Taxonomy - Dependability of CPS

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About 30 years ago, Lapri has defined dependability as a logical framework over multiple quantitative properties, such as availability, reliability, integrity, etc. Since then it has been successfully used for characterizing dependability of computational systems. The latest update of concepts and taxonomy of dependable and secure computing was released in 2004 (see link below):

Avizienis, A.; Laprie, J.-C.; Randell, B.; Landwehr, C.; , "Basic concepts and taxonomy of dependable and secure computing," *Dependable and Secure Computing, IEEE Transactions on* , vol.1, no.1, pp. 11- 33, Jan.-March 2004

We consider the possibility to reuse the dependability as a characteristic of CPS.

In this respect, we first plan to investigate whether or not the taxonomy of dependability, as it is defined in the above mentioned document, can be directly applicable to characterize Cyber-Physical Systems. If it is not the case (as our preliminary investigations point), the follow up question is "which extensions are needed, in order to characterize the dependability of CPS?"

We see two principal approaches to answer this question:

- The use case driven approach (which we pursue right now) would require the attempt to apply the dependability taxonomy on different CPS use cases. The missing aspects and/or semantic uncertainties in applying existing concepts to CPS should highlight the points to be extended and/or changed with respect to CPS distinct features. Among biggest advantages of this approach are its practical relevance and the clear intuitive motivation. However, the biggest disadvantage of this approach is the lack of completeness.
- The systematic analysis of intersections of dependability and CPS taxonomies. For this approach, especially the consensus about requirements, constraints, and properties associated with the CPS taxonomy is required. The biggest advantage of this approach is that it would cover the complete research room. However, to our knowledge there is no such CPS taxonomy available. Therefore we also plan to motivate the discussion in CPS community which would lead to the elaboration of such taxonomy.

Please feel free to post your comments and suggestions related to this topic. We also will be thankful for pointers to interesting papers which might be relevant for this topic.

Looking forward for interesting posts and discussions ;)