Office of Digital Learning

Overview

The mission of the Office of Digital Learning (ODL) is to transform teaching and learning at MIT and around the globe through the innovative use of digital technologies. To accomplish this, under the leadership of director of digital learning Sanjay Sarma, ODL brings together the Institute's principal educational technology resources to focus on the following strategic priorities.

1. Residential education: collaborate with faculty to explore, test, and institutionalize pedagogical models that enhance MIT education through digital and open learning technology and practices
2. Open education: build out MIT's edX portfolio with exemplary courses and modules for a worldwide audience and publish new and updated MIT course materials and other teaching/learning resources through MIT OpenCourseWare (OCW), enabling global access to MIT course materials
3. Strategic education initiatives: undertake digital learning experiments and projects
4. Digital learning research: encourage and support digital learning research across MIT and seek opportunities to exchange data, research, and lessons about digital learning

This report includes the unit-level reports of the groups that make up ODL. Note that these groups represent the AY2014 organizational structure. As of June 30, we were nearing completion of the transition to the new ODL structure shown in Figure 1, and next year's annual report will reflect the new structure accordingly. Constituent units covered in this report are as follows:

- ODL headquarters (HQ; office of the director and certain cross-organization functions)
- MITx
- MIT OpenCourseWare
- Office of Educational Innovation and Technology (OEIT)
- Academic Media Production Services (AMPS)
- Distance Education (DE)

Highlights of the Year

During AY2014, ODL was simultaneously conducting operations in its vital educational technology and support programs through its MITx, OCW, OEIT, AMPS, and DE units while at the same time focusing on a broad organizational transition. Major accomplishments for the year are mentioned below.

Operations and Production

In AY2014, ODL and its constituent units delivered prodigious volumes of output. For example, we:

- Launched 27 online massive open online courses (MOOCs)/small private online courses (SPOCs) (MITx)
- Published 134 OCW courses, including 62 new courses and 72 updates (16 of these courses had complete lecture video series, and 11 more had substantial video assets)
- Launched or advanced nine major educational innovation projects (OEIT)
- Captured more than 2,000 video clips and recordings for classes and events at MIT (AMPS)
- Webcasted 65 live events and added over 4,500 new videos to MIT TechTV (DE)
- Developed or upgraded numerous software systems, tools, and websites (all units)

Strategic Plan

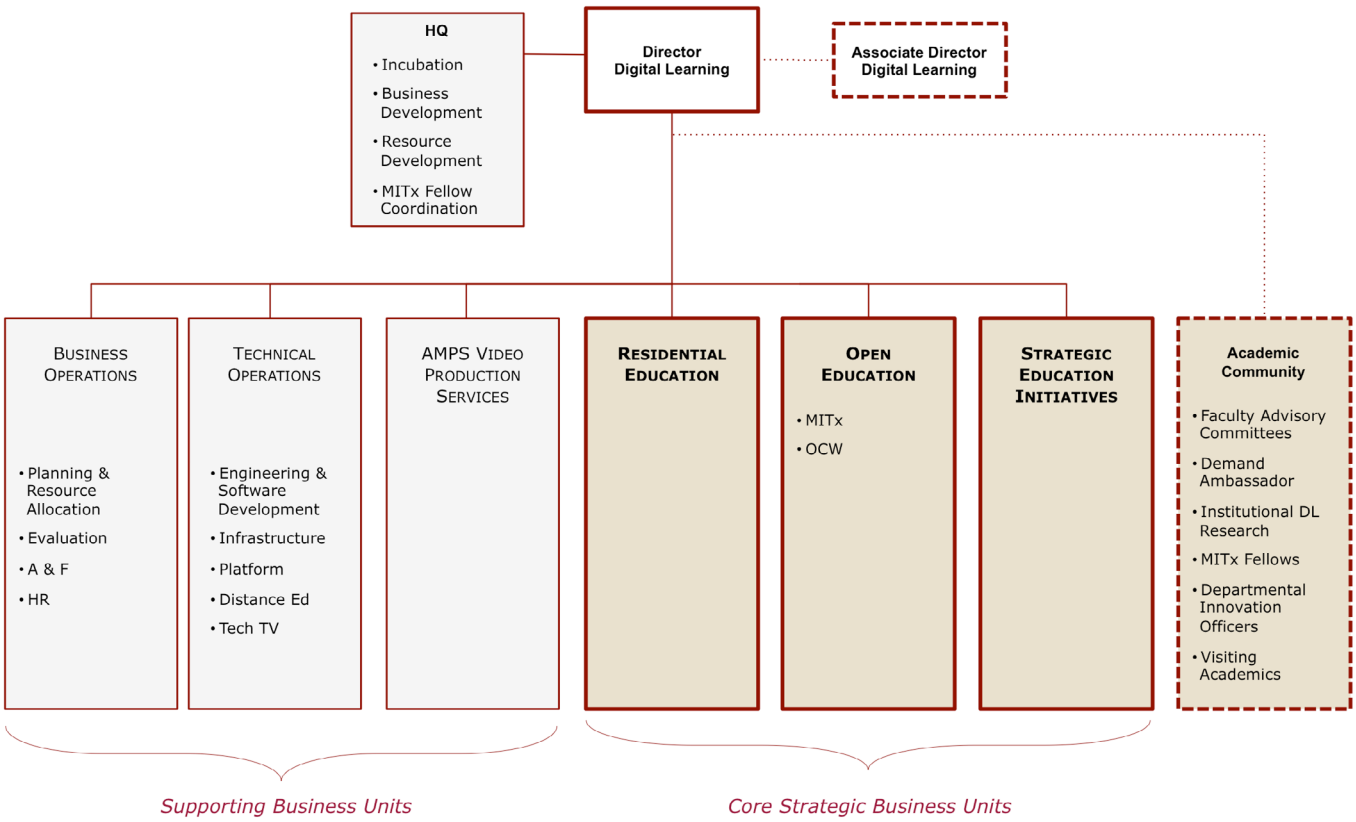
Senior managers along with several staff members were engaged in creation of a strategic plan for ODL. Completed in initial draft form in June 2014, the plan lays out ODL's mission and vision, strategic priorities, implementation strategies, new organizational structure, governance model, approach for an ongoing financial model, high-level evaluation plan, and annual planning process.

Organizational Integration

Throughout the year, formerly independent ODL units took steps to combine, standardize, and streamline internal policies and work processes. As one major aspect of the strategic planning process, a new organizational concept and structure began to take shape, and this guided more formal organizational restructuring.

- MITx and OCW were combined into a new open education business unit.
- Plans were laid to sunset OEIT and instead create two new units: a Strategic Education Initiatives unit and an internal Technical Operations unit.
- Common functions formerly embedded in independent business units were combined into cross-organizational positions or teams (communications/external relations, financial resource development, planning, evaluation, administration/finance, human resources, intellectual property [IP] clearance, and technical support).

Figure 1 summarizes the new ODL organizational structure.



Note: Dotted lines denote that individual/entity reports elsewhere in the institute (not to ODL).

Figure 1. Summary of the new ODL organization.

Space Consolidation

The major space change was relocation of OCW from One Broadway, MITx from Building 41, and a few other individuals from various locations, all to combined quarters at 11 Cambridge Center. Several other space changes were also effected. ODL space planning and consolidation remain a work in progress.

Website

ODL began work on redesigning its website. Several new features were implemented by year's end, and work continues on additional features. Unit-level highlights for the year are included later with the reports of each of the ODL constituent units.

Finances and Funding

Over the past year, ODL began to review and reorganize administrative and financial processing across constituent units. This is an ongoing activity. One result has been the creation of an ODL-wide view of operating income and expense. Table 1 summarizes financial results for the year.

