



Enabling Grids for E-scienceE

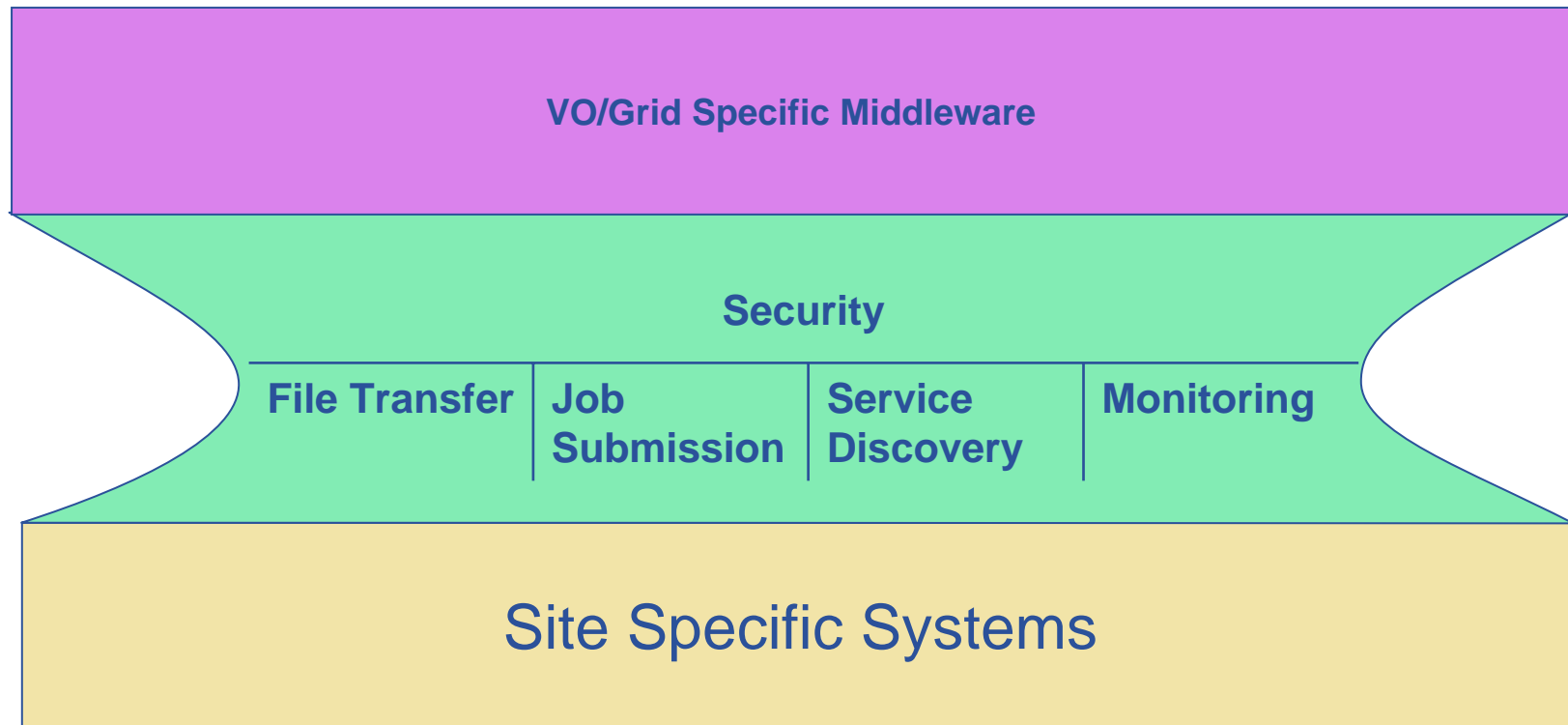
Current Interoperability Activities

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- **Grid Computing is all about interoperability.**
 - Different Batch Systems
 - Different Storage Systems
 - Different Administrative domains
- **Grid Middleware is the implementation of the abstract interface.**
- **Why do we have different implementations**
 - Developed independently
 - Trying different ideas
- **Grid Interoperability, abstracting the abstract interfaces ☺**
 - Long term, standard interfaces
 - Short term,
 - Gateways
 - Translators
 - Moving to Standard Interfaces
- **VOs are already using adaptors**
 - Key hole approach
 - Using minimal functionality from both Grids
 - *Reduced Status Information*
 - Each VO duplicating work
- **Interoperability should improve the situation for the VOs.**
 - LHC, global VOs on a very large scale!



