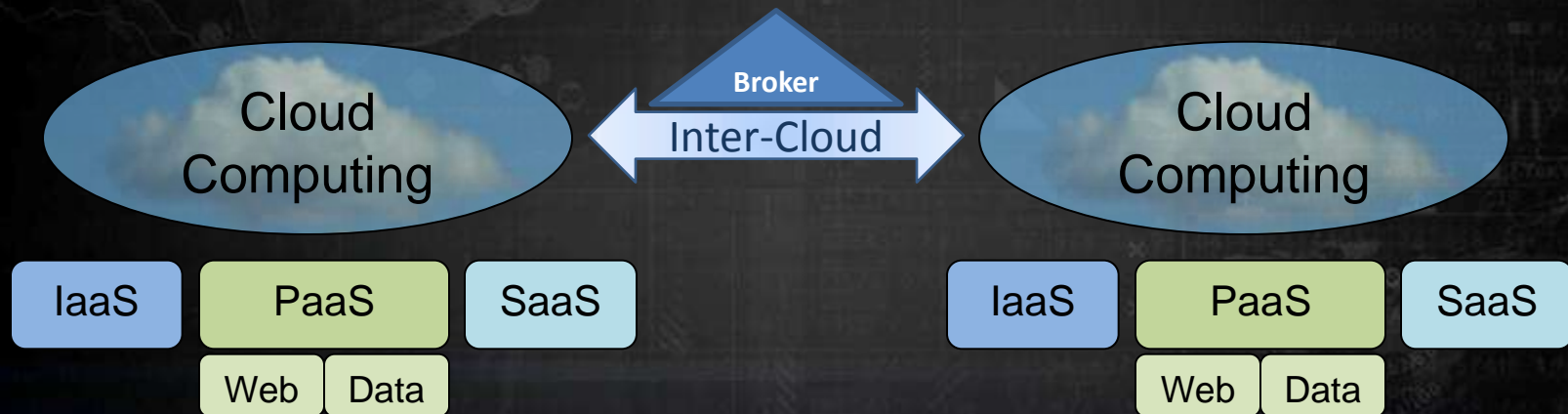


Cloud Computing Actionable Standards

An Overview of Cloud Specifications



Michael Behrens, CTO, R2AD, LLC

Eugene Luster, Cloud Standards Architect, R2AD, LLC

11 June 2013

Cloud Bootcamp, Cloud Expo East 2013, Javits Center, New York City

- R2AD is a contractor, supporting the DISA Office of the CTO, R2AD monitors and participates in:

- NIST
- Academia
- SDOs (details below)
- Consortia and Industry Events (i.e.; Cloud Expo/Camp)



- **Fostering beneficial cloud computing specifications**

- These specifications, if adopted by a wide development community, become standards

- **Participating in a variety of cloud organizations**

- Open Grid Forum (OGF)
 - Open Cloud Computing Interface (OCCI)
- Storage Network Industry Association (SNIA)
 - Cloud Data Management Interface (CDMI)
- National Institute of Standards and Technology (NIST)
 - Document definition and roadmap of cloud standards
- Organization for the Advancement of Structured Information Standards (OASIS)
 - Cloud Application Management for Platforms (CAMP)



Android
Cloud
Management
Client
(OCCI+CDMI)

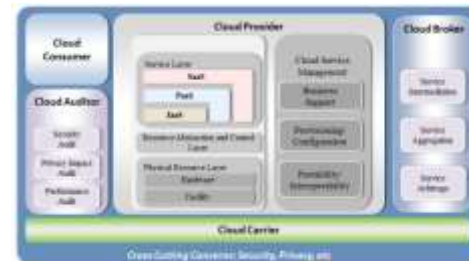
∴R2AD[®] NIST Govt Cloud Computing Effort

- **NIST FY12 Cloud Computing documents**
 - Standards Roadmap
 - Reference Architecture
 - Inventory of Standards Relevant to Cloud Computing
- **Public Working Groups continue to collaborate into FY13 in all the working groups though the most active recently have been:**

