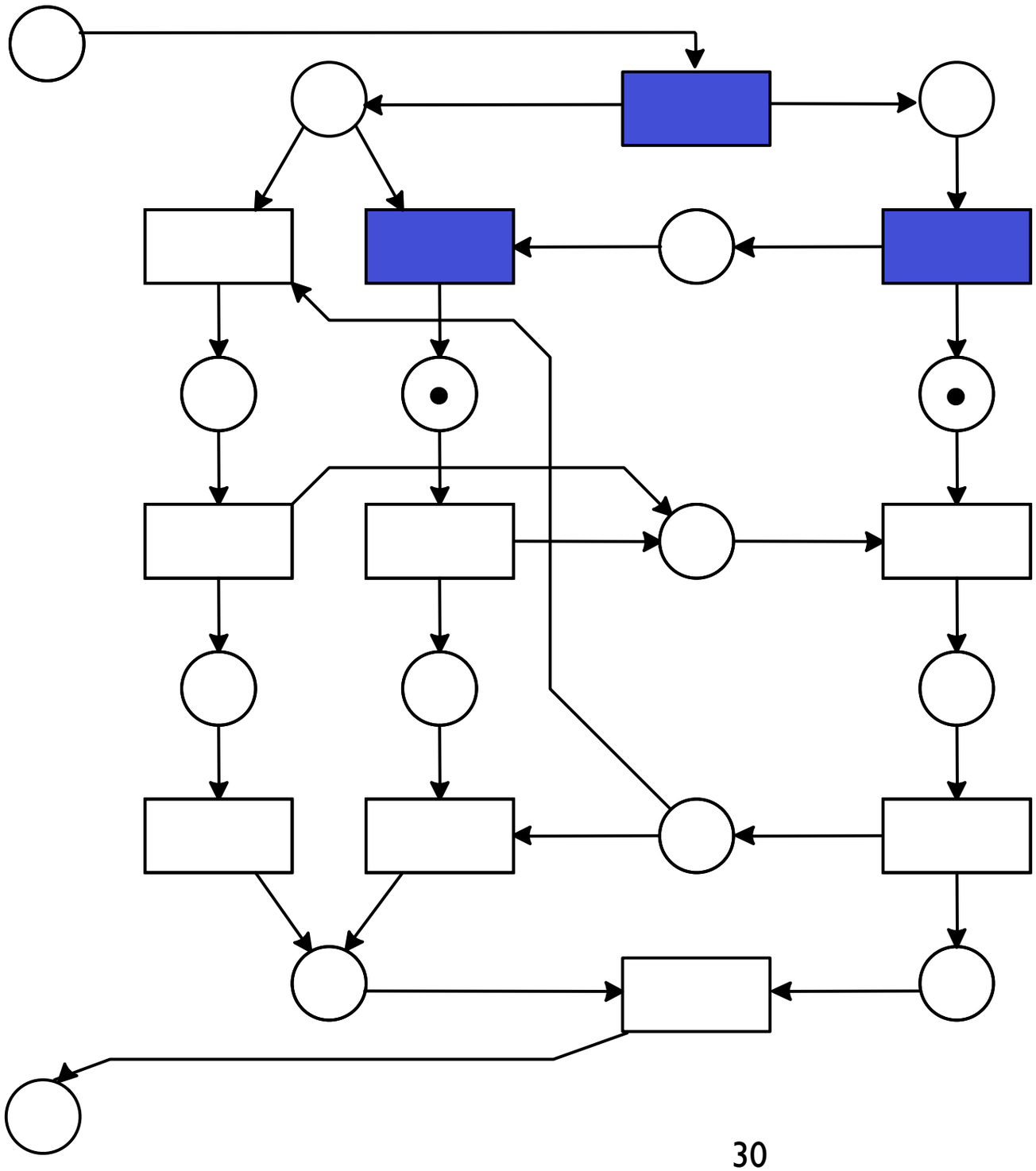
Sound + Sound = not sound



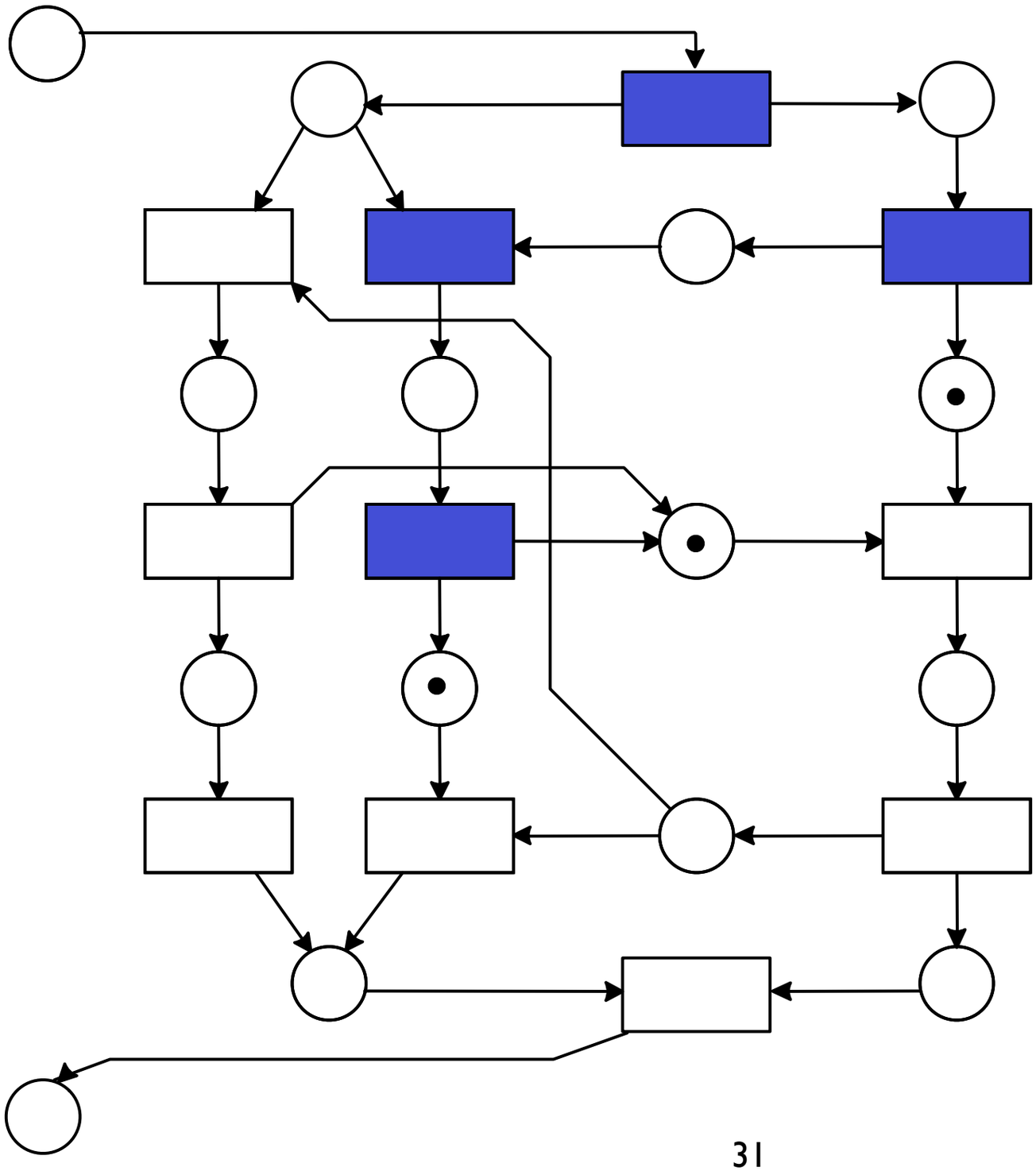
