



Annual Report 2010  
(January 2010 – December 2010)

**Executive Team**

**Sandy Payette**

Chief Executive Officer

**Michele Kimpton**

Chief Business Officer

**Brad McLean**

Chief Technology Officer

# DuraSpace Annual Report 2010

## 1 Executive Summary

The DuraSpace organization continues to identify itself as providers of “*open technologies for durable digital content.*” As we noted in last year’s report, there are different ways that “open technologies” can be interpreted, for example open source, open interfaces, open standards, open access, open content, and open communities. With DSpace and Fedora we have continually addressed all of these aspects of openness. With DuraCloud, we had a major milestone in 2010 of releasing the DuraCloud core software as open source. We also published open APIs for DuraCloud and are committed to embracing cloud standards as they emerge. In all of DuraSpace projects, we also provide the context for *open communities* to collaborate in developing and using our technologies.

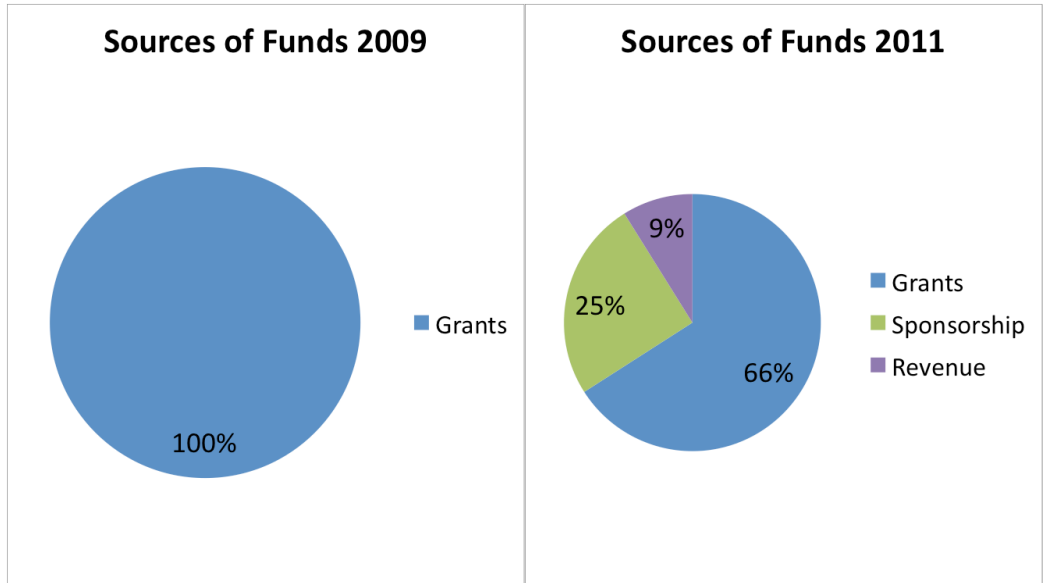
To review, our mission statement is:

*DuraSpace is committed to providing leadership and innovation in the development and deployment of open technologies that promote durable, persistent access to digital data. We collaborate with academic, scientific, cultural, and technology communities in creating practical solutions to help ensure that current and future generations have digital access to our collective heritage.*

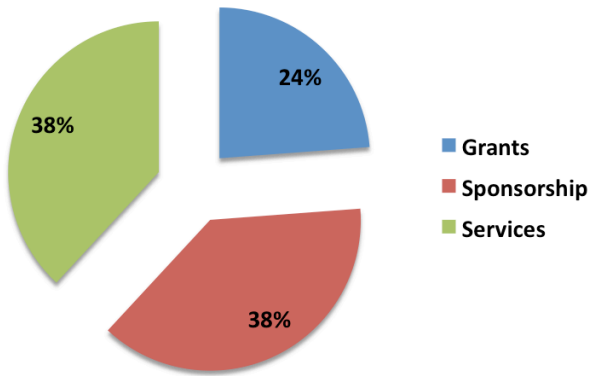
## Sustainability

A key focus in 2010 was continuing the work of achieving our mission and ensuring the sustainability of DuraSpace as an organization. During the year, the Executive Team held a series of working sessions to review all assumptions about revenues, business models, and organizational design. The results of these sessions, which included several scenarios for the organization going forward, were presented to Board of Directors in its September meeting. The Board recommended that DuraSpace continue to pursue “Scenario 1 – The Mission-Focused Organization” by continuing the current strategy of supporting DSpace and Fedora, providing community programs, and devoting resources to the development of new services with a particular focus on DuraCloud. From the revenue perspective, our goal is to continue to migrate away from grants and towards sponsorship and service revenues. As depicted in Figure 1, over the next four years we forecast that revenues will be balanced more equally over three categories: 24% grants, 38% sponsorship, and 38% services. See Section 9 for more detail.

Figure 1: DuraSpace Funding Sources



### Funding Sources 2014



## Planning for Leadership Transitions

A healthy organization is able to accommodate change and move smoothly through transitions in its leadership. DuraSpace has a three-person Executive Team (i.e., the Triad) that works collaboratively to lead the organization. This leadership model helps the organization be resilient in times of change and ensures stability. The resiliency of this model was validated in 2010 when CEO Sandy Payette announced future plans to pursue her PhD at Cornell University starting in Fall 2011. In the September 2010 Board meeting, the Executive Team and the Board began their work on succession planning which began with defining a process for appointing or recruiting a new CEO. It was agreed that the Triad

leadership model should be maintained since it provided a diverse and balanced leadership team. The succession planning process began with the assumption that we will continue with a three-member Executive Team.

The Board resolved that the ideal new CEO for DuraSpace would be Michele Kimpton, the current Chief Business Officer of DuraSpace. The combination of Michele's existing leadership in DuraSpace, her previous role as Executive Director of the DSpace Foundation, her deep understanding of the needs of DuraSpace communities, her extensive background in technology-oriented not-for-profit organizations, and her entrepreneurial and business experience made her the ideal candidate for the new CEO. The Board offered Michele the CEO position and recommended that the Executive Team enact a staged transition plan. With Michele's acceptance of the CEO offer, the Executive Team created a transition plan that would unfold over a six-month period in 2011. The key milestones in the plan are: communication with DuraSpace sponsors and communities, Michele assuming the position of CEO in March 2011, Sandy remaining as Strategic Advisor to the Executive Team through June 2011, and recruiting/hiring a new member of the Executive Team to maintain the Triad leadership model.

*As of publication of this report, the succession plan is in motion with Michele and Sandy in their new roles as of March 1, 2011, and Sandy's departure scheduled for June 2011. Brad McLean continues in his role as Chief Technology Officer continuing his key role in future directions of DuraSpace technologies and strategic integrations. Jonathan Markow was hired as a new member of the Executive Team. Jonathan's role will be Chief Strategy Officer focused on leading community outreach programs and new strategic alliances and collaborations. Jonathan was previously the Executive Director of JASIG, a not-for-profit organization focused on open source technologies for Higher Education. Thorny Staples who was the Director of Community Strategy has taken a new position with the Smithsonian and continues to be an extremely active leader in the Fedora community and ally of DuraSpace.*

## 2010 Highlights

There are many notable highlights during the startup period of DuraSpace:

### **Sustainability Highlights**

- Successful 2010 Sponsorship campaign raising nearly \$300,000
- Successful launch of Registered Service Provider (RSP) Program, with 10 initial members
- Board endorsement of moving forward with services strategy and launching DuraCloud in 2011
- Board advocacy for expanding the DuraSpace Sponsorship Program
- New Board Subcommittee on Sustainable Revenues
- Overall business strategy and 5 year forecast

### **People and Organization Highlights**

- Successful succession planning for a smooth transition of the Executive Team over a 10-month period. Sandy Payette will phase out to pursue PhD at Cornell in 2011. Michele Kimpton will take over as CEO. Brad McLean will remain as CTO.
- Recruited new member of the Executive Team. Jonathan Markow will become the new Chief Strategy Officer. Previously, Jonathan was Executive Director of JASIG.

