From Flow-Global Choreography to Component Types
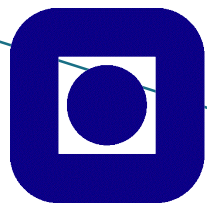
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Outline

- Background & Motivation

- Introduction to some concepts

    - Flow-global choreography (F-G Chor)

    - Flow-localized choreography (F-L Chor)

    - Component types

- Paper contributions

    - Localization from F-G Chor to F-L Chor

    - Component type derivations (from F-L Chor)

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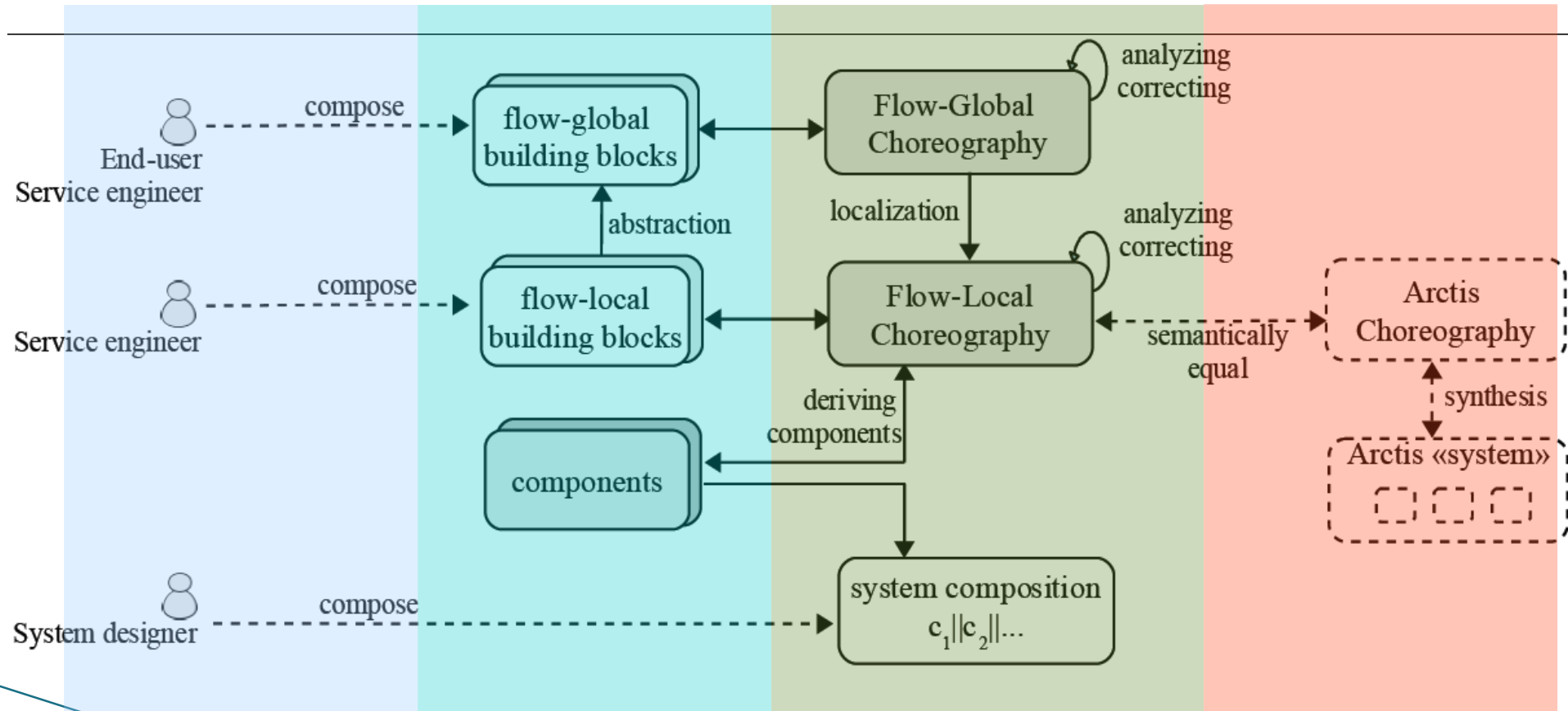# Research background