Table 1. ODL Financial Summary for FY2014

	ODL HQ	MITx	OCW	OEIT	AMPS	DE/ TechTV	Total
Beginning fund balance (July 1, 2013)		3,059,450	3,727,206	719,979	785,610	1,303,784	**9,596,029**
MIT funding	1,118,012	5,000	2,005,701	2,169,145	250,000	253,808	**5,801,666**
Sponsored projects/ contracts	330,000		379,299	1,521,229			**2,230,528**
Gifts	1,020,000	425,000	209,658		225,000		**1,879,658**
Corporate sponsorships			282,770				**282,770**
Annual donations			267,361				**267,361**
Revenue/ Expense Recovery	15,000	322,735			1,738,527	862,405	**2,186,425**
Total FY2014 funding	2,483,012	752,735	3,144,789	3,690,374	2,213,527	1,116,213	**12,648,408**
Total FY2014 expenses	2,030,964	5,150,749	3,931,918	3,022,810	1,938,026	1,528,232	**16,850,457**
Surplus (deficit)	452,048	(4,398,014)	(787,129)	667,564	275,501	(412,019)	**(4,202,049)**
Ending fund balance (June 30, 2014)	452,048	(1,338,564)	2,940,077	1,387,543	1,061,111	891,765	**5,393,980**

Notes: Total revenue/expense recovery and total FY2014 expense amounts have each been reduced by $752,000 to back out intra-ODL internal billings/transfers (between MITx and AMPS and DE/TechTV), which otherwise would overstate the total volume of expenses and revenues. The financial overview consolidates funds for restricted or designated activities/projects with unrestricted funds for operating activities.

Staffing

AY2014 was a year of significant organization building and transition in ODL. There were several new hires into both new and existing positions as well as a number of intra-ODL promotions and reassignments to implement the new ODL organization structure. Table 2 summarizes ODL staff changes.

Table 2. ODL Position and Staff Changes, AY2014

Position	Person or Status	Form of Recruitment	Notes
ODL director of MIT residential education	Sanjoy Mahajan	Outside hire	New position
ODL director of open education	Cecilia d'Oliveira	Internal promotion	Position upgraded from executive director of OCW to cover OCW and MITx
ODL program director for international initiatives	Erdin Beshimov	Outside hire	
ODL director of development	Tom Smith	Internal promotion	Position upgraded from OCW corporate relations manager to ODL-wide director
ODL director of communications	Beth Zonis	Internal MIT hire	Position upgraded from OCW external relations to ODL-wide position; replaces Steve Carson
ODL assistant director of finance and administration	Maria Karatzas	Internal promotion	Position upgraded from OCW administration to ODL-wide position
ODL manager of financial planning	Marine Brown	Internal promotion	
ODL intellectual property supervisor	Lindsey Weeramuni	Internal promotion	Position upgraded from OCW IP to ODL-wide position
ODL program coordinator	Anine Ward	Internal MIT hire	
ODL senior administrative assistant	Sarah Jane Vaughan	Internal MIT hire	
ODL HQ administrative assistant II	Gracie Dorneus	Internal MIT hire	50%–50% split ODL HQ and MITx
ODL HQ senior program manager	Chi-Chu Tschang	Outside hire	
ODL HQ special project manager	Claudia Urrea	Internal MIT hire	
MITx director of MOOC development	TC Haldi	Outside hire	Replaces Dan Carchidi
MITx associate director	Caroline Soares	Internal promotion	

Position	Person or Status	Form of Recruitment	Notes
MITx media service manager	Lana Scott	Internal promotion	
MITx media service manager	Chris Boebel	Intra-ODL transfer	
MITx manager of digital learning	Dana Doyle	Outside hire	
MITx educational technologist	Shira Fruchtman	Outside hire	
MITx educational technologist	Ben Weeks	Outside hire	
MITx project manager, digital learning	Brad Goodman	Outside hire	Replaces Eileen McMahon
MITx video specialist	Tsinu Hermano	Outside hire	
MITx video specialist	Caitlin Stier	Internal promotion	Transfer from OCW to MITx
OCW/MITx manager of technology and production	Peter Pinch	Intra-ODL transfer	Position upgraded from OCW production manager to overall educational technology manager for MITx and OCW
OCW publication manager	Cheryl Siegel	Internal promotion	Replaces Janet Chuang
OCW department liaison	Luke Phelan	Outside hire	
OCW department liaison	Brenley McIntosh	Outside hire	
OCW department liaison	Christopher Tam	Outside hire	
OCW Educator project manager	Open	Search in progress	Departure of Kathy Lin
OEIT software developer	Cole Shaw	Outside hire	
OEIT software developer	Sholka Kini	Outside hire	
OEIT program coordinator	Elizabeth Choe	Outside hire	K–12 Video Project
OEIT project manager	Kirky DeLong (part time)	Internal MIT hire	TAACCTT Initiative, Haiti Project
AMPS video production staff person	Open	Search in progress	3 new positions to meet demand
DE educational technology administrator	Layoff		Position eliminated (cost reduction)
DE network administrator	Position ended		Term position ended, not renewed (cost reduction)

Headquarters

ODL HQ is the home of the office of the director of digital learning as well as certain cross-organization functions, including incubation and experimentation, business development, resource development, and MITx fellow coordination.

Goals, Objectives, and Priorities

HQ is the coordination arm of ODL, providing services across the individual business units of the organization. Examples include programs to encourage the "one ODL" concept (e.g., cross-organization team-building and information-sharing events), planning, and fundraising.

Accomplishments

In July 2013, ODL began a strategic planning process to drive more deliberate and deeper integration across the new organization and to leverage the enormous opportunities and innovations in educational technologies. This process engaged senior leadership, managers, and staff from all ODL units. Representatives from each unit, working with an outside planning consultant, contributed to the strategic plan. The resulting plan was shared with staff at a town hall meeting in July 2014.

Under the aegis of HQ, the organization embarked on several projects this year including the redesign of the ODL website, opportunities to interact with students and faculty, and experiments with digital learning classes.

For example, 3.039 Passion Projects in Materials Science, a project-based research class for freshmen, was developed and taught for the first time in spring 2014 by professor Jeff Grossman. ODL worked with students in 3.039 to create videos telling the story of their learning experiences. Also, 15.390x Entrepreneurship 101: Who Is Your Customer? was designed with the idea of creating a different kind of MOOC. Course leaders brought together a diverse team of instructional designers, cinematographers, graphic designers, and professors to rethink educational media, including creation of interviews and documentaries with entrepreneurs. More than 55,000 students enrolled in this course. The course had a large social media presence with more than 2,500 followers on Twitter in the first seven weeks, as well as student-created Facebook and messaging groups.

In February and May, the MITx special interest group hosted a series of lunches at which faculty and fellows made brief presentations about their experiences using digital learning in the classroom. Between 50 and 70 people attended each session, and the series provided an opportunity for practitioners to interact and share knowledge.

ODL, in collaboration with Admissions, worked to reach out to incoming freshmen to share information with them about how digital learning is transforming education on campus.

MITx

MITx collaborates with faculty and other course staff to develop and offer MOOCs to learners worldwide via the edX teaching and learning platform. MITx also supports the use of digital learning tools and techniques in the delivery of MIT residential programs.

MITx collaborates with the institutional research group in the Office of the Provost to coordinate research on the use and effectiveness of emerging digital technologies. Through the open sharing of data generated by MITx projects, the team helps stimulate research that will make the next generation of learning technologies even more innovative and effective.

Summary and Highlights

The 2013–2014 academic year was extremely productive for MITx. For instance, we:

- Launched 27 online courses (17 new MOOCs, 5 MOOCs that had previously run in AY2013, and 5 SPOCs)
- Enrolled a total of 773,394 students across 22 MOOCs and more than 190 countries
- Awarded 29,601 edX certificates to students enrolled in 22 MOOCs (students in SPOCs cannot earn certificates)
- Hired and trained nine new team members
- Published 12 working papers
- Established the MITx Faculty Advisory Committee (FAC), comprising 11 members
- Generated $460,000 in gross revenue to edX through verified certificates and SPOC/sublicensing arrangements, with an MITx share of $323,000 after edX overhead and fees
- Partnered across and beyond the MIT community, presenting during Parents Weekend, hosting graduate students from Brown University researching educational technologies, hosting five international groups, and providing tours of MITx facilities

By the end of AY2014, MITx had developed and offered a total of 25 courses via the edX interactive teaching and learning platform since the inception of the MOOC program; 10 more are in the pipeline for launch in fall 2014.

Students must enroll in these courses, and they have the opportunity to earn certificates of achievement. Since the first MITx course was offered in August 2012, more than 900,000 people around the world have registered, some for multiple courses (more than 1.3 million enrollments). Individual registrants come from more than 200 different countries. Figure 2 shows the overall distribution.

