Before we begin, we would like to thank the reviewer for carefully reading our paper and for the detailed comments that helped us to improve the readability and technical quality of it. Next we present our replies to his/her comments, as well as the modifications we have introduced in the paper to clarify some points.

**Reviewer #2:**  
  
Page 1, line 44. Do not understand the sentence:  "and privacy to the final user .. raised" - who is the "final user" and the use of "raised" do not seem appropriate.

Response: We have changed the sentence in order to express the former idea behind it. The idea was to show that formal methods and new computational paradigms such as Grid and Cloud Computing must go hand in hand to preserve users’ privacy.  
  
Page 1, line 46: ", as Web" -> "such as web service."

Response: Fixed.

Page 2, end of section 1: Should provide a more complete overview of the paper and not only explain what the next section is about.

Response: Fixed.  
  
Page 3, line 29: - talks about a barred form of reply. In general this notion of "barred" reply is not clear from the paper and should be better explained. The word "barred" at this stage of the paper means very little to the reader.

Response: We have explained this aspect with more detail.

Page 3, line 46: the sentence starting with "These specification allow." is unclear.

Response: We have rewritten the paragraph in order to clarify some concepts that are important for a better understanding on how WSRF works. Thus, we have added a short explanation of the two main concepts behind of WSRF. Nevertheless, it is out of the scope of this paper to completely describe the standard and how it works.

Page 4, item WS-ResourceLifetime. It does not become clearer until later why the associated operation is called "setTimeout" instead of "setLifeTime"

Response: Fixed.

Page 5, line 33: "we define rules for nearly all possible activities" - it would be much more precise to say which ones you leave out, why, and explain the difficulties with the remaining activities.

Response: The rules cover the activities indicated in the syntax, which are main WS-BPEL activities together with the main WS-RF related activities, so they are clear from our syntax. Some possible extensions are actually indicated in the Future Works section.

Page 6, put footnote 1 as a reference instead.

Response: Fixed.

Page 7. Suggest to split 4.1 and 4.2 into two sections at the top-level so that you have a section for the new class of nets, and a section for the translation. Currently, section 4 is very long.

Response: Fixed.

Page 8, conversion table. It would be good with a column "Description" that gave a short explanation of the individual constructs. Also, the "Model" entry for the last row deviates from the model given in other rows - why? The model for subscribe has an "A" parameter but it is not present in the corresponding syntactical element.

Response: We have introduced the table to see the equivalent constructions in a schematic way. However, the definition of a formal model always requires to abstract or remove some aspects of the original model, or even to introduce some slight changes, in order to cover properly all considered aspects. Thus, the subscription operation introduces an activity as argument that does not appear in the original specification, which is the reaction of the subscriber to a notification message (which is therefore abstracted). Accordingly, the resulting formal model allows us subscriptions and notifications, but instead of capturing notification messages, we directly indicate which the subscriber reaction to these messages is.

Page 9, line 31: talk about "applying the translation" At this stage of the paper, the translation has not been specified yet. This makes this part of the paper rather difficult to follow.

Response: We have changed the order in which the translation is presented. We now start the translation with the basic, structured and WSRF/WSN compliant activities, after which the PTCPN structure is defined at orchestration level.

Page 9, line 31. You have a reference to Fig 1 but when none of the translation has been specified, Fig 1 cannot be interpreted at this stage - you need to add more explanation of Fig 1 at this stage of the paper.

Response: Fixed. Same explanation as in the previous point.

Page 12 - you use the word "arrest" in conjunction with the "control" place. Aborting/ halting might be better.

Response: Fixed.  
  
Page 13, Figures 4-12 where you sketch a translation. The intuition of the translation is clear from text - and the present form of the figures illustrates also the ideas, albeit some of them are difficult to precisely interpret - in particular Fig 6. . Still, it would be better if a concrete example was also used in the paper of the paper since all the ".." leaves a lot of interpretation to the reader. Some of the naming used in the models could also be improved. E.g., a transition name like "t0" says very little about the purpose/role of a transition.

Response: We have included a small example that will help the reader to understand better how the pick activity works. Moreover, we have added more explanations about the places and transitions.  
  
