SVOPME
A Scalable Virtual Organization Privileges Management Environment

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on behalf of

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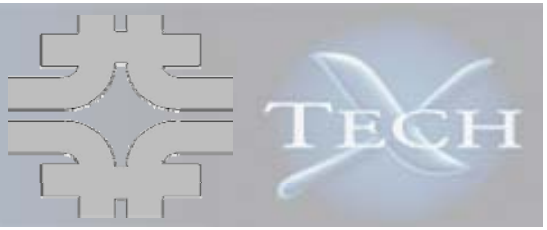
Outlines



- **Project overview**
  - What SVOPME tries to address
- **Proof of concept**
  - Design and capability of the prototype tools
- **Outlook and planning**
  - Plans for a production quality tool

What are VO Privileges?

Virtual Organizations:

- VOs use resources
- VOs wish to define usage policies for various resources for different users within the VOs
  - Example 1: Production team members submit jobs with higher priority
  - Example 2: Software team members can write to disk area for software installations
- VOs define user privileges at different resources to comply with the expressed usage policies
- However, VOs do not manage/configure all Grid sites

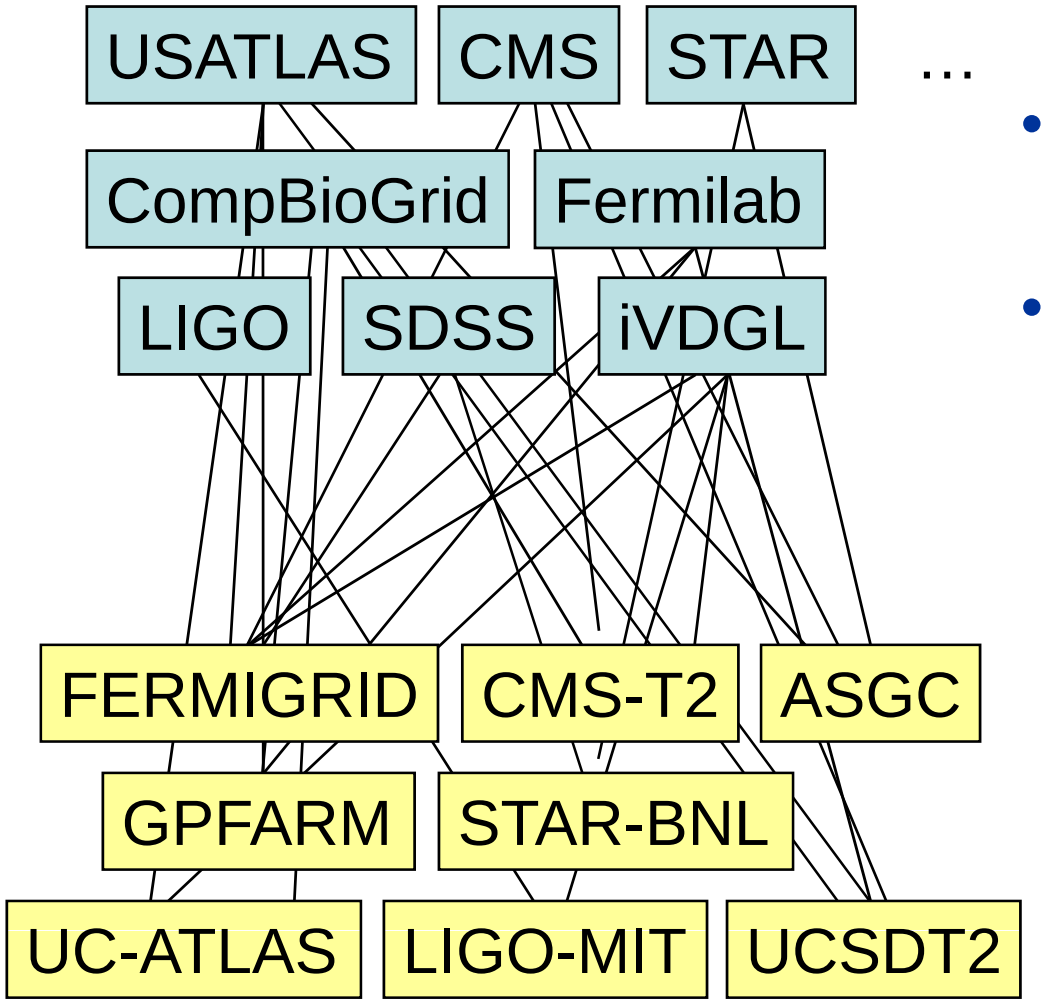
Grid Sites:

- Grid sites provide resources
- Grid sites may want to provide different services to different VOs
  - Example 3: site X has a special agreement with VO Y; therefore, jobs from VO Y might have higher priority than others
- Grid sites help VOs to enforce their usage policies by managing user privileges
- Grid sites don't define VOs' usage policies

Site and VO Challenge: Enforcing heterogeneous VO privileges on multiple Grid sites to provide uniform VO Policies across the Grid
(ad hoc solution: verbal communication)