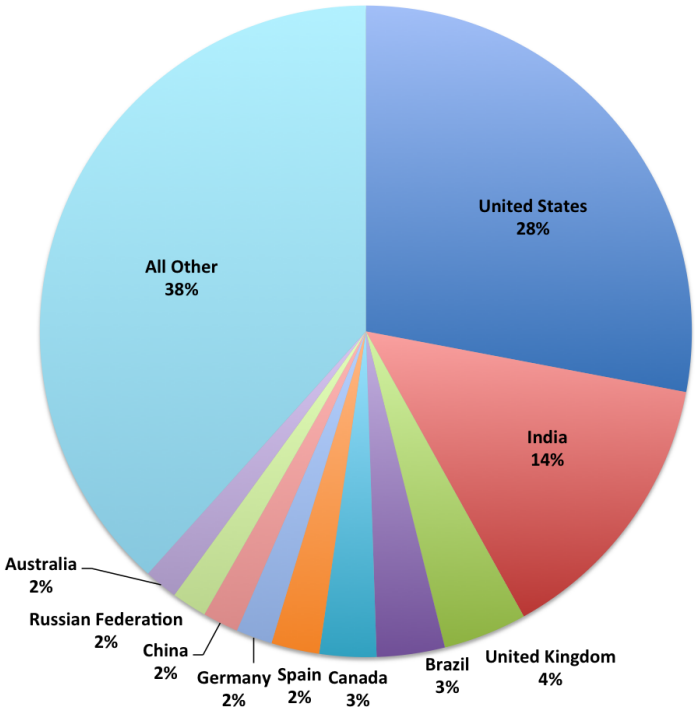


Figure 2. Geographical distribution of MITx registrants.

Goals, Objectives, and Priorities

The mission of MITx is to support the use of digital learning tools and techniques in the delivery of MIT residential programs; support the development of free, openly licensed, scalable, MIT-quality courses for academically talented learners worldwide; and further the understanding of best practices in emerging digital and scalable learning environments via data collected from MITx learners. MITx goals are as follows.

- Reach: expand access to education worldwide
- Residential: improve teaching and learning across campus (and beyond)
- Research: advance teaching and learning through educational research
- Revenue: generate revenue to help sustain MITx and other ODL units

Accomplishments

Reach

- Launched 27 online courses, as shown in Table 3
- Enrolled 773,394 students from more than 190 separate countries (excluding SPOCs)
- Awarded 29,601 edX certificates to students across 22 MOOCs

Table 3. AY2014 MITx Courses

Course	Title	Instructor(s)	Enrollment	No. of Certificates	No. of Countries
		New MOOCs: fall 2013			
2.03x	Dynamics and Control I	David Gossard	20,433	398	111
3.086x	Innovation and Commercialization	Gene Fitzgerald	48,079	616	138
4.605x	Global History of Architecture	Mark Jarzombek	31,855	1,486	105
6.00.1x	Introduction to Computer Science and Programming	Eric Grimson, John Guttag	79,335	4,975	147
8.01x	Classical Mechanics	Walter Lewin	50,839	1,822	120
16.101x	Introduction to Aerodynamics	Dave Darmofal	36,543	288	117
24.00x	Introduction to Philosophy: God, Knowledge and Consciousness	Caspar Hare	64,308	1,893	137
		New MOOCs: spring 2014			
6.00.2x	Introduction to Computational Thinking and Data Science	Eric Grimson, John Guttag	19,733	1,502	103
6.041x	Introduction to Probability—The Science of Uncertainty	John Tsitsiklis	35,686	592	123
6.SFMx	Street Fighting Math	Sanjoy Mahajan, Isaac Chuang	28,355	567	No data
12.340x	Global Warming Science	Kerry Emanuel	14,398	452	115
15.071x	The Analytics Edge	Dimitris Bertsimas	38,362	1,790	115
15.390x	Entrepreneurship 101: Who Is Your Customer?	Bill Aulet	58,484	2,043	141
16.110x	Flight Vehicle Aerodynamics	Mark Drela	31,636	101	118
21W.789x	Building Mobile Experiences	Frank Bentley, Ed Barrett	40,764	101	128

Course	Title	Instructor(s)	Enrollment	No. of Certificates	No. of Countries
JPAL 101x	Evaluating Social Programs	Rachel Glennerster, Marc Shotland	12,240	980	131
MAS.S69x	Big Data and Social Physics	Sandy Pentland	30,107	4,055	No data
		Rerun courses: fall 2013			
3.091x	Introduction to Solid State Chemistry	Michael Cima	17,678	382	105
6.002x	Circuits and Electronics	Anant Agarwal	25,698	379	115
7.00x	Introduction to Biology: The Secret of Life	Eric Lander	38,123	2,086	128
		Rerun courses: spring 2014			
6.00.1x	Introduction to Computer Science and Programming	Eric Grimson, John Guttag	30,937	1,920	119
14.73x	Challenges of World Poverty	Esther Duflo, Abhijit Banerjee	19,801	1,173	135
		SPOCs: spring 2014 (no SPOCs offered in fall 2013)			
6.00.1x	Introduction to Computer Science and Programming	Eric Grimson, John Guttag	NA	NA	NA
6.00.2x	Introduction to Computational Thinking and Data Science	Eric Grimson, John Guttag	NA	NA	NA
7.00x	Introduction to Biology: The Secret of Life	Eric Lander	NA	NA	NA
14.73x	Challenges of World Poverty	Esther Duflo, Abhijit Banerjee	NA	NA	NA
6.BDx	Tackling the Challenges of Big Data (offered through MIT Professional Education)	Daniella Rus, Sam Madden	NA	NA	NA

NA = not available

In addition to these courses, MITx initiated the Summer of Learning program at the request of MIT president Rafael Reif. This program had three components, as follows.

- Summer@Future: This on-campus summer program offered five classes for credit on an experimental basis, taught by MIT faculty for MIT registered students. Summer@Future built on the work of the Institute-wide Task Force on the Future of MIT Education. The classes represented another step in the exploration of opportunities to enhance the residential learning experience with online educational materials and blended learning models. There was significant interest in the program, with 129 students (113 undergraduates and 16 graduate students) participating.
- MITx Global Entrepreneurship Bootcamp: This program was developed during AY2014 to run in August 2014. Designed as an intensive, immersive one-week program, the camp will include seminars with MIT entrepreneurship faculty to expose students to cutting-edge entrepreneurship research and methodologies, coaching by MIT entrepreneurs to combine knowledge with practical perspectives from a variety of fields, interactions with MIT engineers and scientists to provide a close-up view of innovations that will shape our future, and rapid prototyping to develop and validate student ideas into viable potential startups. The program, envisioned to be highly selective, will be offered at a tuition of $6,000 for the week.
- LAX: This summer program, modeled on the 2013 ChicagoX program, was designed for high school students in the Los Angeles area. Participation levels were disappointing, due at least in part to limited publicity about the program.

Residential

During AY2014, the MITx staff supported Residential MITx,. which involves using the edX interactive teaching and learning platform on campus for MIT students. (As part of the ODL organizational transition, "Residential Education" is in the process of becoming a separate business unit within the ODL family.) Growth in faculty adoption of Residential MITx, which began in fall 2012 with three courses, has been significant, with the number of courses doubling every semester. More than 2,000 MIT students enrolled in the 27 courses offered in spring 2014, and 65% of all current students have taken at least one class with a Residential MITx component.

In AY2014, MITx contributed significant technical resources to Residential MITx, supporting multiple releases of the MITx residential platform; releasing the "local course development stack," which allows faculty members to develop courses on their own computers; working with edX to improve and standardize open-source work processes; and contributing to the development of staff-graded assignments (allowing uploads of student assignments to course staff, who then grade them and provide feedback), "hinting" (providing feedback for students to nudge them in the right direction on problem sets), and improved and expanded central authentication service integration.

Examples of educational innovations and tools developed by MITx course teams include:

- A global warming simulator for 12.340x Global Warming Science
- Direct integration of MATLAB into 2.03x Dynamics and Control I to solve graded problem sets, along with weekly "office hour" videos by professor David Gossard addressing and reinforcing complex topics and burning questions in a discussion forum
- Use of 3.091x Introduction to Solid State Chemistry (and 3.091r) as an a/b test to validate professor Michael Cima's hypothesis that students perform better when given the opportunity to practice self-assessments over shorter durations of time (versus formal assessments)
- Development of a study tool for 4.605x Global History of Architecture consisting of an interactive map of buildings around the world
- Integration of Kaggle, a third-party application, into 15.071x The Analytics Edge and creation of a competition whereby students used data to make informed decisions across a variety of topics, including learning what predicts happiness

MITx also coordinated three special interest group events to share best practices among MIT faculty and their teams developing online courses.