- Founding Member of the National Digital Stewardship Alliance (NDSA), an initiative of the Library of Congress NDIIPP program.

**Technology and Services Highlights**

- DSpace and Fedora software releases on target with community release managers
- DSpace and Fedora integrations with DuraCloud
- DuraCloud Phase 1 and Phase 2 pilots successfully completed
- DuraCloud open source software released and notable early adopters (Chronopolis and Kindura)

**Community Outreach Highlights**

- DuraSpace Community Outreach function restructured with all programs under new framework.
- Successful launch of DSpace Community Advisory Team (DCAT)
- Growth of key adjacent projects building upon Fedora - Islandora and Hydra
- Critical mass in institutional repositories as DSpace passed the mark of 1000 instances globally
- New Fedora markets emerging, especially government
- Creation of the Scholarly Infrastructure Technical Summit (SITS) to bring architects of key open source projects together to work towards shared practices, alignment, and integrations.
- Open Repositories Steering Committee – DuraSpace CEO 2010-2011 chair of Steering Committee (SC); DuraSpace providing wiki space to SC for conference planning and SC policies

**Marketing and Communications Highlights**

- Migrated the DuraSpace website to run on Islandora/Fedora hosted by DiscoveryGarden
- DuraCloud branding and graphics
- DuraCloud website design and content development (to run on Islandora/Fedora in 2011)
- DSpace and Fedora integration - community call for participation and responses received

## 2 New DuraSpace Programs

### Community Sponsorship Program

In 2010 our DuraSpace Sponsorship Program was launched and was off to a strong start. In the 2010 campaign, we raised approximately \$300,000 in sponsorship funds. After the sponsorship packets were mailed in May, the Executive Team focused our personalized outreach on Gold sponsor prospects to discuss our mission, our accomplishments, and our future strategies for serving our communities. Notably, Gold sponsors are invited to special events with the Executive Team including the annual Gold Sponsor Forum meeting and other special Gold webinar events. Table 1 lists the 2010 Gold, Silver, and Bronze sponsors:

**Table 1: DuraSpace Sponsors 2010**

Gold Sponsors (\$10,000)	Silver Sponsors (\$5000)	Bronze Sponsors (\$2500 or less)
1. Arizona State University 2. Columbia University	1. Georgia Institute Technology 2. Northwestern University	1. Digital Humanities Observatory 2. Kansas State University

3. Cornell University 4. Denmark's DEFF* 5. Emory University 6. ICPSR** 7. Indiana University 8. Johns Hopkins University 9. Microsoft Research 10. MIT 11. North Carolina State Univ 12. Stanford University 13. Texas Digital Library 14. Tufts University 15. University British Columbia 16. University of Toronto 17. University of Michigan 18. University Illinois 19. University of Virginia  * Denmark's Electronic Research Library ** Inter-University Consortium for Political and Social Research	3. Rice University 4. Smithsonian Institution 5. University of Guelph 6. University of Hull 7. University of Minnesota 8. University New South Wales 9. University of Oxford 10. University of PEI 11. University of York 12. University Edinburgh 13. University of Kansas 14. York University	3. LaFayette College 4. Marine Biology Lab Woods Hole 5. New York University 6. Northeastern University  7. Malmo University 8. The Rockefeller University 9. US National Library of Medicine 10. University of Hawaii Manoa 11. University of Manitoba 12. University of Notre Dame 13. Univ Southern Queensland 14. University Technology Sydney 15. Utrecht University 16. Vanderbilt University 17. Yale Office of Digital Assets
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For many libraries, the \$10,000 Gold sponsorship expense must go through a due diligence process to justify the expense. The Executive Team spent one-on-one time with these organizations to help them communicate the “why go Gold?” within their organizations. Our sponsorship team now has an FAQ that helps organizations understanding the DuraSpace value proposition and value of being a sponsor, particularly a Gold sponsor.

The most valued benefit for Gold sponsors is membership in the Gold Strategic Forum which offers the opportunity for the sponsor organization to work with the Executive Team to provide input on future directions. The forum has not been deemed an official advisory board but it is a mechanism for Gold sponsors to provide advice and viewpoints on the open source projects, the technical roadmaps, and our community outreach programs. The institutions that have come forth as Gold sponsors believe strongly in the DuraSpace mission, are highly invested in Fedora and/or DSpace, and are interested in the prospects of DuraCloud. For these reasons, this is very a valuable group to engage on strategic initiatives. For example, we have engaged the sponsors on issues related to scholarly infrastructure, data curation, and shared solutions directed towards preserving the scholarly record and archiving important digital collections.

## Registered Service Providers Program

In 2010 DuraSpace launched the Registered Service Providers (RSP) program with the motivation of building strong relationships with key service providers with expertise in DuraSpace technologies. Services can range from software development, hosting, consulting, training, customization, and service contracts. By establishing a reliable network of service providers, DuraSpace can better serve its communities. Service providers benefit by having improved communication with the DuraSpace organization as well as the opportunity for collaborative programs.

All Registered Service Providers execute an annual agreement with DuraSpace and contribute a participation fee in proportion to their revenue. Service providers are also required to provide DuraSpace with written plans for technical and marketing collaboration opportunities. DuraSpace evaluates these plans and will offer funds to help execute plans that have strategic merit. After the first year participation, a revenue sharing component of the program kicks in. The plan is that for service providers who earn at least \$750,000 in revenue based on DuraSpace technologies, a percentage of that revenue will be contributed back to the DuraSpace organization.

All Registered Service Providers receive the following benefits:

- Recognition on the DuraSpace website as a Registered Service Provider partner
- Customer referrals from DuraSpace
- Monthly calls with the DuraSpace organization to update on strategy, programs, new releases
- Direct communication channel into DuraSpace for consultation on technical strategy where it directly impacts programs and business at service provider
- Letters of support from DuraSpace on grant proposals, extension developments when applicable
- Budget allocation for joint marketing and co-branding efforts with DuraSpace

2010 Registered Service Providers:

- **@mire** is committed to DSpace services and add-on modules. They are currently serving 40 institutions in 15 countries, including the University of British Columbia, the National University of Singapore and the Inter-American Development Bank.
- **CILEA** is a nonprofit consortium of 11 Italian universities and the Ministry of University and Research. They promote digital asset management systems in academic and research environments, and have supported DSpace since 2003.
- **DiscoveryGarden** is the only full-featured Islandora/Fedora/Drupal services company. With leading open source software engineers and developers, they provide cost-effective solutions and reliable service for repositories with any type of digital content.

- **Enovation** has been working in the area of digital archives and open access repositories since 2005. They offer a variety of managed and consultancy solutions based on open source products, including DSpace and Fedora.
- **Longsight** provides support for selected open source software to education and non-profit organizations. They have been hosting, supporting and customizing DSpace since 2005.
- **MediaShelf** have been leading experts on Fedora Repositories since 2006 and are the primary developers on the [Hydra Project](#). They are creators of numerous open source technologies such as ActiveFedora, Opinionated Metadata, Solrizer, and Fedora's REST API.
- **Neki Technologies** is a company that specialized in open source solutions for the Java environment.
- **Open Repository** is a fully hosted solution from BioMed Central that builds and maintains repositories on behalf of organizations. Their goal is to provide a professional, cost-effective repository solution based on DSpace.
- **VTLS** specializes in providing VITAL, a Fedora-based digital asset management system, for universities, libraries, museums, archives and information centers. VITAL builds on the Fedora repository architecture by providing extensive VTLS developed workflow extensions, management utilities, indexing enhancements, advanced searching capabilities and specialized content displays.
- **Wijiti** provides a wide variety of cost-effective services and strategies for institutional repositories, digital archives and library digitization projects.

