A Profile for DIA

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Motivation (1)

- We need a DSML (Domain Specific Modelling Language)
- What is a DSML?
  - DSML vs. General purpose Modelling Languages

Motivation (2)

- Why do you need a DSML?
  - Because we want to *analyse system properties* using the very same models
  - Which kind of systems?
  - Which kind of properties?
  - Which kind of questions?

Looking for the DSML

- Does not such DSML exist?
  - No. But there are works that can help us
  - MARTE (Modeling and Analysis of Real Time and Embedded systems) —> Performance and Schedulablity
  - DAM (Dependability Analysis and Modeling) —> Reliability, Availability, Maintainability and Safety

UML Profiles

- Which kind of DSML are MARTE and DAM?
  - Lots of literature discussing pros/cons between Profiles and DSML from scratch

Our solution

- DICE Profile
  - *A UML Profile for the qualitative and quantitative assessment of DIA that leverage Big data technologies and it inherits/reuses MARTE and DAM*

- How to fit the DICE Profile in the DICE framework?
  - DICE follows MDA and it adapts to Big Data technologies
    - DPIM (DICE Platform Independent Model)
    - DTSM (DICE Technology Specific Model)
    - DDSM (DICE Deployment Specific Model)

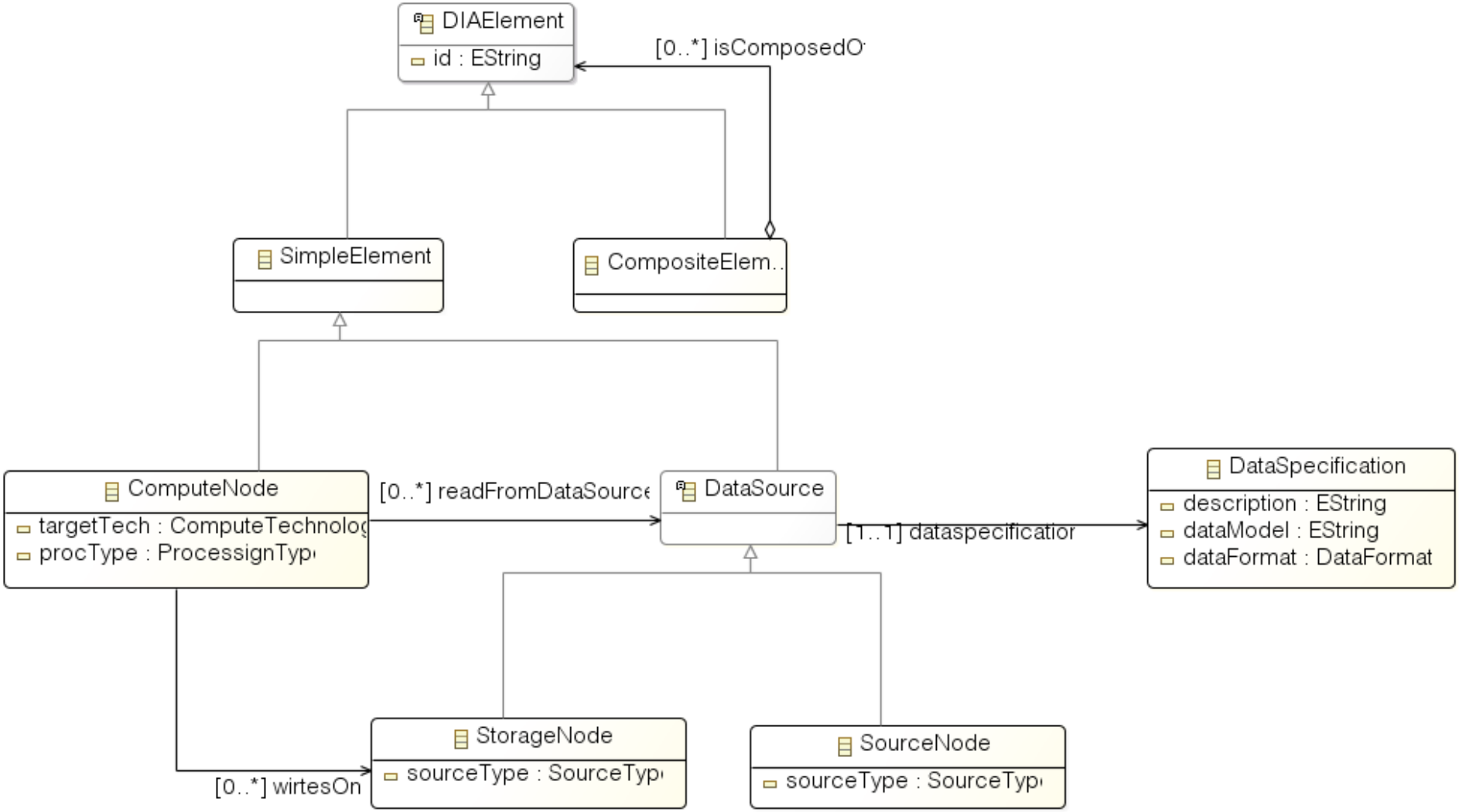
How do we construct the DICE Profile?