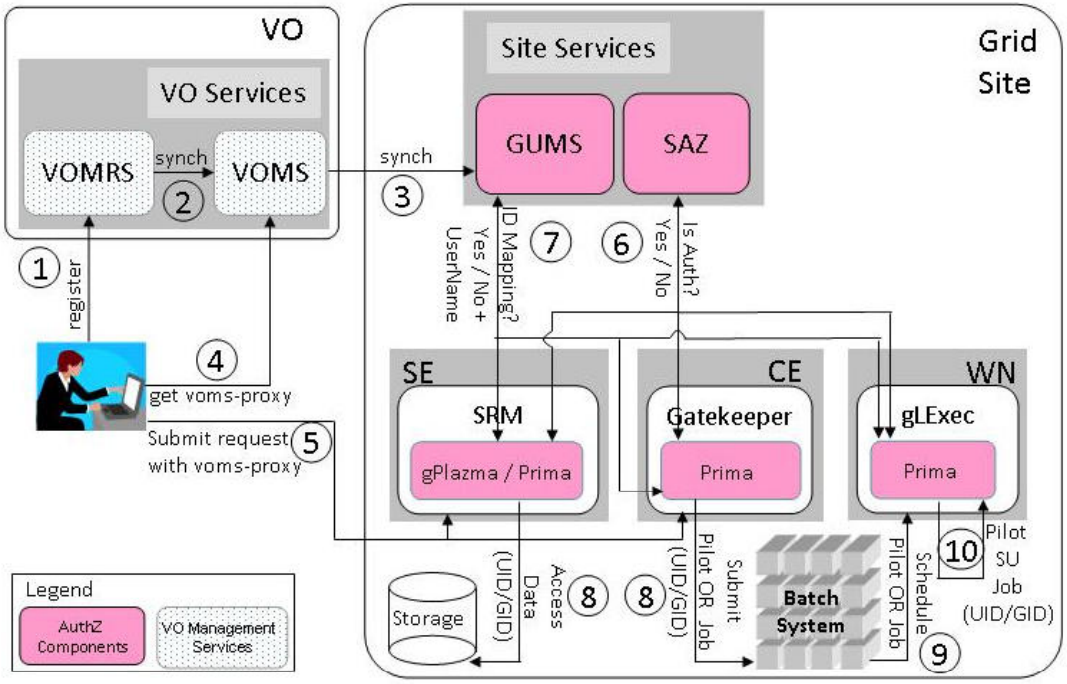
Motivations of SVOPME

Address scalability



- **With the growth in Grid usage, both the numbers of VOs and Grid-sites increase**
- **Serious scalability problems in propagating VO privilege policies**
- **SVOPME:**
  - Provide the tools and infrastructure to help
    - VOs express their policies
    - Sites support a VO
  - Reuse proven administrative solutions – we adopt common system configuration patterns currently in use in major grid sites

Modern User Privilege Management

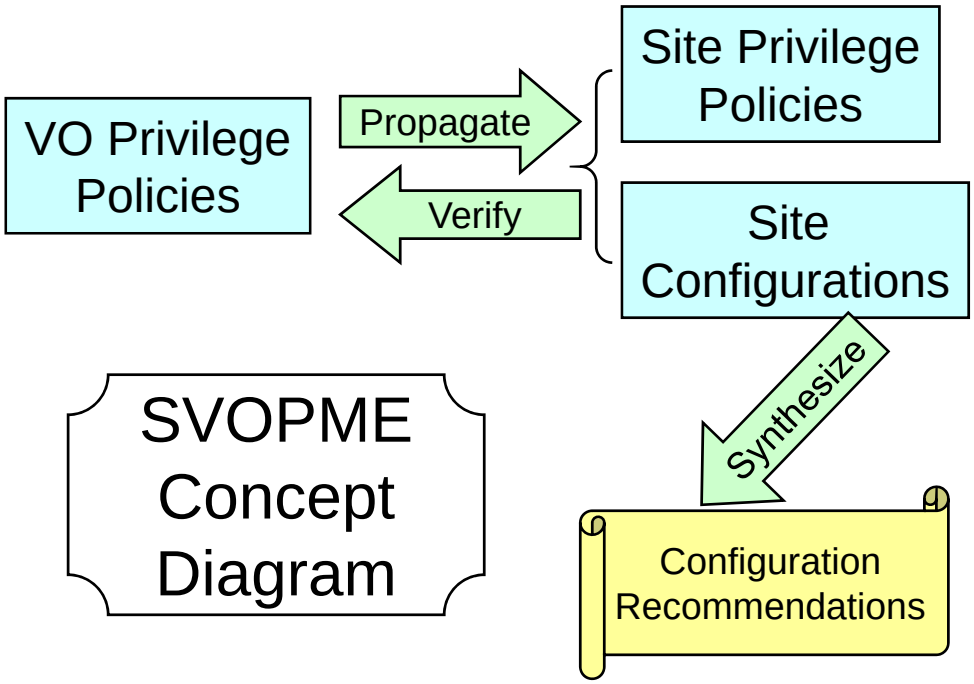


The OSG Authorization Infrastructure

- **Moving away from the use of gridmap files to VOMS/GUMS role-based privilege management**
  - Eliminate the need for multiple user certificates
  - Similar trend can be observed in EGEE (LCAS/LCMAPS + SCAS and VOMS)
- **Managing requests priority for both SE and CE**

Proof of Concept: Prototype Implementation

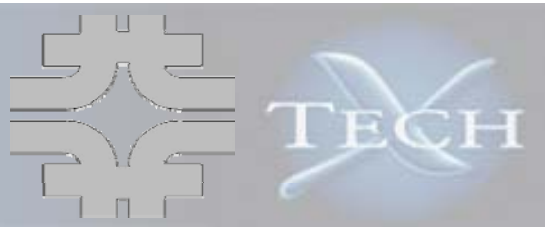
- **Provide validation of the overall approach**
- **Design suitable XML schemas for describing policies**
  - This project adopts XACML
  - Allows aggregation of policies
  - XACML is also used by AuthZ Interoperability project (see CHEP 09 Talk)
- **Determine the information needed in VO and site policies**
  - Compiled a list of resources and policies



