



the globus alliance

www.globus.org



Grids & Web Services: Web Service Resource Framework WSRF

Malcolm Atkinson
Director

www.nesc.ac.uk

23rd April 2004



| epcc |



UNIVERSITY
of
GLASGOW



Overview

- **What is the Web Service Resource Framework**
 - Why has it emerged?
 - What has it to do with Grids?
 - **What are the parts of WSRF?**
 - **What is the status of WSRF?**
 - ▶ Standards process
 - ▶ Implementations
- **Globus Alliance Plans**
- **WSRF in Perspective**
 - What is important for the UK e-Science community?





Reminder: what are *our* goals?

- **Address *the* challenge**
 - build inter-enterprise systems
- **NOT *just* connecting systems**
- **WORK together to build infrastructure**
 - That persistently and adaptively supports multiple Virtual Organisations
 - VOs that span organisational structures
 - Distributed implementation and operation
- **Pioneering new ways of working**
 - John Taylor's vision

**Easy tasks
can use any
technology**

**Only some
of our goals
align with
industry**

We pioneer & transfer results to industry



Why OGSi adopted web services

- **Expectation: WS would meet several Grid needs**
 - E.g. Standard interface definition language
 - ▶ Foundation for better engineering
 - E.g. Standard invocation mechanism
 - ▶ Foundation for interoperability
 - ▶ But other channels used for performance
 - Good commercial tooling (eventually)
 - ▶ Reliability and performance
- **Service-Oriented Architecture**
 - Has valuable scalability and durability properties
 - ▶ E.g. ICENI using Jini



Web Services components and framework

- **Not a silver bullet or a complete solution!**
 - **Most of the engineering effort**
 - ▶ What you do when you get a message
 - ▶ Not how you address, package and deliver it
 - **Most of the standardisation effort**
 - ▶ Agreeing how to factor large systems and the semantics of services
 - ▶ Agreeing conventions for information in messages
 - **Confusing & Rival standards proposals**
 - **Limited quality *public* implementations**
- **Don't give up - engage and help fix it?**
 - Is this the role of e-Science? Is there just one answer?