Sound + Sound = not sound



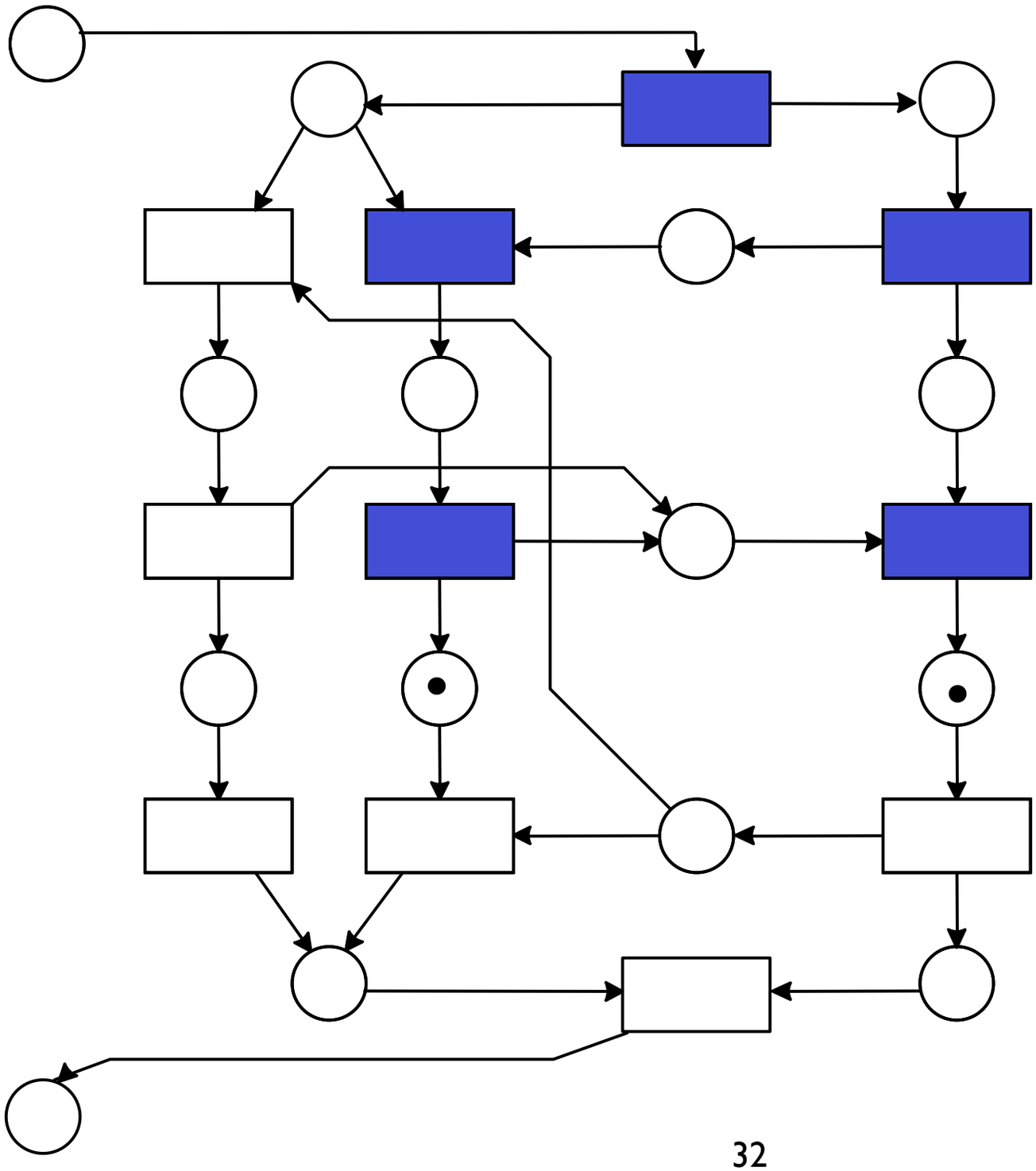
Sound + Sound = not sound