Research

MITx published 12 working papers:

- "HarvardX and MITx: The First Year of Open Online Courses"
- "3.091x Introduction to Solid State Chemistry— Fall 2012 MITx Course Report"
- "6.00x Introduction to Computer Science and Programming—Fall 2012 MITx Course Report"
- "6.002x: Circuits and Electronics—Fall 2012 MITx Course Report"
- "2.01x Elements of Structures—Spring 2013 MITx Course Report"
- "3.091x Introduction to Solid State Chemistry—Spring 2013 MITx Course Report"
- "6.00x Introduction to Computer Science and Programming—Spring 2013 MITx Course Report"
- "6.002x: Circuits and Electronics—Spring 2013 MITx Course Report"
- "7.00x Introduction to Biology: The Secret of Life—Spring 2013 MITx Course Report"
- "8.02x Electricity and Magnetism—Spring 2013 MITx Course Report"
- "14.73x The Challenges of Global Poverty—Spring 2013 MITx Course Report"
- "8.MReV Mechanics ReView—Summer 2013 MITx Course Report"

Revenue

MITx generated $460,000 in gross revenue to edX through verified certificates and SPOC/sublicensing arrangements (channels through which MITx currently generates revenue). As noted above, MITx's share after edX overhead and fees was $323,000.

Administrative Accomplishments

MITx established new policies, processes, and collaborations in several areas, as follows.

- MITx fellows: developed a strong community of practice with MITx fellows, MIT employees who have dual appointments in an academic department and ODL and who have a demonstrated interest in online teaching
- MIT departments: increased departmental outreach and one-on-one meetings with department heads
- Finance: established a cost accounting, revenue tracking, and financial reporting system to manage MITx business processes
- Budgeting: refined and standardized the course budgeting process
- edX: worked closely with edX to strengthen our ongoing relationship and partnership and provided ongoing feedback on the edX platform
- edX Consortium: participated in semiannual meetings of the consortium (November 2013 in Cambridge and June 2014 in Delft, the Netherlands) and partnered closely with founding member HarvardX on a number of issues (edX Consortium, edX product development, and edX engineering roadmap)
- Work processes: created and documented new processes, procedures, and policies, including a pipeline tracking system, resource capacity planning, course budgeting and account set up, intellectual property agreements, tracking of intellectual property assets, a self-service development model, new hire onboarding materials, video file management, and course production processes
- ODL unit support: supported MITx employees' participation in cross-functional ODL work teams that focused on identifying strengths and areas of improvement across the newly formed unit with respect to production processes, communications revenue, and ODL's strategic plan
- ODL space changes: relocation of the MITx team offices in the middle of the academic year

MITx Faculty Advisory Committee

Purpose

The purpose of the MITx Faculty Advisory Committee (FAC) is to provide oversight and guidance for MITx courses. The committee:

- Offers clear guidelines on topics related to MITx and is responsive to the MIT faculty with regard to MITx governance.

- Provides oversight on subjects or modules produced for MITx: the residential benefit of each MITx proposal will be considered; the budget, timing, and sustainability of each module (learning unit), subject, or subject sequence proposed will be assessed based on the strategy described by each department; and each proposal will be assessed for whether it adequately reflects the diverse "face of MIT," especially with regard to equity in the demographics of the faculty teaching each subject.
- Promotes innovative approaches to an MIT education: FAC will evaluate and facilitate innovative new approaches proposed for MITx courses and experiments in digital learning. Also, it will guide MITx in seeking to bring innovative new approaches to digital learning and education for MIT students. Such new approaches for developing, employing, and maintaining online materials will emerge over the years ahead, in blended classrooms, modular content, and novel approaches to video, animations, simulations, or production tools.

Membership

The committee's cochairs are professor Sanjay Sarma, director of digital learning, and professor Hazel Sive of the Department of Biology. Members are as follows:

Isaac Chuang, ODL associate director and professor in the Department of Electrical Engineering and Computer Science

Elfatih A.B. Eltahir, associate department head/professor, Department of Civil and Environmental Engineering

Woodie Flowers, Pappalardo professor emeritus of mechanical engineering

Steven Hall, professor, Department of Aeronautics and Astronautics

Mark Jarzombek, interim dean and professor, School of Architecture and Planning

S.P. Kothari, deputy dean/Gordon Y. Billard professor of management, Sloan School of Management

Nergis Mavalvala, Curtis and Kathleen Marble professor, Department of Physics

Christopher A. Schuh, department head/professor, Department of Materials Science and Engineering

Craig Steven Wilder, professor and chair, History Section, School of Humanities, Arts, and Social Sciences

OpenCourseWare

MIT OpenCourseWare is a free and open digital publication of high-quality educational materials organized as courses. Through the Internet, MIT OpenCourseWare has opened MIT's curriculum and the course materials created by MIT faculty to a global audience of teachers and learners. In the United States and around the world educators use these materials for teaching and curriculum development, while students and self-learners draw upon the materials for self-study or supplementary use.

Since the inception of OCW in 2001, more than 9,000 individuals, including nearly 70% of current MIT tenured or tenure-track faculty members, have voluntarily shared their teaching materials through OCW, amassing a collection of thousands of individual resources including documents, videos, audio, simulations, animations, and sample programming codes. More than 150 million people from virtually every country on the planet have accessed these resources, and hundreds of universities around the world have joined MIT in sharing their own course materials freely and openly on the web.

Beyond its service to a worldwide audience, OCW has a significant impact at MIT, where both faculty and students embrace it. OCW staff work extensively with faculty to develop or refine course materials for publication, and faculty frequently use these updated materials in their classroom teaching on campus. According to our most recent evaluation surveys:

- 84% of MIT faculty use OCW in their teaching, advising, or research
- 32% of faculty say that publishing on OCW improves their teaching materials
- 93% of MIT undergraduate students and 82% of graduate students use OCW in one or more ways: as a part of their assigned coursework, as a supplemental resource for study, or as a tool for planning curricular programs and choosing courses
- 96% of these students say OCW has a positive impact on the MIT student experience

Summary and Highlights

AY2014 was an incredibly busy year for OCW. In addition to achieving (in fact, slightly exceeding) annual goals for normal publication of course materials and other educational resources, OCW contributed an enormous level of support for ODL and MITx, integrated "This Course at MIT" (OCW Educator) into the regular course publishing process, further ramped up OCW site curation, and eliminated the backlog of video production. All of these achievements are explained in more detail below.

Publication Highlights

- Published 134 courses (62 new, 72 updates). ("Updates" involve fresh materials and, often, new pedagogical approaches. An update normally requires the complete reassembly of the course site and therefore involves an effort similar to that required in publishing a new course. When a course is updated, its older version is usually archived to DSpace.)
- Published 27 courses (included in the count above) with video assets, of which 16 had full video lectures, eliminating the entire OCW backlog of unpublished video assets.
- Initiated a new, more rapid process for creating subtitles for videos and upgraded the OCW embedded video player.

- Greatly expanded OCW Educator materials and integrated This Course at MIT into the ongoing OCW publishing process.
- Published three more OCW Scholar courses, completing the Scholar publication effort at 15 courses in total.
- Delivered 25 more courses for the Singapore University of Technology and Design (SUTD) program in collaboration with MIT faculty.
- Redesigned and rearchitected the Highlights for High School (HFHS) section of OCW.
- Improved the user experience on the OCW website via site curation.
- Logged record traffic, with daily average visits to the OCW website of 78,818, up 22% from the prior year, and with 28.8 million total visits for the year. OCW materials continue to be made available through other sites such as YouTube, iTunes U, VideoLectures.net, and Internet Archive, as well as through translation affiliates. Figure 3 shows how traffic to the OCW website has grown over the years.