### 3 Product Positioning

Last year we included a product positioning diagram in the annual report to show how our current and emerging technologies fit across two notable dimensions: (1) product use case (dominant orientation towards preservation vs. access) and (2) product deployment style (turnkey solutions vs. modules or services to be embedded in other systems).

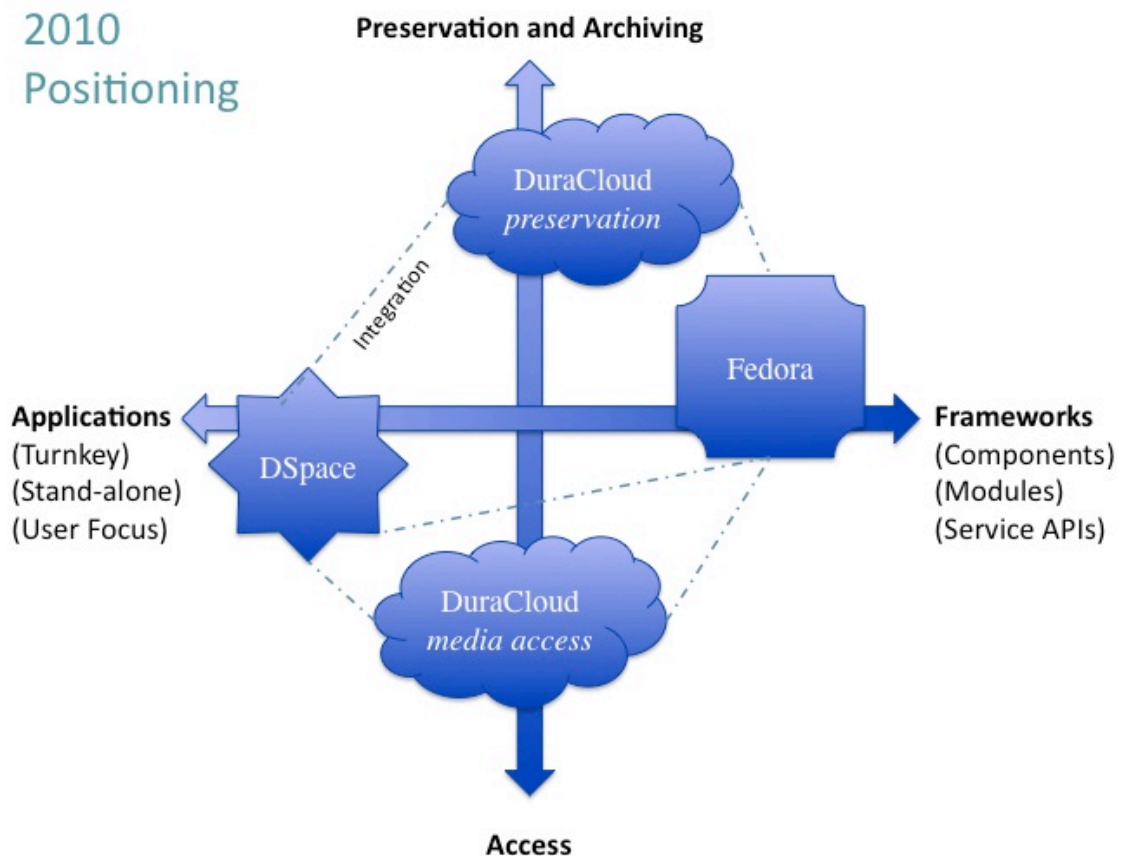
Figure 2 depicts the new relative positioning of the current technologies in the DuraSpace portfolio. Over the course of 2010, this positioning has changed in several ways. First, the Mulgara semantic triplestore project is no longer part of DuraSpace. The Triad and the Board concluded that this technology was not core to the DuraSpace mission and was better managed as an open source project outside of the DuraSpace organization. Second, relative to last year, DuraCloud has moved more towards the digital preservation/archiving end of the use case axis. While DuraCloud offers access-oriented services such as image and video viewing, it is important to note that from an external perspective, the key differentiating factor in DuraCloud is its position as a digital preservation service. Compared to other cloud services, DuraCloud is unique in its special attention to digital preservation and



its targeting at communities who are responsible for the management and preservation of digital content. In 2010, the DuraCloud pilots were funded by Library of Congress with digital preservation as a dominant motivation. However, it is also worth noting, that the manner in which DuraCloud addresses preservation also positions it to address issues of access to content. In some ways, we can look at preservation as a form of “perpetual or long-term access.” Thus, in the diagram we depict two variations of DuraCloud, one focused on the preservation services, and the other focused on the media access services. DuraCloud customers will be able to choose different DuraCloud packages to support their interests in either or both of these service categories.

Consistent with our preservation focus, we also initiated technical integrations of DSpace and Fedora repositories with DuraCloud. This integration strategy has the effect of bolstering the preservation capabilities of both DSpace and Fedora via DuraCloud, as depicted by the dotted lines in the diagram. In the case of DSpace, there is a new capability for exporting DSpace content items as Archival Information Packages and uploading them to DuraCloud. In Fedora, all digital object content is stored in files, which made replication of Fedora content easily achieved with the new DuraCloud file synchronization tool. In both cases, DuraCloud augments both the preservation and disaster recovery capabilities of repositories by enabling multiple copies of repository content using cloud technologies.

**Figure 2: Product Positioning - Updated 2010**



## 4 Technology Strategy and Portfolio 2010

A significant theme in the DuraSpace technology strategy is *integration of open technologies*. First, there is the prospect of the DSpace and Fedora integration. In 2010, the DuraSpace organization issued a recommendation to the open source communities to rally around a project to enable DSpace to run on top of a Fedora backend (the “Fedora Inside” recommendation). There are key committers in both projects that are supporting the recommendation and engaging in design discussions on how to move forward. If the DSpace/Fedora integration happens, this will be a key move towards having the technologies in our portfolio become more complementary, rather than two separate options. DSpace is strongly positioned in the end-user application space for institutional repositories, open access, and scholarly repositories. Fedora continues as a robust, modular repository service that serves as a backend that can support many front-end user applications. Ideally, there will be more cross-fertilization and collaboration between the DSpace and Fedora developer communities.

Second is the integration of DuraCloud with commercial and non-commercial clouds and storage providers. In 2010, we successfully completed the integration and testing of DuraCloud with three commercial cloud providers - Amazon, RackSpace, and Microsoft Azure. Additionally, DuraCloud was successfully integrated with Chronopolis (grid-based storage) in collaboration with colleagues at University of California San Diego. Looking forward, we will collaborate with others who are interested in running DuraCloud with connections to university clouds or cloud-like storage systems.

Third is the work of integrating the DSpace and Fedora repositories with DuraCloud. The Fedora and DSpace integrations with DuraCloud were key milestones for completing the Phase 2 DuraCloud pilots. Most of the pilot partners were either DSpace or Fedora users who were interested in testing use cases involving replication of content from repositories to DuraCloud, and also restoring content to the repositories from DuraCloud.