- 1. Conceptual models for each abstraction level
- 2. Introduce concepts for quality assessment —> Fitting them in the previous domain model
- 3. Follow technical advise on Profile construction [7,10]
- 4. We conducted profile assessment using our partners case studies
  - fraud detection, acquisition of news from social sensors, vessel traffic management

1st step:

- 1.1. Abstract models for modelling DIA —> DPIM
- 1.2. Reviewed different Big Data technologies and defined abstractions —> DTSM
- 1.3. Reviewed metamodels for deployment (e.g., Modaclouds) —> DDSM (on going work)

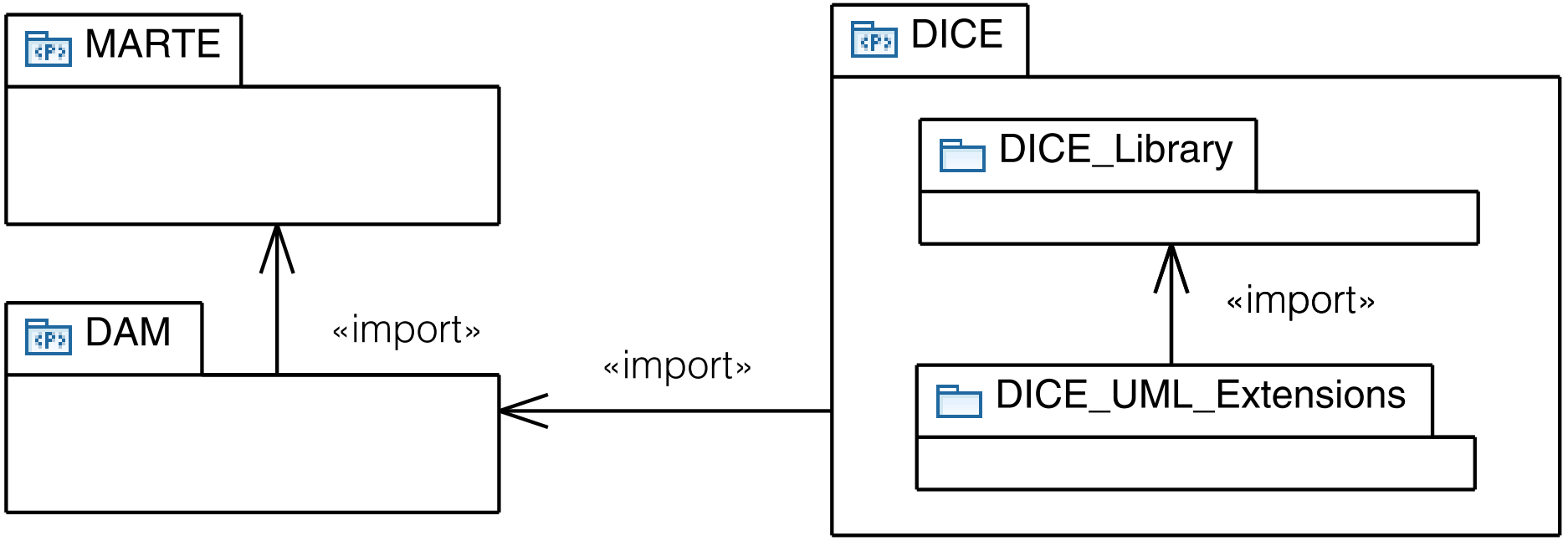
Step 1.1. DPIM meta-models



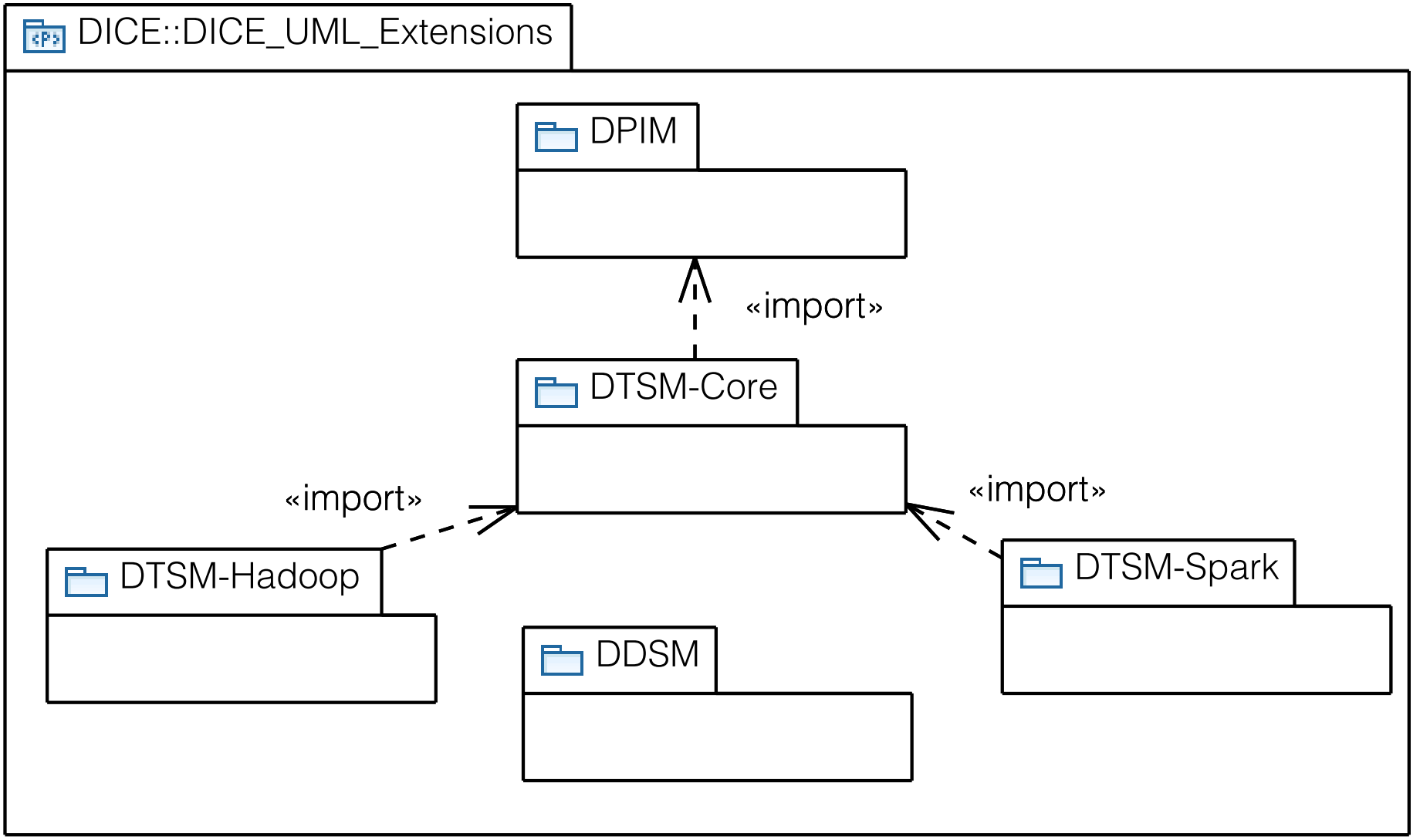
2nd step: Introduced concepts for quality assessment

- DPIM domain model is for representing architectural views
- Lacks capabilities for defining QoS and behavioral properties
  - MARTE and DAM
- What we did?
  - We combined the DPIM domain model with MARTE and DAM domain models
- We got a complete design view: architectural and behavioural

