1. INTRODUCTION

1.2 Provenance Applications

- Trust Assessment
- Workflow Re-execution
- Workflow Validation
- Workflow Reduction.
- Etc...

1.3 Learning and Provenance

One of the unexplored applications of provenance is exploiting it for the purpose of learning. A large store of the previous executions of services and workflows, as well as their specifications, provides an appropriate data set for learning and knowledge discovery.

2. ARCHITECTURE

Fig 1. The overview of the proposed multi-functional architecture.

1. Workflow Model Extraction and Discovery Component: This component is responsible for extracting the workflow pattern and associations that exist among the relevant workflows previously run and executed.

2. Workflow and Service Evaluation Component: Workflows need to be assessed and analyzed to discover how trustworthy the composition of services are, therefore, in case the trust given by a workflow is not satisfactory, the workflow sequence can be repaired and improved.

3. Workflow Repair and Refinement Component: The policy graph is traced to find a path that can replace the defective part of the workflow.

4. Workflow Composition and Generation Component: Having the previous history of executions, provides the data, which is essential for learning, therefore, the composition will be done in a more intelligent way by exploiting the provenance data. This component receives the requirements and composes a workflow dynamically by taking advantage of the service specifications provided in the store.

5. Workflow Service Selection Component: The service discovery phase is much simpler if provenance data is used. Previous executions of workflows along with the workflow templates simplify the process of service discovery for a simple query. The set of suitable concrete services for the abstract workflow can then be selected more optimally by using the selection mechanisms along with the evaluations of previous executions.

3. IMPLEMENTATION

The implementation of the architecture is based on artificial intelligence and statistical methods.

- Abstract Service Selection for Workflows
- Workflow Evaluation
- Workflow Model Extraction
- Service Composition

4. CONCLUSION

- A multi-functional architecture is proposed which addresses the current issues of workflows and services using provenance data.
- The proposed architecture will be augmented with other services to provide more functionality, robustness, and reliability.
- Components will return feedback to the provenance store to feed the provenance data with more information.
- The provenance store gets trained dynamically so that the components would operate more intelligently.