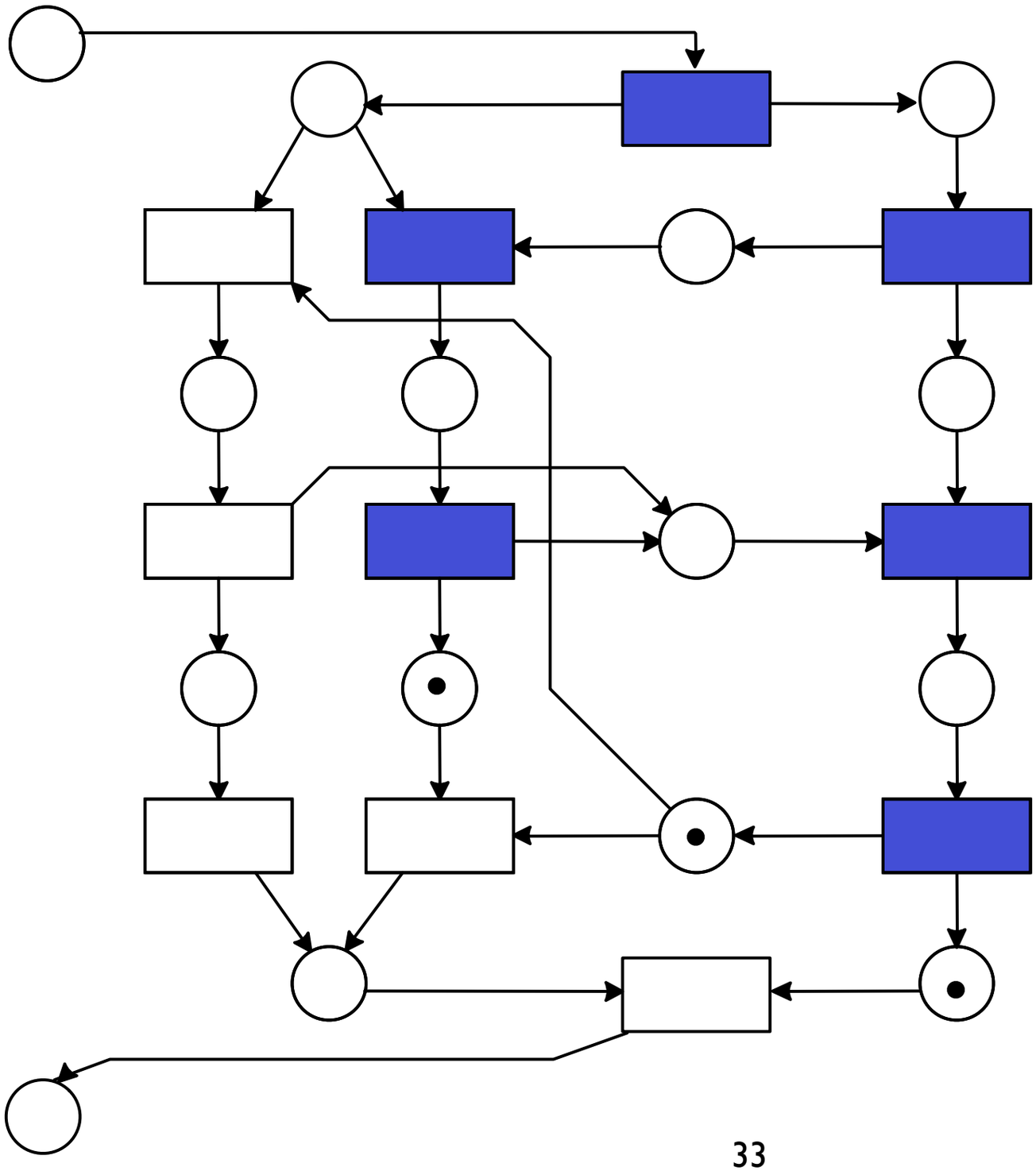
Sound + Sound = not sound



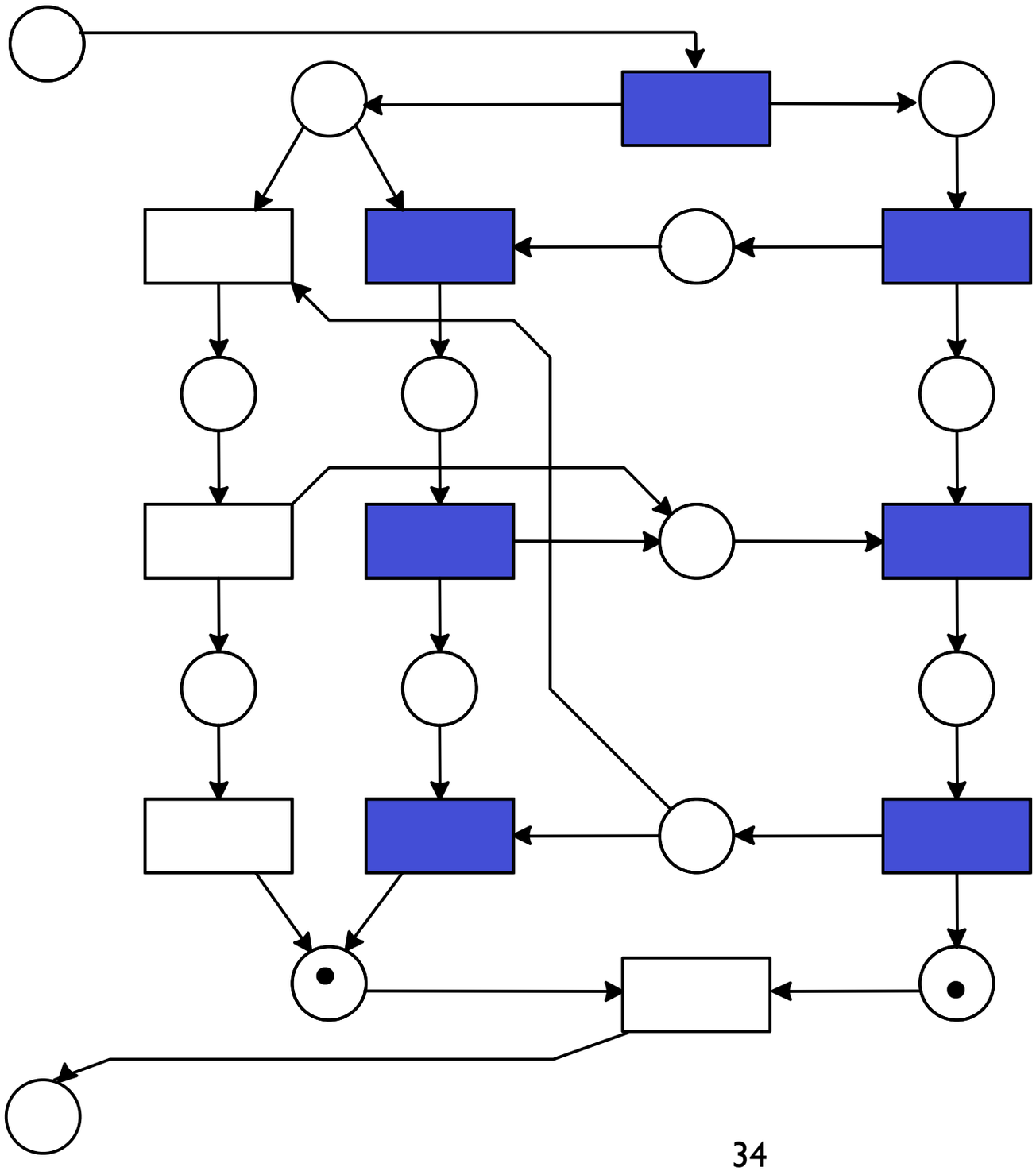
Sound + Sound = not sound