- **The Open Science Grid (OSG)**
 - US grid computing infrastructure
 - Supports scientific computing
 - Schedule driven by U.S. participants of LHC
 - Other projects contribute and benefit from advances in grid technology
- **OSG and LCG built upon previous Grid projects**
 - Grid3 and EDG respectively
- **Grid3 and EDG were developed independently**
 - however, both use middleware from the Globus Alliance

	OSG	LCG
Job Submission	GRAM	GRAM
Service Discovery	LDAP/GIIS	LDAP/BDII
Schema	MDS/Grid3	GLUE
Storage Transfer Protocol	GridFTP	GridFTP
Storage Control Protocol	SRM	SRM

- **November and December 2004**
 - Initial meeting with OSG to discuss interoperability
 - A common schema is the key
 - Proposal for version 1.2 of the Glue Schema was discussed
 - Include new attributes required by OSG, Marco Mambelli
- **January 2005**
 - Proof of concept was tried, Leigh Grundhoefer (Indiana)
 - Installed Generic Information Provider (GIP) on an OSG CE
 - OSG CE was configured to support the dteam VO
 - “Hello world” job, submitted through the LCG RB and ran on an OSG CE
 - Installed the LCG clients available on OSG from a tarball
 - *Oliver Keeble (CERN)*
 - Submitted test job that did basic data management operations

- **Modifications to the OSG and LCG software releases**
 - Updated the GIP to publish version 1.2 of the Glue Schema
 - The GridFTP server on the OSG CE advertised as an LCG SE
 - Automatically configure the GIP in the OSG release
 - Information scavenger script, Shaowen Wang (Iowa)
- **August 2005 (month of focussed activity)**
 - Included first OSG sites into the LCG operational framework
 - Set up a BDII that represented these OSG sites
 - Included this BDII to the LCG information system
 - All OS sites found in this BDII were automatically tested
 - Using the Site Functional Tests (SFT) framework
 - Created a script to install the LCG clients on OSG CEs
- **November 2005**
 - First user jobs from GEANT4 arrived on OSG
 - Started discussions on interoperations

- **The ARC and LCG middleware projects**
 - Shared a common background of EDG
 - LCG is an evolution and ARC is an actual spawn
- **ARC is predominantly used in the Nordic Region.**
 - Also used by a few other sites outside the region.
- **Main differences**
 - GridFTP as the Job Submission interface
 - Was more reliable than GRAM
 - ARC schema

	ARC	LCG
Job Submission	GridFTP	GRAM
Service Discovery	LDAP/GIIS	LDAP/BDII
Schema	ARC	GLUE
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- **Information system gateway**
 - Translate the ARC schema to Glue
 - Use a BDII to represent the ARC sites
- **Add job submission interface.**
 - Condor can submit to ARC
 - Glite RB can use a Condor submitter
 - Modify Glite RB to recognise and submit to ARC

- **Interoperating grids binds them together.**
 - Evolving one will affect the other
 - Must evolve together
- **Common interfaces lead to stronger defacto standards.**
 - Assist standards development

	ARC	OSG	LCG
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- **OSG/LCG interoperability activity**
 - Moving to sustained production operations
- **ARC/LCG interoperability activity.**
 - Well defined plan
 - Progressing well
 - Starting to address operations activities
- **Interoperability binds grids together.**
 - None backwards compatible upgrades even harder
 - Common interfaces lead to stronger defacto standards
 - Must evolve the technology together
- **Don't forget, interoperating infrastructures also need **interoperations!****