OGSI & GT3 investment

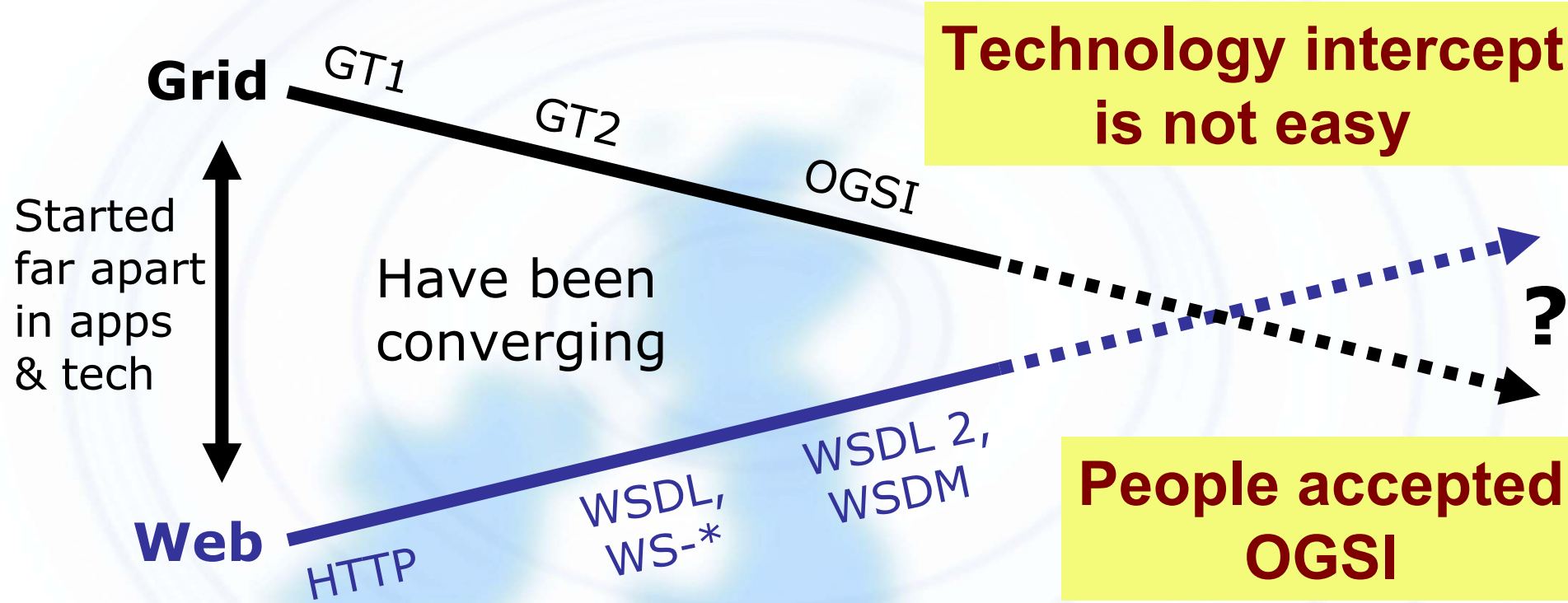
Three forms of investment

- **Architectural effort**
 - OGSA: Use cases, Design Patterns,
 - Factoring & describing a complex environment
- **Standardisation effort**
 - OGSI, DAIS, WS-Agreement, etc.
 - WSDL 2.0, WSDM, WS-Security, etc.
- **Implementation effort**
 - Combined OGSI & Grid component work

**This
investment
carries
forward
into
WSRF**



Combining Grid and Web Services - First try



- Several (some partial) implementations
- Issues: technical, political & commercial
- Successes: a number of *operational* grids