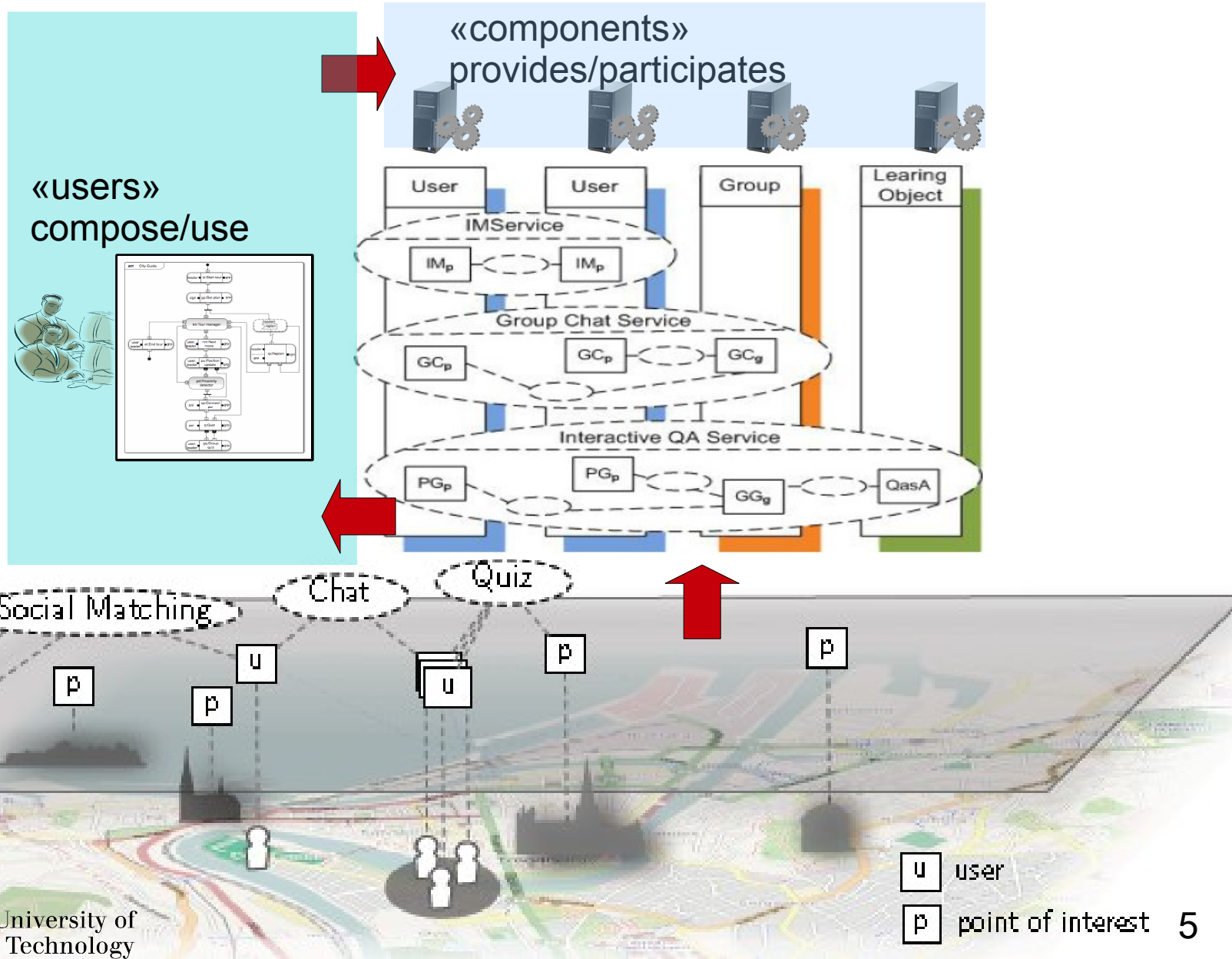Modeling/Analysis/Design/Composition of distributed services/system and automatic code generation: MDD