SVOPME Concept Diagram

- **A prototype environment for synthesizing administrative directives and verifying VO policies**

Survey of Resources and Policies Managed on the Grid



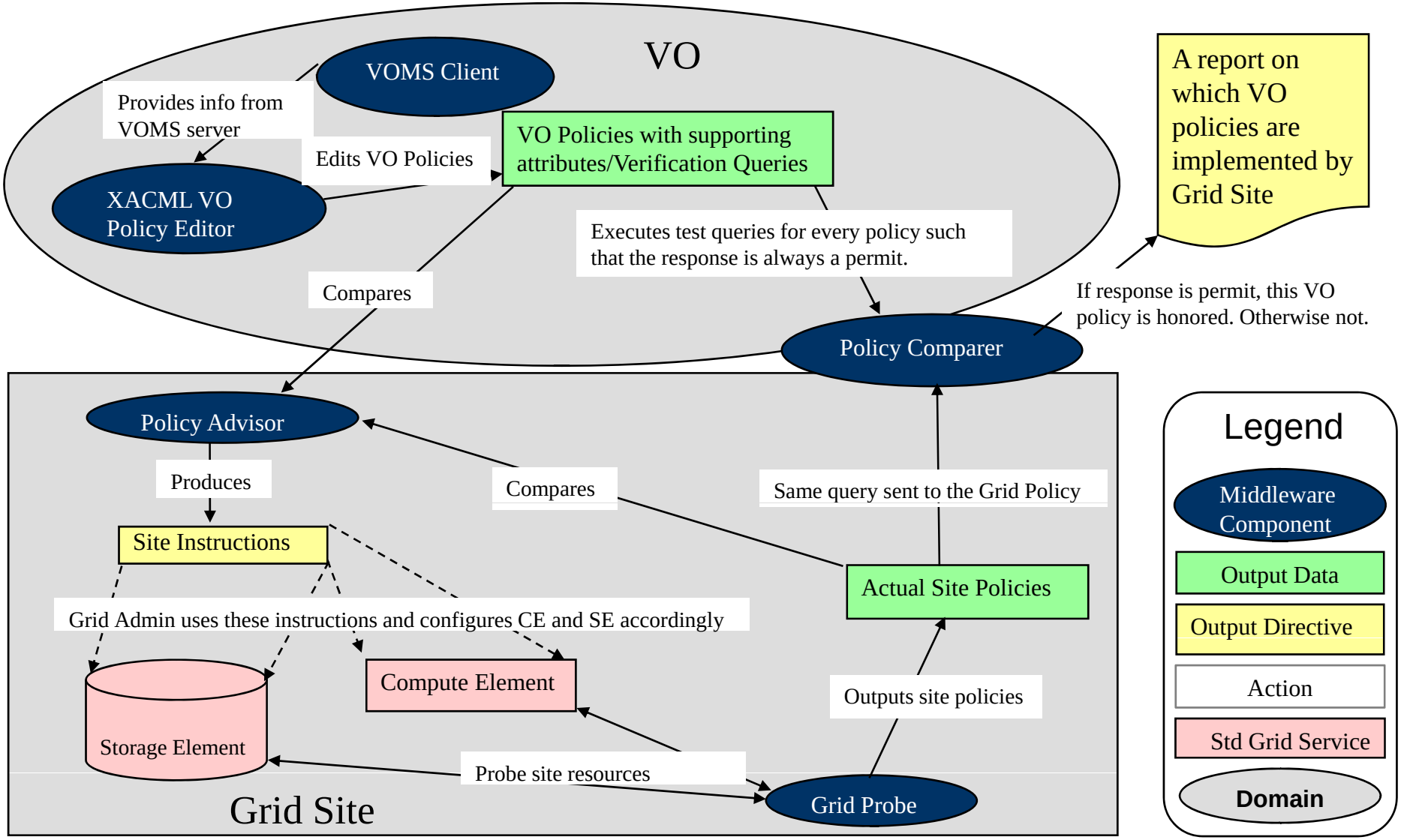
- **Resources**
  - OS protection (account types: group or pool)
  - Batch system
  - File system
  - External storage (SRM/dCache)
  - Network access (inbound/outbound)
  - Edge services
- **Policies expressed by the Site**
  - Timed availability (execution time slots for certain VO users)