<http://www.nist.gov/itl/cloud/index.cfm>

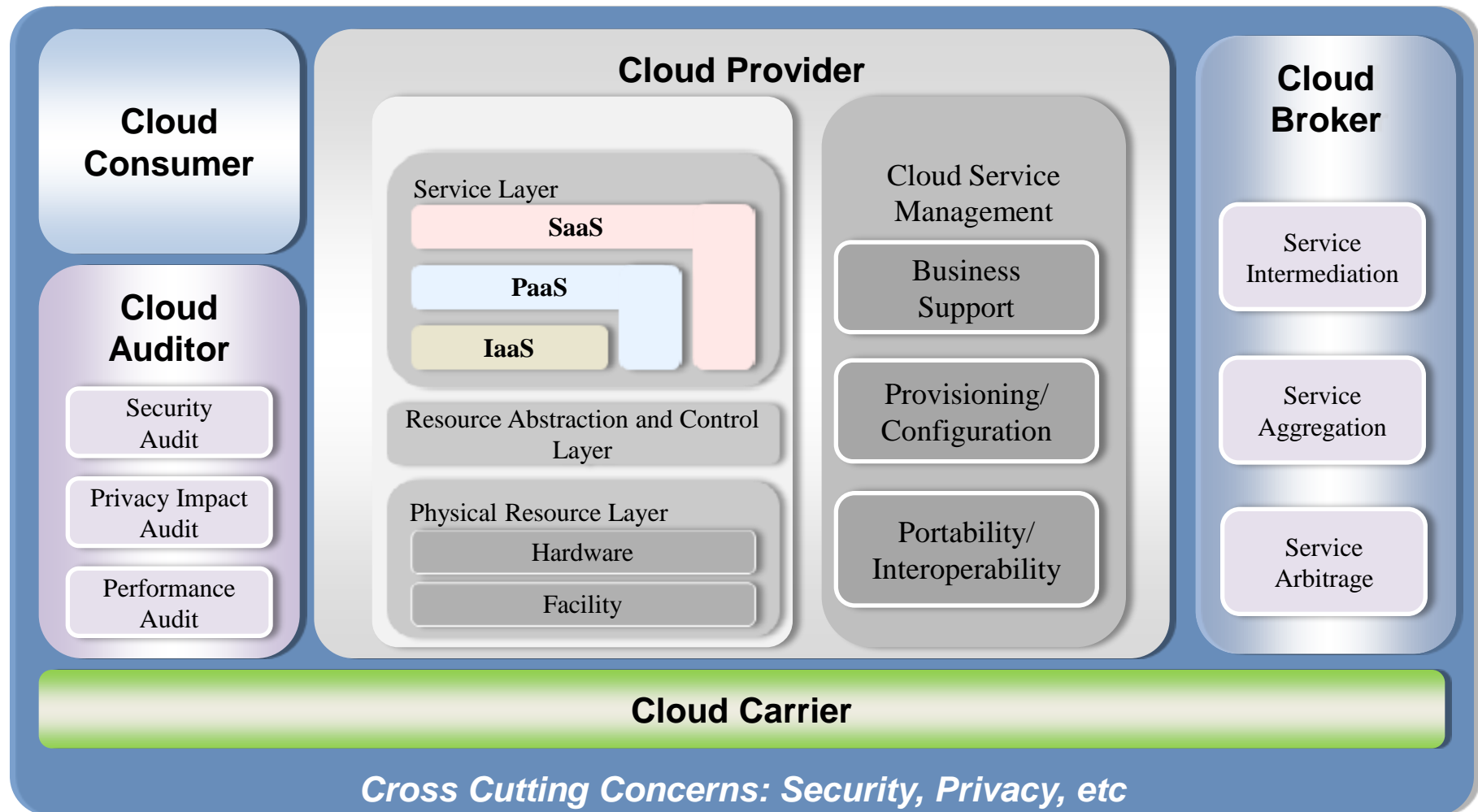
www.cio.gov/documents/Federal-Cloud-COMputing-Strategy.pdf

- Security
- Taxonomy
- Federated Clouds
- Reference Architecture

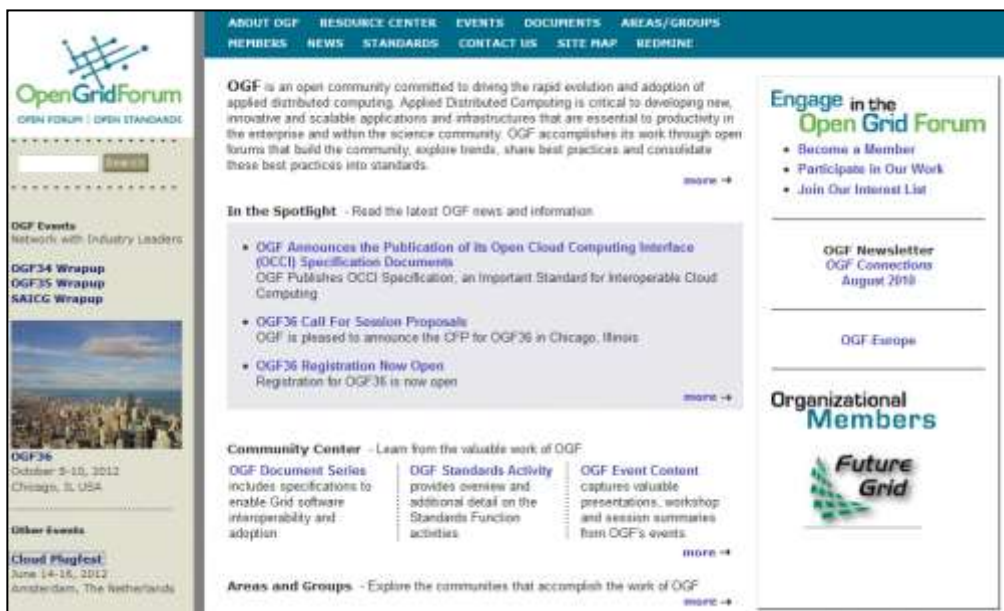


NIST Architecture
Details, next slide.