- <u>Services</u> – as partial system functionalities where one or more components collaborate or interact

- Abstract services and systems are modeled using <u>UML collaborations</u>

- Detailed behavior is described using <u>UML activity diagrams</u>

- Services are represented as <u>building blocks</u> having different types of input and output pins

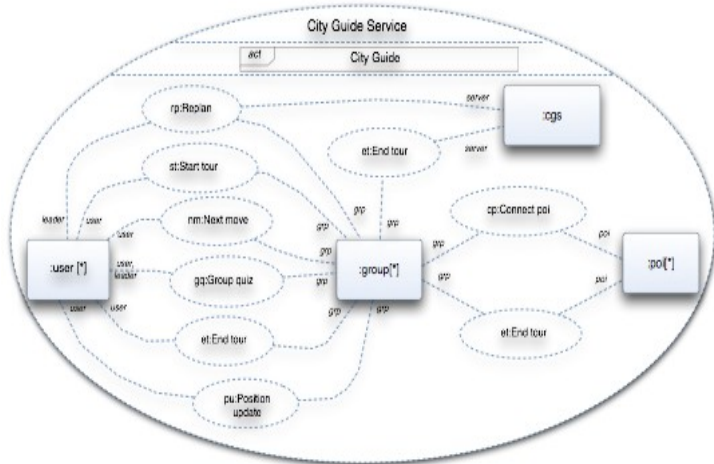- Tool support – <u>Arctis</u> www.arctis.item.ntnu.no

