

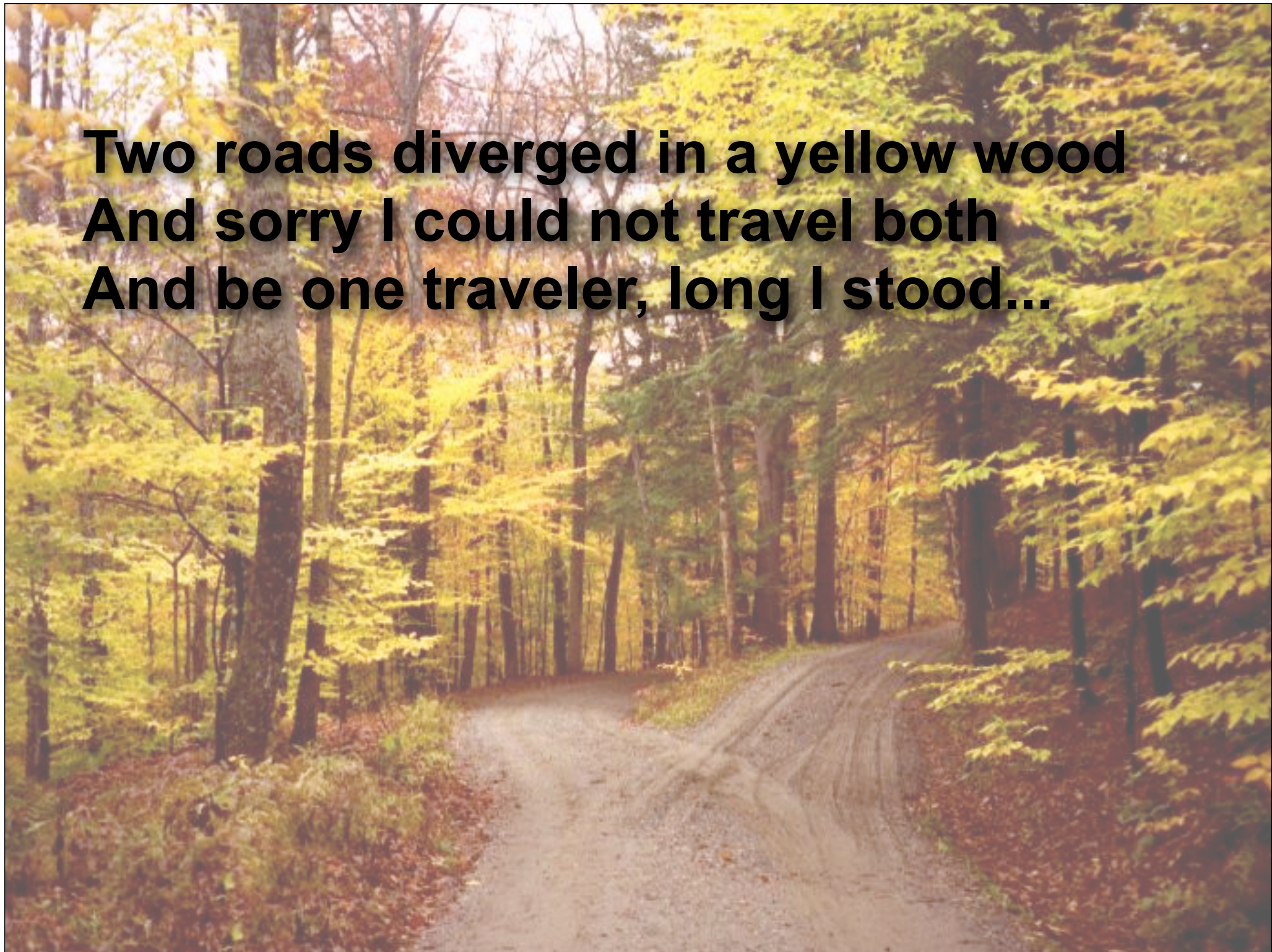
Heterogeneous Multi-core Systems: UML Profiles vs. DSM Approaches