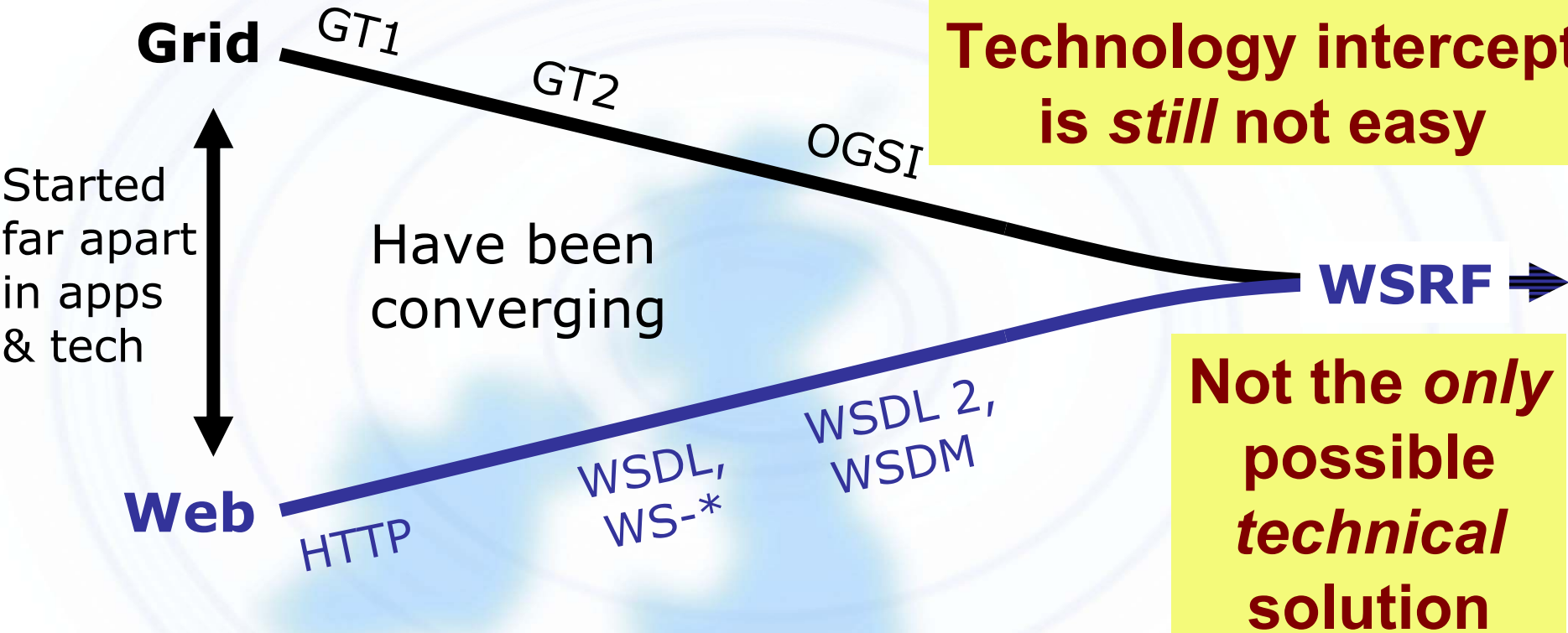


Combining

Grid and Web Services: Second try

Technology intercept
is *still* not easy

Not the *only*
possible
technical
solution



**Support from major WS vendors
especially service management suppliers
e.g., CA, HP, IBM, Fujitsu, BEA, SAP, ...**





Core Ideas in WSRF

- **Preserves OGSi functionality**
 - Lifetime, properties, notification, error types, ...
- **Separates service from resource**
 - Service is static and stateless
 - Resource is dynamic and stateful
- **Builds on WS-Addressing**
- **Is WS-I compliant**
 - But note that WS-I alone doesn't make the problems go away, still need to worry about how to manage lifetime, naming, state, ...