Motivation

Motivation (2) – concrete example

«components»
provides/participates

«users»
compose/use

User User Group Learing Object

IMService
IMp   IMp

Group Chat Service
GCp   GCp   GCg

Interactive QA Service
PGp   PGp   GGg   QasA

Social Matching   Chat   Quiz

u   p   p   u   u   p   p

u   user
p   point of interest

Structure and Behavior of Service

Service behavior using UML Activity

Service structure as UML Collaborations
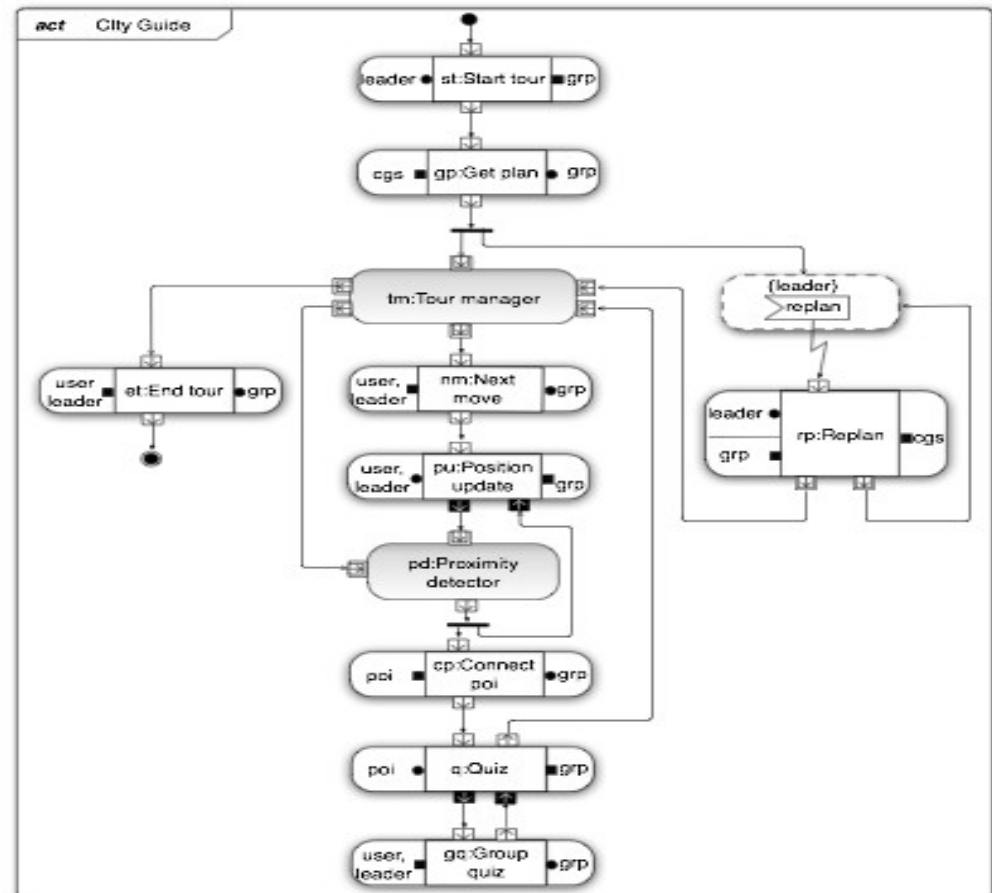
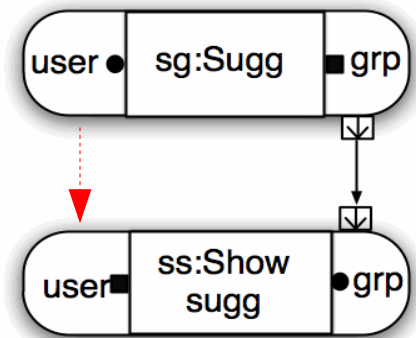Different levels of behavior specification !
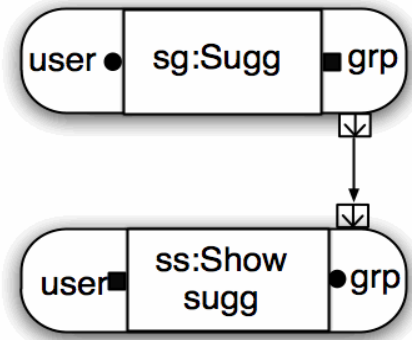
Flow-Global Choreography
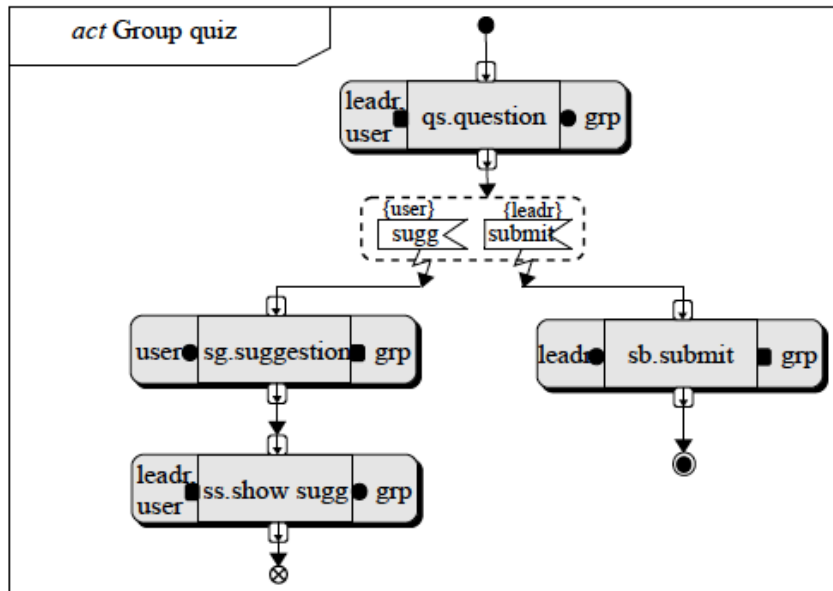
✔ Group quiz example