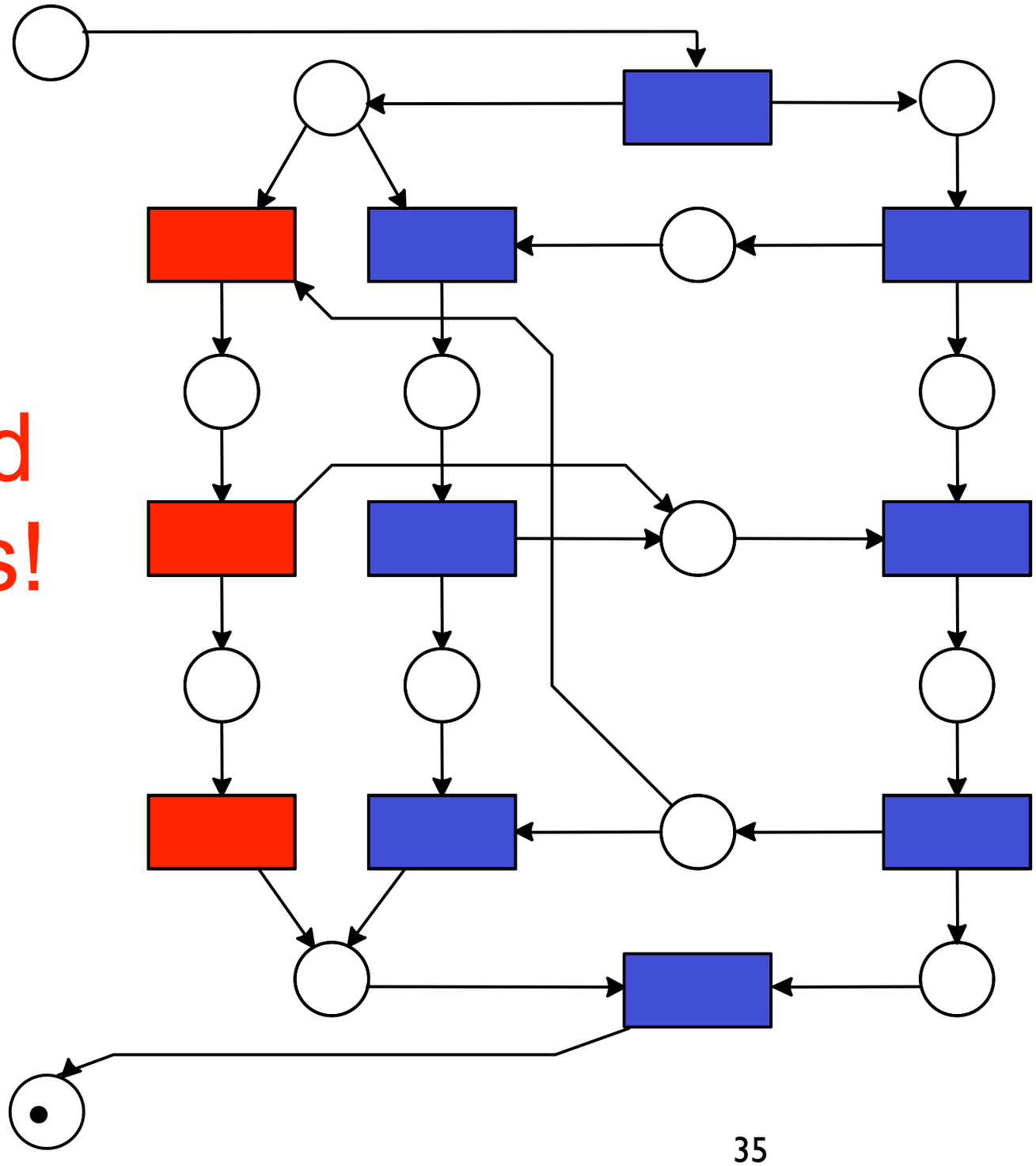
Sound + Sound = not sound



Sound + Sound = not sound