- **Plans to continue developing, fostering and collaborating cloud computing technologies utilization throughout FY13**
- **Cloud computing model definition has evolved**
 - Though it remains based on a central cloud technology
 - We recommend advances to not be tied to *aaS model
- **SAJAAC re-constituted**
 - Standards Acceleration to Jump-Start Adoption of *Cloud* Computing



- **Open Grid Forum (OGF)**
 - Open Cloud Computing Interface (OCCI) specifications
 - JSON rendering nearly complete. Next focus would be PaaS/Broker/Messaging.
 - Specifications: <http://occi-wg.org/about/specification/>
 - The OCCI OpenStack implementation is now available on StackForge, OpenStack's 3rd party and related repository:
 - <http://occi-wg.org/tag/ogf/>



OGF #39 will be in Madrid, Spain as part of Cloud **Interoperability** Week!

[OCCI Implementations Link](#)

RESTful API for Service Management (IaaS and more)

consisting of 3 parts (OGF proposed recommendations)

Core – defines the OCCI model, a power ReSTful model for resource management

Rendering – defines RESTful rendering using text/plain or text/occi
(JSON and XML in next version)

Infrastructure – defines IaaS resource parameters

Compute, Storage, Network

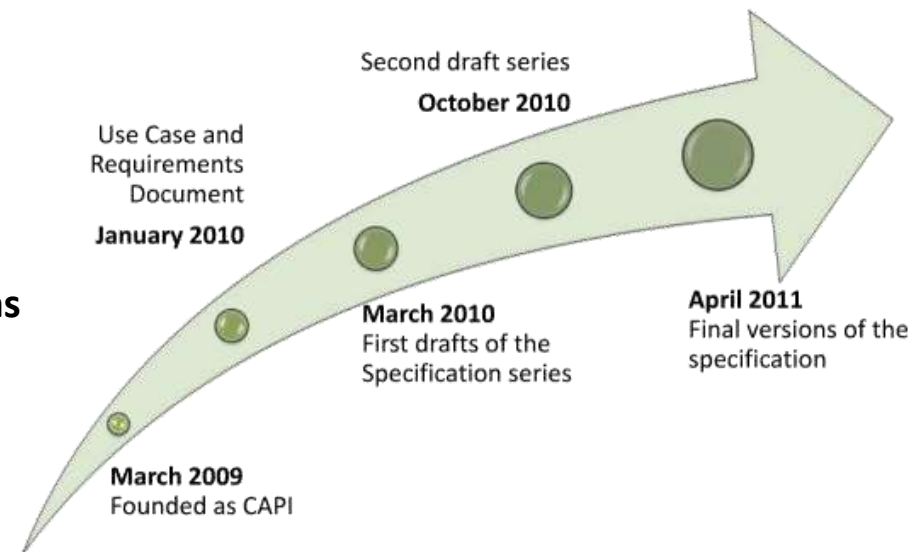
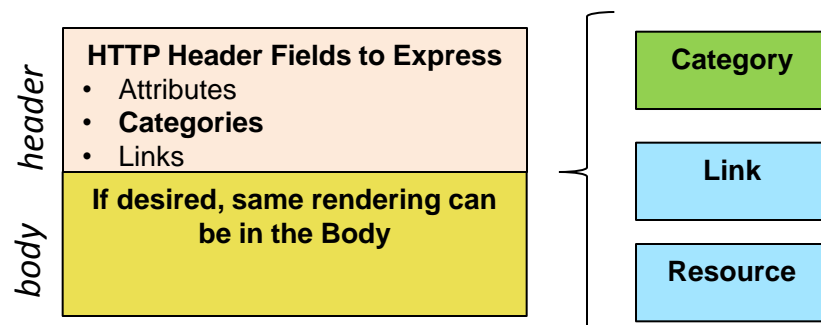
easily extendible by