✔ Global ordering of services

✔ Service pins are global

✔ Global variables and control elements

✔ More abstract

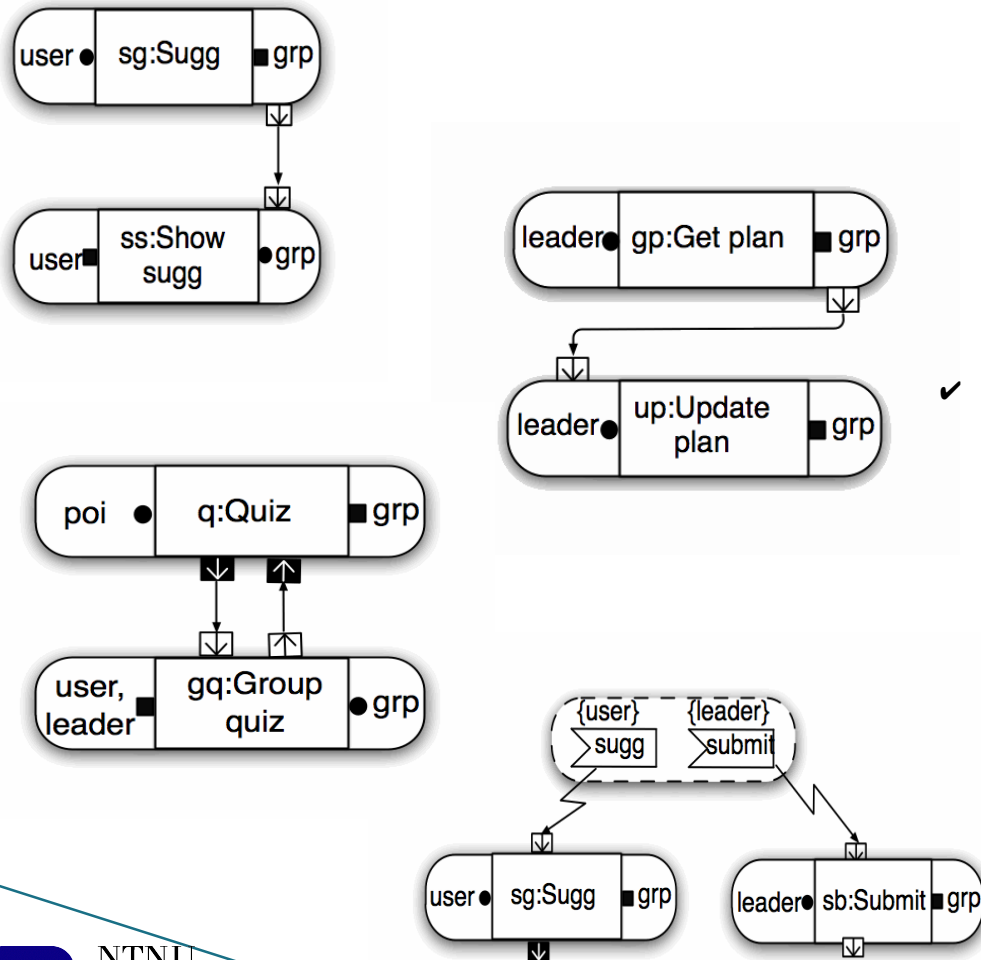# Flow-Localized Choreography

- ✔ Global ordering of services

- ✔ Service pins, control elements are localized

- ✔ Flows are therefore localized

- ✔ External flows to a role
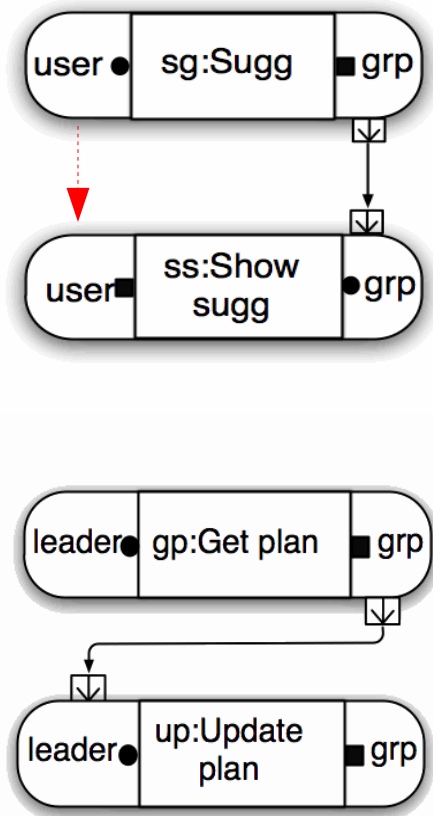 - ✔ Responding flows