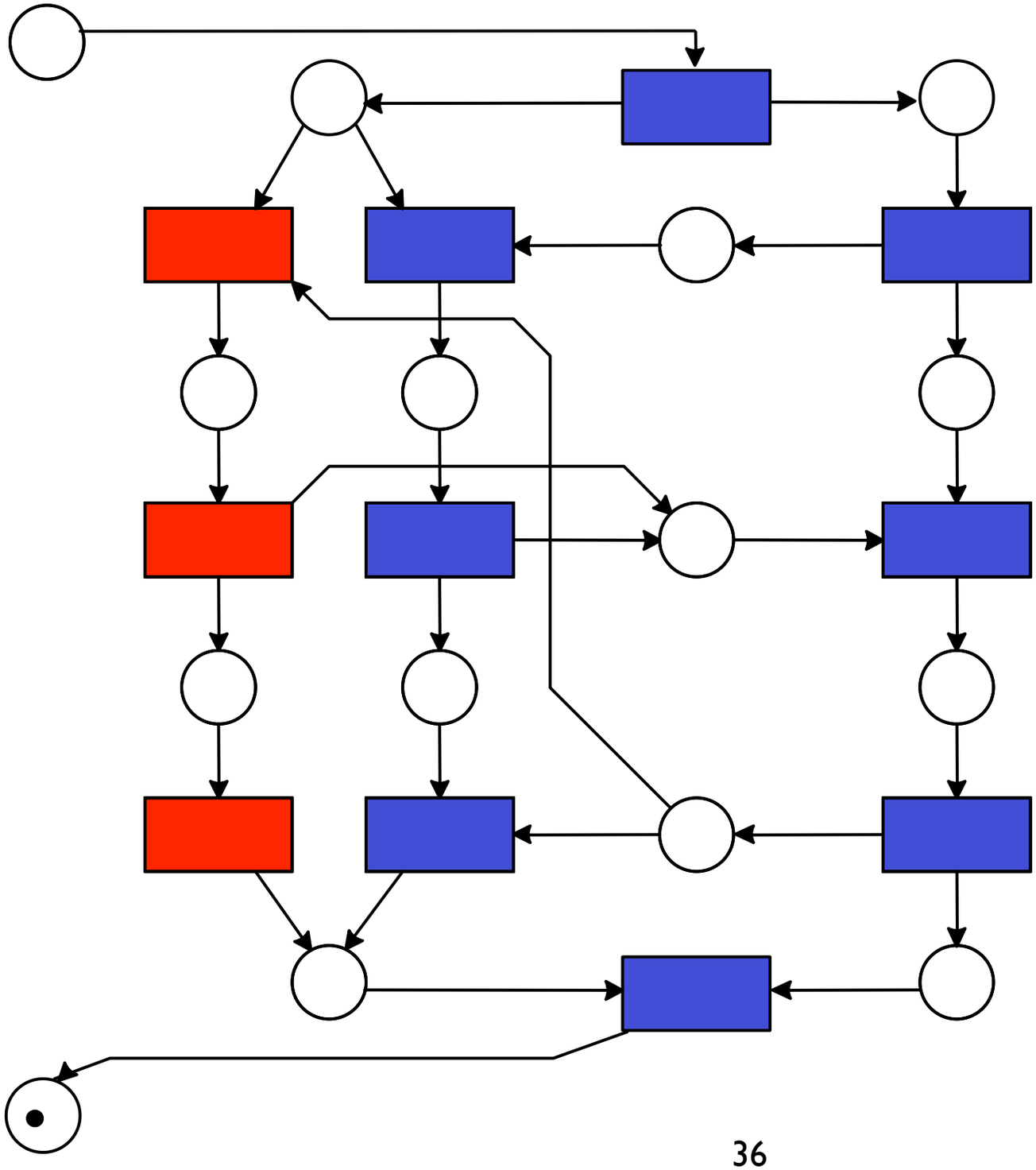


Sound + Sound = not sound



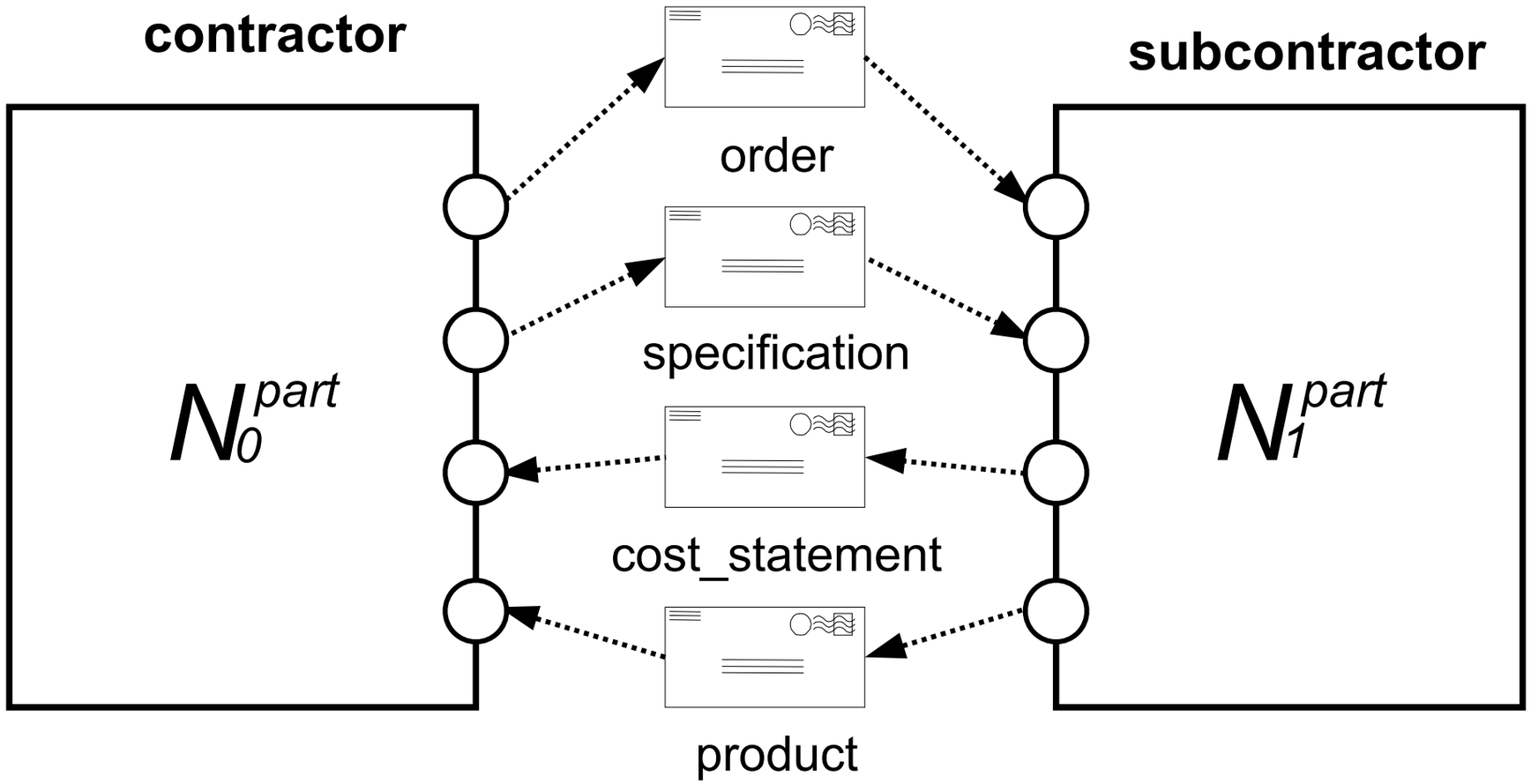
Dead tasks!