“Components” of WSRF

WS-Addressing March 04

www-106.ibm.com/developerworks/library/specification/ws-add/

WSRF

White paper on modelling stateful resources www.globus.org/wsrf/

WS-ResourceLifetime March 04 www.globus.org/wsrf/

WS-ResourceProperties March 04 www.globus.org/wsrf/

WS-BaseFaults March 04 www.globus.org/wsrf/

WS-RenewableReferences March 04 www.globus.org/wsrf/

WS-ServiceGroup March 04 www.globus.org/wsrf/

WS-Notification

WS-BaseNotification March 04 .../specification/ws-notification/

WS-Topics March 04 .../specification/ws-topics/

WS-BrokeredNotification March 04 .../specification/ws-pubsub/





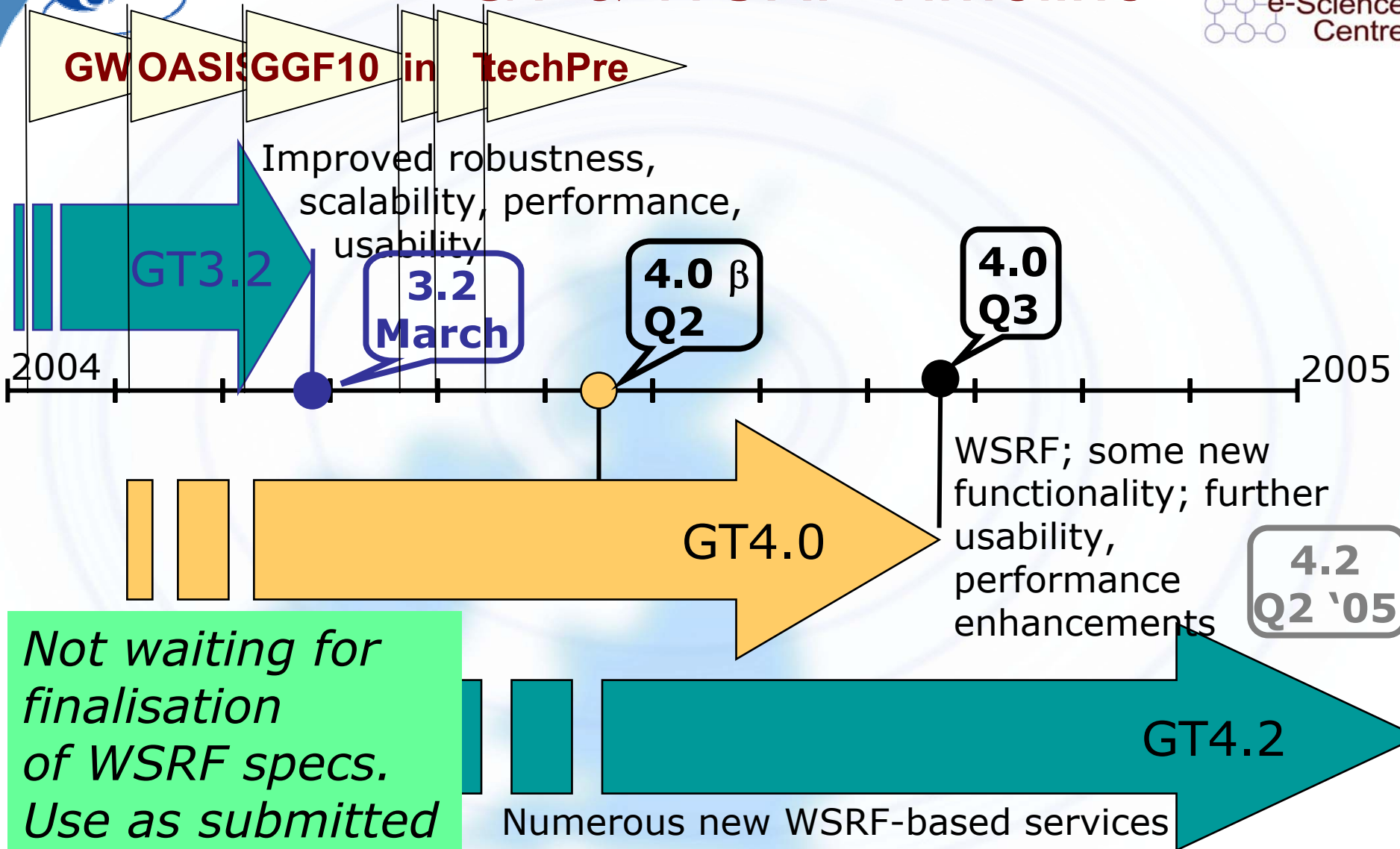
From OGSI to WSRF Refactoring and Evolution

Identity & naming is being done by **OGSA**

OGSI	
Grid Service Reference	WS-Addressing
Grid Service Handle	WS-Addressing
HandleResolver portType	WS-RenewableReferences
Service data defn & access	WS-ResourceProperties
GridService lifetime mgmt	WS-ResourceLifetime
Notification portTypes	WS-Notification
Factory portType	Treated as a pattern
ServiceGroup portTypes	WS-ServiceGroup
Base fault type	WS-BaseFaults