Fourth is integration of DuraSpace technologies with key adjacent projects within our communities. In the Fedora community, the Islandora and Hydra projects have provided key user interfaces, workflows, and services integrated with Fedora repositories. Islandora is a Drupal application layer on Fedora, with many configurable features that make it a full-featured Fedora solution with support from Discovery Garden (now one of our Registered Service Providers). Hydra is a technical framework that provides a toolkit of reusable components that can be combined and configured in different ways to create different types of content management solutions. Hydra is a joint project of Stanford University, University of Virginia, and University of Hull. These two Fedora integration projects are strategically significant and in sync with the DuraSpace technology strategy, and thus serve as models for the types of projects that work well for DuraSpace incubation or collaboration. Other notable integration projects are the “Big Digital Machine” initiative led by Indiana University that has supported integrations of scholarly applications (e.g., Open Journal System, Connexions) with DuraSpace preservation-oriented technologies.

## Open Source Repositories - DSpace and Fedora

The Executive Team continues to adhere to the strategy outlined in last year's annual report in terms of the positioning of the DSpace and Fedora brands. Our goal was to "unabashedly re-focus on the essence of each brand and re-direct our brand marketing towards promoting each for what it does best."

In 2010, both the DSpace and Fedora open source repository projects worked effectively as community-driven teams with DuraSpace support to both the development and user communities. The DSpace and Fedora Technical Leads, employed by DuraSpace, continue to provide overall coordination and guidance to the open source development communities. The Director of Community Program is focused on supporting existing community outreach efforts and developing new programs for the repository community.

The DuraSpace team continues to believe we should strive to evolve the current DSpace and Fedora technologies to be consistent with emerging technologies and new paradigms for managing and publishing digital content. The Triad continues to recognize that "path dependence" is a force to be reckoned with in the DSpace and Fedora technologies and existing communities. What this means is that decisions that were made in the past (e.g., data models, designs, use cases), tend to have undue influence on the ability to make significant change to the technology in the present – even if new requirements and competing technologies are emerging.

*The DSpace and Fedora open source projects are described in more detail in Section 5.*

## DuraCloud

DuraCloud is a hosted service and open technology developed by DuraSpace that makes it easy for organizations and end users to use cloud services. It is a cloud-based service that leverages existing cloud infrastructure to enable durability and access to digital content. The service is particularly focused on providing preservation support and access services for academic libraries, academic research centers, and other cultural heritage organizations. DuraCloud offers cloud storage, plus replication of content across multiple providers, via one web-accessible interface. Once digital content is stored in the cloud, compute services are the key to unlocking its value. DuraCloud has been in a pilot phase since Fall 2009. Plans will go forward in 2011 to launch DuraCloud as a service that will be hosted by the DuraSpace not-for-profit organization.

### Decision to Open Source

In 2010, the DuraCloud project made excellent progress. In July, we released the core components of DuraCloud as open source software to start engaging early adopters in providing feedback, testing, and eventual participation in the open source development process. We unveiled the open source release at Open Repositories 2010 and held a session for interested developers, which was well-received and served to jump-started participation. DuraCloud was released under the Apache 2.0 license.

The decision to open source the core will help us engage more eyes on the code and attract developers who want to integrate services and components into DuraCloud. Furthermore, open sourcing the code is key to a responsible exit strategy. If, in the future, our organization does not continue to run DuraCloud as a hosted service, the code base is open, transparent, and available for others to maintain and run. This can be an individual organization, an open source community, or an organization that would like to host DuraCloud. Since the open source release there have been notable early adopters. The Chronopolis service led by University California San Diego was integrated with DuraCloud, providing our first example of integration with grid-based storage. Also, DuraCloud is being tested as a storage layer in a JISC-funded pilot project run by Kings College in London.

Consistent with the Apache open source process, community developers will sign Contributor License Agreements (CLAs) to ensure that the DuraCloud open source project launches with best practices for managing the software over time. The major benefit of using CLAs is to enable the DuraSpace organization to maintain copyright control of the DuraCloud code base. This enables the organization to exercise certain rights consistent with open source process, such as being able to modify licenses on future releases, negotiate special licenses with potential partners, or assign copyright to another organization if there were a change in the custodial organization in the future. CLAs also help DuraSpace to protect its open source community members from intellectual property claims against individual contributors.

#### **Pilot Partner Program: Overall Impact and Value to Partners**

One good way to understand the overall impression of DuraCloud by our pilot partners is to ask them to express, in their own words, what DuraCloud means to them. Below is a list of statements from our partners that express their views of the DuraCloud value proposition after having completing the DuraCloud pilots:

- DuraCloud is an abstraction layer, hiding the complexity of cloud storage behind simple, consistent command-line and web-based tools.
- DuraCloud is a cloud storage service with potential to integrate to collaborative working environments in a cloud server infrastructure.
- DuraCloud is a set of tools and services for storing, processing, accessing, and preserving digital files in a cloud environment.
- DuraCloud is a storage layer for the institutional repository, helpful for preservation and also useful for serving large files.
- DuraCloud is the premier platform for cloud-based preservation, description, and user access of digital archival objects.
- DuraCloud is an online storage area that can be automatically uploaded to, with a nice web UI and individual services that can be enabled over the uploaded content, like video streaming, check-summing, and duplication.

- DuraCloud is a scalable, cloud-based preservation solution for repositories that also supports a number of additional services, such as multimedia streaming and image conversion to JP2000, for end-users who do not have the local capacity to provide them on their own.

There was notable consistency among the pilot partners' overall experiences with DuraCloud. A detailed report of the pilot use cases and results will be on the new DuraCloud website in 2011. Selected quotes from partners provide additional impressions of DuraCloud's potential as a cloud-based hosted service:

*"The potential for DuraCloud is very high: by hiding the complexity and idiosyncrasies of multiple storage providers behind a single interface and a suite of tools, it delivers the benefits of a diverse network of storage locations, but without the overhead of managing different vendors. It brings together the best of both worlds."*

*"One of the best things that DuraCloud does is bridge the complex gap between normal users and cloud-based services, and it does this job very well, especially compared to the current crop of offerings, none of which appear to provide the exact combination of services that DuraCloud can provide."*

### **Process and Results of Pilots**

Two phases of the DuraCloud Pilot Program were successfully completed in 2010. In Phase 1, we worked with three partners: WGBH, New York Public Library, and the Biodiversity Heritage Library. In July, we completed the Phase 1 pilots with presentations and a panel discussion with the pilot partners at the Library of Congress NDIIPP meeting. Phase 1 partners were key contributors to the early requirements and design of DuraCloud.

The Phase 2 pilots began in September and ran through year-end (see Appendix A for the full list of Phase 2 partners). We expanded the pilot program to include 13 new partners who tested a more extensive range of use cases and provided the context for reliability and performance testing. Throughout the course of the pilot program, the partners participated in a series of use case challenges. The first challenge focused on uploading content. The partners tested the DuraCloud user interface, the DuraCloud Synchronization Utility, and the DuraCloud APIs to upload content from a variety of local origin points, including DSpace, Fedora, file system, and other local storage systems. In later challenges, the partners exercised all of the functionality of DuraCloud preservation and access services with particular attention to usability and reliability.

Many partners focused on the DSpace and Fedora integrations with DuraCloud and fully tested the scenario of replicating repository content to DuraCloud and then restoring content to the repositories in simulations of disaster recovery. In DSpace, the integration with DuraCloud was done via a DSpace plug-in that exported DSpace objects as "Archival Information Packages" and then used the DuraSpace Synchronization Utility to upload them to the cloud. In Fedora, the integration was achieved by pointing the DuraCloud Synchronization Utility directly at the file system directories where the Fedora digital objects and datastreams are stored. After these initial upload tests, partners moved on to test DuraCloud services.