Localization

- ✔ Flow-Global to Flow-Localized Chor.
  - ✔ Service pins localization
  - ✔ Control nodes localization
- ✔ Localized flows
  - ✔ Strong sequencing flows
  - ✔ Weak sequencing flows
  - ✔ Streaming flows
  - ✔ Initiative choices and interruptible regions

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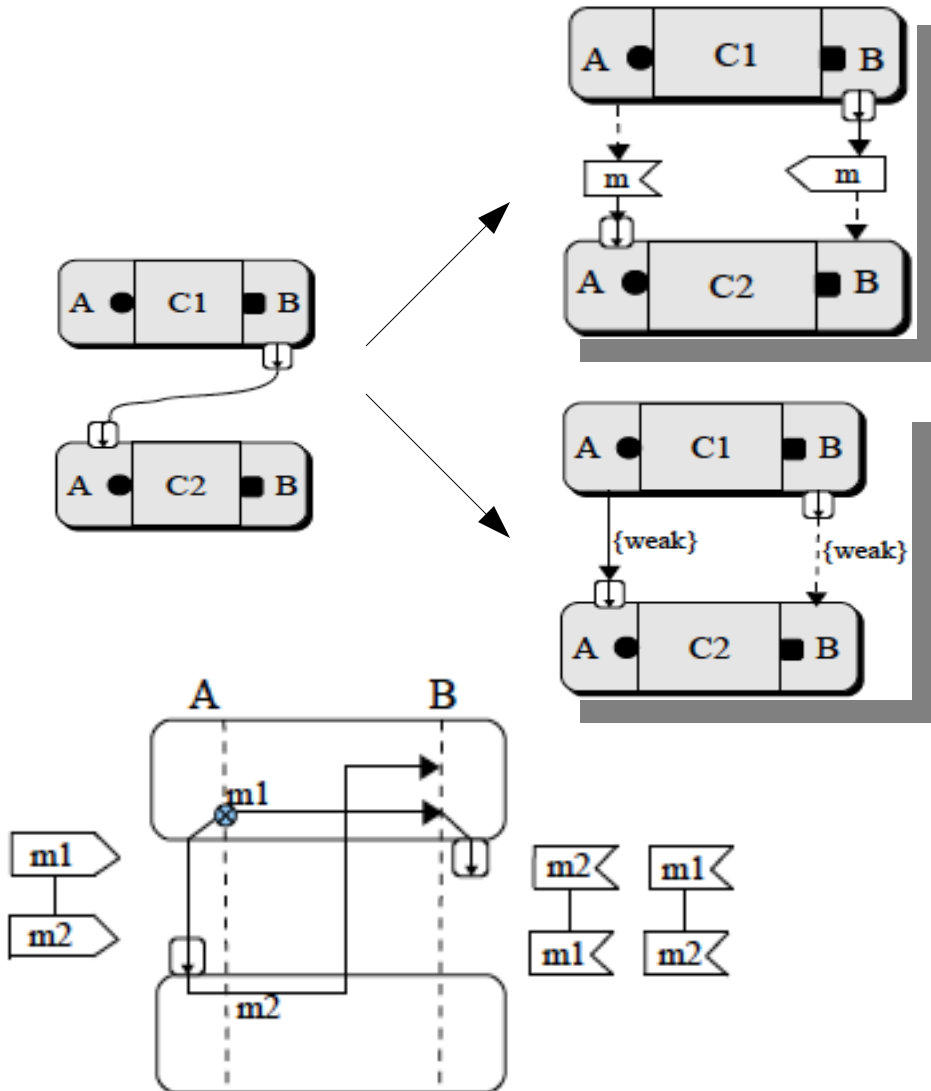Science and Technology

