

# ArchiMate

## My struggles with “collaboration”. What is it?

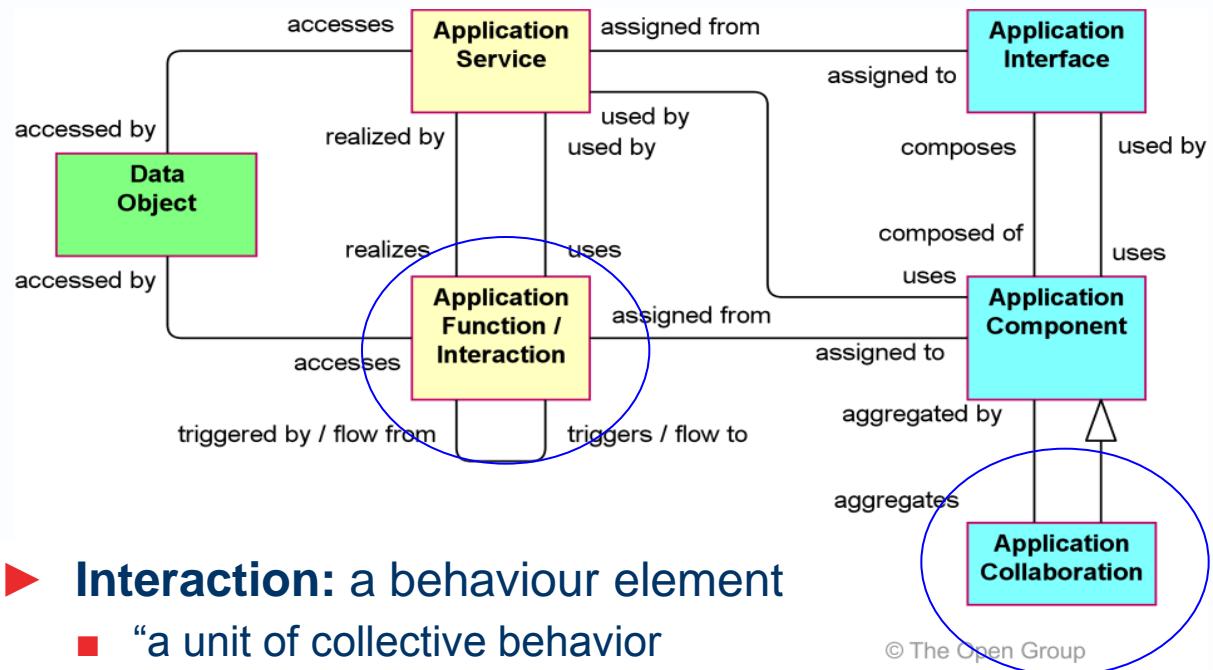
Illustrating and distilled from a longer paper

Including diagrams and definitions edited from the ArchiMate 2.0 standard.

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# ArchiMate collaborations



## ► Interaction: a behaviour element

- “a unit of collective behavior performed by (a collaboration of) two or more active structure elements.”

## ► Collaboration: a structural element

- “an aggregate of two or more active structure elements, working together to perform some collective behavior.”

- OK at this level, but less clear on closer examination of the text.

- ▶ A UML **interaction** diagram is a behavioral view of roles cooperating in a transient process.
- ▶ A UML **collaboration** diagram is a structural view of the roles in an interaction.
- ▶ *It excludes all details irrelevant to the interaction.*
- ▶ The collaboration is realized in persistent role/interface definitions that specify what actors can ask each other to do in transient interactions.

- ▶ ArchiMate defines collaboration as
  - a *specialization* of component,
  - an *aggregate* of roles.
  
- ▶ This paper is about whether those definitions make sense.

## Specialization of component?

- ▶ ArchiMate first defines a collaboration as temporary, and later defines it as logical or temporary.
- ▶ Does such an abstract or transient concept truly inherit all the properties of component?

## Aggregate of roles?

- ▶ The roles associated in a collaboration are the same as the roles named in interactions attached to the collaboration
- ▶ But what an actor does during an interaction is usually only part of a broader role.
- ▶ Does a collaboration truly *aggregate* roles, or only *associate* roles?

## This slide show

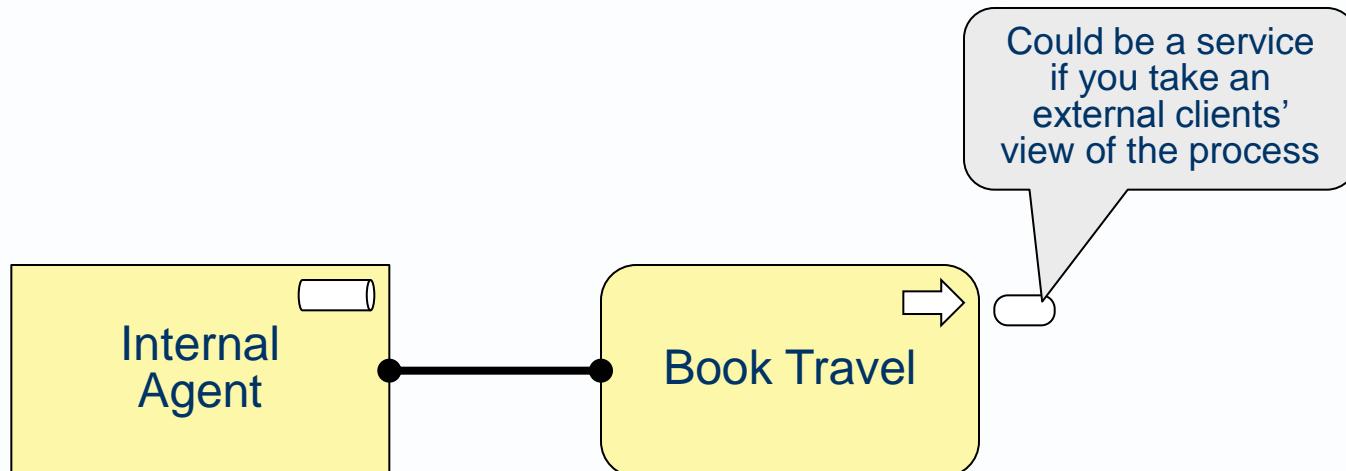
- ▶ This paper explores these and other uncertainties and ambiguities.
- ▶ It illustrates some parts of a longer paper

## Book Travel scenarios and questions arising

- ▶ Consider the following system migration path in which
- ▶ internal (employee) agents and external agents
- ▶ interact/collaborate/cooperate to process requests to book travel.