Sound + Sound = not sound

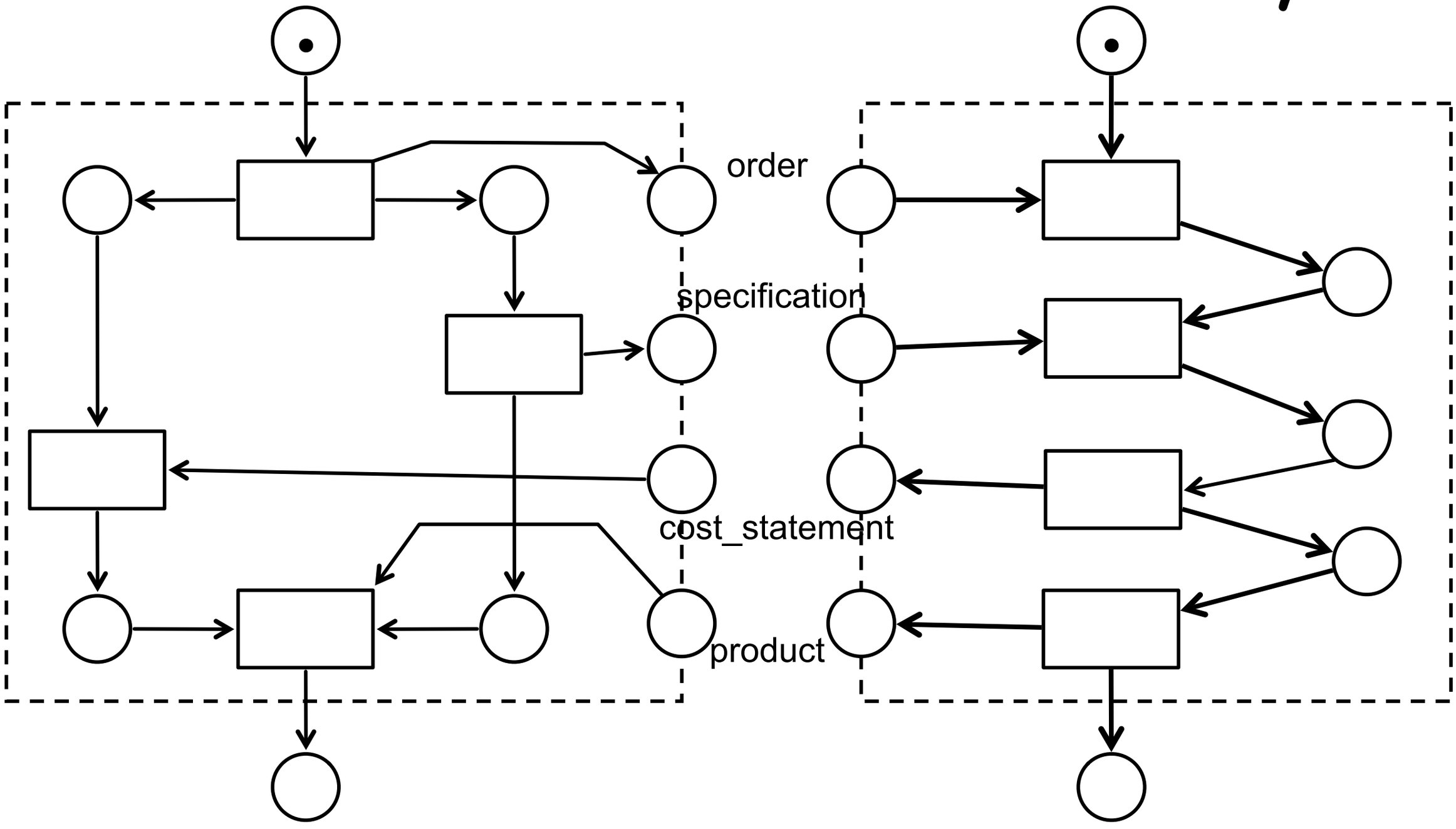


Weak Sound!