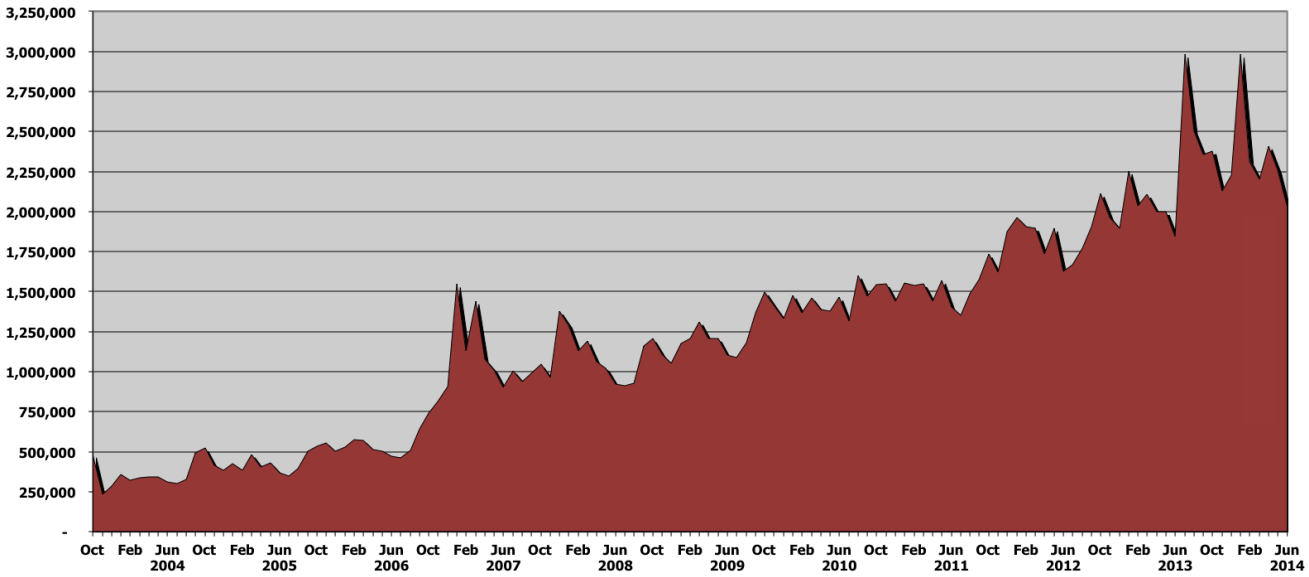


Figure 3. Monthly traffic to the OCW website through June 30, 2014.

Other Highlights

- Brought together OCW publication and MITx MOOC development into a single open education unit under the leadership of Cecilia d'Oliveira
- Continued other staffing and reporting line transitions in OCW associated with organizational integration within the new Office of Digital Learning
- Provided multifaceted support for MITx and ODL
- Generated over $250,000 in individual donations through online OCW fundraising campaigns
- Began work with two marketing firms on market research and an awareness campaign for OCW Scholar but, in the end, did not launch the campaign because it was inconsistent with the MIT brand

Publication Status

As of June 30, 2014, there were 2,232 courses available on OCW, representing virtually the entire undergraduate and graduate curricula in MIT's five schools and 33 academic units. Of this total, 90 courses and supplemental resources have full video lectures, and another 54 courses have significant video demonstrations and recitations. Hundreds of courses have video clips of various kinds. In addition to the courses on the live site, at year's end there were a total of 866 courses archived on DSpace. All courses, including archived courses, can be accessed from the OCW website.

Goals and Objectives

OCW has a formal, hierarchical goal structure that we use for developing the annual operating plan and for monitoring progress against that plan. OCW's goals are as follows.

- Publish high-quality, up-to-date MIT course materials: expand the OCW publication with new MIT course materials in step with the MIT curriculum, maintain the currency of published content, continually improve the depth and quality of materials, continually improve user features and the site structure to optimize the user experience, maintain and enhance an effective technology infrastructure, and continually refine effective and efficient work processes
- Increase use of OCW for teaching and learning: increase awareness of OCW, increase traffic to OCW content via multiple distribution channels, tailor OCW content to the needs of key external audiences, foster the development of communities of learning around OCW content, and support the use of OCW content by educators and educational systems globally
- Maximize the benefits of OCW for the MIT community: support MIT initiatives, create lifelong connections between MIT and our students and alumni, catalyze improvements in teaching and learning at MIT, and showcase MIT's curriculum, strengthen its reputation, and promote international engagement
- Support worldwide open educational resources (OER) and the OCW movement: support the OCW Consortium and engage with other OER programs to increase the collective benefits of open resources
- Sustain the MIT OCW program: continually develop the OCW team as a responsive, professional organization, maintain communications to keep stakeholders informed, evaluate and report on OCW programs, manage OCW finances responsibly, ensure the long-term financial viability of OCW, and ensure a vibrant future for OCW through effective planning

Among these goals, priorities for AY2014 were meeting core publication targets, completing OCW Scholar publication, improving the video subtitling production process with 3Play to enable more timely posting of video subtitles, supporting ODL planning, and effecting a smooth organizational transition as OCW integrates into the ODL family of digital learning functions.

Accomplishments

Course Publication

Course publication is the heart of the OCW mission. OCW courses typically include planning materials, such as a syllabus, calendar, pedagogical statement, and faculty introduction of the course; subject matter content in the form of lecture notes, reading lists, full-text readings, and video/audio lectures; and learning activities, which may include problem sets and solutions, essay assignments, quizzes, exams, labs, and projects depending on the nature of the course.

Faculty take great pride in their teaching, and this is reflected in the depth and quality of the materials they provide for publication on OCW. This year (as noted) we:

- Published 134 courses.
- Published 27 courses with video assets. This brings the number of full video lectures to 91. These are among the most popular materials on OCW.
- Initiated a new, more rapid process for creating subtitles for videos.
- Upgraded the OCW embedded video player.
- Greatly expanded OCW Educator materials in OCW.

OCW Scholar

In FY2010, OCW received a grant of $2 million over three years from the Stanton Foundation to publish materials for foundational courses specifically structured for independent study. These "OCW Scholar" courses are relatively complete first-year college-level core courses designed for independent learners who may have few additional resources, such as textbooks, libraries, or subject matter experts, available to them. Scholar courses feature:

- Units organized into learning modules that take the learner through a logical progression of course topics
- Richer content than "regular" OCW courses, including (depending on the course) detailed course notes and course slides integrated from multiple MIT on-campus courses as well as new content specifically developed for the Scholar course
- Complete lecture videos by world-class MIT faculty
- Applets, simulations, and multimedia visualizations to illustrate concepts
- Learning aids such as video recitations showing step-by-step problem-solving techniques, as well as homework problems and exams with explanations and solutions
- Links to selected websites with related materials for further study
- Access to online peer study groups, powered by OpenStudy.com, allowing interactions with other independent learners

There are 15 Scholar courses currently available on OCW, with the final three being published in AY2014:

- 2.003SC Engineering Dynamics (September 2013) includes full video lectures (by professor Kim Vandiver), 12 recitation videos (also by Professor Vandiver) with notes, and concept questions, problem sets, quizzes, and exams, all with solutions.
- 8.03SC Physics III: Vibrations and Waves (November 2013) also includes full video lectures (by professor Walter Lewin) as well as detailed viewing notes (keyed to time codes in the lectures), concept questions testing understanding of key concepts in the lectures, 10 one-hour recitation videos (by professor Wit Busza), and problem sets and exams with solutions.
- 6.041SC Probabilistic Systems Analysis and Applied Probability (February 2014) includes full video lectures (by professor John Tsitsiklis), 52 help (problem-solving) videos (for graduate students), assignments and exams with solutions, and an index listing all of the resources for each topic in the course.

Supplemental Resources

In addition to publishing MIT course materials, OCW undertakes many special projects to produce supplemental resources that enrich educational content. As of June 30, 2014, there were 46 substantial supplemental resources on OCW.

Highlights for High School

In addition to the regular course publication, OCW also offers Highlights for High School, which was launched in 2007. This program takes advantage of our trove of exceptional teaching resources to better serve high school constituencies. Since its inception, the HFHS portal has received nearly 3.3 million visits and currently averages more than 54,000 visits per month.

During AY2014, OCW undertook a major overhaul of HFHS, redesigning the program's entire website and restructuring its architecture, upgrading the HFHS embedded video player, and updating OCW course and resource content on HFHS and rebuilding many of these courses and resources to fit the new design.

The new design updates the look and feel of HFHS to keep it aligned with the rest of OCW, although we use a different color palette to distinguish it from the general audience website. The new HFHS website includes updated navigation to better reflect the needs and interests of the target audiences: high school students and their parents and teachers. We also updated the technology on the site to make it more accessible for our users and easier for us to maintain. For example, RealMedia files have been replaced with MPEG 4 video, which can be streamed through HFHS from TechTV or from YouTube.

OCW Educator

OCW Educator was conceived by the OCW Faculty Advisory Committee in spring 2012, and the first of the initiative's resources were published in 2013. OCW Educator enhances the value of OCW for educators at MIT and around the world. Its two main goals are to articulate and share the educational ideas, practices, and pedagogical expertise of MIT faculty and to enhance users' ability to take best advantage of course materials on OCW by helping them understand the context and manner in which the materials are used here on campus. Amidst the proliferation of MOOCs and other online courses, this project also supports a developing role for OCW: using the Internet to inspire and enhance traditional classroom teaching, both at MIT and around the world.

