Assurance of Autonomous Systems: Characteristics and Challenges

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The Problem Statement

o In the near future, autonomy will play an important role in many aspects of humans' lives.

o This means that many **essential components** of various main **domains** will become increasingly **autonomous**.

The Problem Statement

o Autonomous systems can be characterized by their ability to make decisions **without human intervention**.

o Autonomous systems present new assurance challenges that can be partially tackled by answering the following **questions**:

RQ1. Can current **assurance methods** address special attributes of **autonomous systems?**

o Many of current **autonomous systems** can be classified as **safety-critical systems**. Therefore, their safe use should be **assured** before they are used in their **operational environment**.

o This can be done by **assessing** their **compliance** with **safety standards.**

RQ2. How can we characterize **humans interaction** with **autonomous systems**?

o Can we guarantee that **autonomous systems** can make **better control decisions** than **humans** with respect to **safety**?

o We know that **humans** are **"imperfect"** but to which extent such systems can be considered **"perfect"** to make safety-related decisions?

o We may need to **adjust** the **level of autonomy** of autonomous systemsin a way that enables them to **safely** perform their activities.

o We still need to investigate how **adjusting** the **level of autonomy** may influence system **performance**.

RQ4. Is it possible to provide **assurances** for existing systems?

o After answering the **three** previous questions, the answer is most likely **yes** we can provide assurances for existing systems.

o This will require providing a **detailed process** to be followed while performing the required **modifications** on such systems.