All partners tested the core preservation services - integrity checking and replication among multiple cloud providers. Additionally, selected partners tested the image transformation service focused on transforming TIFF images to the JP2000 format. From an access perspective, many partners tested the Djabatoka image service for advanced viewing of JP2000 images. The video streaming service was tested with significant input from WGBH, our partner with a strongest interest in exploring cloud solutions for video.

During the Phase 2 pilots, the DuraCloud service platform was a key focus, with improvements in the integrity checking service, image viewing service, video streaming service, and overall service configuration. Significant work was completed to enable *bulk jobs* using parallelization of compute jobs via the MapReduce framework for distributed computing. This is an essential capability for DuraCloud to ensure that we can enable efficient execution of large compute-intensive jobs using the DuraCloud platform. Initially, we are leveraging the Apache Hadoop implementation of MapReduce, as available from Amazon.

Overall the Phase 2 pilot program resulted in software improvements, new features, system tuning for reliability and scalability, and bug fixes – all essential in preparing for a public launch of the hosted DuraCloud service, currently planned for September 2011. In Q1 and Q2 2011, the DuraCloud technical team will focus intensively on high priority features, robust testing, completion of the end-user Dashboard application, and documentation for meeting the major milestone of versions 1.0. The DuraCloud business team will finalize the pricing model and service level agreements prior to launch.

For more information about DuraCloud: <http://duracloud.org>

## 5 Open Source Projects – 2010 Update

### Fedora Open Source Project

In August, we released Fedora 3.4, a significant feature release. This was Fedora's second successful community-managed release. Highlights in this release included an enhanced Content Modeling framework with validation, increased flexibility in how Fedora's reserved datastreams (Dublin Core, RDF, etc) are stored, and the official move to the new, pluggable Akubra framework for content storage. The release included 23 additional features and improvements and 44 bug fixes.

In October, we released Fedora 3.4.1, a bugfix release that addressed a SQL injection vulnerability in Fedora. Due to Fedora's design, this did not put our users at risk of permanent data loss, but could require significant downtime if exploited. We did not receive any reports of this issue being exploited, but worked to fix it and provide patches for users of previous versions of Fedora as soon as possible after the discovery was made.

The remainder of the year was spent preparing for Fedora 3.4.2, a minor release that was completed in January 2011, and planning for Fedora 3.5, our third community-managed feature release, due for release in early 2011.

In late 2010, we also moved the project's source code management function from SourceForge to Github. Github is a popular social coding website that we believe will enable increased collaboration possibilities among Fedora committers and other code contributors.

The Fedora committer team grew by one to twelve members in 2010. We expect this to grow in 2011 by opening up our nomination process to the public. This is a model the DSpace team has had success with in the past year, and we hope to see similar results by following suit.

#### **Fedora Users:**

Fedora continues to grow in usage with notable diversity into new markets. In 2010, there was particular interest and uptake of Fedora in the government sector. Notable installations are:

- The Smithsonian is using Islandora/Fedora for data and other digital materials. Thorny Staples is now with the Smithsonian and is taking a very active role in this project. He is also collaborating closely with DuraSpace, especially by initiating Fedora community activities such as the Fedora user group in the Washington DC area.
- NASA's Oak Ridge Laboratory is using Fedora to develop a "next generation prototype" for how NASA will handle data in a repository.
- The National Technical Information Service at the Commerce Department is using Fedora to store and manage publications for multiple departments.

Two adjacent open source projects built upon Fedora made excellent progress in 2010 and are attracting many new users of Fedora. The Islandora offering, developed at University of Prince Edward Island, has become a premier Fedora-based solution and is now supported by a new service company, Discovery Garden. Mark Leggott, the founder of Islandora and CEO of Discovery Garden is an important collaborator with the DuraSpace organization. Also, DuraSpace now outsources its websites to Discovery Garden and can celebrate using our own Fedora technology as a web content management solution.

The Hydra Project has also make excellent progress, and interest has expanded outside of the three founding institutions (Stanford, University of Virginia, and University of Hull). Hydra has provided the Fedora community a framework and components to be able to easily develop applications and workflows on to of Fedora repositories. The MediaShelf service company is a major technical contributor to Hydra, and well as the core Fedora project. Hydra and MediaShelf are important collaborators with the DuraSpace organization.

## DSpace Open Source Project

In March, DSpace release version 1.6.0, which added several significant new features to the platform. These included enhanced usage statistics, an embargo facility and a batch metadata editing feature. In addition to these major features, the release provided numerous bug fixes, security improvements and various additional features. May and June saw the release of 1.6.1 and 1.6.2 respectively, both of which provided bug fixes for the 1.6.0 platform and features.

Over the summer, DSpace took part in its fourth straight Google Summer of Code student internship program, sponsoring four successful student projects. We also saw the first of these GSoC projects being accepted immediately into "out-of-the-box" DSpace. Pere Villega's student project to add Unit Testing to DSpace (mentored by Stuart Lewis) was officially released as part of DSpace 1.7.0. Another student project, Bojan Suzic's project to add a REST API to DSpace (mentored by Mark Diggory and Aaron Zeckoski), is likely to be released in an upcoming version of DSpace.

At Open Repositories 2010, DuraSpace announced our recommendation to investigate strategies to allow DSpace software to run "on top of" the Fedora platform. Essentially, this would mean that the DSpace application would have a new option to install it with "Fedora Inside" (<https://wiki.duraspace.org/display/DSPACE/DSpace-Fedora+Integration+FAQ>). This work is ongoing, with initial development work coming in DSpace 1.7.0 release (complete DSpace backup & restore via Archival Information Packages). Further refactoring & integration work to make steps towards "Fedora Inside" is planned for DSpace 1.8 and following versions.

In December 2010, DSpace officially released 1.7.0, which added even more new features while also providing numerous significant performance improvements to the platform. New features included a faceted browse/search interface (via Solr), a new theme (for the XMLUI), a Curation Tasks system and the aforementioned improved backup and restore functionality (via Archival Information Packages).

### **DSpace Users:**

DSpace continues to be the most popular open source repository solution, with well over a third of the known institutional repositories using the DSpace software. Each month in 2010, the DSpace registry added between 15-20 new repositories.

Number of DSpace instances: 1039 (up from 831 in 2010): New DSpace instances for the first time in the following 15 new countries, including: Dominican Republic, El Salvador, Kazakhstan, Kyrgyzstan, Latvia, Lebanon, Mozambique, Nepal, Poland, Puerto Rico, Senegal, Serbia, Sri Lanka, Tanzania, Zambia. DSpace is now used in almost 100 countries around the world.

The countries that had the largest increase in the number of DSpace repositories were: Japan +33, Taiwan +28, USA +16, Spain +13, Brazil +12, Ecuador +11, China +10, Portugal +10, Ukraine +10, South Africa +8, Thailand +7, Vietnam +7.



## DuraCloud Open Source Project

The DuraCloud project began its software development phase in the Fall of 2009. The primary goal of the project was to provide a platform for leveraging emerging cloud infrastructure in order to simplify the tasks surrounding digital content preservation and access. By the summer of 2010, the majority of DuraCloud software had been released as open source. Along with openly available code, extensive documentation and an online collaborative environment were provided to encourage participation. The transition to open source software had been planned since the inception of the project, to provide transparency, to spur uptake of the technology, and to promote collaborative development of the software by the larger community.