linking to new or external objects and services

adding new attributes to existing objects

flexible API

active development and existing implementations

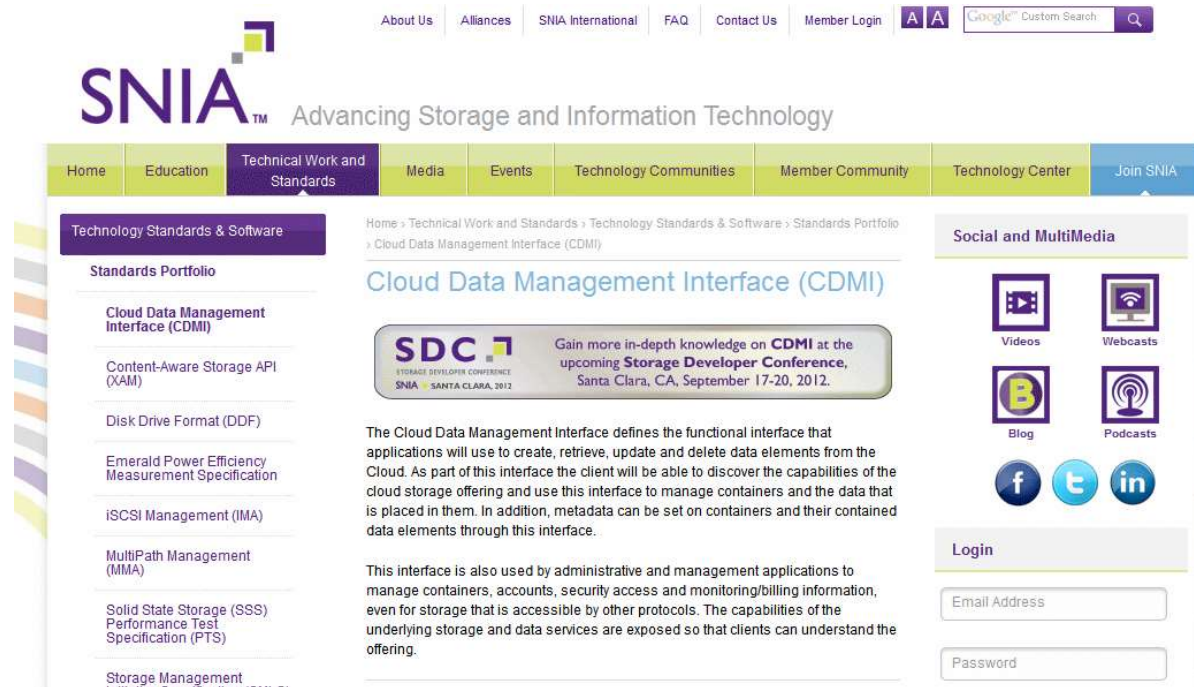


Slide derived from, with permission:
Florian Feldhaus, TU Dortmund

- **Storage Network Industry Association (SNIA)**
 - **Cloud Data Management Interface (CDMI)**
 - Management of data and storage
 - <http://www.snia.org/cdmi>
 - ISO standard: Oct 2012

SNIA is also participating in Cloud **Interoperability** Week!

<http://www.cloudplugfest.org/cloud-interoperability-week>

RESTful API for Cloud Data Management

developed by SNIA

Standardize Access:

object storage

support for legacy storage

NFS, CIFS and WebDAV

containers for grouping

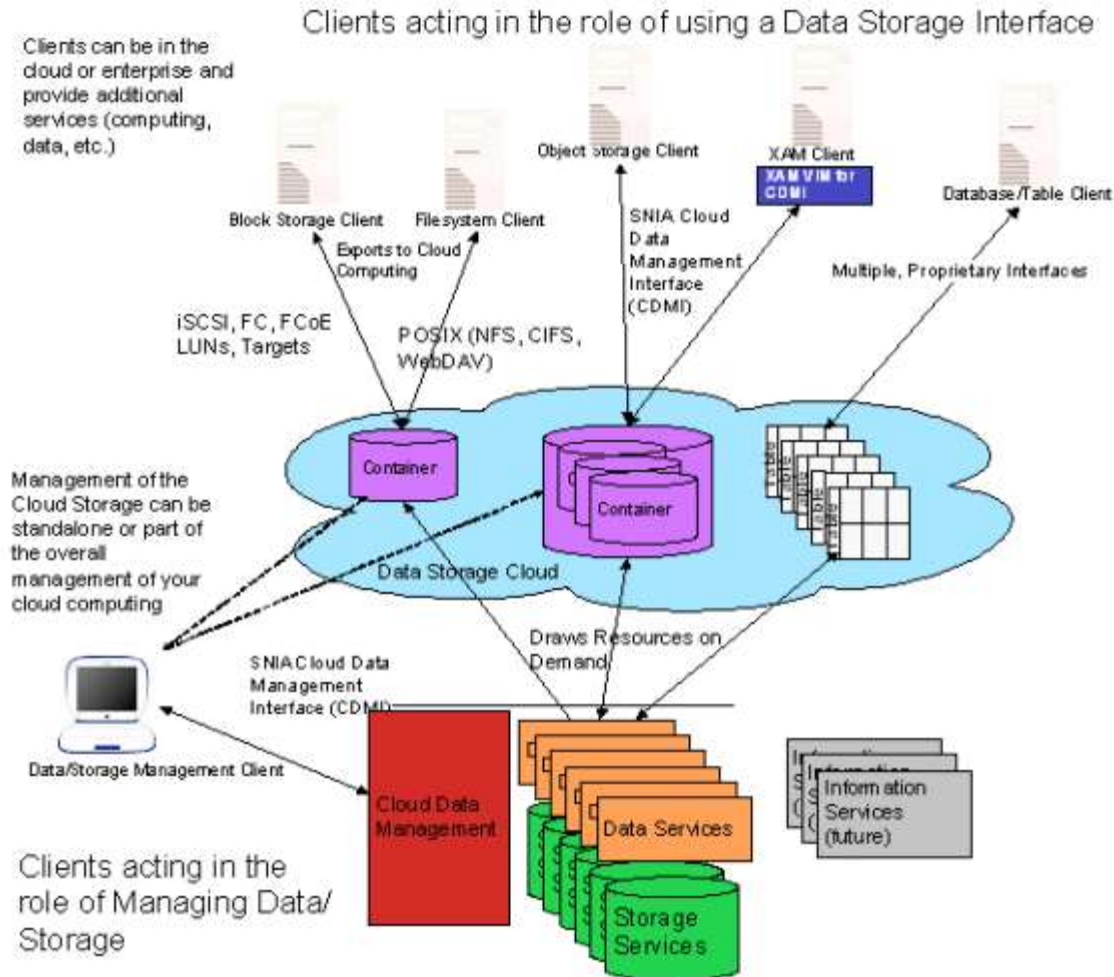
metadata

search

simple management

Implementations:

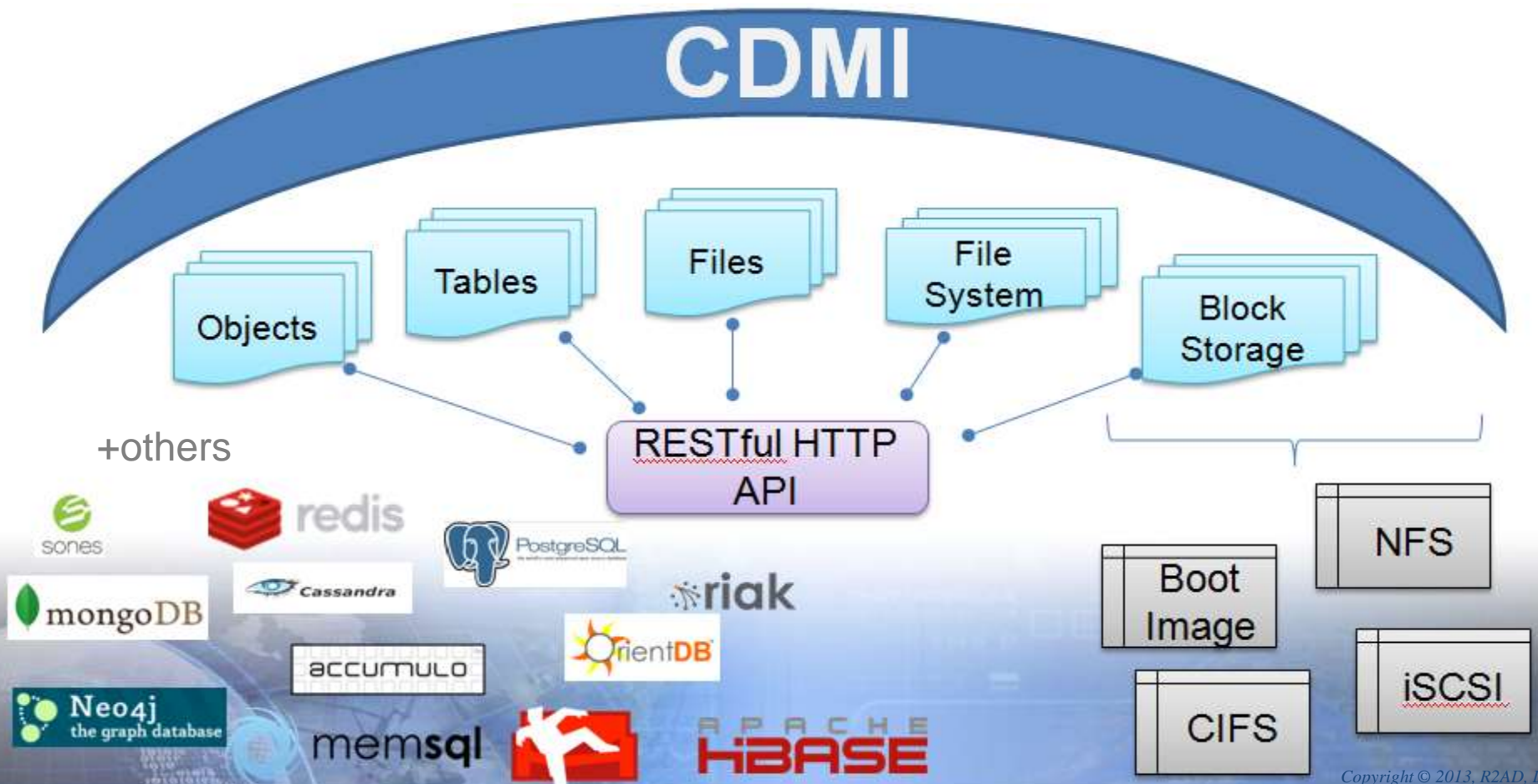
- NetApp's [StorageGRID](#)
- [Mezeo](#)
- And others



Slide derived from, with permission:

Florian Feldhaus, TU Dortmund

- **Cloud Data Management Interface (CDMI)**
 - A specification from Storage Network Industry Association (SNIA) which addresses the need for a standardized access layer to object data as a cloud service. CDMI includes support for metadata and querying.
- **Data Location Transparency as an Enterprise Information Service**
 - Using CDMI “could” decouples data sources from data consumers in a standard based manner



- **Organization for the Advancement of Structured Information Standards (OASIS)**
 - **Cloud Application Management for Platforms (CAMP)**
 - Define the interoperability standard for managing applications in Platforms as a Service (PaaS) environments
 - <http://www.oasis-open.org/committees/camp/>