Strong sequencing localization

- ✔ Localization of initiating and terminating pins of service

  - ✔ Flow localized to same role type and

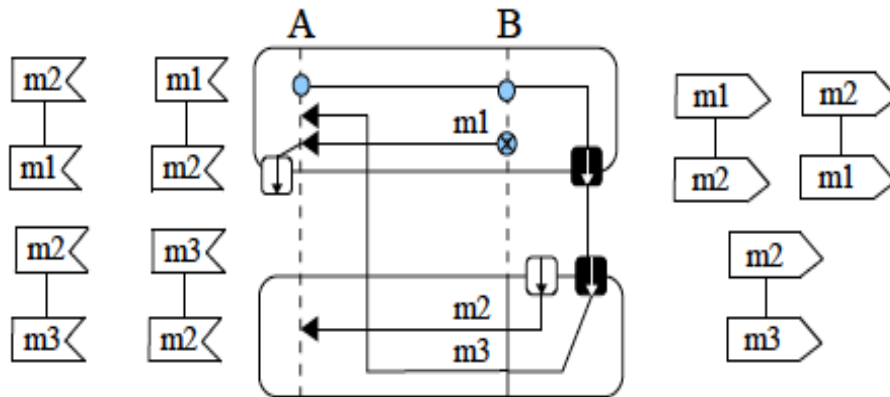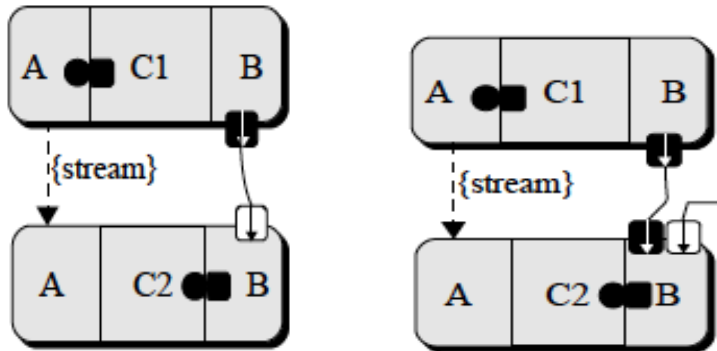 - ✔ Flow localized to different role types, *interaction flows*

Interaction flows may lead to weak sequencing

- ✔ A may initiate C2 as soon as it finished its part in C1

- ✔ Semantics of SD

- ✔ May cause the overlap between the collaborations !

  - ✔ {weak} responding flows are indications of potential realization problems !!
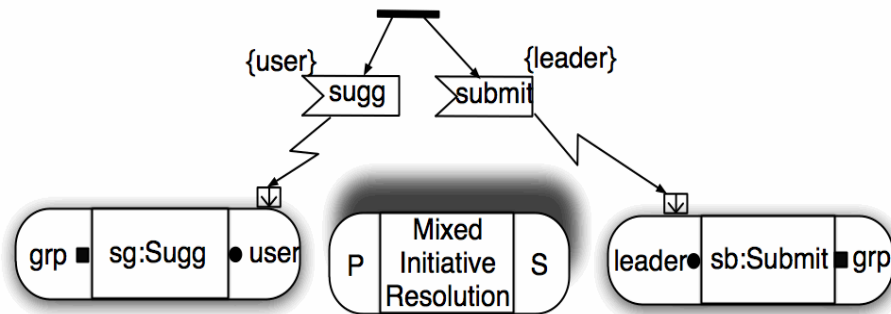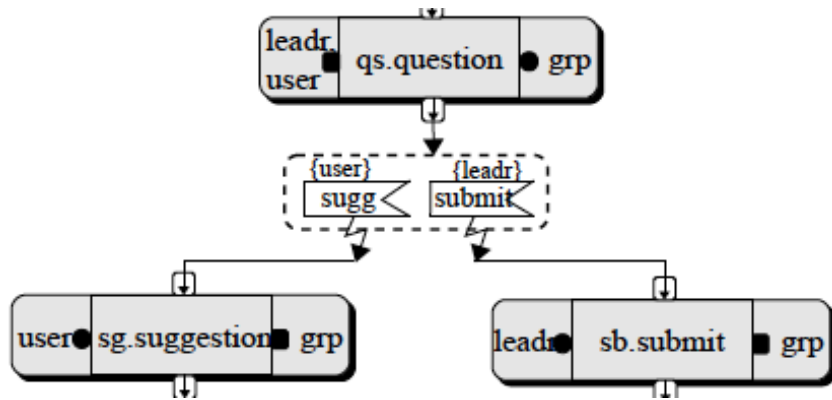
Streaming flows localization

