assessability

from resilience-building to resilience-scaling technologies: directions

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contributors

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research topics

GA1 - Integration of modelling in the engineering process
GA2 - Data selection, collection, validation
GA3 - Dependability cases
GA4 - Security quantification
GA5 - Benchmarking
GA6 - Model complexity
GA7 - Metrics/models for evolution processes
GA8 - Evaluation of dynamic systems
GA9 - On-line assessment for resilience
GA10 - Trust and cooperation
GA11 - Verification of mobile computing systems
GA12 - Abstraction
GA13 - Test methods for aspect-oriented systems
GA14 - Compositional reasoning
GA15 - Emergent behaviours in large-scale socio-technical systems
GA16 - Modelling effect of micro-decisions In the whole system
GA17 - Modelling human behaviour
GA18 - Inter-organisation boundary failures

Assessability

from the project proposal:

motivated by:

“... the fact that current and future systems result from evolutions of pre-existing systems, and, as a consequence, to move from off-line, pre-deployment assessment to continuous automated and operational assessment. ”

roughly defined as:

“the ability to assess their ability to function properly and the quality of service that they will deliver”

with challenges (as anticipated in 2004) in:

- metrics
- mathematical modelling
- observability
- assessable architecture
- argument structuring and confidence
system perspective

characteristics:
- evolvable
- pervasive, mobile
- heterogeneity in scale: small devices, large servers
- everything inter-networked, dynamic coalitions
- new programming approaches

implication for assessability:
- evolving requirements
- large models
- stiff models
- on-line assessment
- self-similarity, chaos

two main returning issues in assessability of evolving systems
1. how to assess the impact of human behaviour (user, operator)?
   - need for models of human behaviour
     - malicious behaviour
     - accidental failures
     - §
   - how to involve humans in test beds, e.g. in mobile systems ('living labs')
2. how to deal with ever increasing complexity
   - on-line solution of formal models, improve composition, abstraction
   - how to measure complex systems, identify emerging behaviour, characterise its complexity, etc.
   - conventional modelling approaches break down in chaotic, self-similar systems
methods & techniques perspective

how do our known methods and techniques (model checking, monte-carlo simulation, Petri net modelling, ...) hold up?

in addition to the complexity challenge, two main issues stand out
1. how to include stakeholder perspective (user, business, regulator)?
   – need for higher-level modelling paradigms for various perspectives
   – need for integration of new modelling approaches: game-theoretic, risk analysis, ...
   – how to deal with the sensitivities around benchmarking
2. how to measure and model security
   – development of a security metric
   – models of threats, impact, analysis of risk

engineering discipline perspective

why is assessment not an integral part of computer system design, deployment and operation?

we urge for new contributions in:
- resilience benchmarking
- dependability case construction and argumentation
- inclusion of assessability techniques in model-driven design and domain languages
- demonstration vehicles

challenge increases: evolving systems implies we must move from design to deployment and operation
assessability conclusion

extensive analysis of research challenges, greatly refining and completing the anticipated challenges

identified the following foci:

- system: *human behaviour* and *complexity*
- methods & techniques: *stakeholder perspective* and *security models & metrics*
- engineering discipline: overarching driver

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