DuraCloud was envisioned to be used through either the hosted service provided by DuraSpace or by organizations with the resources and initiative to build local cloud environments that would be exposed to their users via DuraCloud. Through the use of DuraCloud, consortial groups will have the option to tie private clouds, which leverage unused compute and storage capacities of member institutions, with commercial cloud solutions. DuraCloud will also provide users that have specific, technical needs for their content the option to create additional services to run over their data. These services can then be submitted back to the entire community and, thereby, increase the total number of services available to all users of DuraCloud. The portion of the code that was not released as open source is that which will form the basis of the service platform run by DuraSpace. While the open source code allows the use of an individual DuraCloud instance, this additional, unreleased code allows for the management of a large number of DuraCloud accounts by a small team (a capability specific to offering DuraCloud as a service).

The DuraCloud software has been architected with an eye towards easing external integrations and encouraging the proliferation of additional storage provider plug-ins and community-created compute services. Since the open source release of DuraCloud, several individuals and organizations have taken interest in integrating the code into their own technologies and environments. Specifically, the following projects are currently underway:

Mike Smorul of the Chronopolis team has contributed the first extension to the set of DuraCloud storage provider plug-ins. Chronopolis is founded on a distributed network of iRODS storage nodes. By creating a new DuraCloud to iRODS storage adapter, not only has the Chronopolis integration been enabled, but the door is now open to connection to any iRODS installation via DuraCloud. On the DuraCloud side, the Chronopolis partnership provides an additional, low-cost, secondary storage option for users of the DuraCloud service. On the Chronopolis side, the partnership eases content ingest and adds access services for users of Chronopolis.

Richard Rodgers, at the Massachusetts Institute of Technology, is prototyping a DuraCloud-DSpace integration that will serve as a basic replication service in DSpace, using DuraCloud storage facilities, to enable asset recovery in the event of local content loss or damage. The integration will allow for a DSpace content corpus to be replicated to DuraCloud via an archival information package, and then keep changes to DSpace content (additions, updates, deletes) synchronized to DuraCloud. Another

component of the MIT integration is the ability to check the integrity of an individual content item or a set of content (a collection in DSpace) on a scheduled or on-demand basis.

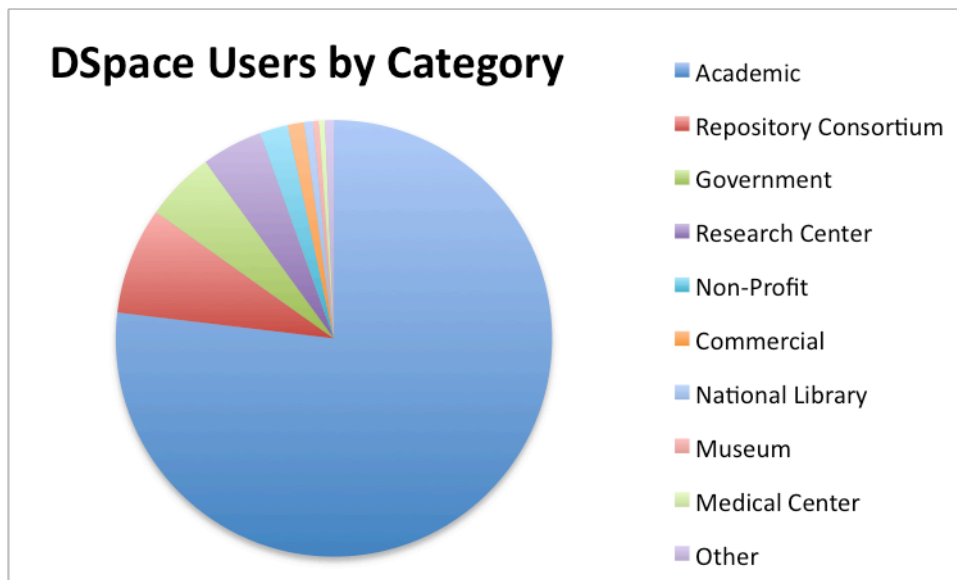
The JISC-funded Kindura Project at King's College London is exploring the possibilities of a hybrid cloud infrastructure for providing repository-based services to partner institutions in the UK. Additionally, the project is interested in building a rules engine on top of DuraCloud, such that content could be automatically assigned to a particular storage provider based on associated metadata.

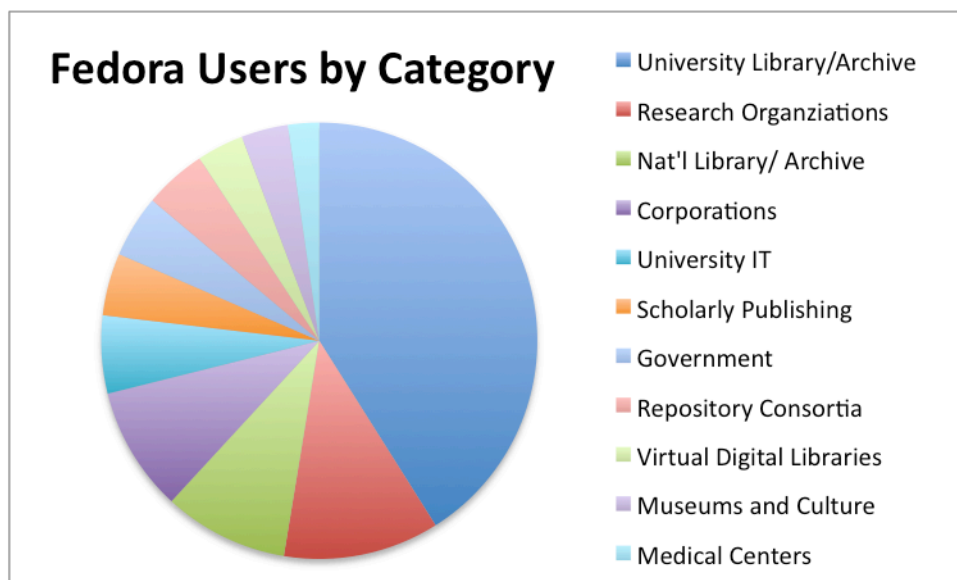
Alec Smecher at the Public Knowledge Project is currently investigating options for integrating the Open Journal System with DuraCloud. Various levels of integration are being envisioned, from using DuraCloud as a store for content backups to having the OJS data backend located entirely in DuraCloud.

## 6 Markets and Competition

As discussed last year, the DSpace and Fedora brands are well rooted, particularly in university libraries and are also gaining traction in other types of organization, especially research institutes, academic departments, and IT organizations. The Fedora and DSpace brands are very closely associated with the notion of digital repositories, which is very well understood in the library and scholarly communities. Figure 3 depicts the market distribution of DSpace and Fedora in 2010.

Figure 3: DSpace and Fedora Users





While the specific category labels from the DSpace and Fedora registries do not completely line up, the charts still make it clear that over 75% of the DSpace market is in “Academic” which translates in practice to university libraries. In the case of Fedora, we see a more diverse distribution of markets with university libraries occupying less than 50% of the user base and significant penetration in research organizations, national libraries, corporations, and university IT. This attests to the key differences between DSpace and Fedora, where DSpace was designed as an end-user application focused primarily on requirements of university libraries for institutional repositories, and Fedora was designed as a general-purpose, modular framework upon which a range of different applications could be built.

Below is our *updated* view of markets in play for **ALL** DuraSpace technologies:

- University Libraries:** University Libraries continue to be the primary market for the DSpace and Fedora open source repositories. They have also shown notable interest in DuraCloud as a replication solution, and are especially intrigued with the integration of DSpace and Fedora repositories with DuraCloud. The scenario presents libraries with a solution that creates a hybrid architecture including institutional systems and the cloud.
- University IT:** There are some Fedora-based solutions that are in university IT organizations and there may be more opportunities to integrate Fedora with systems in both academic computing and enterprise digital asset management contexts. We see new opportunity to target DuraCloud at University IT organizations, especially as a replication strategy and in the area of managing research data. We have given several presentations to University CIOs, which have generated interest in the DuraCloud proposition. There are also early discussions about a possible pilot with Microsoft, DuraCloud, and University CIO organizations. Last year we also noted that our market research by Thanos indicated that University CIOs report being out of capacity and are looking for secondary storage solutions for low risk content. Also, CIOs are validating the need for brokers to cloud solutions (like DuraCloud).