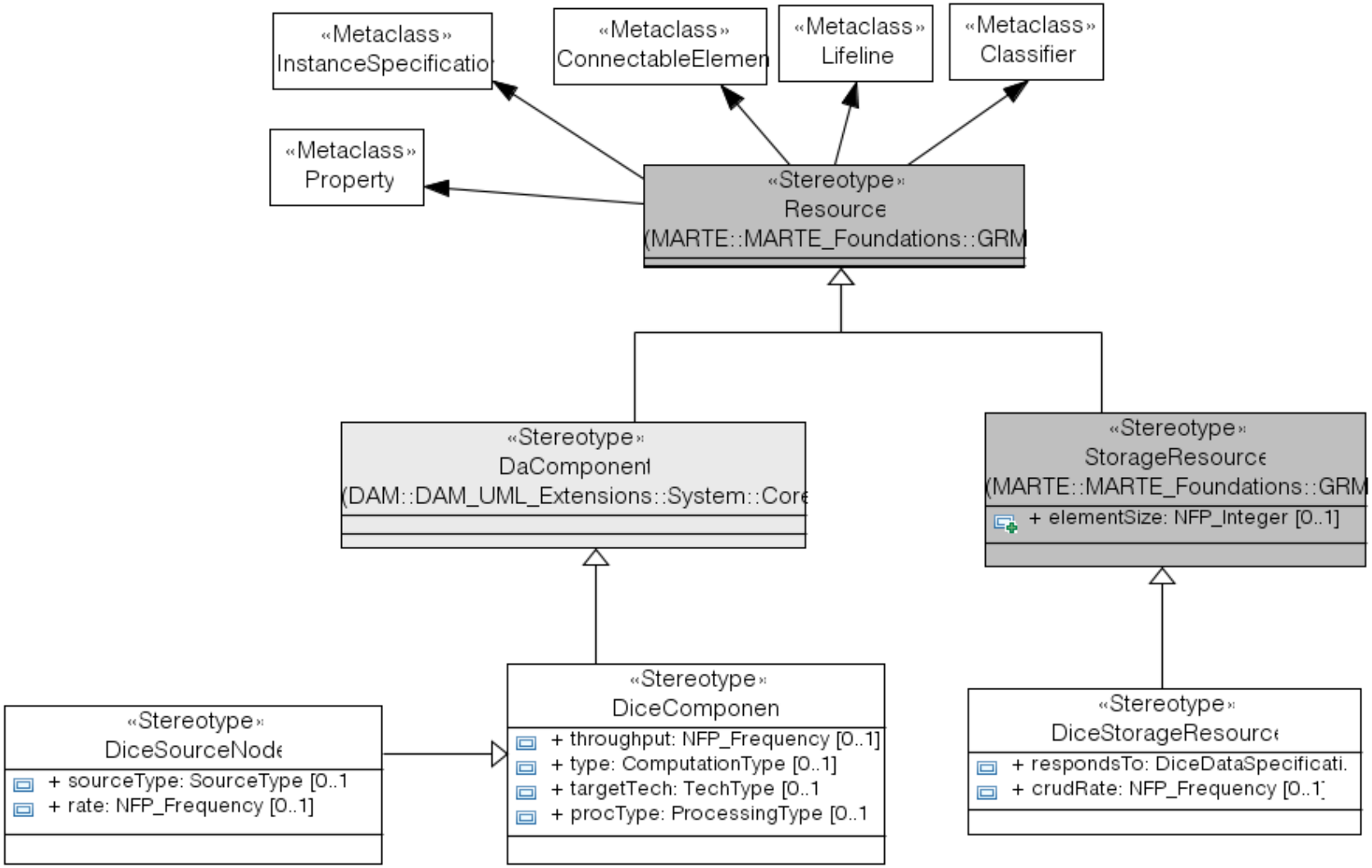
3rd step: Technical solution (1)



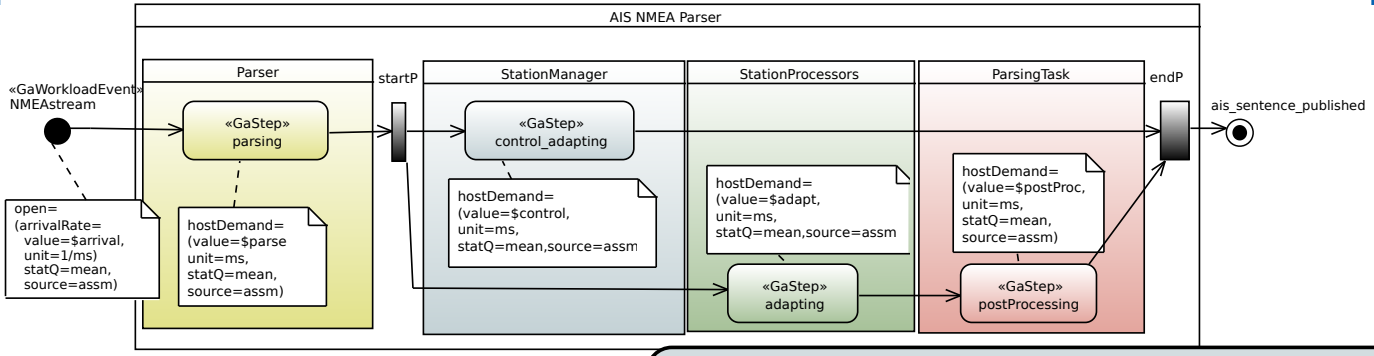
3rd step: Technical solution (2)