In AY2014, OCW established OCW Educator as a standard part of the OCW publication process. The primary component is This Course at MIT, a new OCW section that provides information about how a given course was taught at MIT, including course outcomes, prerequisites, other curriculum information, the kinds of students taking the class, assessments, and student time investment. Often, this section also includes insights from instructors on how they structured and taught the course. By June 30, OCW had published 45 of these pages, with another 20 in the pipeline.

Segments with instructor insights often include multiple pages in which the instructor expands on the thinking that went into the course. Sometimes the insights section includes video interviews with the instructor interspersed with video highlights showing what happened in the class.

Another facet of OCW Educator is publication of project-based or experiential courses, which often do not align well with traditional OCW content standards since, for example, they have no syllabus or lecture notes. In AY2014, OCW published 18.821 Project Laboratory in Mathematics. This course provides students with the experience of doing mathematics research. The course site has extensive observations about how such a course works and why it affords such an extraordinary learning experience for students. OCW is looking to publish more of these experiential and project-based courses in the future.

While we will continue to add OCW Educator pages for traditional OCW courses, in coming years we expect to also use OCW Educator to document and explain some of the technology-enabled innovations and transformations in on-campus courses at MIT.

Site Curation

Site curation refers to deliberative selection, preservation, maintenance, collection, and archiving of digital assets to add value to websites of digital materials for present and future use. It is designed to afford greater use of the breadth and depth of an OCW publication, improving its value and usability. Site curation includes adding more contextual information to courses, such as how various courses on a topic relate to one another; analyzing and improving the course portfolio's currency and relevance in relation to the MIT curriculum; and helping users find the content best suited to their interests and needs. Curation activities are a complement and enhancement to regular OCW publication.

Over the last year, we undertook the following site curation activities:

- Set up a schedule of periodic changes in featured courses on the rotators (rotating feature highlights) on OCW home pages and on each department's page in OCW
- Improved the OCW site search process to find course home pages as the default search
- Added links on every course home page to lists of topic-related courses to encourage users toward further exploration
- Created new pages listing free online textbooks where available and highlighting suggested introductory programming courses
- Improved our understanding of web traffic by adding tags that allow more refined use of Google Analytics (a traffic analysis tool)
- Used the OCW blog and Twitter several times per week to highlight courses relevant to current news

Accessibility

In late spring 2014, OCW initiated a new, more efficient process for adding subtitles to videos on OCW and on YouTube. The plan is for all video courses to have subtitles when or shortly after they are published. We are also adding subtitles incrementally to video courses that do not have them now. Of the 91 full video lectures, 40 currently have complete subtitles and transcripts.

Singapore University of Technology and Design

OCW staff worked with MIT faculty and the MIT-SUTD Collaboration Office to coordinate, produce, and deliver 25 courses for SUTD, bringing the total number of SUTD courses produced by OCW to 74. Funding for this work is provided through an agreement between MIT and SUTD that calls for OCW to produce 87 courses; however, at this writing discussions are under way to increase the total to 100.

MITx and ODL Support

For the second consecutive year, several OCW managers and staff assisted in the further ramp up of our sister organization, MITx, and our umbrella organization, ODL. During AY2014, we provided:

- Program management expertise for two MITx courses (12.340x and 6.041x)
- Administrative support to the 8.01x team
- Administrative support to the MITx Faculty Advisory Committee for several months when MITx was without a director
- Instruction and advice to the MITx staff and MIT instructors making videos for MITx courses
- Support for video capture of courses destined for MITx and help in ensuring timely posting of these videos on TechTV for student use

- Supervision for the MITx technical staff and interfacing with edX
- Advice and participation in numerous meetings on MITx intellectual property licenses and on best practices in dealing with intellectual property objects in MITx course materials
- Promotion of MITx course offerings via the OCW newsletter, the OCW blog, and Twitter
- Significant assistance with development of the ODL strategic plan

Administrative Accomplishments

As part of the overall ODL organizational transition, the OCW and MITx units were brought together under the leadership of Cecilia d'Oliveira, executive director of open education (and former executive director of MIT OpenCourseWare). As part of this restructuring, several key OCW staff moved to ODL-wide positions (specific staff changes were identified above).

The other major operational change was the physical move of OCW from One Broadway and MITx from Building 41 to consolidated space at 11 Cambridge Center.

Finances and Funding

Core Budget

OCW expenses for FY2014 totaled $3.9 million, 10% below the approved budget of $4.35 million. MIT contributed $2 million from general Institute funds to support OCW. Remaining funding came from a combination of grants, corporate gifts, general donations, Amazon revenues (commissions on sales generated through the OCW website), interest on endowment funds, and reserves.

Reserves represent unspent funds from prior years from donations, grants, corporate gifts, and other external revenue sources. The amount we draw down from these reserves to cover expenses depends on our ability to attract grants and gifts and varies each year. The OCW reserve balance at the beginning of FY2014 was $3.7 million, while the balance at the end of FY2014 was $2.9 million. Eventually these reserves will be exhausted, and we continue to work toward a sustainable funding model for OCW.

Online Donations/Small Gifts

As in recent years, once again in FY2014 OCW mounted three online fundraising campaigns through the OCW website and the monthly newsletter. These efforts resulted in general donations totaling $267,000, down 15% from last year. These donations included small online gifts and matching gifts from donors' employers.

Corporate Underwriting and Sponsorship

In the fourth year of our corporate underwriting program, our corporate gifts totaled $283,000, down from $525,000 in total corporate gifts in prior years. This year's gifts were primarily planned gifts from sponsors who had signed onto the OCW Next Decade

Alliance program in previous years. The downturn in new corporate fundraising this year is a natural outcome of broadening the scope of sponsorship discussions to include financial support for OCW, MITx, and the Office of Digital Learning. Tom Smith, OCW corporate relations manager, took on the full-time role of director of development for the Office of Digital Learning in FY2014 and in that capacity worked closely with Sanjay Sarma, director of digital learning, and offices across the Institute (Office of Resource Development, MIT Energy Initiative, Office of the Provost) on joint presentations and coordinated fundraising messaging for ODL.

Grants and Contracts

OCW continued to receive funding from the SUTD agreement for development of SUTD courses.

Now that the project to develop OCW Scholar courses is complete, we are in discussions with the Stanton Foundation (the sponsor of the Scholar program) on whether and how we might make use of unspent funds from that program.

Faculty Advisory Committee

The Faculty Advisory Committee is an internal oversight group that advises on OCW policy, sustainability, and relations with the MIT faculty and with academic departments. Committee members in AY2014 were as follows:

- Hal Abelson, Electrical Engineering and Computer Science
- Eric Klopfer, Urban Studies and Planning
- Vijay Kumar, Office of Educational Innovation and Technology
- Stuart Madnick, Sloan School of Management
- Haynes Miller, Mathematics
- Shigeru Miyagawa, Foreign Languages and Literatures
- Hazel Sive, Biology
- Karen Willcox (chair), Aeronautics and Astronautics
- Dick Yue, School of Engineering

At the end of AY2014, Professor Miyagawa stepped down as chair of the committee, although he remains a committed member. Professor Willcox agreed to become the new chair for the coming 2015 academic year.

We also note with profound sadness the passing in fall 2013 of longstanding committee member Ann Wolpert, who was an energetic supporter of OCW and wise counsel for many years.

Office of Educational Innovation and Technology

The Office of Educational Innovation and Technology works with faculty, staff, and students to enable and promote the development and dissemination of innovative uses of technology in teaching and learning.

Summary and Highlights

OEIT experienced a very productive transitional year as part of the Office of Digital Learning. Of particular note were the following initiatives:

- First production version of the MIT Core Concept Catalog (MC3) for sharing curricular content across disciplines
- The "Backstage" tool set for expediting searching and authoring in edX
- Engagement with community colleges and the advanced manufacturing initiative through the Trade Adjustment Assistance Community College and Career Training (TAACCCT) Grant Program
- The iCampus Student Prize
- Restructuring of StarBioChem for translation, continuing development of StarCellBio, and StarCluster's collaboration with the Computer Science and Artificial Intelligence Laboratory (CSAIL)
- Inaugural season of the xTalks Digital Discourses series to provide a forum for sharing experiments and achievements in online and face-to-face education

OEIT also launched a series of new K–12 videos as part of the MIT+K12 Videos initiative that supports MIT students producing videos to engage young people in science and engineering education.