SVOPME focuses on VO policies

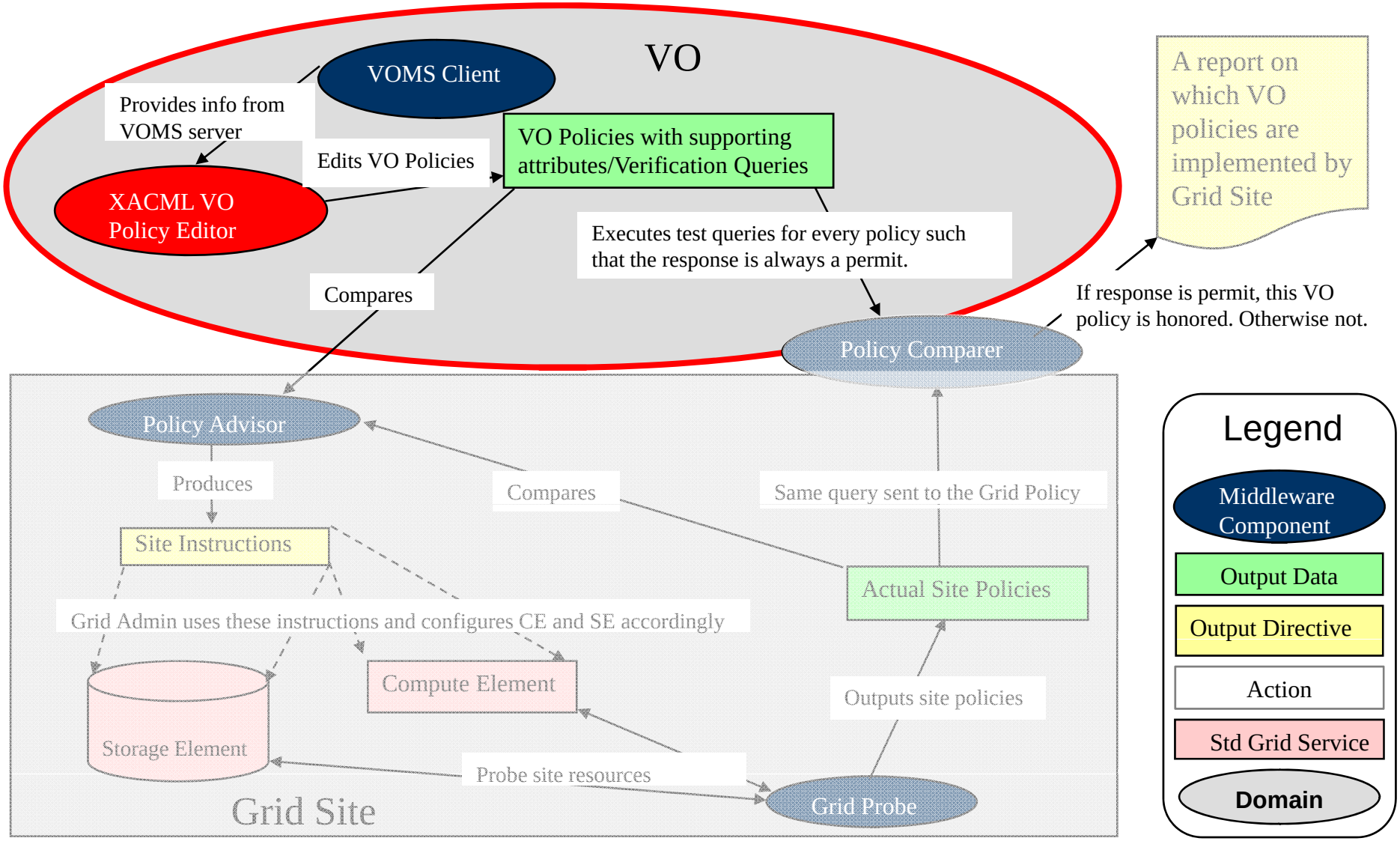
Highlighted policies are supported

- **Policies expressed by the VO**
  - Intra-VO relative priority in batch system
  - Directory access permissions
  - Consecutive execution period
  - Suspension/resumption of jobs
  - Repeat execution (Allowing restart or not in batch system)
  - User file privacy
  - Two roles to share the same GID
- **Policies expressed by both**
  - Disk quota
  - File retention period
  - Account type
  - Network (inbound/outbound) access control

