

# Services to provide support for the adoption of UML-B Event-B and RODIN tools for the Thales Feasibility Study

# Quotation

A quotation for work to be performed by

**ECS Partners Ltd**

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United Kingdom, SO17 1BJ

Company number 4684407

for

**Thales Group - Division Transportation Systems**

Supporting the adoption of UML-B/Event-B and RODIN in the Thales Feasibility Study

# 1. Introduction

This is a proposal for the provision of a package of support to enable the adoption of UML-B/Event-B, RODIN tools and related methodologies for the industrial development of Railway Control Applications.

The proposal is in response to a Enquiry from Thales Group - Division Transportation Systems (Thales, Romania) for Technology Training and Support Needs for a ‘Railway Control Application Development – Feasibility Study’ ( CMCS:001SCM00149109;01P03 ).

The Enquiry states that a Prototype Railway Control Application will be developed during a 3 months project.

In reviewing the details of the Enquiry we believe, based on our experience of providing support to other organisations in similar projects adopting the tools and methodologies, the outlined needs are reasonable. We believe that ensuring adequate, ongoing and relevant coaching and support during the 3 months project phase will make the chances of successful adoption more likely. There is of course a cost to providing a significant amount of support during this period but we have experience of a number of industrial projects and this has proved to be a beneficial investment.

The aim of consultancy activities within the package of support we propose is to provide the necessary training, advise, tool extensions, etc. to allow Thales to make effective use of the tools and methodologies on the project.

# 2. Training

The first activity is the basic provision of training in the tools and related methodologies.

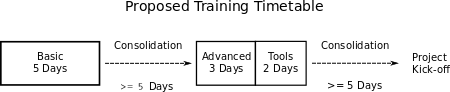
Location: The training will be conducted at a facility provided by Thales in Stuttgart.

Pre-requisites: The training will be most effective if the attendees have;

* Undertaken some preliminary reading of material on Event-B modelling. We will provide references to appropriate materials prior to the training.
* For the tool development course a working knowledge of Java and developing Eclipse plug-ins including use of the EMF and GMF packages.

In reviewing the details of the Enquiry we would recommend that the students considered advanced users also attend the basic module. Given the class size we feel the training is best arranged in 2 sessions, of 5 days duration each, with a consolidation period of one week in between the sessions. We suggest the consolidation period so that the trainees have a chance to assimilate and experiment with the topics covered in the first session before moving on to the advanced topics such that class of students as a whole is best prepared for the project.

Exercise will be set by us during the consolidation periods to aid the learning. Support will be provided via telephone and email during this period to undertake the exercise and to reinforce the learning.



Both training sessions will be delivered by Dr C.F. Snook who has expert knowledge of UML-B and Dr A. Edmunds who has expert knowledge of the code generation tools. Both, Snook and Edmunds have extensive knowledge of Event-B modelling with the Rodin toolset and are experienced developers of Rodin plug-ins.

Session 1 (5 days) will cover;

* The topics requested in the Enquiry, specifically 2.1 Module – Basic User

Following the initial training session an exercise will be provided for the consolidation period to aid the learning.

Session 2 (5 days) will cover;

* The topics requested in 2.2 Module – Advanced use

The Enquiry requested that Module allow for the understanding of the results of models reported on in ADVANCE Deliverables. While these explicit models cannot be made available, because this case study is subject to IPR restrictions, we have other models of rail networks that can be made available as part of this training.

* The topics requested in 2.3 Module – Tools Developer

In addition to the areas requested in the Enquiry we also recommend including the Event-B EMF and Generic Diagrams support framework because several plug-ins rely on this. We will provide material on this topic in the tool development section.

Following the second training session a further exercise will be provided for a second consolidation period to embed the learning prior to the Prototype phase.

# 3. Coaching and Support for Prototype Development

The training phase should provide a strong foundation to allow Thales to make effective use of the tools and methodologies on the proposed prototype development project.

We expect the Prototype Railway Control Application will be developed during a 3 months project shortly following the training.

In reviewing the details of the Enquiry we believe, based on our experience of providing support to other organisations in similar projects adopting the tools and methodologies, the outlined Prototype Goals are reasonable but are quite ambitious given the proposed three month allowance.

Looking specifically at the Prototype Goals, the specification of the interlocking control, interlocking environment and safety properties are achievable provided informal requirements already exist for these. Ideally these requirements should be available to the Southampton team for the coaching to be effective (under NDA if necessary). Proof of correctness should be achievable provided the models are not overly complex. Visualisation will be achievable using a combination of the state machine animation plug-in and BMotion studio plugin. Code generation and test case generation are likely to require further customisation of the relevant plug-ins.