As part of the overall Office of Digital Learning restructuring, the OEIT organization is phasing out, with most staff transitioning to either the new Strategic Education Initiatives business unit or the Technical Operations support unit.

Goals and Objectives

The Office of Educational Innovation and Technology engages with the MIT community to develop, disseminate, and sustain educational innovations through the strategic use of technology. OEIT focuses on three key areas to which it brings unique perspective, skills, and methodologies: bridging research and learning, linking digital content to the curriculum, and fostering communities of innovation and practice.

The formation of ODL represents a significant opportunity for our work and competencies to be even further aligned with the Institute's agenda for transformation through digital learning technologies.

Accomplishments

OEIT continued its deep involvement with several ongoing and new educational innovation projects.

MIT Core Concept Catalog

OEIT launched the first production version of the MIT Core Concept Catalog service in fall 2013. MC3 is a new academic data service to help the MIT community manage and share information about curricular topics, learning goals, and related content within and across disciplines and subjects. Initial data include learning objectives from the

Crosslinks system as well as data from a handful of subjects involved in modularity experiments. MIT's Teaching and Learning Laboratory has used MC3 to develop the CurriMap tool for navigating pivotal concepts, curricular themes, and educational goals for engineering at MIT and for SUTD. During the spring semester, OEIT began work with the Department of Aeronautics and Astronautics on the new MIToces application. MIToces will document, group, and connect learning outcomes across the undergraduate curriculum, beginning with the curriculum in Aero/Astro.

OEIT also began developing prototype tools for managing and sharing curricular content, particularly content that is being developed for MIT. The first proof-of-concept, Backstage, allows developers of MITx courses to search for materials across other edX-delivered courses in order to accelerate course authoring. Our experiences with the Backstage product are helping to inform a content management strategy within ODL. Initially, this strategy will involve development and deployment of content management products focused on assessment and video assets.

OEIT is also developing the Concept Map Authoring Tool, a web-based tool that enables MIT faculty to design and develop concept maps of their courses. This project is part of the MC3 suite of tools that allow MIT faculty to easily interact with core infrastructure services provided by OEIT.

Embedded Assessment

OEIT is developing an infrastructure and set of tools to enable MIT faculty to embed any assessment (e.g., quiz questions or concept questions for formative feedback) in any web-accessible content. As OEIT collaborated with MIT faculty, it recognized that faculty needs are beginning to revolve around continuous formative feedback, especially as faculty "flip" their classrooms and develop more online content to support their subjects. The embedded assessment tools allow instructors and authors to place assessments directly in any content, thereby providing a richer learning experience.

Two use cases illustrate the potential of these tools and services. OEIT has been working with Aero/Astro faculty who have developed a comprehensive set of lecture notes. As part of their course redesign efforts, they are switching to a "flipped" classroom model in which they require students to read the lecture notes and complete the embedded assessments before coming to class. These faculty members use embedded assessments to gauge student understanding before they meet with students in class, allowing them to tailor the classroom experience to address misunderstandings. Also, OpenCourseWare is a static publication of MIT course materials. OCW could be extended by embedding assessments, using questions and problems that already exist in the course materials as live assessments directly in course pages. This has the potential to extend the value of OCW and enable self-learners using OCW to better check their mastery of the materials.

The OEIT technical approach differs from current practices used by most learning management systems and other tools because existing tools require either a system that presents both content and assessments together as part of a typically complex and fully integrated system or a system in which the learner is required to leave the content

to take an assessment in a separate quiz system, which breaks the flow of learning. As noted, the OEIT approach enables any assessment to be embedded in any web-accessible content, freeing instructors to design the learning experiences they want.

Modular Course Support

i2.002

OEIT continued its collaboration with the Department of Mechanical Engineering and professors Pedro Reis and Ken Kamrin to extend the work on i2.002 Mechanics and Materials II from the MIT Council on Educational Technology (MITCET) modularity experiments first begun in 2011–2012. (In 2011–2012, i2.002 was taught simultaneously for students in Cambridge and asynchronously for MIT students around the world. The MITCET modularity experiments led to a modularization of the course and the video recording of all of the lectures, labs, and recitations. In 2012–2013, OEIT and Professors Reis and Kamrin continued to bring more technology capabilities into 2.002, a required subject in Course 2.) This year, OEIT developed a prototype video concept browser to link the lecture videos recorded in spring 2012 with key concepts in mechanics and materials to enable students to find specific video segments. Students are able to easily find the 10-minute segments on a particular concept among a sea of 90-minute videos. OEIT will be further developing the technology and using it in additional classes beginning in fall 2014.

In addition, OEIT worked with faculty to develop "Virtual Office Hour" videos, in which teaching assistants offer video segments to help students get started on problem sets, just as if they had attended a virtual office hour. This new experiment began to explore how a "traditional" MIT subject might develop technology-enhanced support for fully online or hybrid courses. Work on i2.002 is an example of the collaborative relationship that OEIT has developed with the faculty and demonstrates a commitment to long-term experimentation to evolve MIT subjects.

3.003

OEIT continued to collaborate on 3.003 Principles of Engineering Practice, providing web support to enable collaboration with a similar course at the University of Tokyo. Students in 3.003 at MIT use the course website to access special lectures by MIT and University of Tokyo faculty, and the site documents the progress students make on the class project. Because the University of Tokyo term begins two months after MIT (April versus February), University of Tokyo students use the website as a sort of class diary to understand the work that MIT students have already completed to help launch their class. The collaboration is capped with a site visit in which MIT students join their University of Tokyo peers in Japan for a joint symposium.

D-Lab

D-Lab (Development through Dialogue, Design, and Dissemination) creates technologies for underserved populations in developing regions of the world. OEIT collaborated with D-Lab Energy and D-Lab Design to enable real-time participation by D-Lab students located remotely (in Brazil) with the classroom in Cambridge. Most of the infrastructure at MIT that supports video recording and video conferencing assumes a presentation-mode delivery, whether it is in a Level 5 classroom or a departmental conference room.

Cameras are typically fixed on the presenter at the front of the room, and usually only lecture theaters with fixed seating have audience cameras. D-Lab needed the ability to conduct a traditional lecture with both whiteboard and projected computer displays, along with small group activities with a team distributed between Cambridge and Brazil, in the same physical space at the same time. In the D-Lab pedagogy, instructors move from presentation mode to collaboration mode throughout any given class session.

OEIT collaborated with D-Lab to use consumer-level USB video cameras, MIT's WebEx subscription, and a laptop to originate the lecture video feed and to simultaneously use Skype and a separate laptop/iPad. The configuration enabled real-time participation by the remote MIT students. Further work is needed to improve the experience and allow for members from multiple teams to remotely participate from different sites around the world.

iCampus Prize

OEIT, on behalf of MITCET, awarded the grand prize in the 2014 iCampus Student Prize competition to Daryl Neubieser '16 and Michael Everett '15 for OfCourse, an online tool that provides a centralized place to learn about classes and discover what to take next. The competition also recognized Aidan Bevacqua '16 for his development of MIT Locate, a mobile app that provides a service enabling students to locate each other on campus.

The annual iCampus Student Prize competition recognizes innovative and creative applications of technology that improve living and learning at MIT. The prize is endowed through the iCampus research collaboration between Microsoft Research and MIT.

Online Teacher Education

OEIT is collaborating with MIT faculty to develop aspects of online teacher education courses that highlight the pedagogies favored and developed by faculty members. Over the last few years, OEIT has had discussions with private foundations and governments to help develop an online teacher education program. These discussions have paralleled an interest by Institute faculty in developing such a program for MIT.

OEIT received a grant from the Education Development Center (with US Agency for International Development funding) to prototype aspects of an online teacher education program for Pakistan based on the teaching techniques and approaches used by MIT faculty. These courses, currently under development, will highlight:

- Games and simulation-based learning
- Use of mathlets—applets highlighting mathematical, engineering, and physical principles
- Visualizations for learning
- Best practices in teaching and learning
- A digital learning toolkit featuring best practices for online learning

In addition, the project is developing tools to enable faculty to design and develop concept maps along with an infrastructure to support the back end. Participating faculty members and OEIT plan to use these courses and tools after the close of the project to conduct additional online teacher education.