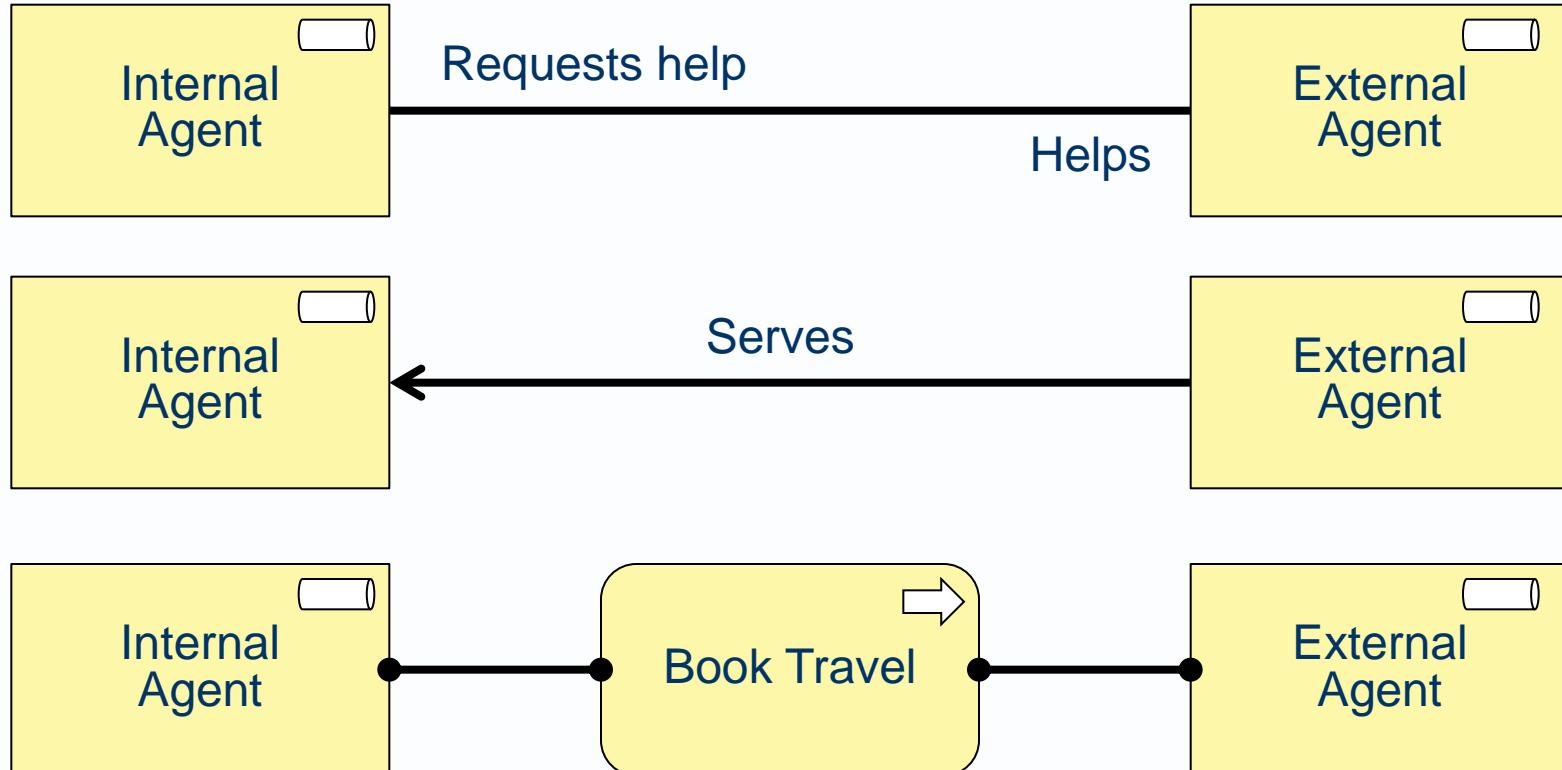
## Baseline state

- ▶ In the baseline state, an internal agent/actor acts alone
- ▶ You draw a structure diagram showing Book Travel as a process box, connected to the Internal Agent role box by an assignment relationship line.



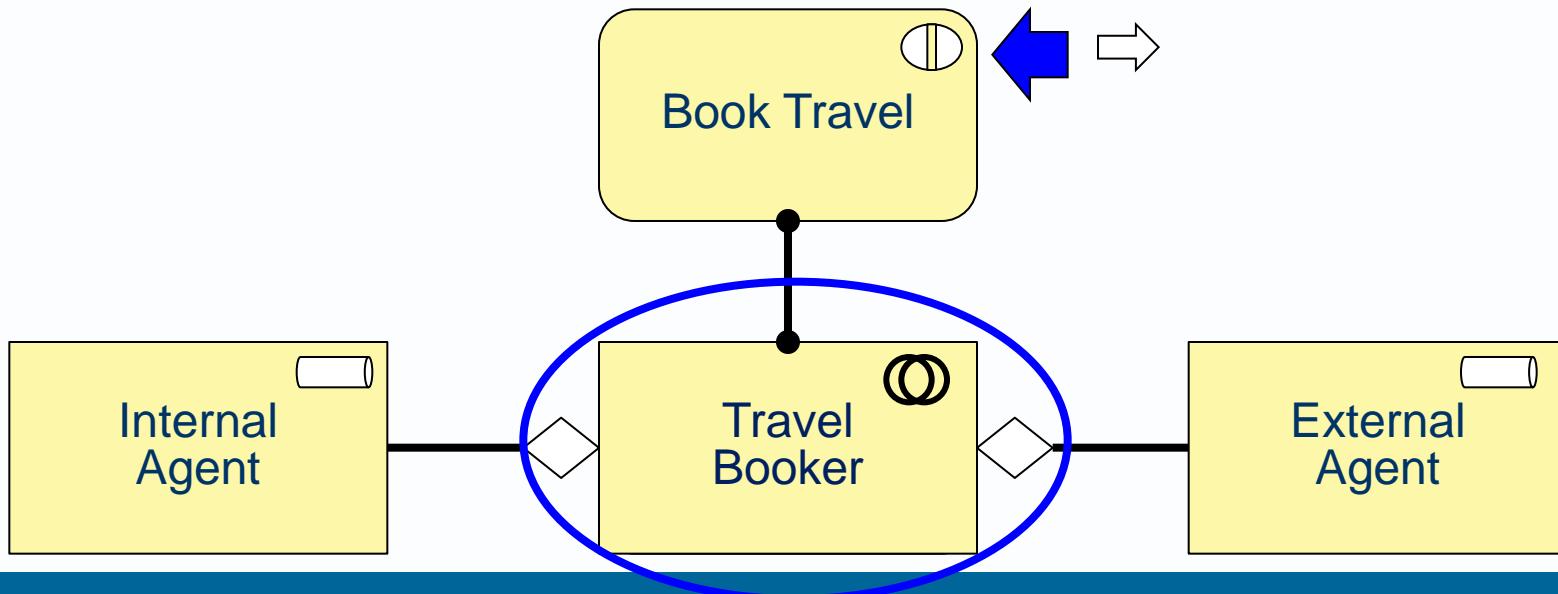
## Transition state 1

- ▶ An internal agent/actor *may* engage an external agent/actor.
- ▶ A Book Travel instance is always a process performance and *sometimes* an interaction also. Options include:



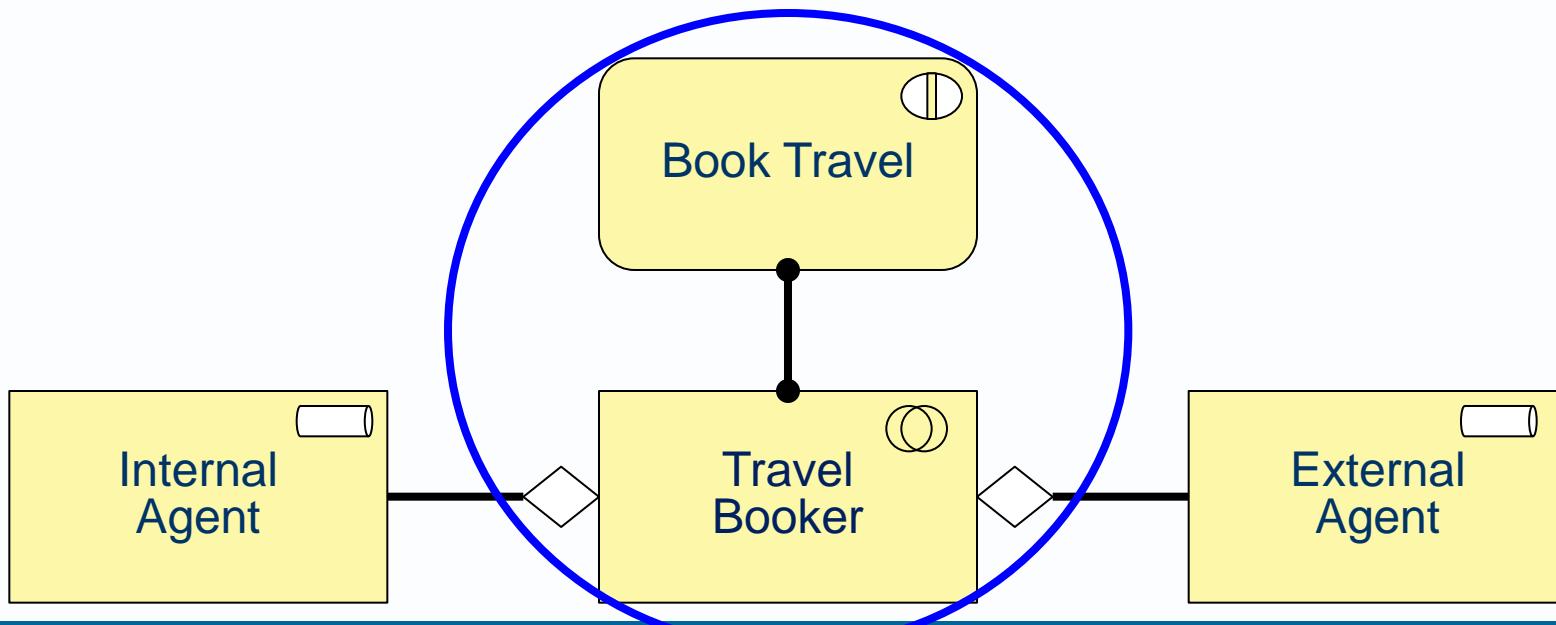
## Transition state 2

- ▶ An internal agent/actor *always* engages an external agent/actor.
- ▶ Every Book Travel instance is now both a process performance and an interaction.
- ▶ Suppose you now replace the Book Travel process box on the diagram by an interaction box. ArchiMate rules say *every interaction is performed by a collaboration*.



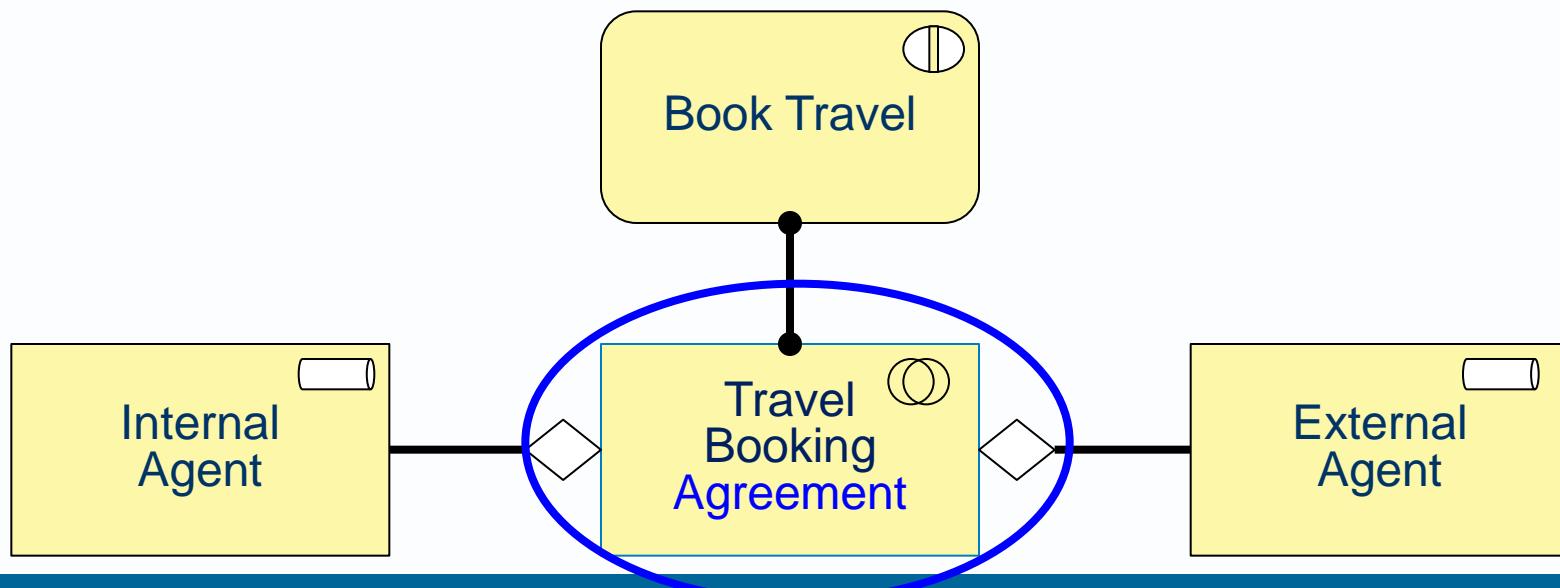
## Transition state 2

- ▶ Internal agent/actors both find and select external agent/actors (to play the external agent role) on an ad-hoc basis.
- ▶ If collaboration and interaction have the same life time, are they in 1-to-1 correspondence?



## Target state

- ▶ Internal agents and external agents must form agreements before cooperating in bookings.
- ▶ Might you see these agreements as persistent collaborations under whose overarching structure interactions are allowed?



- ▶ ArchiMate says an interaction is "a unit of collective behavior performed by (a collaboration of) two or more active structure elements".
- ▶ I say an interaction box represents a logical and temporary cooperation of actors playing different roles in a process.