- **Individual Researchers:** We are aware that researchers are in search of data management solutions that are both easy and reliable. Researchers are aware of cloud options and some have already begun to experiment themselves (or in their labs) with direct use of utility cloud storage like Amazon S3 and replication solutions such as Dropbox. We believe there is significant opportunity for DuraCloud with researchers due to our providing the benefits of cloud storage and compute, but with particular attention to the needs of academia, and notably our focus on preservation services.
- **Public Institutions of Knowledge:** This includes both large institutions such as the Library of Congress and smaller institutions such as archives, museums, and virtual organizations. Solutions that are easy to get started with and that do not require extensive programming and software development by the institution are very attractive to this sector. With DuraCloud positioning as an easy way to use cloud infrastructure for digital content management and preservation, there are many institutions that can be served.
- **Government:** Most significantly, we are working with Library of Congress in the context of DuraCloud pilot partners and the National Digital Stewardship Alliance. There is also notable new interest in Fedora by other government organizations as evidenced by new Fedora users in this sector and two Fedora user group meetings in the Washington DC area with government organizations present. In terms of DuraCloud, we have had inquiries from government organizations, suggesting that there may be future opportunities the government sector around use of cloud services. Also, with the emergence of Islandora, we see new opportunity for smaller organizations to have the benefits of Fedora within a packaged application. For example, units within the Smithsonian are currently embracing the Islandora/Fedora solution.
- **Public Broadcasting:** With WGBH as both a Fedora users and a DuraCloud pilot partner, we have been exploring how our technologies can have impact in the public broadcasting community. WGBH has shown leadership in embracing open source technologies and in collaboration with them we will continue to further explore the potential of this market sector.
- **Not-for-Profit Organizations:** DSpace continues to be an easy-entry solution for small institutions that are interested in creating institutional repositories. Also, with the emergence of Islandora, we see new opportunity for smaller organizations to have the benefits of Fedora within a packaged application. Also, as noted last year, DuraCloud could be attractive to a variety of small institutions and not-for-profit organizations that need solutions for storing and managing digital content, but are constrained in IT infrastructure and staff. DuraCloud can provide an “instant infrastructure” at low cost, as well as services that they would not have resources to develop themselves. We will further explore this market area.

In terms of competition, with DSpace and Fedora we continue to be the dominant provider of open source digital repository software to university libraries.

We view our repository offerings to libraries as **complementary** to other solutions for library and

scholarly content, most notably HathiTrust and LOCKSS. Indeed, we continue to investigate collaborative opportunities with both of these providers.

For DuraCloud, we believe we are well positioned as a value-add player upon commercial cloud providers offering a unique value proposition. Thus, we see many potential partnership opportunities with commercial cloud providers, rather than direct competition. Currently, DuraSpace is uniquely positioned as a not-for-profit offering a cloud mediation/brokering solution with a special focus on digital preservation. This is especially appealing to our existing communities).

## 7 Community Strategy and Outreach

In the later half of 2010 we evaluated the effort vs. impact of our current community support programs. We observed that many threads of our community outreach efforts for DSpace and Fedora could be consolidated to enable DuraSpace to focus in high impact areas with a more generalized approach. We observed that there was an opportunity for the community outreach effort to focus within two generalized program themes: the Community Support Programs and the Education and Outreach Programs. Generally, the idea behind this is to do less customized outreach work and to have broadly valuable and re-usable program offerings. In the area of Community Support, we believe the big areas of impact are in enabling user group meetings, providing communication/collaboration infrastructure to communities, and offering valuable online resources.

In the area of education and training, we observe that there is an unfulfilled need for training and we will explore how we can help fill this gap with the existing resources of the DuraSpace organization, in collaboration with key community members and service providers. This work is in the conceptual stage. The basic motivation is to make maximum use of the DuraSpace staff to provide value to growing the repository communities. The same outreach principles of high impact with manageable effort by DuraSpace staff will be necessary for supporting the new open source community that we hope will emerge in the DuraCloud project. The community outreach strategy is primarily conceived around supporting the communities that surround our open source projects and is not to be confused with customer support that will be necessary to offer a hosted service such as DuraCloud. There is a separate team that is focusing on this.

Several 2010 community outreach highlights are summarized below:

### Community Groups

The Solution Communities program is now being moved under a new umbrella known as “Community Groups.” DuraSpace will continue to provide communication and collaboration infrastructure to both existing and new community groups. Also, DuraSpace will provide advice and support to new groups that are in formation or trying to solicit more participation.

Also, the Executive Team is beginning discussions on better defining the notion of “adjacent projects”

and “incubated projects.” Part of this work will be a DuraSpace policy on how projects can attain this status, and how DuraSpace’s supports such projects.

## **Fedora and DSpace Annual User Group Meetings at OR10**

DuraSpace helped to plan and facilitate a very successful and well-attended user group meeting in conjunction with Open Repositories conference in Madrid, Spain July 2010). There was a joint DuraSpace plenary session, as well as separate tracks for both the Fedora and DSpace communities.

## **DSpace Community Advisory Team (DCAT)**

Last summer in collaboration with the DSpace Committers, the DSpace Global Outreach Committee (DGOC) authored a proposal for a new community group that would have more direct involvement with the DSpace development process. As agreed by the Committers, the goals of the new group are:

- 1) Provide the community an opportunity for direct input on new features in future releases
- 2) Provide support to the Committer group in producing releases

Over the later months of 2010 the DGOC worked on behalf of the community and the Committers to design a process to facilitate the above goals. In this effort, it became clear that while the DGOC’s previous activities centered around community resource development, that the biggest need in the community was helping to facilitate the development process. As a result, rather than start another seperate project group, the DGOC, in consultation with the Committers, decided to reconstitute itself into the new group, called the DSpace Community Advisory Team (DCAT).

DCAT started their work in early 2011, reviewing new feature requests from the DSpace community issue and feature-tracking tool. The aim is to review all new feature requests and facilitate community-wide discussions on those requests that appear to have the broadest appeal or would have the biggest impact for the community. Part of the goal of the community discussion is not only to solicit more feedback and gather specific requirements, but also to find project groups or stakeholders who could work on the development of the features. You can see the first few issues that have been reviewed by DCAT on the new wiki-based DSpace discussion forum. DCAT anticipates using this same wiki discussion forum for the community-wide discussions and anyone in the community should feel free to add their thoughts. Announcements and updates about the community discussions will be posted regularly to the mailing lists. The community should note that there are currently over 40 new feature requests and it will take the DCAT several months to optimize their review process and get through the backlog.

There is broad representation in DCAT membership -- both in terms of member's role, organization and country of origin. After the new group was announced, there were 7 new members who volunteered to join.

## **DSpace Ambassador Group**

The DSpace Ambassador Program seeks to identify a volunteer in every country or region to be a point of contact for organizations just getting started with DSpace. These Ambassadors help new or potential users with general questions about DSpace as well as providing guidance on additional resources available in the larger DSpace community. Ambassadors are also encouraged to help build the DSpace user network within their country. The Ambassador role is primarily for those serving as repository managers or administrators at their organization, although anyone with DSpace knowledge and experience is eligible. There are currently 32 DSpace Ambassadors in 24 countries, with good representation in developing countries/regions, like Africa and India. In 2010 there was clear evidence that the Ambassadors have helped many organizations get started with DSpace as well as several examples of trainings and regional user group meetings.