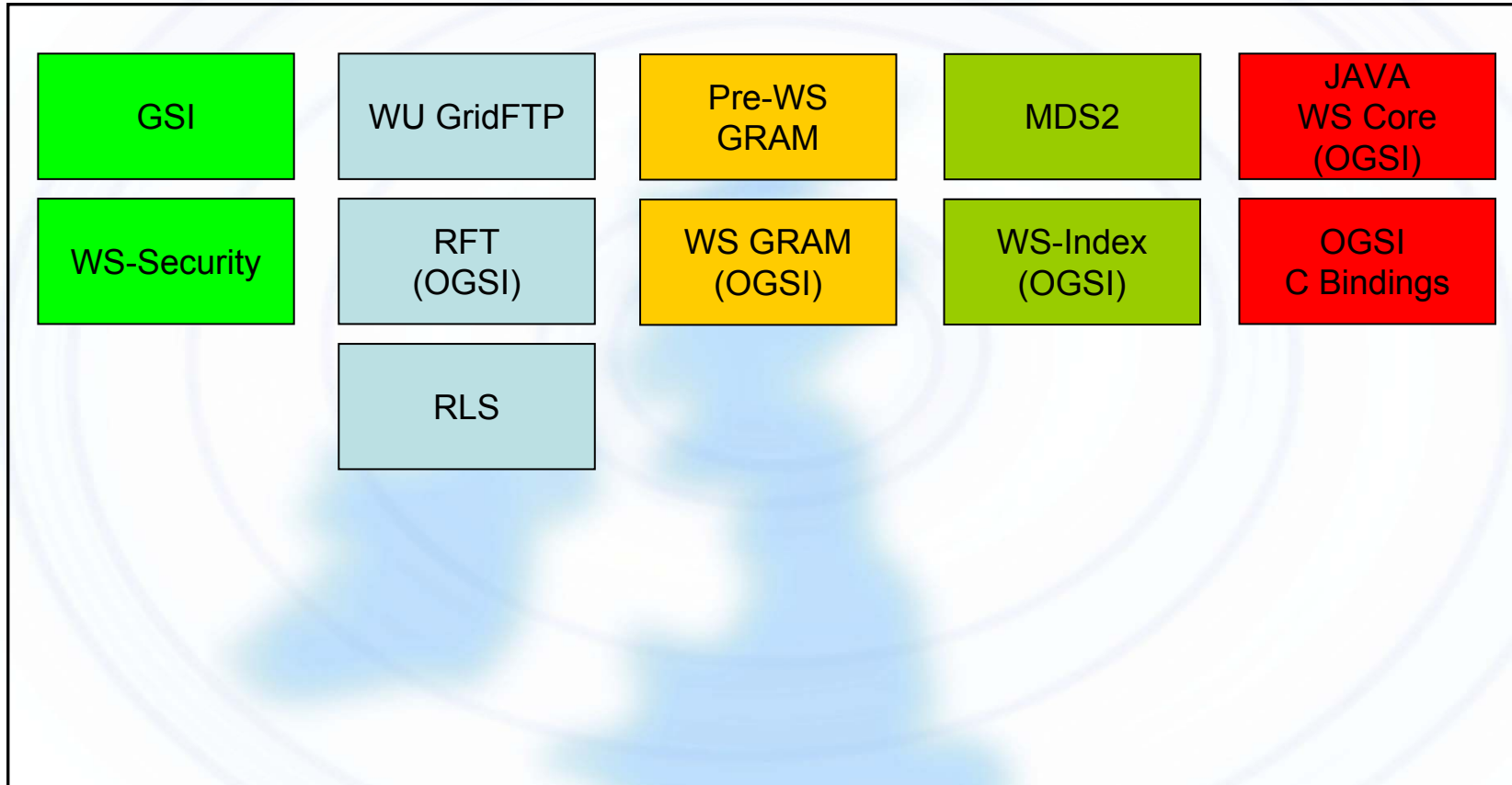


GT & WSRF Timeline





Components in GT 3.0



Security

Data Management

Resource Management

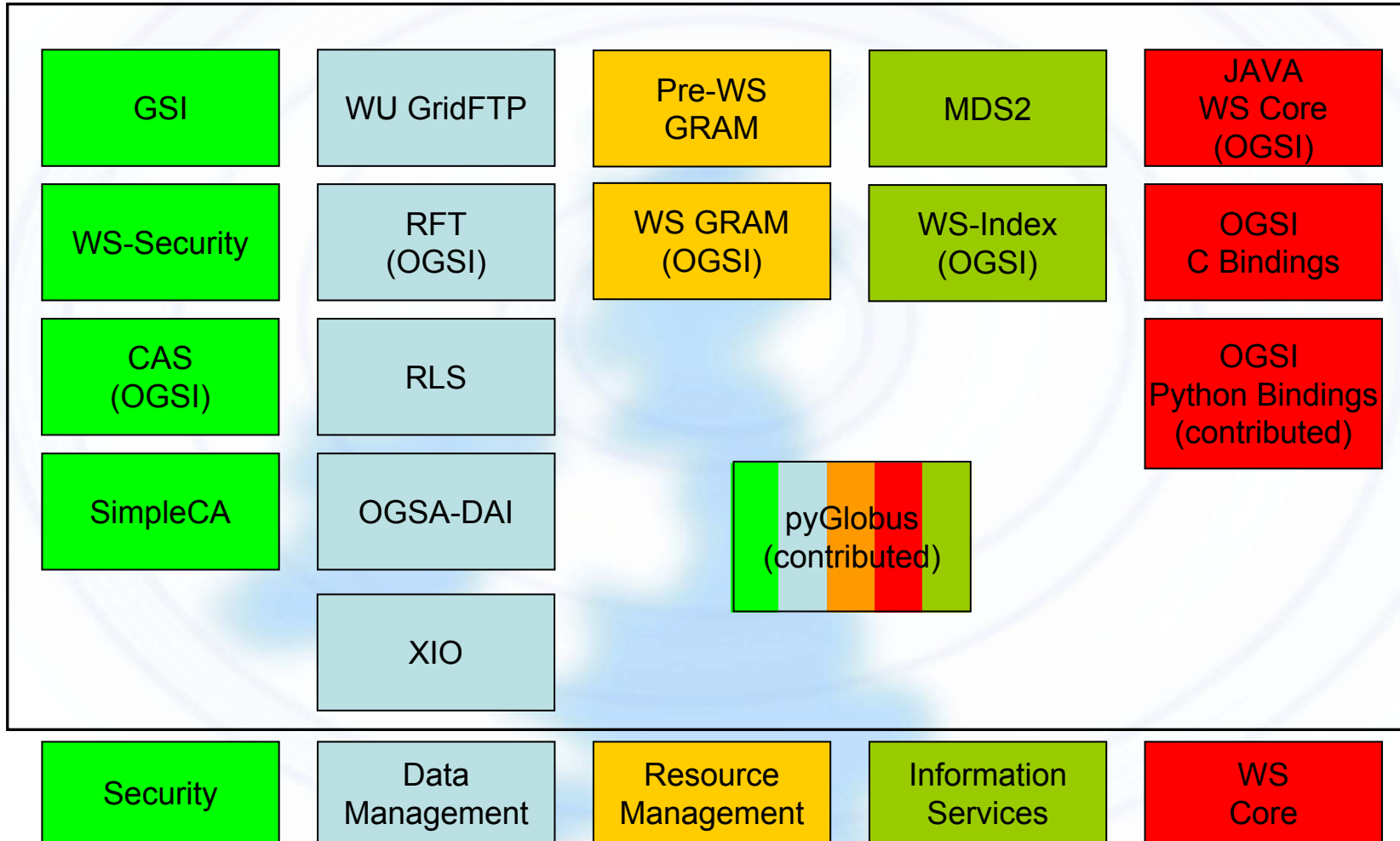
Information Services

WS Core