SVOPME Prototype Architecture

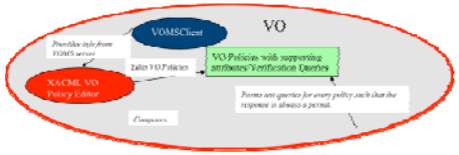


The VO Tool – Used by VO-Admin

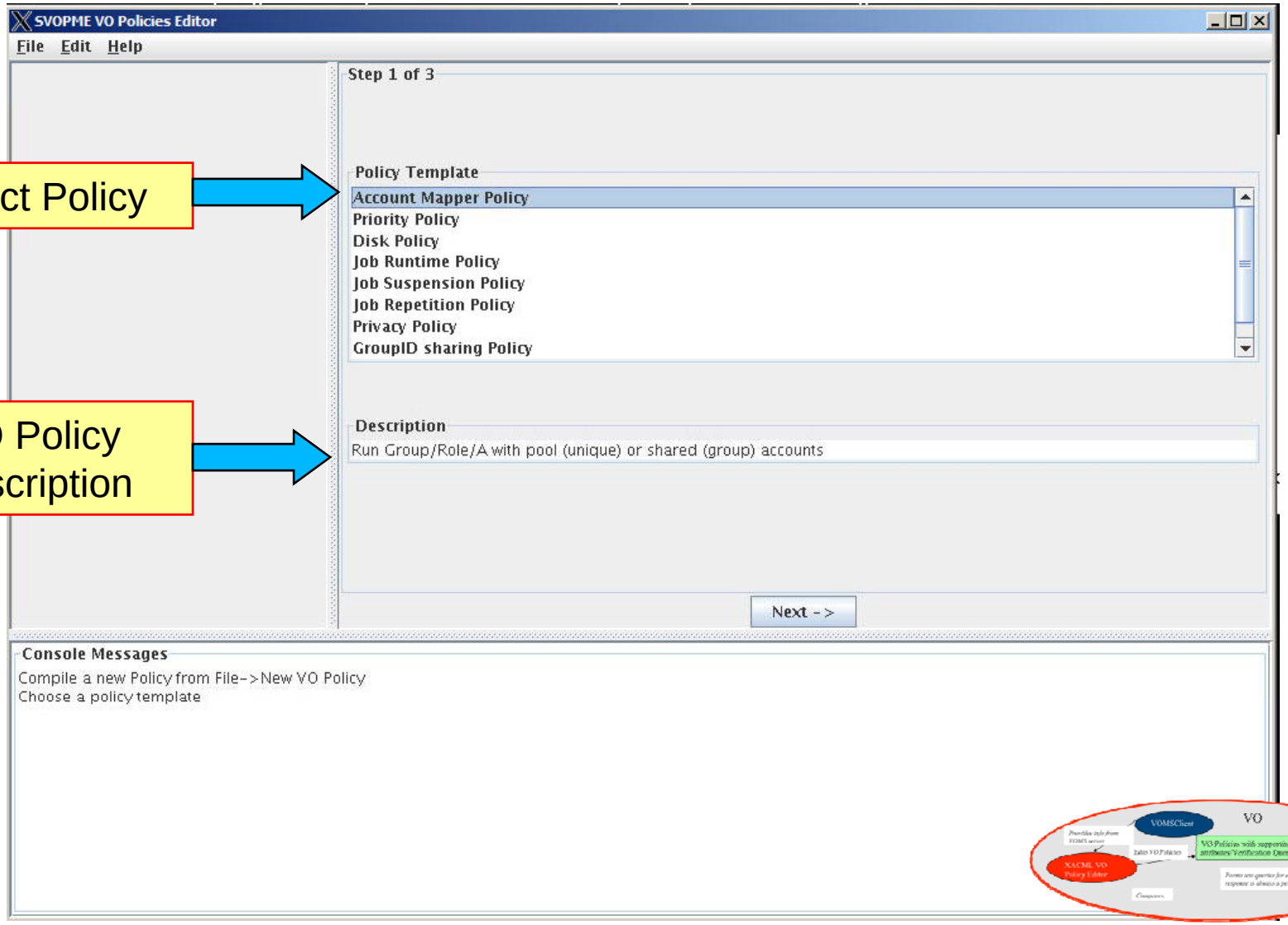


XACML VO Policy Editor (Domain Specific)

- **XACML is a generic XML-based language for specifying access control policies**
  - Not very human readable
  - Suitable for machine processing
- **The VO Policy Editor, therefore, allows VO administrators to edit a set of pre-defined VO policies in simple readable forms**
  - For example: Account Mapping Policy
    - Group _____ should run with pool/group account
- **The VOMS client obtains information about all the Group/Role and the number of users from the VOMS server. This information is passed to the VO Policy Editor to avoid operator errors**
- **The Editor stores the policies and test queries for verification in XACML format to enable automation**
- **Support for new policy types can be added as "Policy Template" plug-in's**
- **We also plan to develop command-line policy editing tools to convert between a text-based policy specification and XACML documents**