- ▶ You might never draw an interaction box, because you can represent a behavior as service or process box instead.
- ▶ But you should know
  - what the box ought to mean in somebody else's diagram
  - that ArchiMate says to draw a collaboration box before attaching an interaction box to it.
- ▶
- ▶ It is easy to say explain *when* ArchiMate requires a collaboration box in a diagram
- ▶ Harder to explain *why, and what it means.*

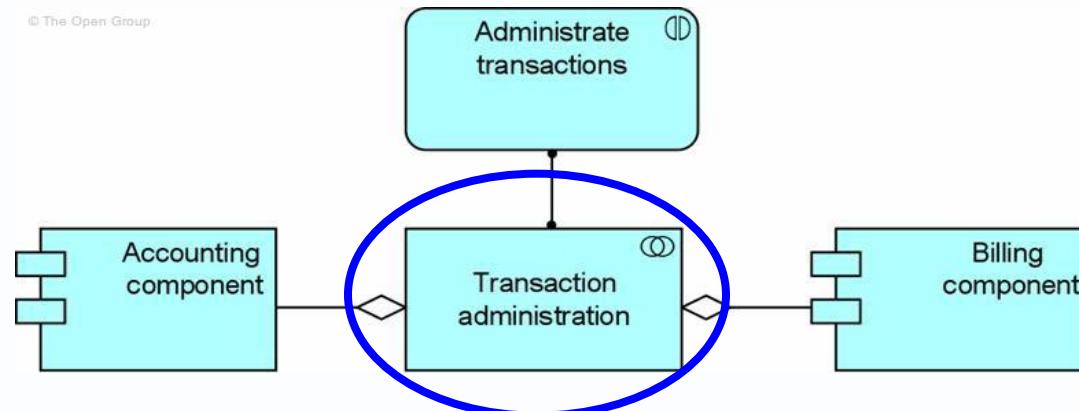
- ▶ ArchiMate offers several definitions of a collaboration, which seem to me not entirely consistent or entirely coherent.
- ▶ Sometime it seems like an aggregate of roles
  - but only the part-roles in interactions attached to that specific collaboration.
- ▶ Sometime it seems like kind of component type
  - but one that cannot be instantiated.
- ▶ It seems safer to think of it as an N-way association relationship between the N roles in one (or more) interactions.

## Temporary?

- ▶ “A collaboration is defined as a (temporary) grouping (or aggregation) of two or more structure elements, working together to perform some collective behavior.”
- ▶ Temporary implies it has a start and an end;
- ▶ it is an instance that is instantiated for a period of time.
- ▶ Later, the standard says “*logical or temporary*” which will be analyzed later.

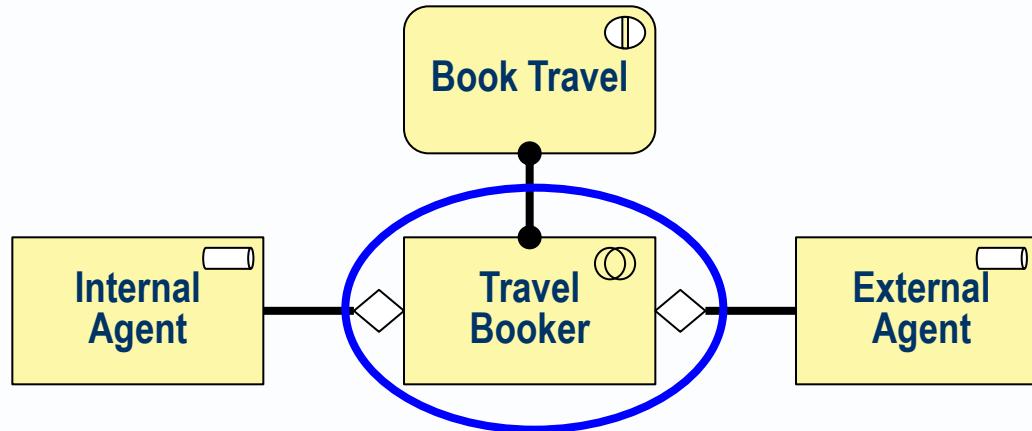
# Collaboration

- ▶ “An aggregate of two or more active structure elements, working together to perform some collective behavior.”



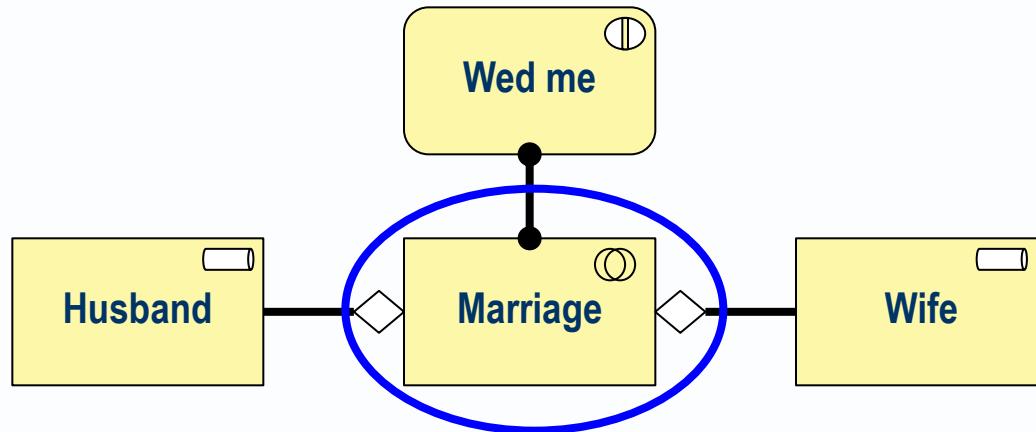
## It seems easy to generate Collaboration examples

- ▶ A travel booker is an aggregate of internal and external agents, working together to book travel.



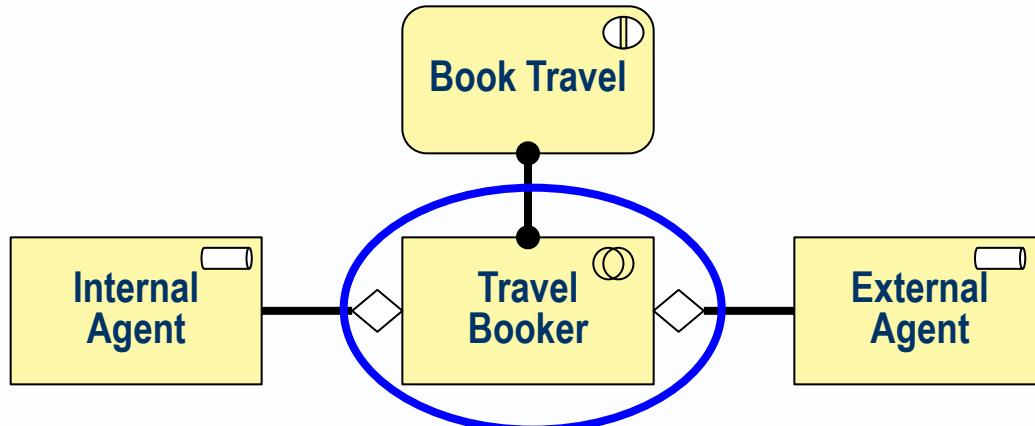
## Also

- ▶ A marriage is an aggregate of husband and wife, working to marry, love, honour and obey each other.



## But

- ▶ But what is that aggregate collaboration exactly?



- ▶ When is it formed and destroyed or dispersed?
- ▶ How does it differ from a behavior?
- ▶ How does it perform behavior?
- ▶ Is it the same as collaboration in UML?

## Optional roles

- ▶ A collaboration is "an aggregate of **two or more active structure elements**, working together to perform a behavior."
- ▶ Are the elements roles, actors, or either? The lack of a type-instance distinction leads to some ambiguity.