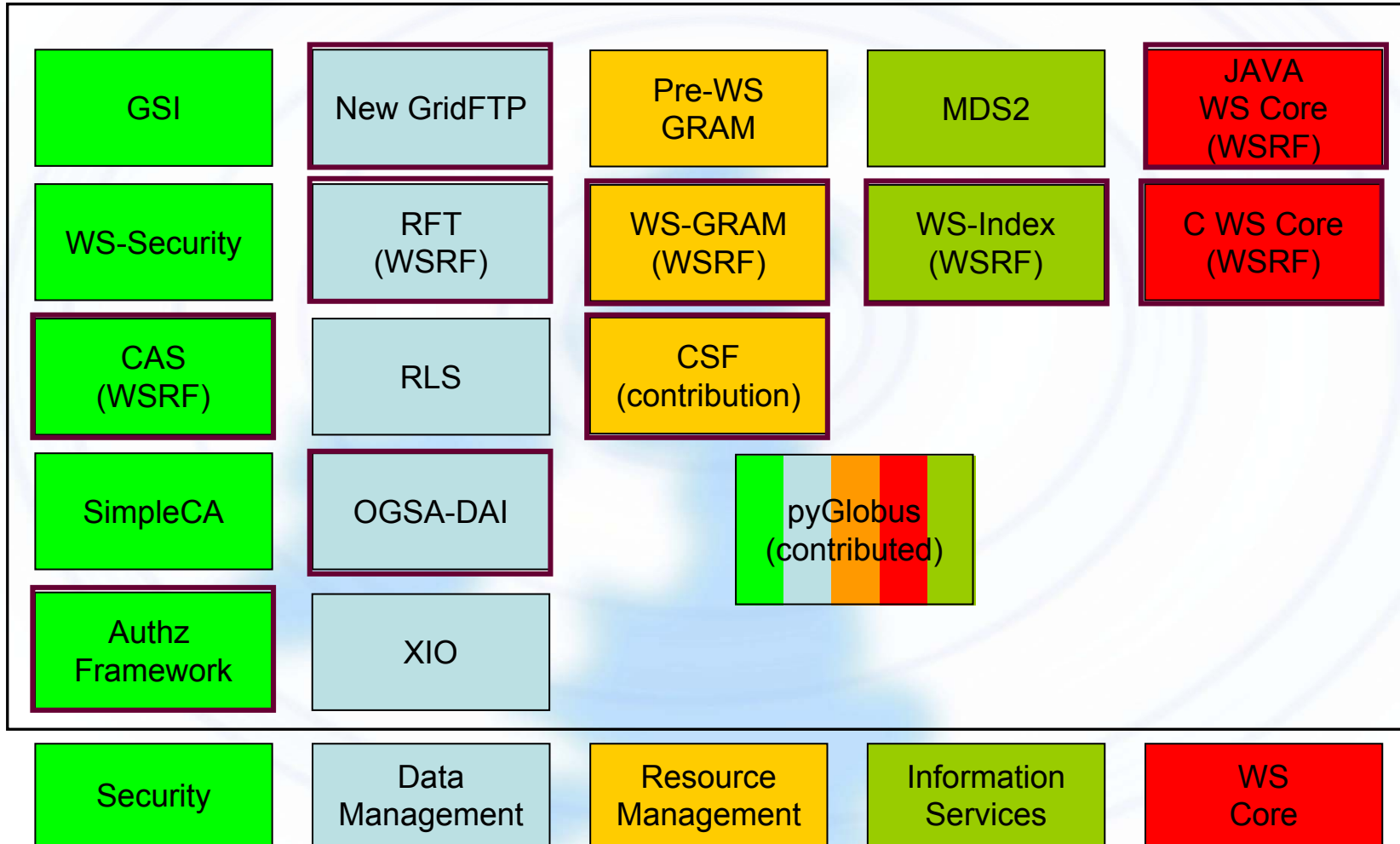


Components in GT 3.2





Planned Components in GT 4.0





Importance of collaboration: VDT

- **A highly successful collaborative effort**

- VDT Working Group
- VDS (Chimera/Pegasus) team
 - ▶ Provides the “V” in VDT
- Condor Team
- Globus Alliance
- NMI Build and Test team
- EDG/LCG/EGEE
 - ▶ Middleware, testing, patches,
- PPDG
 - ▶ Hardening and testing
- Pacman
 - ▶ Provides easy installation cap
 - ▶ Currently Pacman 2, moving t