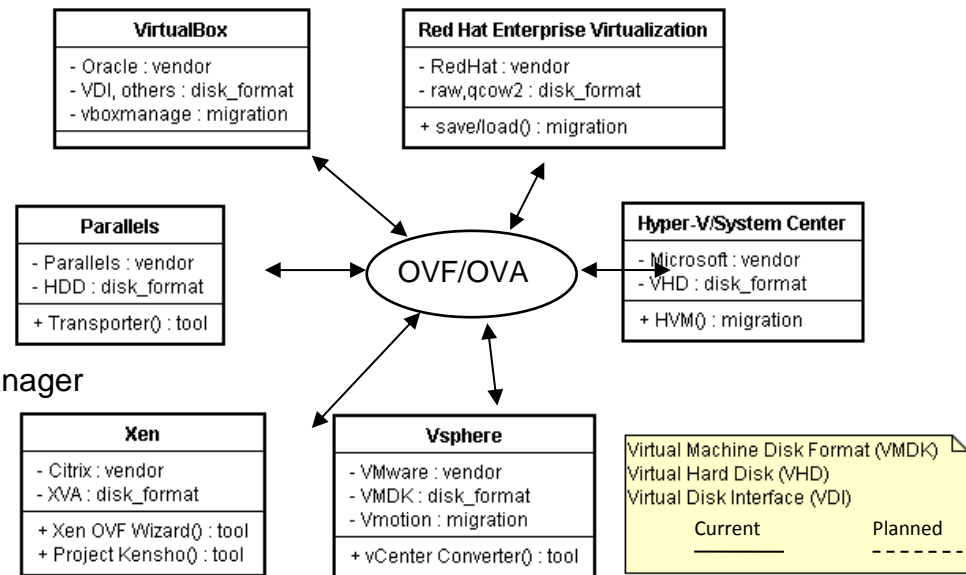


The screenshot shows the OASIS Cloud Application Management for Platforms (CAMP) Technical Committee (TC) website. The header includes the OASIS logo and navigation links. The main content area features a 'Table of Contents' with links to announcements, overview, subcommittees, TC liaisons, technical work, expository work, external resources, mailing lists, press, standing rules, and additional information. A sidebar on the right contains 'Connect with OASIS' social media links, 'Related links' such as Charter and PR Statement, and a 'TC Sponsors' list including CloudSoft Corporation, Fujitsu Limited, and others.

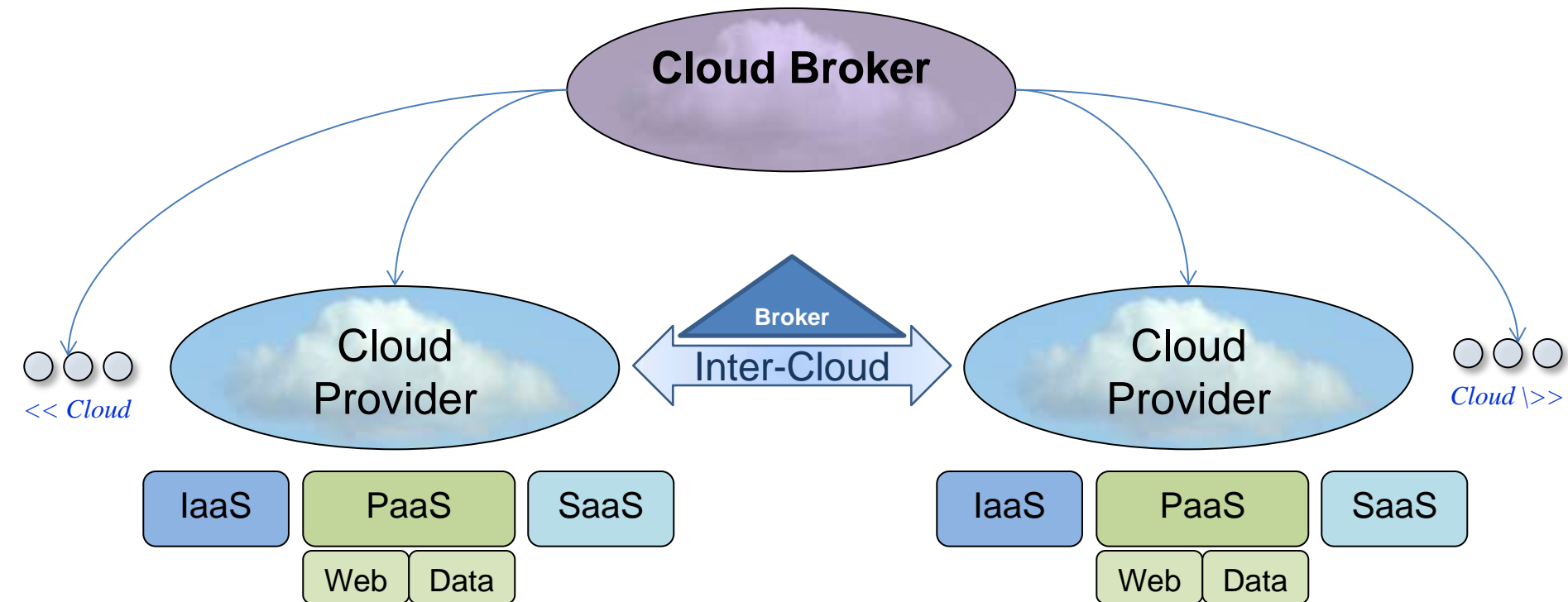
CAMP is being worked actively – next Face2Face is in 2 weeks (Texas). CAMP will help standardize PaaS Provisioning through the management of “Assemblies” It can be managed by OCCl as well and can use CDMI to store application suites. We participate in the CAMP Technical Committee teleconferences.