Buyer

Broker

Seller

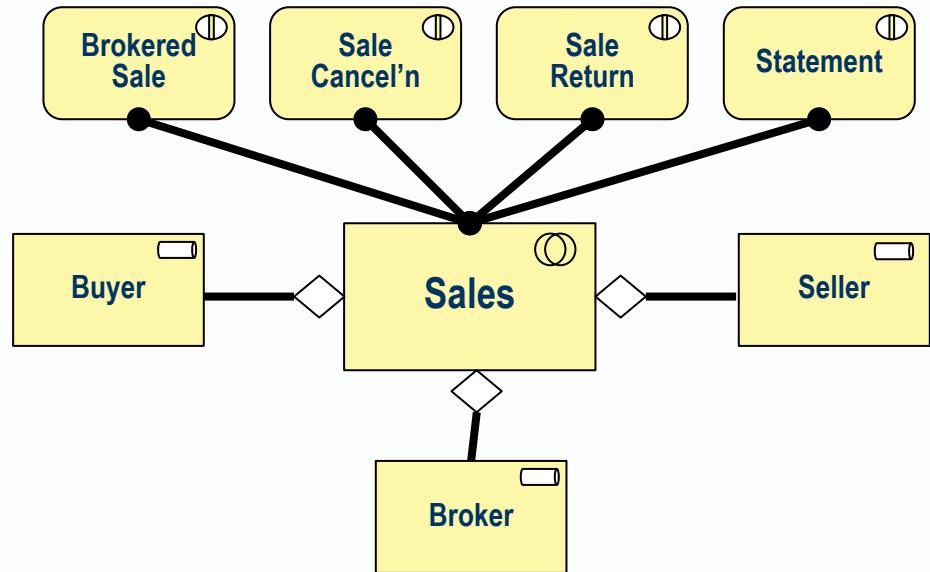
Brokered  
Sale

Sale  
Cancel'n

Sale  
Return

Statement

- ▶ In our diagram, 4 interactions are assigned to a 3-role collaboration.

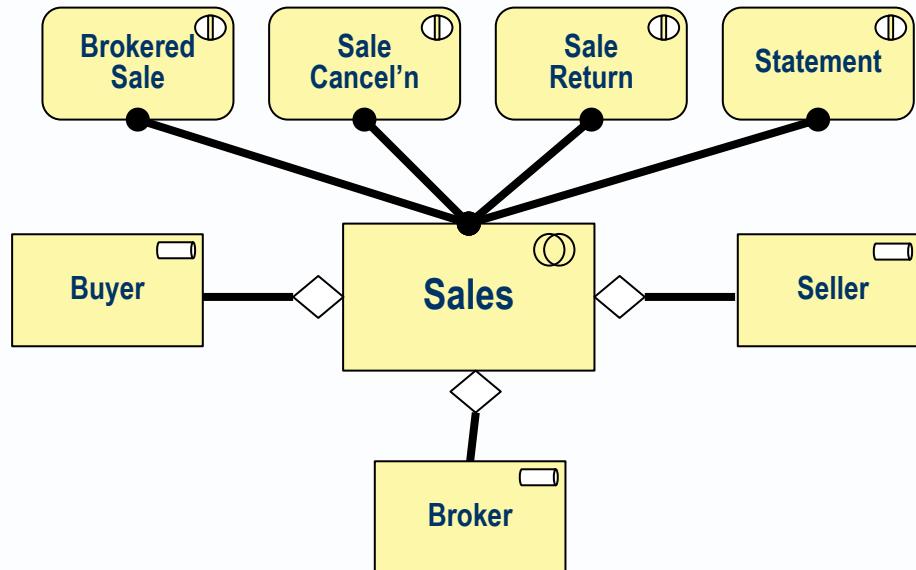


- ▶ In interactions of one type, one of the 3 roles is optional.
- ▶ So an instance of that type may include only 2 actors.
- ▶ Q1) Should we change the diagram in any way?

- ▶ In our diagram, 3 interactions (B, C and D) are assigned to a 2-role collaboration.
- ▶ In interactions of type D, one of the 2 roles is optional.
- ▶ So an instance of interaction D may include only 1 actor.
- ▶ Q2) Should we change the diagram in any way?

## Broad roles in N-way collaborations

- ▶ The roles here are broad, encompassing various responsibilities



- ▶ There may be also 2-way collaborations involving the same roles

## Surely a collaboration cannot be specified *on its own*?

- ▶ Obviously, a collaboration associates the roles involved in an interaction.
- ▶ The roles named in an interaction must be the roles related via the corresponding collaboration, and vice-versa.
- ▶ With no collaboration between roles, there can be no interaction (that's a diagram drawing rule in ArchiMate).
- ▶ With no concept of an interaction involving two or more roles, there can be no collaboration (that's a fact of life).

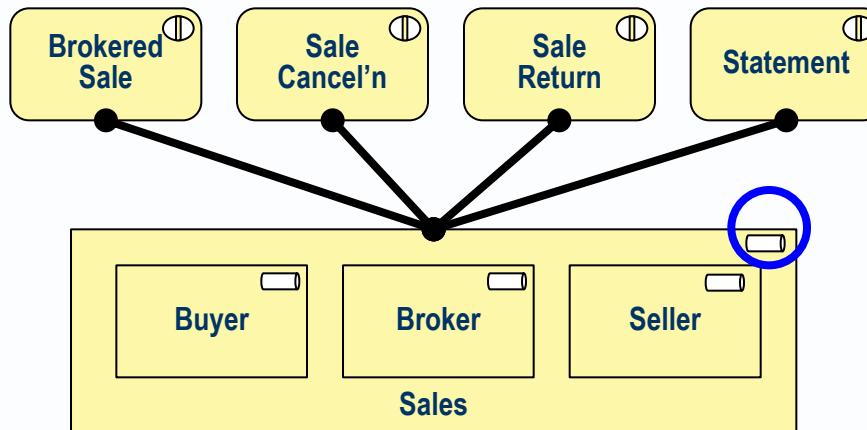
## Structures (e.g. roles) are assigned to behaviors

- ▶ The responsibilities of a role must include the behaviors that actors in that role are asked to perform.
- ▶ But it doesn't matter here whether "responsibility" corresponds exactly to "behavior" or not.
- ▶ In practice, the responsibilities of a role are often (usually?) wider than the responsibilities relevant to one interaction that role appears in.
- ▶ Further, one role may appear in several (2-way, 3-way, N-way) collaborations.
- ▶ So the responsibilities of one role can be wider than the responsibilities exercised in any collaboration that role is related to.

- ▶ UML is explicit that a collaboration *excludes* everything irrelevant to the collaboration.
- ▶ Meaning it includes only all those responsibilities of roles relevant to an interaction associated with the collaboration.
  
- ▶ An ArchiMate collaboration must be the same in so far as it aggregates *role responsibilities relevant to related interactions*
- ▶ It does not include any other responsibilities of those roles, exercised in different collaborations.
  
- ▶ Is it well-defined as an aggregate of the broader roles?

- ▶ **Wife <is aggregated into> marriage <is aggregate of> husband,**
- ▶ That might be considered a sound statement, because wife and husband are *narrow roles* in the sense they have no meaning outside of marriage.
- ▶ But drawing aggregation relationships to a collaboration seem misleading where the roles are broader.
- ▶ **E.g. customer <is aggregated into> sale <is aggregate of> salesman**
- ▶ That seems unsound
- ▶ Because customer and salesman are *broad roles* that have responsibilities/behaviors outside of sale interactions.

# Is a collaboration really an *aggregate* of roles?



- ▶ Q) May an ArchiMate collaboration aggregate things that are irrelevant to the collaboration?
- ▶ E.g. A Brokered Sale aggregates Buyer, Broker and Seller role responsibilities relevant to other 2-way collaborations?