Used by many projects
Systematic testing
Rich integration of
components
The UK should be part of
this – exploit test bed
contribute components

Thanks to Miron Livny





the globus alliance

www.globus.org

Relative Importance



- **What envelopes you put your messages in**
 - How they are delivered
 - Infrastructure to organise a common technical platform - the foundations of communication



| epcc |



UNIVERSITY
of
GLASGOW



Relative Importance

- **What envelopes you put your messages in**
 - How they are delivered
 - Infrastructure to organise a common technical platform - the foundations of communication
- **What information you send in your messages**
 - Their patterns of Use - sequences that mean something
 - Their Contents
 - The Grammar and Vocabulary of Communication
 - Agreed Interpretations



Relative Importance

Technical Experts

- **What envelopes you put your messages in**
 - How they are delivered
 - Infrastructure to organise a common technical platform - the foundations of communication
- **What information you send in your messages**
 - Their patterns of Use - sequences that mean something
 - Their Contents
 - The Grammar and Vocabulary of Communication
 - Agreed Interpretations
- **What you do when you get a message**
 - The Application Code you Execute
 - The Middleware Services
 - ▶ Security, Privacy, Authorisation, Accounting, Registries, Brokers, ...
 - Integration Services
 - ▶ Multi-site Hierarchical Scheduling, Data Access & Integration, ...
 - Portals, Workflow Systems, Virtual Data, Semantic Grids
 - Tools to support Application Developers, Users & Operations
 - ▶ Incremental deployment tools, diagnostic aids, performance monitoring, ...



- **What envelopes you put your messages in**
 - How they are delivered
 - Infrastructure to organise a common technical platform - the foundations of communication
- **What information you send in your messages**
 - Their patterns of Use - sequences that mean something
 - Their Contents
 - The Grammar and Vocabulary of Communication
 - Agreed Interpretations
- **What you do when you get a message**
 - The Application Code you Execute
 - The Middleware Services
 - ▶ Security, Privacy, Authorisation, Accounting, Registries, Brokers, ...
 - Integration Services
 - ▶ Multi-site Hierarchical Scheduling, Data Access & Integration, ...
 - Portals, Workflow Systems, Virtual Data, Semantic Grids
 - Tools to support Application Developers, Users & Operations
- **Creative Actions and Judgements of Researchers, Designers & Clinicians**
 - Data, Models & Analyses
 - In Silico Experiments, Design, Diagnosis & Planning
 - Creating the Scientific Record

Domain Experts



Conclusions - Strategy

- **If you are making long-term plans**
 - Plan to use WSRF
- **If you develop or research middleware**
 - Engage with groups developing WSRF
 - If you need those or related functions
 - ▶ E.g. to notify or handle state without incremental resource loss
- **If you run distributed Grid operations**
 - Plan to use WSRF
 - But only when components using it are robust
 - Incremental transition is possible - even necessary



Conclusions - Tactics

- Value your team's skills & momentum
- Change only if necessary
- If you're an applications researcher
 - Stay with what you have working
 - ▶ WS-I +GSI; GT2, VDT, LCG2, GT3, ...
- If you're a computing researcher
 - If your platform serves your investigation stay on it
 - ▶ WS-I +GSI; GT2, VDT, LCG2, GT3, ...
- If you're doing middleware R&D
 - Hard choices & frustrating times - keep going
 - Those who understand the new order will reap advantage
 - Therefore engage with WSRF



Conclusions - Final

- **WSRF**
 - Good enough for recurrent platform requirements
 - Has significant commercial and technical momentum
 - Improves engagement with industry
 - Only sensible flag to rally behind
- **Must collaborate internationally**
 - Scale of challenge & international virtual organisations
- **Discourage localised alternatives**
 - Avoid effort fragmentation and unnecessary arguments
- **Coping well with transitions ...**

Is a primary Darwinian selector!