- **Distributed Management Task Force (DMTF)**
 - Cloud Infrastructure Management Interface (CIMI) specification
 - CIMI is an Infrastructure as a Service (IaaS) management interface
 - Open Virtualization Format (OVF)
 - Supports the export/import and distribution of virtual machines
 - Great for template/base VM distribution
 - <http://www.dmtf.org/standards/ovf>
 - More details on next slide

- **VMs can be distributed in OVF format**
 - OVF is a Distributed Management Task Force (DMTF) standard
- **Most hypervisors have conversion tools to import/export from/to this standard**
 - **VMware:**
 - vCenter Converter Tool
 - OVF Tools
 - Import/Export Feature of product
 - **XEN:**
 - XenConvert
 - **Hyper-V**
 - Virtual Machine Manager (VMM) ([ref](#))
 - **VirtualBox**
 - Can open VMDK files with Virtual Disk Manager
 - qemu-img tool
 - **Linux:**
 - qemu-img
 - **RedHat:**
 - virt-V2V Tool
 - **Oracle VM:**
 - Package the VM as OVA, Import it to VM Manager as an assembly, Create template and clone/deploy
- **NIST VM Portability White Paper**
 - <http://collaborate.nist.gov/twiki-cloud-computing/bin/view/CloudComputing/SAJACCVMPortability>
- **Commercial Options available too, i.e., Racemi Cloud Path**



Cloud Broker Technical Overview



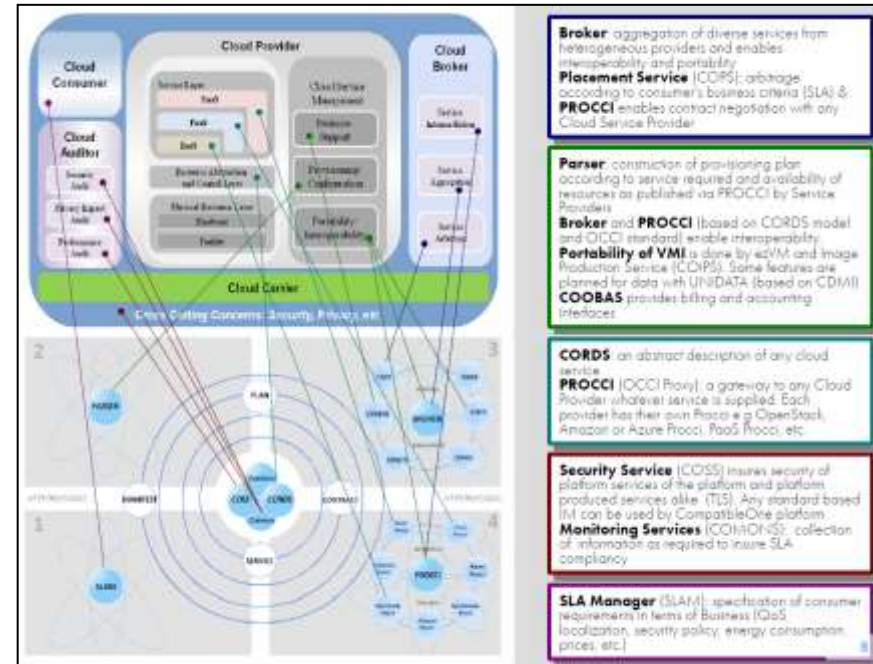
3. Manifest based provisioning performed by the ACCORDS Broker working in cooperation with the CompatibleOne Placement Service (COPS), and provisioning components, PROCCI (Proxy OCCI)

4. heterogeneous provider platforms are engaged for the deployment of the applications and hardware required to satisfy the configuration as described by the manifest