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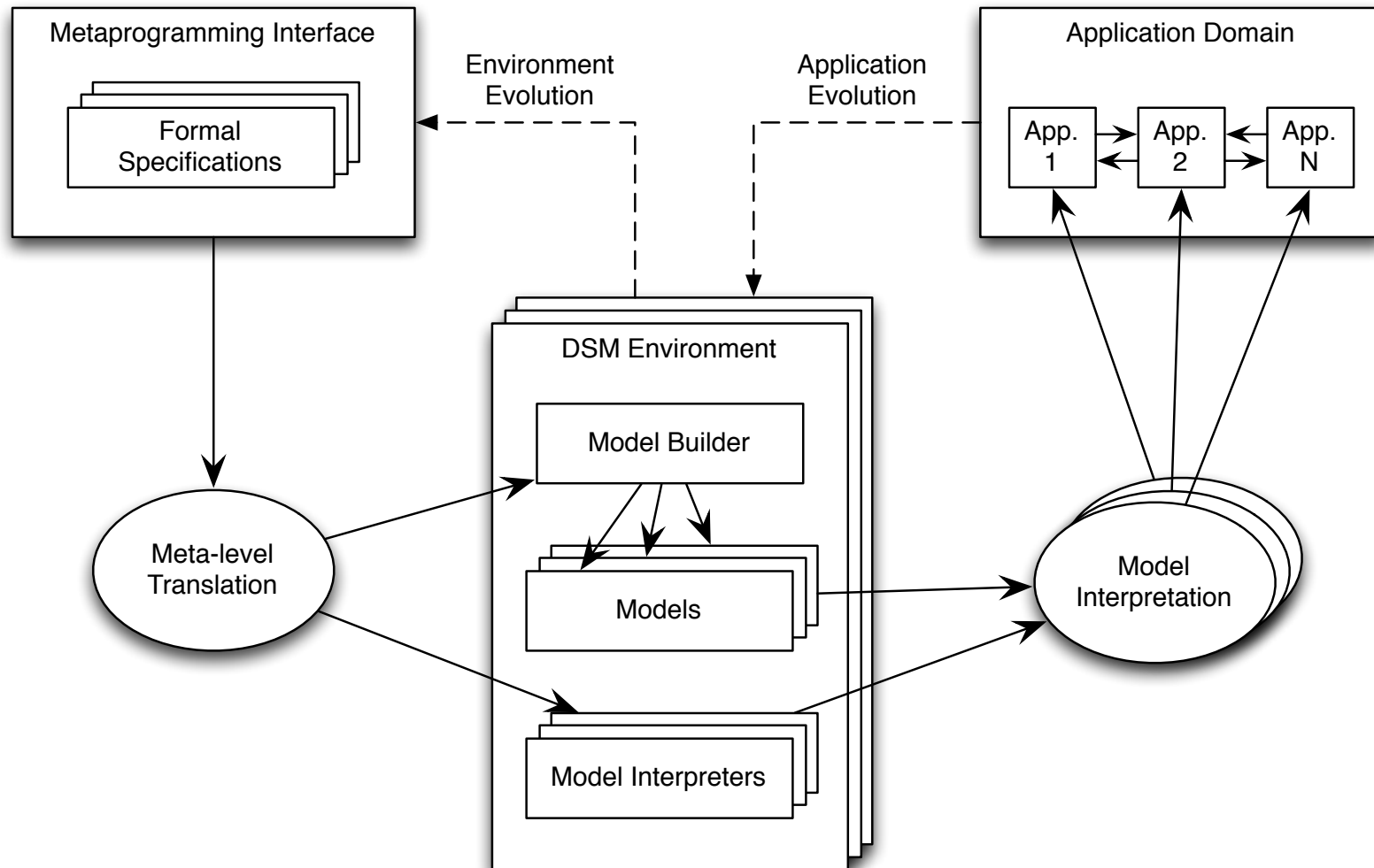