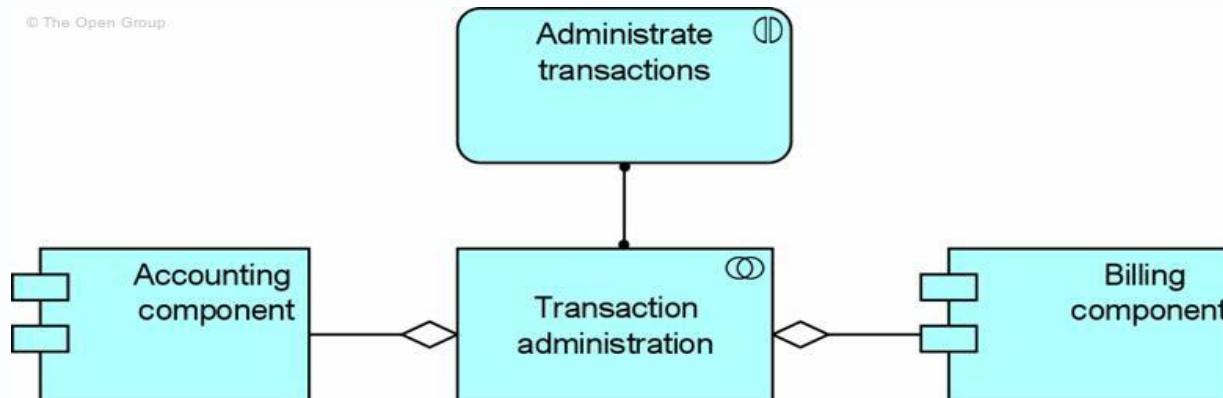
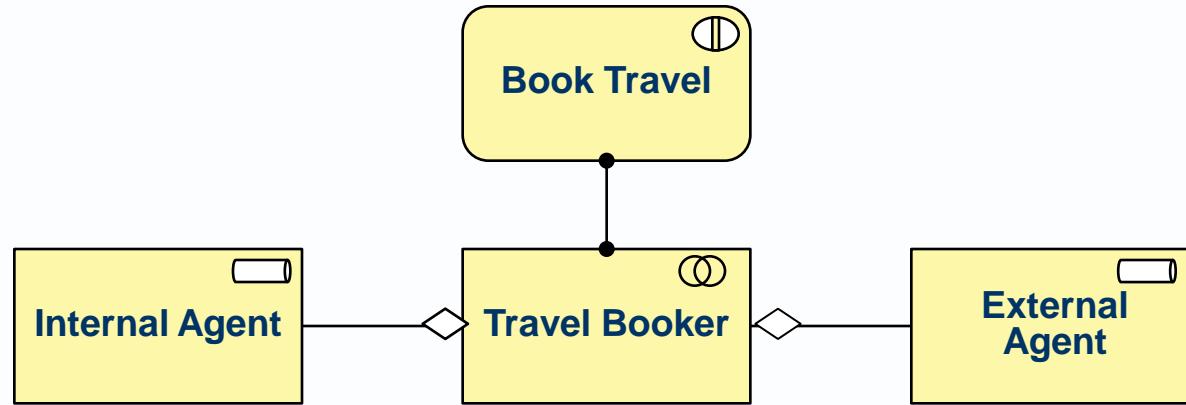
## In what sense does it exist?

- ▶ “An application collaboration typically models a logical or temporary collaboration of application components, and **does not exist as a separate entity** in the enterprise.”
- ▶ Separate from what? The structural roles? A behavioral interaction?
- ▶ When does it exist? Only during an interaction related to that collaboration?
- ▶ When the first component involved in an interaction is instantiated? Or the second? Or all of them?
- ▶ Surely a collaboration cannot be instantiated?
- ▶ Only its elements can be instantiated – and not necessarily at the same time?

- ▶ Behind every N-way collaboration is an N-way Association.
- ▶ Because weaker relationships can stand in place of stronger ones.
- ▶ E.g. wife <is aggregated into> marriage <is aggregate of> husband.
- ▶ Can be relaxed to: wife <is associated with> marriage <is associated with> husband.
- ▶ From which can be derived: wife <is associated with> husband.

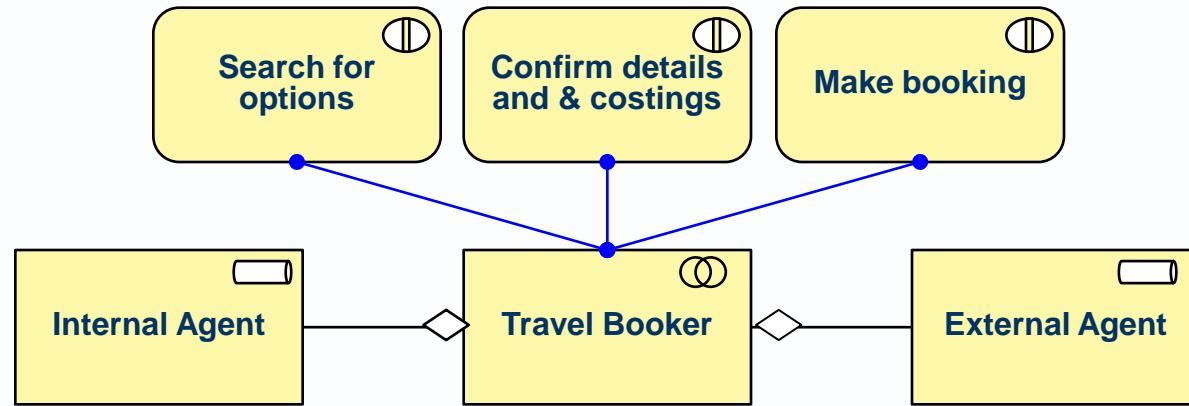
# Collaboration as N-way association

- ▶ If there is only one interaction, the collaboration box doesn't add information

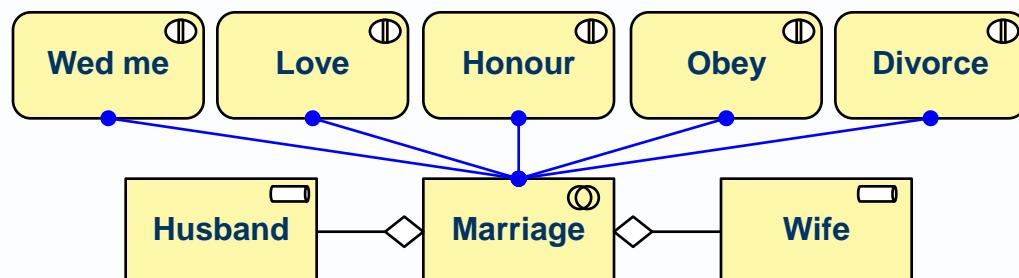


## The benefit

- ▶ The collaboration box is a connection point that saves you connecting N Interactions to both boxes in the collaboration



- ▶ Do people want place all behaviours on a structural model?.



# ArchiMate collaboration v UML collaboration

- ▶ Interactions are logical **and** temporary behaviors.
- ▶ ArchiMate collaborations are "logical **or** temporary" structures.
- ▶ Meaning?