<http://compatibleone.org/>



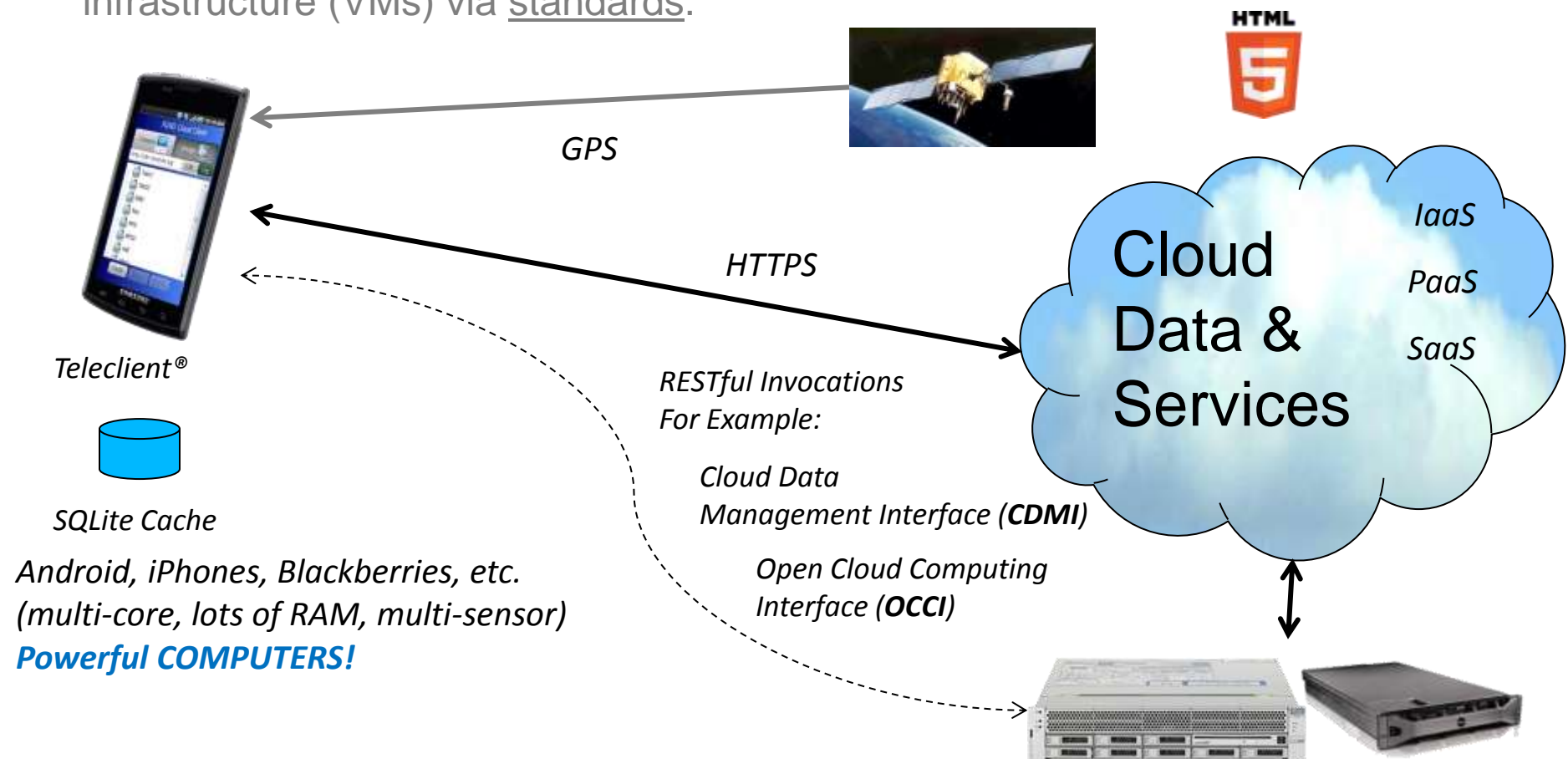
- **CompatibleOne (CO)**
 - Open Source Cloud technical Brokerage prototype
 - Full technical broker implementation in C++
 - Developed primarily by France, however [Intel](#) and others are taking an interest
 - Supports many cloud providers already: **Amazon, Azure, OpenStack, Rackspace[®]**, others
 - Maps to NIST model
 - OW2 & OGF supporting CO
 - OCCl is used extensively
 - CDMI, WS-Agreement, others



News: [COAPS: CompatibleOne Application and Platform Service](#)

::R2AD® Standards Based Mobile Client

Implemented demo mobile application to allow management of storage and infrastructure (VMs) via standards.



*Android, iPhones, Blackberries, etc.
(multi-core, lots of RAM, multi-sensor)*
Powerful COMPUTERS!

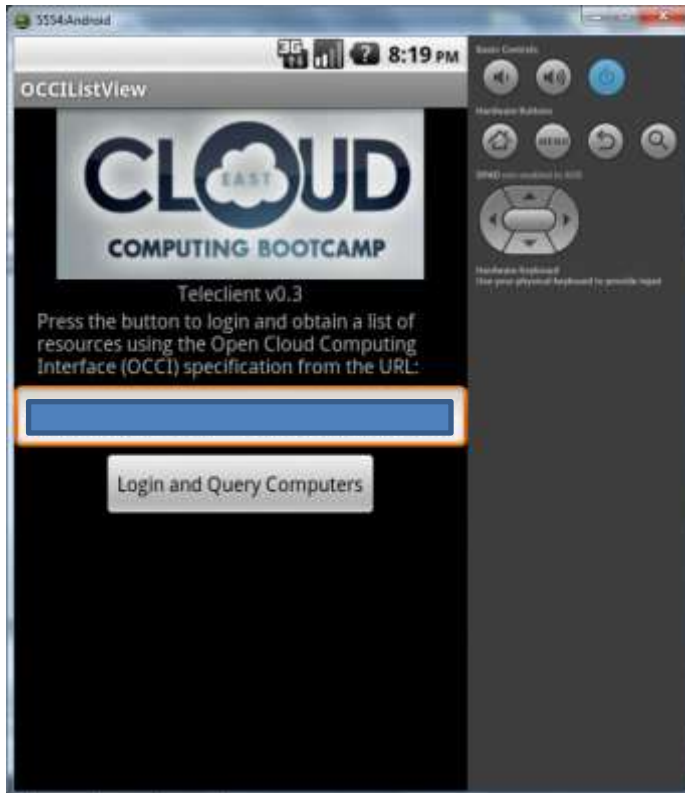
Cloud Services built using PaaS or traditional and hosted via IaaS. Demo Concept: Gary Mazzaferro

Next PlugFest: July 2013 and then Sept 2013

<http://www.cloudplugfest.org>

R2AD playground: <http://r2ad.net>

∴R2AD® Demo Time...



- **Basic OCCI query App**
- **Connects with CompatibleOne and others....**
- **See demo video posted: <http://r2ad.net>**

Brainstorming session....White Board