## **8 Marketing and Communication**

DuraSpace has established the Marketing and Communications (MarComm) group that is responsible for communications, marketing, and educational services required meet the strategic objectives of the DuraSpace organization. The key objective of MarComm is to create messages and vehicles that will encourage global communities to use DuraSpace technologies, participation in DuraSpace communities, and support the DuraSpace mission (though in-kind or financial contributions).

Combining Fedora Commons and DSpace expertise in this area has enabled the rapid creation of an integrated Communications and Marketing program. The MarComm planning Matrix, established in July 2009, is a synergistic schedule of strategic messages coordinated with events, meetings, conferences, publications and materials. The MarComm Matrix provides benchmarks for accomplishments, and is a dynamic tool for adjusting efforts based on organizational priorities and work plans. In the first two months of operation, we have improved service to the community while growing participation, interest and awareness. See Appendix C for more information on campaigns, materials, events, and publications.

Key goals of the program are to define, target and engage all current and potential DuraSpace audience and market segments, to conduct related campaigns to reach those markets while building a corporate persona. All of vehicles will contain consistent messaging about the DuraSpace organization to maintain strong brand awareness for flagship products—DSpace, Fedora, DuraCloud and Mulgara—while at the same time linking these brands to the new organization. MarComm collaborates with all parts of the DuraSpace organization in developing a unique organizational identity that has as its hallmarks innovation, openness, transparency, and trust.

A sampling of the activities in 2010 include:

### **Drinking Our Own Champagne**

In 2010 Marketing and Communications began migrating all DuraSpace web properties to Islandora—an open source framework developed by the University of Prince Edward Island's Robertson Library. Islandora that uniquely combines the Drupal and Fedora open software applications to create a robust digital asset management system. We simultaneously began work on new web site designs and content for DuraCloud and DuraSpace. 2011 plans include completing the migration with Fedora and DSpace.

The aim of this collaboration is to leverage Islandora expertise and resources to develop a lightweight and easy-to-use web content management system with Fedora under the hood. Using DuraSpace's own technology—drinking our own champagne—to redesign and manage our web properties is an attractive strategic option that allows us to underscore our belief in our open technologies for durable digital content.

## **First Annual DuraSpace Sponsorship Campaign**

To help engage our community leaders in the financial support of DuraSpace, Marketing and Communications developed branded graphics and designs for the first sponsorship brochure, associated materials and sponsorship program web site resulting in a successful 2010 campaign.

## **Community News, Events and Webmetrics**

Readership for ongoing news and event coverage in 2010 increased with blog visits averaging about 2,000 unique visits per month throughout the year. The DuraSpace Digest monthly email is sent to a combined subscription list of approximately 5,000 with an average 10-11% open rate. There are now over 600 DuraSpace twitter followers, up from 350 in January of 2010, with DSpace, Fedora, and DuraCloud tweet streams also gaining followers. The twitter-verse gets the word out quickly regarding web seminars, calls for participation, news releases and other organizational topics gauged by numbers of re-tweets to external networks and bit.ly statistics that show click-throughs to individual news and event items. From September 2010 until January 2011 DSpace 1.6 downloads increased by 12.8% and Fedora 3.3 downloads were up by 31.2%.

## **Extending DuraSpace Marketing and Communications Reach**

DuraSpace Registered Service Providers submitted marketing and communications plans that outlined their ideas for collaborative marketing and communications initiatives for year one of the DuraSpace Registered Service Providers Program. Plans included participation in conferences and events, creating co-branded marketing and training materials.

“Trade Show Packs” were distributed to Registered Service Providers to enable them to represent DuraSpace at events that included:

- DuraSpace tabletop banner with stand with the RSP logo



- DuraSpace stickers
- DuraSpace informational brochures
- Open technologies datasheets

## National Digital Stewardship Alliance

DuraSpace is a founding member of the National Digital Stewardship Alliance, sponsored by the Library of Congress NDIIPP and launched in 2010.. Carol Minton Morris, DuraSpace Marketing and Communications Director is co-chair of the Outreach Working Group of the alliance. This group will focus on building relationships with stakeholder communities and preparing and sharing digital preservation information resources. This includes: Identifying and assessing tools the NDSA community needs for communication; Identifying and promoting key digital preservation information resources; Defining opportunities for outreach within the NDSA and to the community beyond.

## 9 Future Revenues and Funding Sources

In terms of revenue-generating potential for the DuraSpace not-for-profit organization, the Executive Team and the Board of Directors believe our best strategy is to pursuing a multi-pronged approach. In Section 1, we provided a series of pie charts showing how our forecast of revenues will change over the period of 2009 to 2014. Below, is a more detailed description of the sources of revenue anticipated in each major piece of the pie. To review, the pie charts depicted our starting point of 100% grant funding in 2009 (and prior). We then forecast that by 2014, we will have a revenue pie that is evenly distributed among three major categories: Services (38%), Sponsorships (38%), and Grants (24%).

### Services

- DuraCloud: We will launch DuraCloud as a hosted service in Q3 2011. We are starting with a modest forecast of revenue in 2011 and forecasting 3X growth in 2012 and 5X growth in 2014.
- Royalties: We anticipate the prospect of royalties and profit sharing from DuraCloud hosting partners in the future.
- Registered Service Providers: As described earlier, this program got off to a strong start in 2010. While the participation fees are modest, we will move into the revenue sharing phase of the program in 2011, at which time we will evaluate this program in terms of its revenue potential for our five-year forecast.

- Education and Training: we have just begin work defining requirements for an Education and Training program offered by DuraSpace. We anticipate a hybrid of free educational resources and resources and training for a fee. We will report on progress in this area in 2011.

## Sponsorship

- Community: After a successful launch of our community sponsorship program in 2011, we are optimistic about sponsorships continuing to be an annual source of revenue going forward. Our major goal for the 2011 sponsorship campaign is to have all current Gold sponsors continue as sponsors, to convert Silver sponsors to Gold, and to attract new prospects for sponsorship.
- Corporate: In 2011 we will begin our work of creating a Corporate Sponsorship Program. For the first year, have made conservative forecasts focused on a few corporations who have supported us in the past. With the new program, we anticipate expanding the program and see new opportunities for corporate sponsorship if DuraCloud takes off.

## Grants

We will significantly decrease our reliance on grants over the next 3 years, with the goal of reducing grants to be 24% of the income portfolio by 2014. Our strategy will be to pursue grants to advance our existing technologies, participate in research and development projects with strategic partners, and to support DuraSpace innovation.

In addition to the above forecasted revenue sources, the DuraSpace Board of Directors and the Executive Team have begun serious work in identifying other stable sources of income that can be used to build an endowment. We are working with the Board of Directors on strategic initiatives and alignment with universities and other organizations who share commons goals for which DuraSpace and other not-for-profit organizations offer solutions. Initially, members of our Board have initiated outreach efforts to begin strategic dialog with institutions who are committed to preserving the scholarly, scientific, and cultural record.

## 10 Financial Reports

See separate package containing financial narrative, financial reports, and 5-year forecast.

## **APPENDIX A: DuraCloud Phase 2 Pilot Partners**

- Colorado Alliance
- Columbia University
- Hamilton College
- ICPSR
- IUPUI
- MIT
- North Carolina State University
- Northwestern University
- Orbis Cascade Alliance
- Rhodes College
- Rice University
- University of Prince Edward Island
- WGBH Public Broadcasting Media Archive