In order to give best chance to achieve the Prototype Goals, both Snook and Edmunds will each devote a significant proportion of their normal working time to providing coaching and support during the three-month prototyping phase to ensure that the project progresses quickly. Snook and Edmunds will need to work closely with the Thales team to ensure appropriate Methodology and tool usage in the required tasks to achieve the defined objectives.

The Thales team will be based at Thales premises in Romania. In order to ensure the project progresses it is proposed that Snook and Edmunds both make 3 on-site visits of 3 days each at monthly intervals during the duration of the prototype development to ensure close working interaction with the Thales team.

During visits the Thales team can select whatever topics they need to receive coaching or assistance with for supporting the prototype developments. This could include assistance with modelling and verification as well as development of plugins or support for Thales to develop plug-ins.

At other times both Snook and Edmunds will be provide remote assistance by telephone in addition to email to support day-to-day activities or queries. The support is provided during UK office hours, 9am to 5pm.

As well as reviewing and providing input to prototype developments Snook and Edmunds will be provide support for tool bug-fixes and engage with Thales engineers to allow them to propose fixes for submission back to the tool’s public repository.

This proposal cannot by it’s scope include significant bespoke tool development effort or extensive coding activity apart from that requested during prototype development support visits.

Should an issue be identified that requires significant additional development then advice will be provided such that Thales can decide whether to request a quote for the additional work to be undertaken or to undertake the work themselves with continued coaching from Snook and Edmunds.

# Other Support

The Rodin toolset has been developed with funds provided by a range of funding bodies and additional industry sponsored projects has helped establish appropriate adoption models and expanded our Community of users. We are working to develop an active technical community, members of which contribute ideas and new plug-ins (which provide functionality) for all to share.

Under our current funding we are able to fix reported bugs in the Rodin toolset. Southampton contributes to the overall Rodin platform and as part of the on-going developments we will make changes to the tools based on activities and issues within the 3 month project.

There are some parts of the Rodin toolset that we do not have direct control over and while we can assist in getting bugs determined and logged for these, any fix may be dependent on the original tool provider and might come as part of a periodic schedule. We would attempt to provide fix support to the best of our ability but timeliness cannot be guaranteed.

The Rodin development team are also willing to consider feature requests for the open source tool set so that it aligns with the needs of industry and where these align with the generic aims of the funding projects they may be incorporated freely into the development cycle. Any feature request that is outside the scope of existing funded projects can be considered but may require funding from Thales either via a development that Thales engineers can make or via separately quoted and Thales funded development by the expert team here in Southampton.

We feel this system of mutual interest in adoption of the tools and methodology by an expanding, active technical community with ongoing support underpinned by an expert team is beneficial to all. While we can seek funding for the core development activities we also need to undertake fee based Services to ensure the adoption and to continue to be able to provide a level of core expertise with practical experience that the community can continue to depend on.

For other clients our Services have included helping adoption via client specific customisation of UML-B to fit better with their in-house process. Within this proposal we can advise on any tool customisation that would facilitate further adoption within Thales. We maintain the expertise to undertake or advice on such customisations but development of significant activities would need to be part of a separate quoted contract.

Our model is essentially not-for-profit: revenue generated by our Services not only supports the direct employment costs of providing the Services but supports our continuing promotion of the tools which of course are open source and have no direct license fees. We look forward to working with you to meet your own immediate project goals and in encouraging you to be part of our expanding, active technical community and in spreading best practise in the adoption and impact of the tools and methodologies.

Costs

The quotation is an outline estimation of all costs including time of the consultant, any necessary travel, consumables and other related costs.

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| **Item** | **Description** | **Cost**  **£** |
| **1** | Preparation and delivery of two weeks of training, consisting of 5 days basic, 3 days advanced, 2 days tool development and continued remote support for periods of consolidation including exercises to reinforce the learning prior to 3 month project. | **12,680** |
| **2** | Estimated costs for travel and accommodation in Stuttgart for training. | **3,900** |
| **3** | Coaching and support during Phase 2 with remote and on site support from Dr Snook and Dr Edmunds. | **31,680** |
| **4** | Estimated costs for travel and accommodation in Stuttgart for three on-site visits during 3 month project. | **5,700** |
|  | **Total** | **53,960** |

Our Proposal is based on our experience of providing equivalent support to other organisations in similar projects adopting the tools and methodologies and is based on making the successful adoption more likely.

While we believe this is an appropriate resourcing for the project we recognise that each organisation has their own view of needs and expectations of support. We would be happy to review our proposal with you if anything is unclear or requires further refinement.