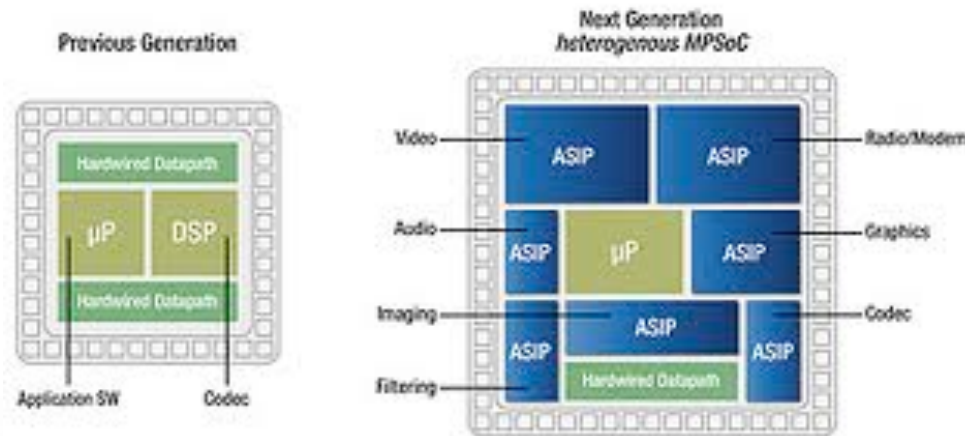
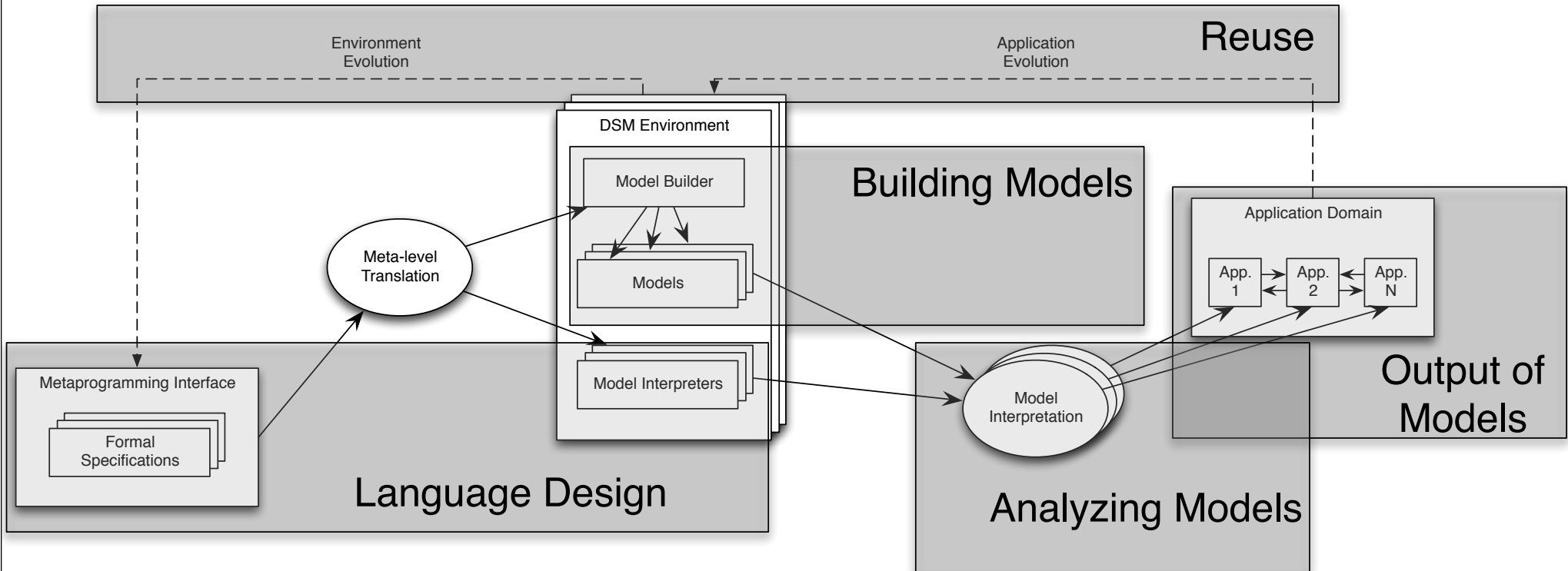
**Two roads diverged in a yellow wood
And sorry I could not travel both
And be one traveler, long I stood...**



- Given a goal system, and a goal of “model based,” how to decide whether to go with UML profiles, or DSML?