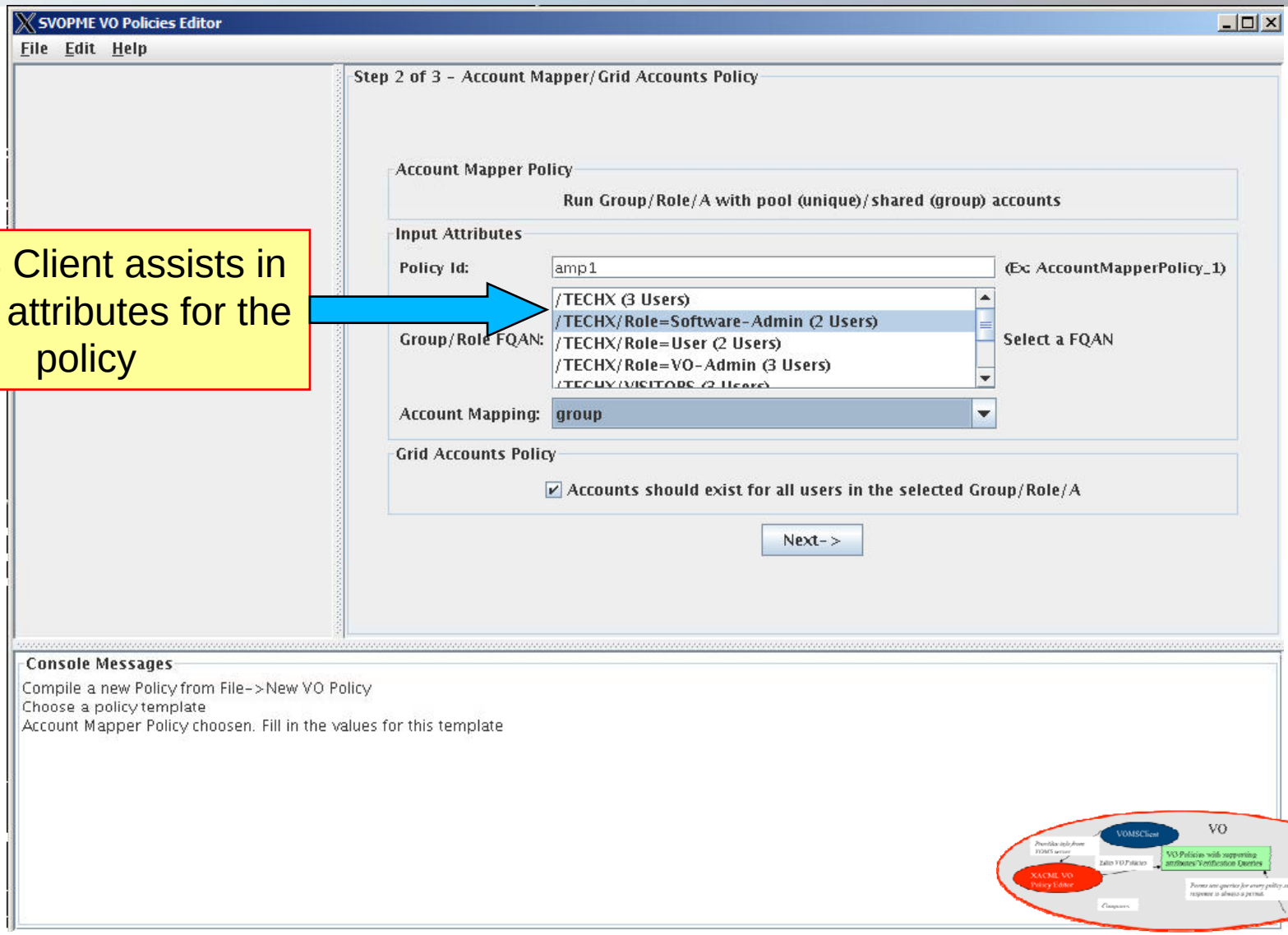


Prototype VO Policy Editor Screen Shot 1
Select Policy Type to Add

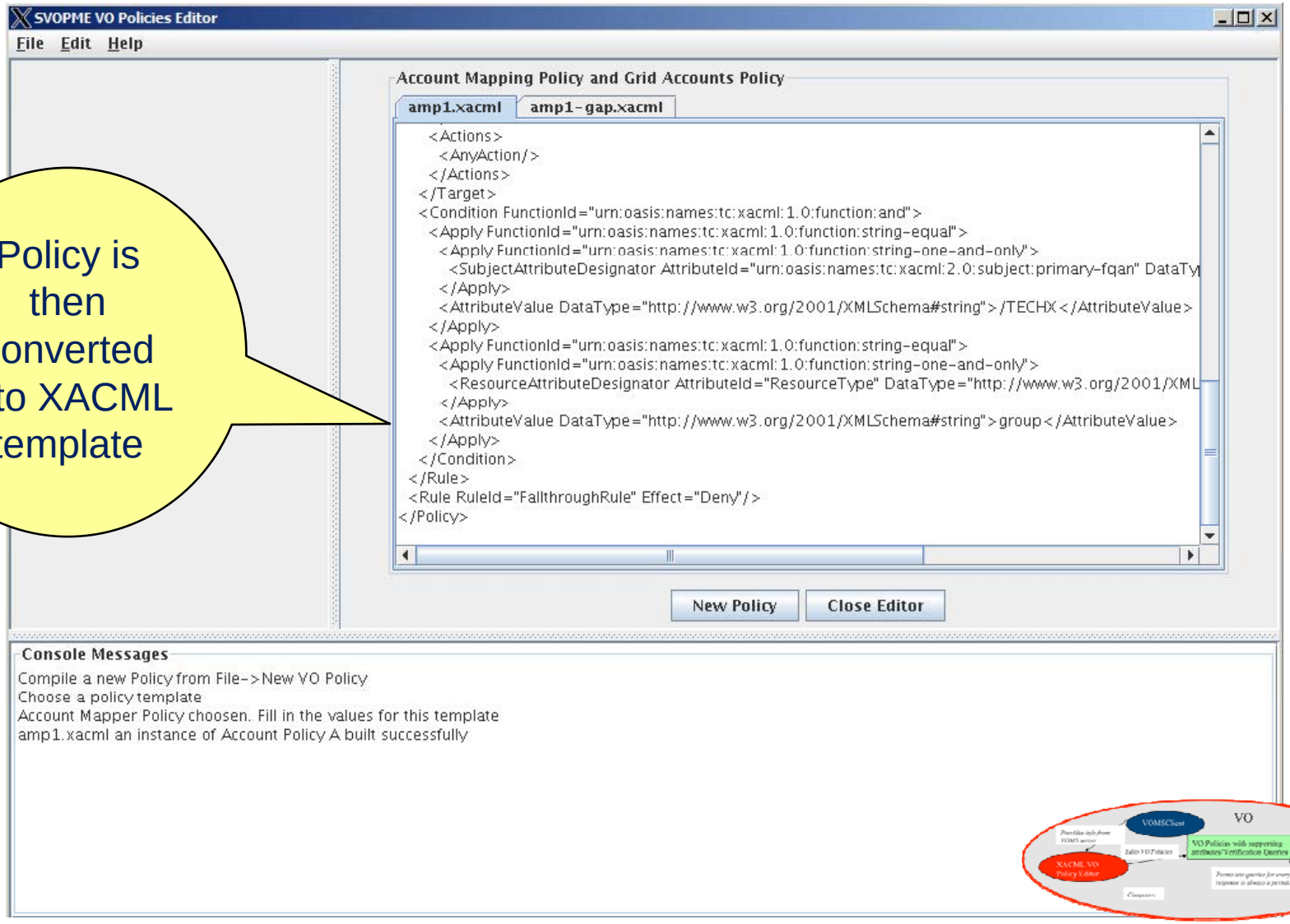


Prototype VO Policy Editor Screen Shot 2
Edit Policy Attributes

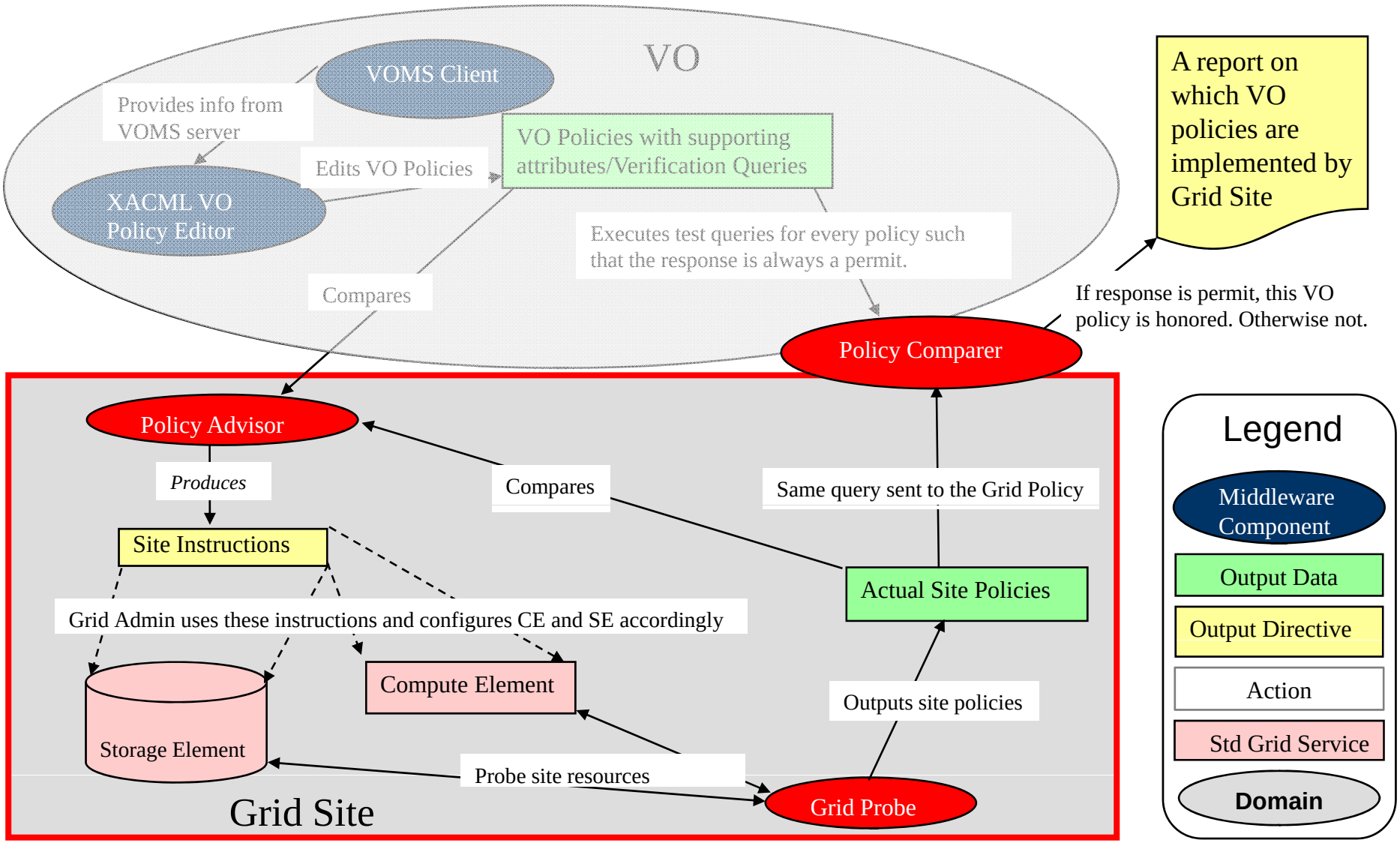
VOMS Client assists in setting attributes for the policy



Prototype VO Policy Editor Screen Shot 3
Allow XACML view

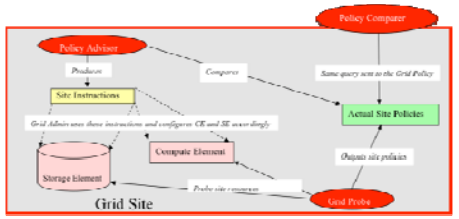


Three Grid Site Tools – Used by Site-Admin



Grid Probe

- **Probes the Grid site local configurations**
- **For Phase-I we probe the settings of the GUMS and Condor systems**
  - GUMS provides info on account mapping from VO user/role to local UID
  - Condor provides priorities of accounts
- **Generates the equivalent Grid side policies (in XACML)**



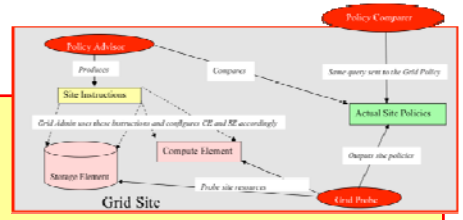
VO/Grid Policies Advisor

- Verify that the Grid site configurations support the VO policies by running the verification queries generated by VO Policy Editor for each VO policy
- Provide advice for the **Grid site administrator** on what amendments need to be done on the Site; such that the Grid site complies with the VO policies
- Example output:
  - VO requested 3 accounts for VISITORS role via VO policies
  - Site-policies derived from GUMS do not match


```
[java] VO/Grid Grid Accounts Policy Advices
[java] ----------------------------------
[java] No matching Grid Accounts Policy was found for /TECHX/VISITORS on the Grid site. Create a mapping in GUMS config such that /TECHX/VISITORS be mapped to at least 3 account(s)
[java] TECHX/Role=VO-Admin mapped to 1 account(s) (techxVOadmin) on the Grid site, is not suffient enough. Needs to be mapped to atleast 3 accounts.
```