	Logical	Physical
Temporary	Interaction	<b>Collaboration instance?</b>
Persistent	<b>Collaboration type?</b>	

## Collaboration as logical and persistent type

- ▶ Such a collaboration can exist in the form of a logical and persistent contract
- ▶ The collaboration contract defines roles (or parts of roles) relevant to interactions between the collaborators,
- ▶ Role or interface definitions specify what actors can ask each other to do in one or more interactions.
- ▶ In a diagram, one can draw boxes for those roles/interfaces, and relate them behaviors.

- ▶ There is no active object distinct from the collaborating objects.
- ▶ The logical types only specify behaviors, do not perform them.

## Collaboration as physical and temporary instance

- ▶ This sounds like an instantiated object, which exists in addition to the collaborating objects
- ▶ To make sense of it, we have to know its creation and destruction events.
- ▶ If those events are the start and end of an interaction, then there is no collaboration between interactions.
- ▶ So it seems collaboration and interaction merely views of the same behavior.

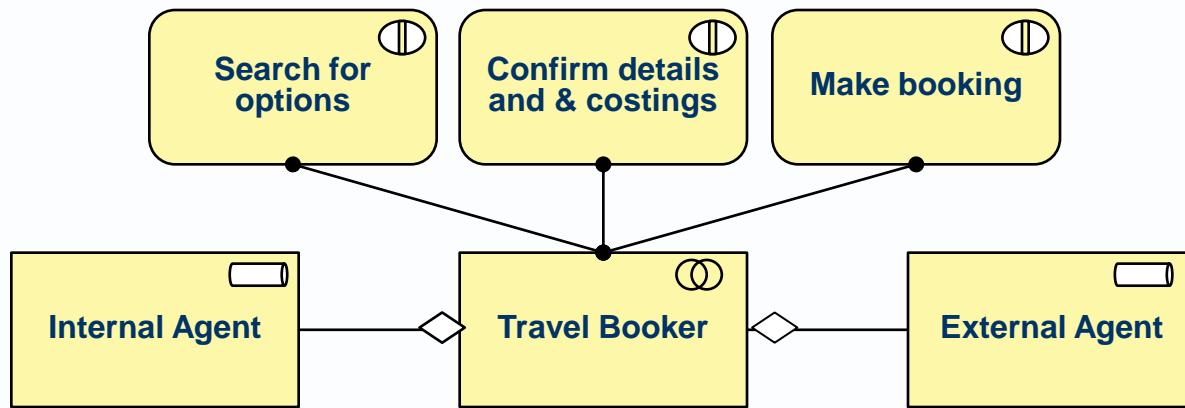
- ▶ "A collaboration is often defined in terms of roles typed by interfaces."
- ▶ "An interface [describes] externally observable features required or provided by an instance."
- ▶ "A behavior of a collaboration will eventually be exhibited by a set of cooperating instances that communicate with each other by sending signals or invoking operations".
- ▶ "Collaborations allow us to describe only the relevant aspects of the cooperation of a set of instances by identifying the specific roles that the instances will play."

- ▶ I read UML as saying a collaboration is like a persistent contract (think of a marriage contract).
- ▶ It is logical and persistent
- ▶ It is embodied in the form of role or interface definition(s) that define services partners offer to each other.
- ▶ It is not embodied in an active structure element of the kind ArchiMate's collaboration component appears to be.

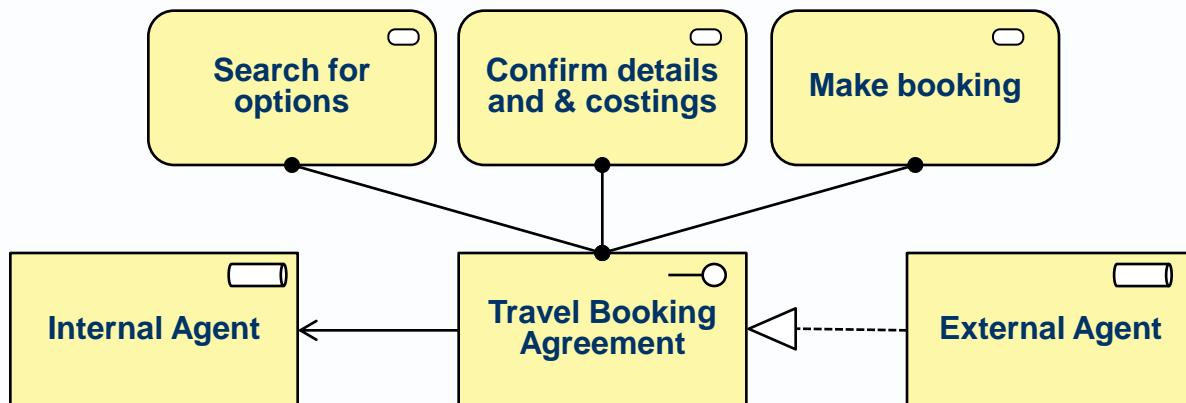
## Collaboration as passive interface rather than active structure

- ▶ Think of collaborations how UML defines them.
- ▶ A collaboration be seen as a passive interface between roles rather than an active aggregate of roles.
- ▶ E.g. a travel booking agreement defines services in the interface of an external agent.
- ▶ E.g. a marriage contract defines services (e.g. love, honor and obey) in the interface between two married actors.
- ▶

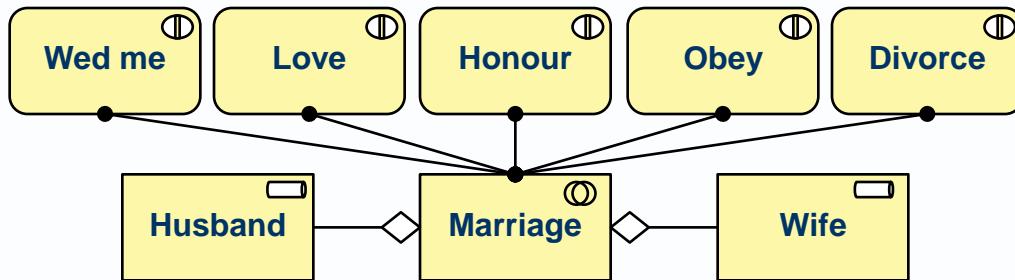
# Substitution of collaborations by interfaces



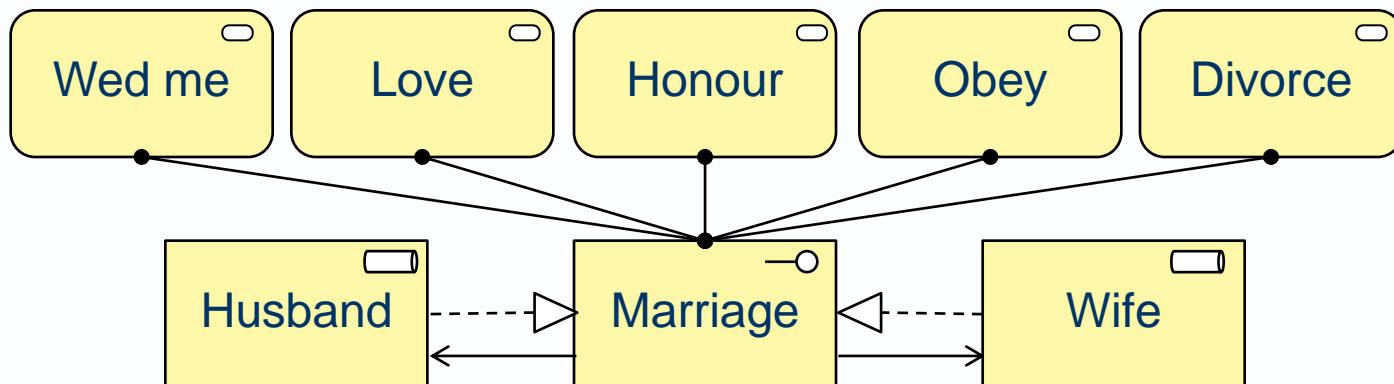
- ▶ A collaboration can be seen as a passive interface between roles rather than an active aggregate of roles. E.g. A travel booking agreement defines services in the interface of an external agent



# Substitution of collaborations by interfaces



- ▶ A collaboration can be seen as a passive interface between roles rather than an active aggregate of roles
- ▶ E.g. Marriage defines services the two actors can request of each other.