Page 15. The presentation of the detail of the auction system and it corresponding CPNs is very sketchy. The behavior of the agents on page 18 is hardly explained, and you show just the top-level of a simplified PTCPN for the auction system. Please also explain in what sense the PTCPN is simplified compared to what you translation would generate. It would give the work more credit, if this case study needs to be explained in more detail and in a much more systematic way.

Response: We have developed a more complex and detailed example with more participants in order to show the scalability of our nets. In addition to this, we have carried out a more complete analysis of the case study.

Page 20, line 42. You say that your approach enables analysis and verification, but this has not really been demonstrated in the paper. In particular the use of time intervals on transition represents a challenge in the context of state space analysis for CPNs because standard state space does not combine with probabilistic distribution (state space will depend on the concrete random values). Hence you present model seems only amendable to simulation analysis.

Response: We are now aware of a new version of CPNTools, which (version 3.5.4) allows us to attach time intervals to transitions, so that when a transition is fired, it produces a token on its output places whose time stamp is randomly selected from inside the interval. But the real novelty here is that the tool now generates the state space taking into account all the possibilities inside the interval. Thus, verification can actually be done with this new version of the tool, otherwise we would be limited to consider deterministic waits, like wait (a,a).

For further information about this new feature of CPNTools please refer to:

<http://westergaard.eu/2013/01/demo-of-time-intervals-and-time-equivalence-reduction-in-cpn-tools-4/>

Technical/scientific quality:  
  
Page 3, 2nd paragraph: it is stated that only integer variables are considered - but nowhere in the paper is it discussed why this restriction is required nor how difficult it would be to consider non-integer variables.

Response: It is said in the paper that this restriction is introduced for simplicity; the main changes required would be to consider general colors in places associated to variables, and the same for resources.

Page 6, Def 4.1. This definition could be made more easy to follow, by saying that a PTCPN is a CPN = (...) as defined in [10] with the following restriction (then list restrictions ) and the following additions (the list addition in bullets).

Response: We have changed the definition, taking the definition from [1] and describing the specific model we use from it.

[1] K. Jensen and L. M. Kristensen. Coloured Petri Nets - Modelling and Validation of Concurrent Systems. Springer, 2009.

Page 6, Def 4.1. Currently, you are leaving out colour sets and the  initial marking function. Another problem with Def 4.1. is the definition of V. You say that they all initially have value one. It seems that you are confusing variables in the web service system and variables in CPNs. The latter is not assigned a value unless in the context of a binding of a transition. In the definition of EXPR\_V you also need to say that V is the set of free variables in EXPR.

Fixed: We have tried to avoid this confusion improving the explanations and changing some definitions.

Page 6, Def 4.1: It is not appropriate to refer to a particular tool (CPN Tools) inside a mathematical definition - this leaves the impression that your approach is linked to a specific tool (which is not the case). Also, there is too much text in the definition of the lambda function - better to explain the purpose of lambda outside the definition in the main text.  
The delay function D which associates an interval: better to say that the time interval is uniformly distributed.

Response: We have changed the explanations about lambda. Regarding the tool, it is evident we use this tool, and we must mention this important aspect. We have tried to avoid references to the tool model or semantics, as we are using a formal model coloured Petri nets with time and priorities, but of course with this tool support.  
  
Page 7, line 51: "Vars" should be "Var"

Response: There could be really some confusion about Vars and Var, which we have tried to clarify. Each orchestrator only uses ts own variables (Vars), which are a subset of the (complete) set of variables (Var). The idea is that in a distributed system each component only uses its own variables, so in the expressions it is assumed that the variables used only belong to the orchestrator performing the corresponding operation.

Page 11, In the model patterns presented in Figs 2 and 3 many of the places has an integer colour set even if only the values "0" is used as arc and inscription. This seems to suggest that it would be technically better to use a "UNIT" colour set with just a single value as colour set on these places. The comment applies particularly to the "Control" place. In a number of places you have two arcs in opposite direction with the same inscription. It would be more elegant to use a double arc instead. Finally, you could consider making the "control" place a fusion place to avoid many long arcs in the nets - that would make the nets easier to read as they would have a more explicit control flow that could be highlighted.

Response: We have changed the colour set for those places whose colour set has only a possible value. Regarding fusion places, it could be done, but this is only a graphical simplification.