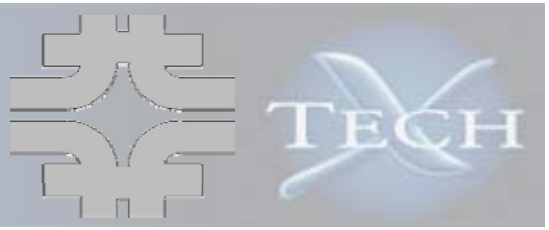
VO/Grid Policies Comparer

- Verify that the Grid site configurations support the VO policies by running the verification queries generated by VO Policy Editor for each VO policy
- Produces a report for the **VO admin** on which VO policies are honored by the Grid site and which are not
- Example output:



[java] VO/Grid Grid Accounts Policy Comparison
[java] ----------
[java] /TECHX/Role=User is mapped to 1 account(s) on the Grid site. Passed!
[java] No Account Mapping Policies for /TECHX/VISITORS were found on the Grid site.
[java] /TECHX/Role=Software-Admin is mapped to 1 account(s) on the Grid site. Passed!
[java] /TECHX/Role=VO-Admin does not have sufficient accounts on Grid Site. Failed! (Needs to be mapped to at least 3 accounts.)
[java] /TECHX is mapped to 1 account(s) on the Grid site. Passed!

Advantages for VOs and Sites



Advantages for the VOs

- No need to run ad-hoc jobs to figure out what policies are enforced and what not
- Provides templates to define commonly used policies
- Automates most of the communication with Sites that support the VO
- Provides the basis for the negotiation of privileges at sites that provide opportunistic access

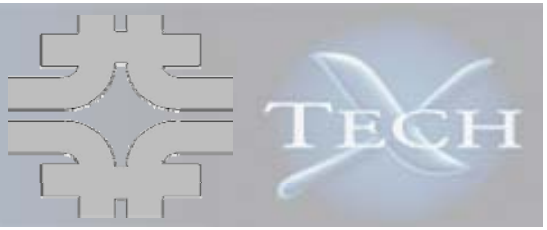
Advantages for the Sites

- Sites can advertise and prove that a VO is supported
- Sites that want to support a VO have a semi-automated mechanism to enforce the VO policies
- Privilege enforcement remains responsibility of the Site, informed by formal VO policy assertions

Future Workplan

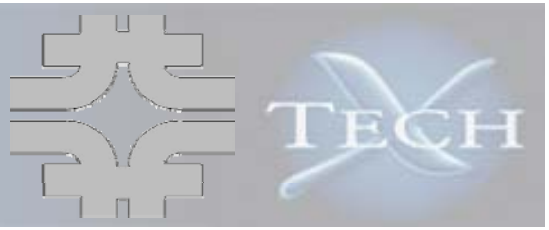
- **Objective 1: Usability**
  - Support a more comprehensive set of VO policies
    - Add support for remaining policies collected in Phase I
      - Not sure if we want to incorporate site-specified policies or not
    - Collaborate with VOs and key OSG grid sites to gather VO policies needed and how sites could support these policies
  - Command-line scripting tools
    - Derive a set of policy statements
    - Embed policy statements in generated XACML

Future Workplan (Cont.)



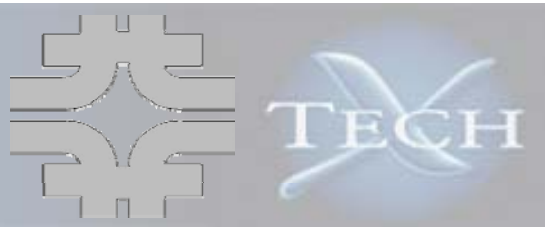
- **Completing Features and Hardening of prototype tools**
  - Overall Feature enhancements
    - Change to use PolicySets for VOs and grid sites
      - Allows us to aggregate policies
      - Supports the semantics of a whole VO or site
    - Modularize components
      - Support new policies
      - Support new grid environments and configurations
    - Support customized policies and queries
  - VO Policy Editor
    - Merge VOMS Client with the Editor
    - Allow opening/editing/saving of existing PolicySet
    - Support browsing of PolicySet
    - Support consistency check of overall VO PolicySet
    - What to do when there's a mismatch between VO and PolicySet
  - Grid Probe
    - Support probing of more resources / configurations

Future Workplan (Cont.)



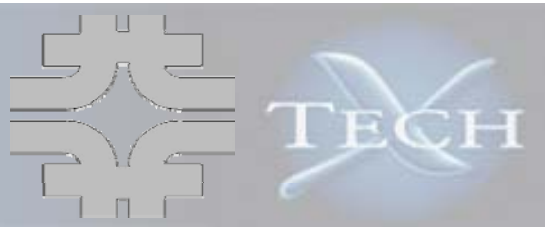
  - VO/Grid Policy Comparer/Advisor
    - Currently, we only check for supported policies but not redundant site policies
    - Address security concerns (of site configurations and policy inconsistency, etc.)
  - Services for VOs and Grid sites to exchange/verify policies
- **Objective 2: Flexibility and Robustness**
  - Modularize system aspects such as Grid configurations and tool stacks
  - Migrate toward a common Grid XACML profile (Authorization Interoperability Profile)
  - Identify and implement more privilege policies
    - Site-specific policies
    - Service contracts between sites and VOs?

Future Workplan (Cont.)



- **Objective 3: Demo the Effectiveness**
  - Integrate with OSG distribution
  - Develop recommendation for running/using SVOPME tools
  - Deployment, documentation and customer service

Conclusions



- SVOPME ensure uniform access to resources by providing an infrastructure to propagate, verify, and enforce VO policies at Grid sites
- SVOPME integrates with the OSG Authorization Infrastructure
- We are extending and adjusting the scope of the project based on feedback and comments on the prototype tools