- ▶ The travel booking agreement or marriage contract is an interface definition that must exist before actors can interact or collaborate as defined in that interface.
- ▶ But the interface is not itself active, it only defines activities that provider and consumer actors cooperate in.
- ▶ In other words, one might interpret the collaboration box as a kind of interface or data entity - a precondition for interactions.
- ▶ Think of it as a relatively persistent inter-actor contract (like travel booking agreement or a marriage contract) that defines the interface actors use to interact in subsequent services and processes (like love, honor and obey).

# FOOTNOTES



# Using life history analysis to understand entities

- ▶ You speak of a football team.
- ▶ You think of it as a collaboration - as an aggregate of roles played by footballers to win football matches.
- ▶ You speak of its current attributes (name, manager, goal difference, and league table position.)
- ▶ So are you talking about the team in a specific game? over one season? over all time? If you don't have an answer, then your concept of the team ill-defined.

# Does a collaboration perform behaviour?

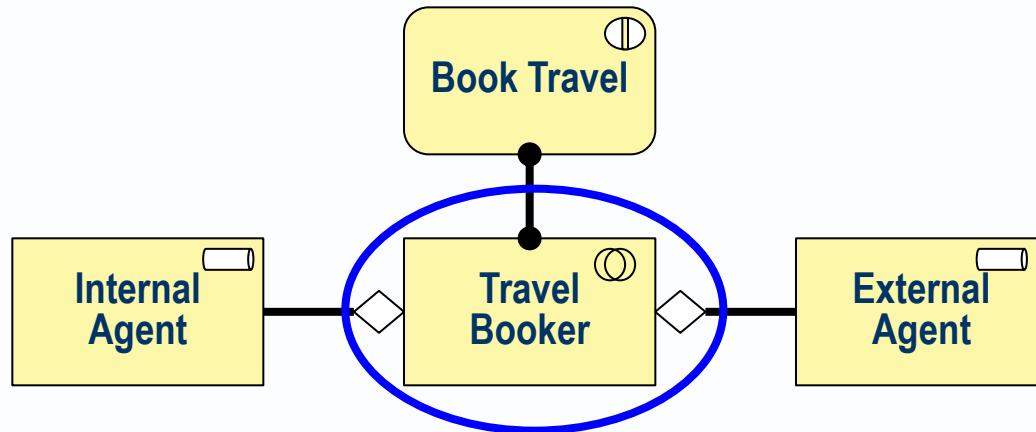
- ▶ At some points, ArchiMate seems to align collaboration with interaction.
- ▶ "An application collaboration typically models a logical or temporary collaboration of application components"
  - You cannot define words by reshuffling the same words!
    - The definitive phrase is "a **logical or temporary** collaboration".
  - "[It] **does not exist** as a separate entity in the enterprise."
    - Meaning it is logical rather than concrete?
    - Or concrete but transient, does not exist between interactions?
- ▶ But the standard goes on to align a collaboration with a physical component that performs behaviour.

## But then

- ▶ “[It] is a specialization of a **component**.”
  - So, by inheriting the properties of component, it does exist as a separate entity – but not at a different time from an interaction?
- ▶ “[It] **aggregates** (co-operating) application components.”
  - So, it is a coarser-grained component?
- ▶ “[It] is an **active structure element**”
  - So, it performs activities, like a component?
- ▶ “An application interface may be used by an application collaboration”
  - So, it invokes services, like a component?
- ▶ “and [it] may be **composed of** application interfaces.”
  - So, it is exactly like an ArchiMate component then?

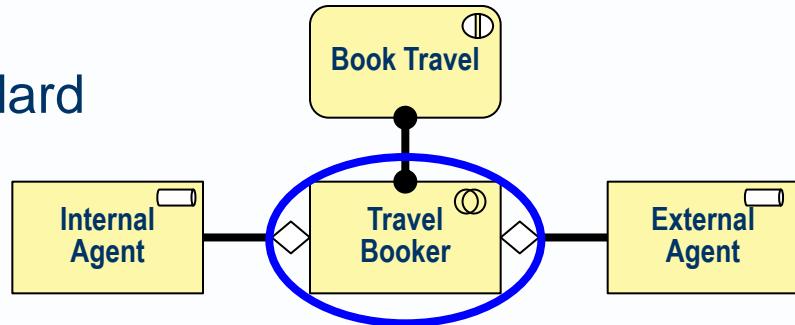
## And yet

- ▶ the rule that "every interaction must be performed by a collaboration" is questionable.
- ▶ Can a collaboration/aggregate be asked to perform a behavior?

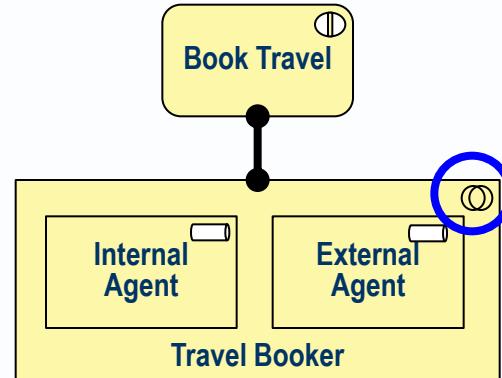


# Is a collaboration an aggregate role/actor/component?

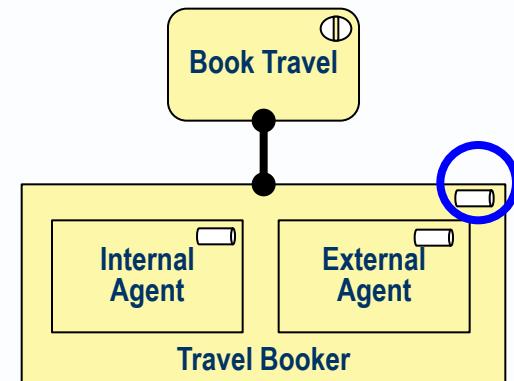
- ▶ As in the standard



- ▶ A grouping box?



- ▶ An aggregate role?



## Also in the associated paper

- ▶ The longer paper associated with this slide show addresses other points and questions, including
  - Q) Is a collaboration an aggregate of two active structure element *types* or *instances*?
  - Q) Are elements “working together” when not active?
  - Q) Is “working together” a behavior rather than structure?
  - Q) Is collaboration is an “active structure” or a passive one?