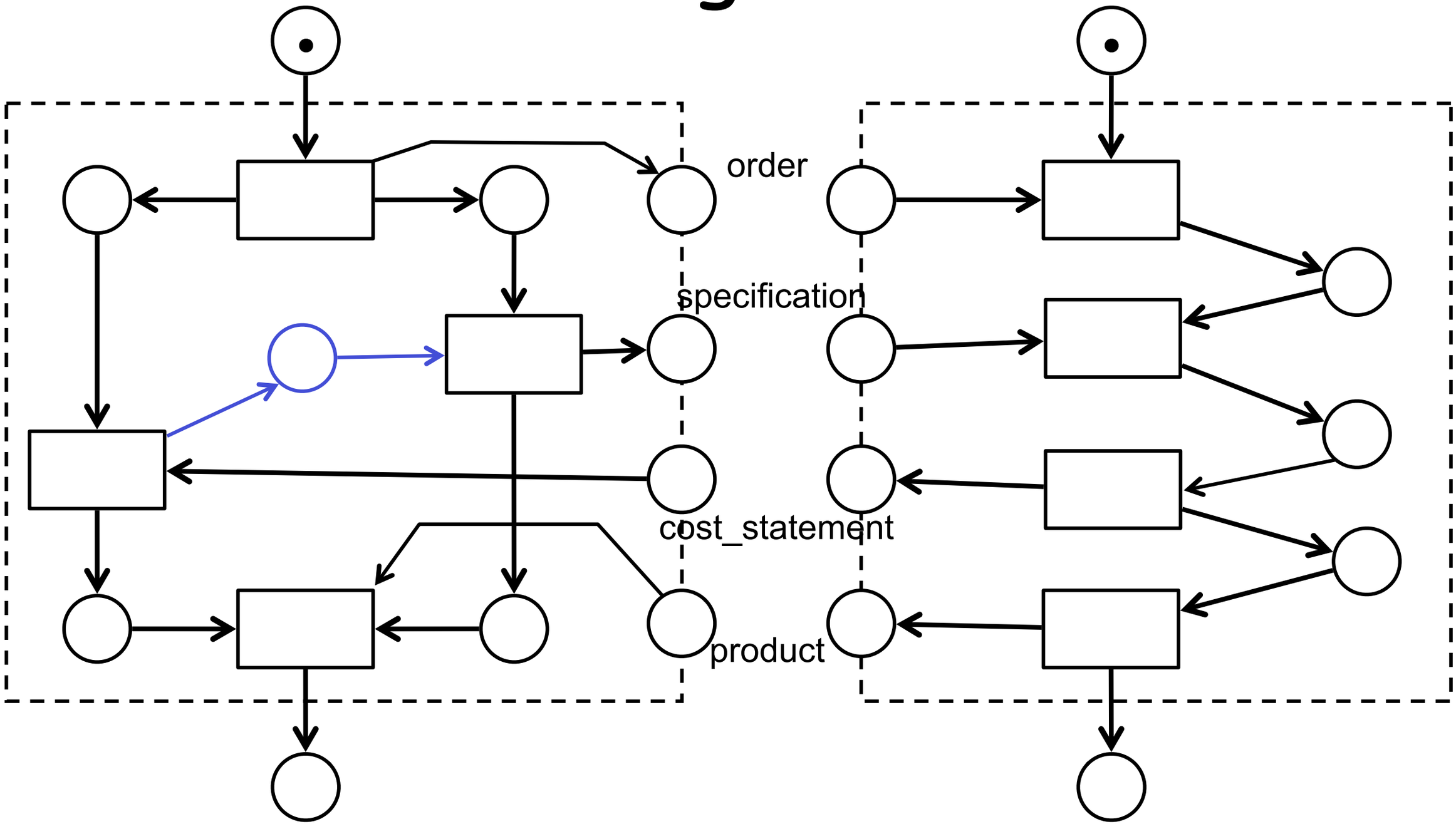
Exercise: Preliminaries



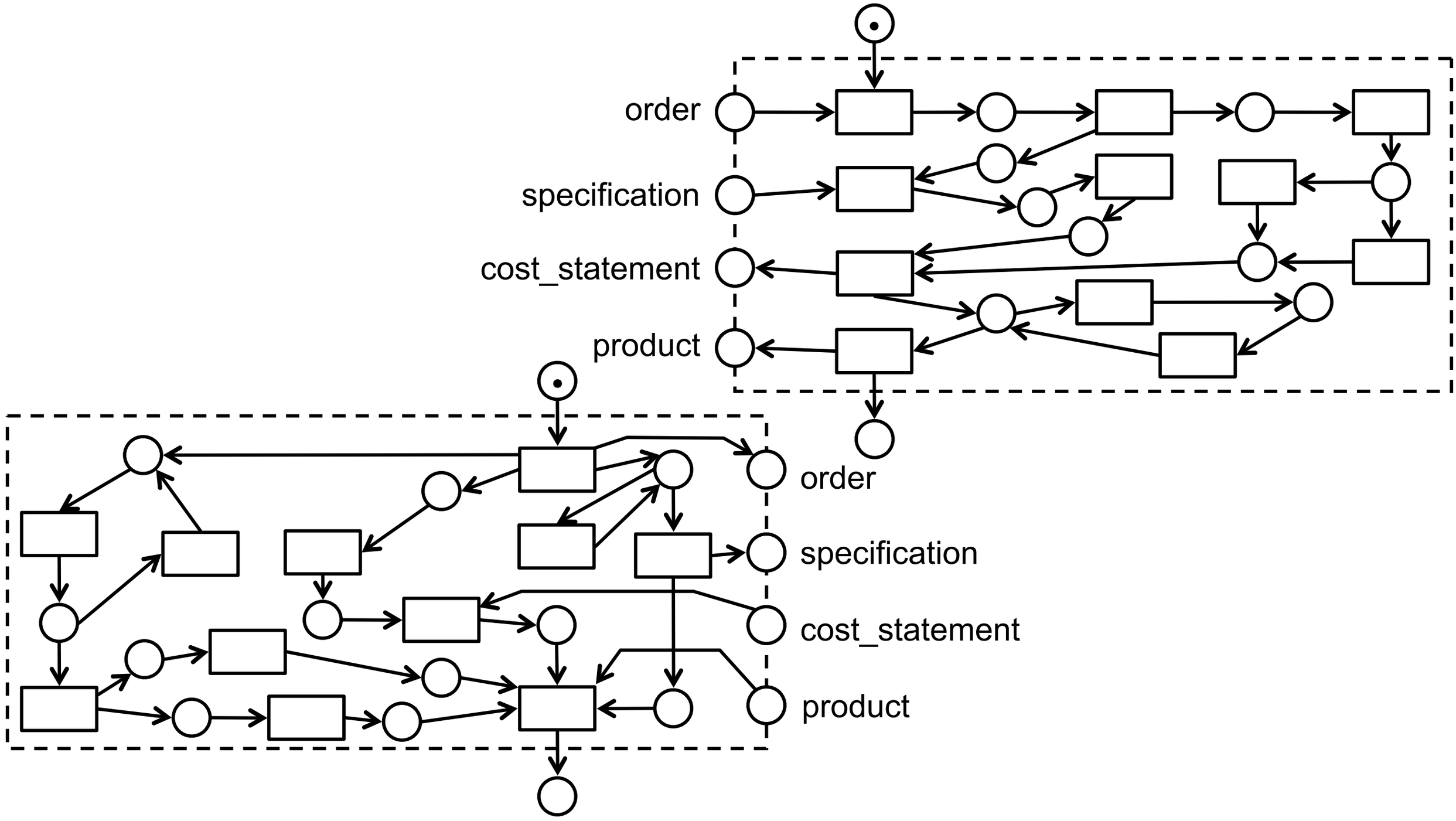
Exercise: Check Weak Soundness of The Assembly