- ✔ Presence of streaming pins

- ✔ Different possibilities

- ✔ Even weaker sequence

- ✔ Potential realization problems

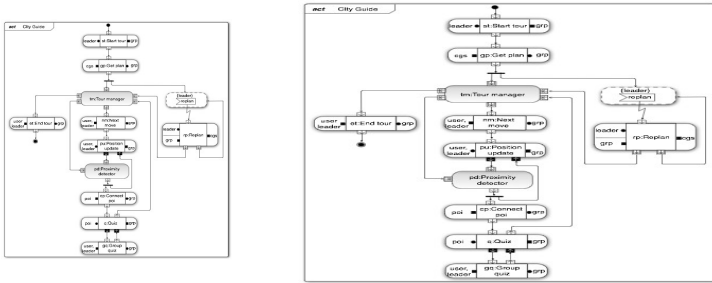- ✔ Different resolution strategies !

Mixed Initiatives Cases

- ✔ Two independent initiative may collide

- ✔ Resolution strategies depends on each case

  - ✔ Library of alternative solutions

  - ✔ One possible solution is assigning primary and secondary priorities

- ✔ Difficult to solve in a general way.

Deriving Components

- ✔ Projection of F-L Chor. onto the components

  - ✔ Keep local actions, collaborations, and nodes

  - ✔ Keep completely localized flows

  - ✔ Mark interaction flows as {weak} or {enforced strong}

  - ✔ Identify responding flows

- ✔ Component types can then be automatically derived
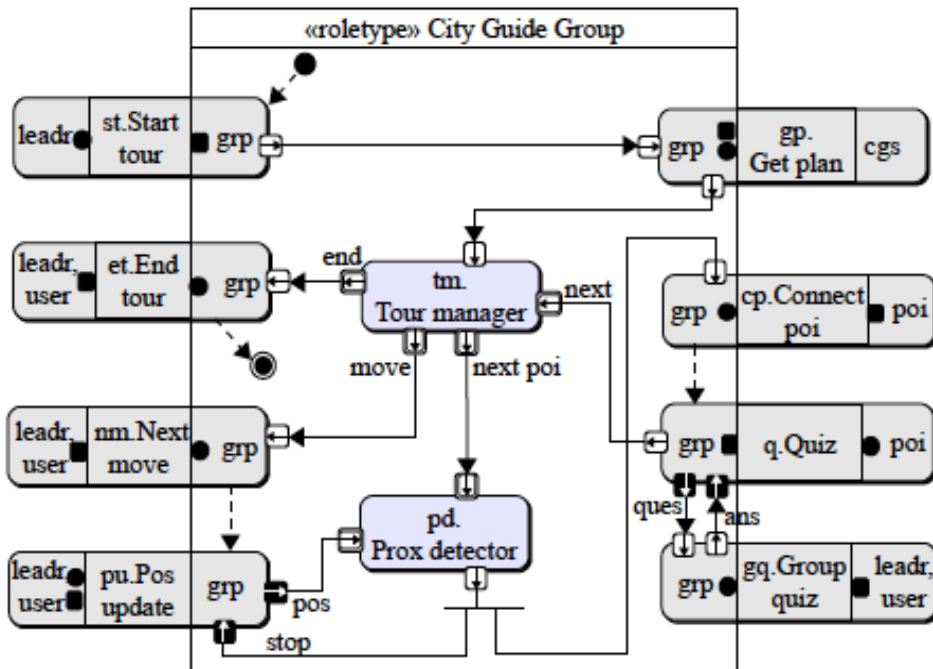
Thank you.

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