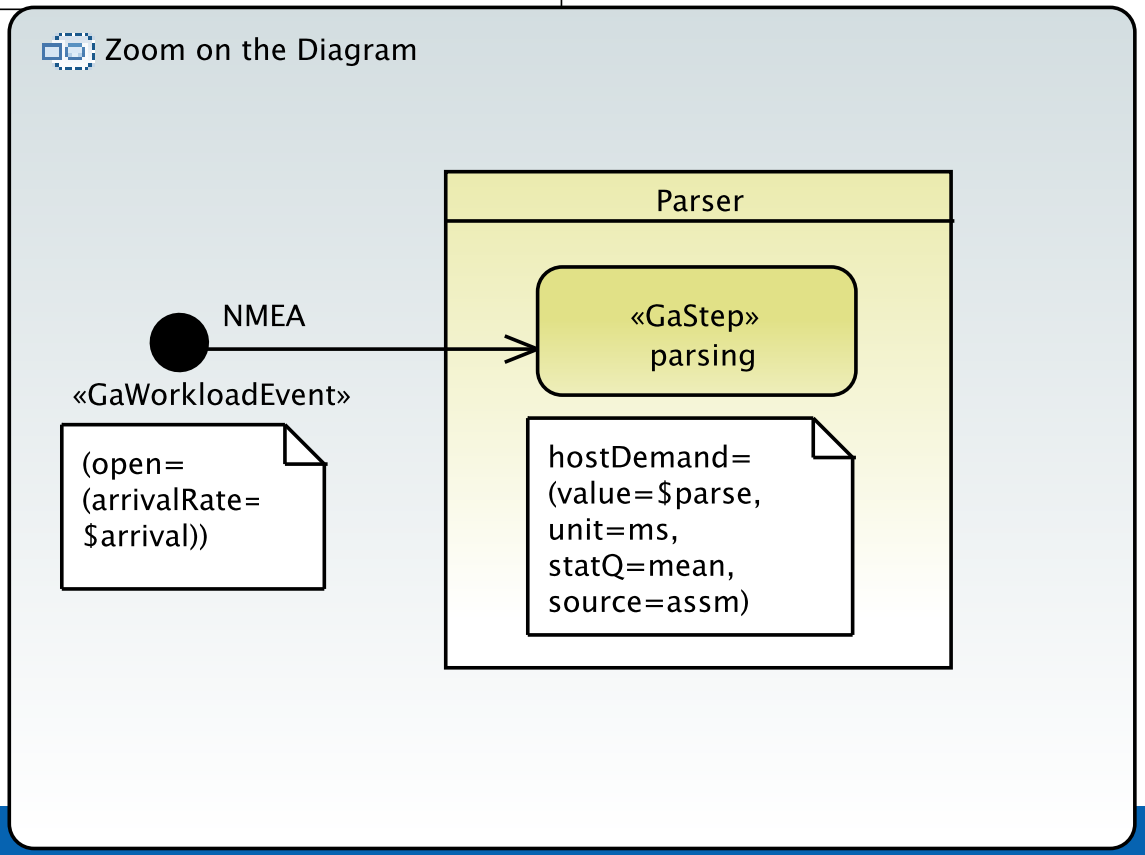


3rd step: Technical solution (3)



4th step: Application of the DICE Profile





Conclusion

- The DICE Profile is being integrated into Papyrus modeller
- Publicly available in GitHub (both: definition and implementation)
  - https://github.com/dice-project/DICE-Profiles
- Pending
  - DTSM level: address more Big Data technologies
  - DDSM level
  - Application to other case studies