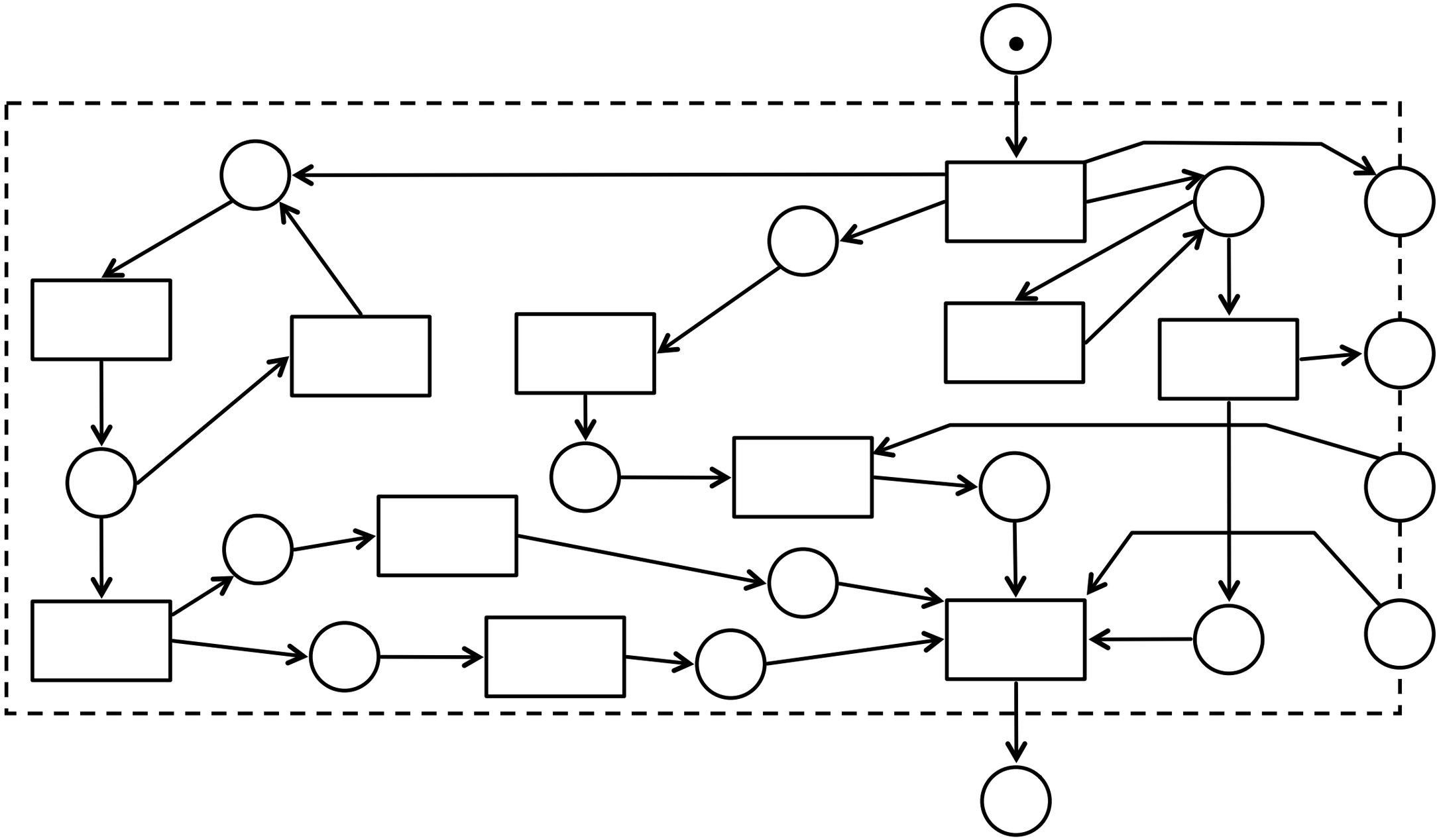
Exercise: Check Again After Refactoring Contractor



Exercise: Check Again After Refactoring Both



(Contractor zoom-in)



(Subcontractor zoom-in)