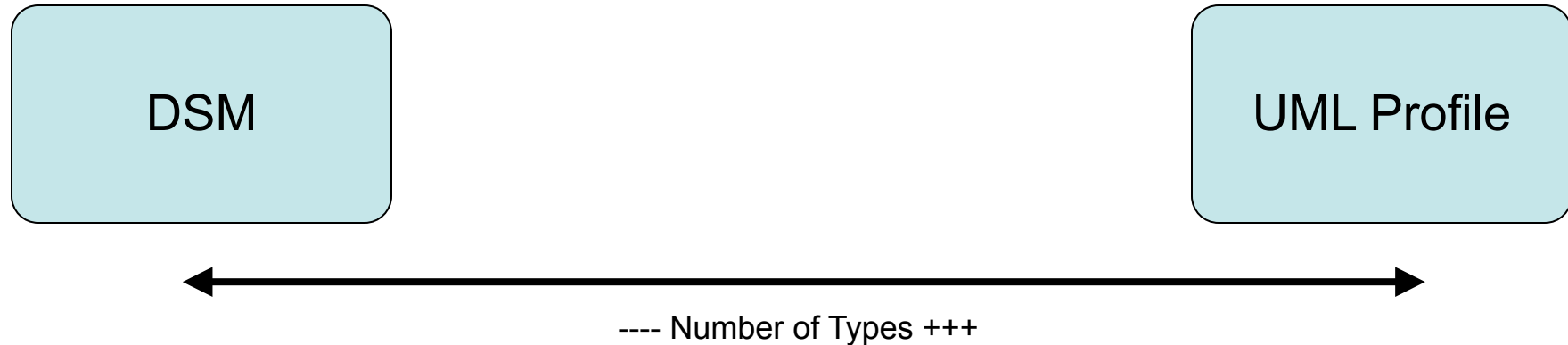




- Questions
 - Effort required to adopt the schema
 - Effort required to design/build models
 - Analysis methods available
 - Output artifacts available
 - Potential for reuse
- Caveats
 - Based on authors' experience
 - Other questions (and caveats) may be valid
 - No one question (or answer) provides a definitive result--only a holistic view of how the balance tips
- Answers provided (along w/ questions) from our case study in heterogeneous application development (HAD)



- Does anyone in the organization have previous experience with profiles? (Yes)
- Does anyone in the organization have experience with domain- specific modeling? (Yes)
- If the answer to only one question is “yes,” then that answer tips the balance in favor of that response.
- Note that it does not necessarily imply that none of the other questions should be answered!



- As number of types increases, complexity of building semantic map (to build tool) grows
- HAD: 10-20 types (not very large)

- What kind of analysis is most important to my output?
 - Existing tool: no edge to either side
 - No tool exists? give edge to DSM (fewer objects permits lower barrier to extrapolating analysis artifacts)
- HAD:
 - Significant analysis already exists in UML MARTE profile
 - Could be difficult for a DSM approach to compete with this

- What will I do with these models when the design is complete?
 - Generate XML? etc.: UML Profiles
 - Generate customized code? etc.: DSM
- HAD:
 - Goal is to integrate OpenCL (concurrent language), which has no clear semantics in UML MARTE Profile
 - Tips favor slightly to DSM, as customized generator is required

- Is reuse of models (to other applications) important to the problem?
 - Yes: UML (ease of extracting non-profiled structure, and passing it onto other models/applications)
 - No: DSM (perhaps useful to make transformations, but model is usually the final artifact)
- HAD:
 - Reuse is not really important, if it is, then trivial to regenerate UML MARTE profile models from DSM models

- Slight edge to DSM, since output artifacts (and their structure/semantics) not immediately clear, so custom generators required
- If no one on the team had DSM experience, however, then UML Profile would probably be the way to go
 - Better resources (in a corporate world) for UML Profiles
 - Better tutorials and examples
 - Myth (or reality?) that UML Profiles are industry standard
 - Nobody ever got fired for hiring IBM
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