Trade Adjustment Assistance Community College and Career Training Initiative

OEIT, on behalf of ODL and MIT, is taking the lead in collaborating with community colleges in the development of curricula in areas such as advanced manufacturing and entrepreneurship and in online learning using edX and other MIT/OEIT-developed technologies. The curricula will also reflect MIT's philosophy of blending online/virtual learning with hands-on learning.

Along these lines, OEIT has begun a collaboration with the Transformation Agenda, a consortium of 15 Massachusetts community colleges that received Round 1 TAACCCT funding. OEIT discussions with the Transformation Agenda have revolved around development of blended courses in advanced manufacturing in collaboration with these community college partners in Massachusetts.

OEIT is currently planning to collaborate with the Commonwealth of Massachusetts on the TAACCCT Round 4 proposals. This would lead to the development of a software tool that integrates proactive advising linked to labor market information (for employment outlook) and courses. The tool's community college application will likely focus on college completion, whereas MIT might use the same tool to better track progress related to flexible degree programs such as Course 2A or 16-ENG. This proposal will also likely focus on advanced manufacturing, nonnursing health care, and perhaps information technology.

Bridging Research and Learning

OEIT's Software Tools for Academics and Researchers (STAR) group continues to support and improve STAR software offerings:

- Over the past academic year, OEIT restructured StarBiochem for translation, and a project is now under way to adapt it for use in MITx.
- StarMolsim support continues for teaching modeling.
- A number of significant revisions were made to StarGenetics, and OEIT engaged in substantial efforts to adapt it for use with MITx.
- Work continues on the development of StarCellBio, with special attention to issues of incorporation into MITx.
- StarCluster work continues to focus on resolving issues and responding to requests from an ever-growing user community for new features. Work is under way to add support for the Open Stack cloud platform currently used by CSAIL, various research labs at MIT, and many academic institutions worldwide. STAR is collaborating with CSAIL to add this support, which will benefit approximately 100 users of the CSAIL cloud at MIT as well as the entire Open Stack community.

Funding from the National Science Foundation (awarded to professors Chris Kaiser and Graham Walker), initiated in September 2011, allowed the STAR program to begin development of StarCellBio, a new STAR software product for teaching cell biology. Two StarCellBio assignments were integrated into 7.06R Cell Biology this spring.

During AY2014, work on StarCellBio continued as a higher priority than the unfunded work on StarGenetics. Recent interest in funding the StarGenetics work for incorporation into MITx courses has led to updating of the operational plans for this work.

xTalks Digital Discourses

The xTalks program was created to foster community among education innovators and to provide a forum for sharing experiments and achievements in online and face-to-face education. Before each semester, xTalks invites colleagues from the Teaching and Learning Laboratory, RELATE, OCW, STAR, and other groups to participate in discussions on issues of interest, speaker ideas, and thematic synergies.

There were 10 xTalks seminars during AY2014. The fall 2013 program explored teaching and research related to online platforms and MOOCs, with presentations by John Belcher, Isaac Chuang, Haynes Miller, Lourdes Aleman, Brandon Muramatsu, Eric Klopfer, Una-May O'Reilly, Dave Darmofal, and Vijay Kumar.

The spring 2014 program took a wider look at issues in education, including impacts on broader social and pedagogical contexts. The presenters were J.R. Hildebrand, Sanjoy Mahajan, David Mindell, Thomas Kochan, Jonathan Bloom and Jeremy Orloff, Jennifer DeBoer, and Karina Meiri and Berri Jacque.

Strategic Education Initiatives

Strategic Education Initiatives (SEI) has been involved in the development of four international collaborations:

- A proposed initiative with Brij Mohan Lall Munjal University (BMU) would involve a five-year academic collaboration between MIT and BMU to develop, deliver, and support approximately 18 engineering courses. The courses would be delivered in a blended format using MITx for online course delivery combined with the hands-on and project-based learning that is the hallmark of an MIT education.
- SEI collaborated with the Education Development Center to propose a five-year program that would strengthen the competence of skilled workers in STEM (science, technology, engineering, and mathematics) fields, accounting, and tourism across the Lower Mekong Initiative partner countries and catalyze increased global competitiveness among firms in that subregion.
- SEI is working with collaborators in India to develop an operational plan for a three-year program to improve science, mathematics, and English preparedness among traditionally underserved students in grades 8–12 in India. The program, to be supported by the Sir Dorabji Tata Trust, is intended to ensure that students in India are prepared to go on to further education as well as to enter the workforce with strong career opportunities.

- SEI developed a concept note for a multiyear collaboration with the Al Dabbagh Group (Saudi Arabia) for an endeavor termed "Virtual Philanthropy University." This collaboration will develop and deliver approximately 10 courses using MITx and will provide capacity-building professional development at scale to support philanthropic activity and institutions around the world.

MIT-Haiti

The MIT-Haiti project "INSPIRE: Kreyòl-based Cyberlearning for a New Perspective on the Teaching of STEM in Local Languages" was funded by the National Science Foundation with professor Michel DeGraff as principal investigator (PI) and Dr. Vijay Kumar as co-PI. The MIT-Haiti team conducted three workshops (January 2013, August 2013, and March 2014) as part of the project.

The INSPIRE workshops, held in Port-au-Prince, emphasized pedagogy, assessment, and technology-enhanced resources for active learning in biology, math, and physics. During its first year, the project developed Kreyòl-based resources and trained Haitian university professors and high school teachers in the use of technology-enhanced tools to support active learning. Workshop participants received instruction and guided practice with feedback on incorporating active learning into lesson plans that align student learning objectives, learning activities, and assessments. The MIT team is working with Haitian faculty to deepen their expertise in the use of digital resources for active learning in STEM, specifically physics, biology, and math. To date, about 100 Haitian faculty have attended the workshops.

The Haiti project was marked this year by significant interest from the Haitian government, resulting in a leadership program offered by the MIT Sloan School of Management.

iOS Workshop

OEIT continued a collaboration with Apple to host an annual iOS workshop during Independent Activities Period in January. The workshop introduced MIT students to development of iOS apps.

Learning Sciences and Online Learning Symposium

SEI submitted a proposal to the National Science Foundation for a symposium to engage leading researchers and educational practitioners in a discussion on how learning science, in particular discipline-based educational research (DBER) findings, can inform the development of meaningful online learning experiences, particularly for STEM subjects. Participants representing the learning sciences, discipline-based education, and online learning will identify and address opportunities for the practice of DBER in online learning initiatives. The symposium will address key challenges and opportunities for inquiry in DBER posed by online learning, particularly for STEM disciplines, leading to a set of recommendations for the future design, development, and research of online environments informed by DBER.

Awards

This past year Vijay Kumar, senior strategic advisor and director of OEIT, was awarded an honorary professorship by Tianjin Open University. He was also appointed to the ExxonMobil chair for technology-enabled learning at Qatar University. This past year, Dr. Kumar completed his tenure as chairman of the board of the New Media Consortium.

Administrative Accomplishments

OEIT continued to contribute to the Institute-wide Task Force on the Future of MIT Education. Vijay Kumar is a member of the Task Force on Global Education. Molly Ruggles and Jeff Merriman provided support to Karen Willcox in her role as chair of the Task Force on Education and Facilities.

OEIT took over management of the MIT+K12 Videos initiative from the School of Engineering. The initiative supports MIT students who produce videos that engage young people in science and engineering education.

Dr. Kumar served as a guest member of the MIT International Advisory Council.

Finances and Funding

As noted, OEIT received a grant from the Education Development Center to prototype elements of an online teacher education program for Pakistan based on MIT faculty members' teaching techniques and approaches.

OEIT received funding from the Commonwealth of Massachusetts, through Quinsigamond Community College, to work with select community college partners to develop blended courses in advanced manufacturing. This program is part of the Transformation Agenda.

AMPS MIT Video Productions

Summary and Highlights

FY2014 was a very productive and successful year for AMPS MIT Video Productions (MVP) . Over the past year, we generated a record volume of video content, capturing more than 2,000 separate production events; launched a new website; implemented new digital workflows; and upgraded our production, editing, and archiving infrastructure. In addition, we successfully provided our services on a cost recovery basis, generating modest surpluses in our production and postproduction business lines.

As part of the ODL organizational transition, AMPS MVP shifted its reporting line from MIT Libraries to become a business unit of ODL.

This year we were lauded by the Office of the President for the support we provided in helping to create community at MIT through our work. Also, in June 2014, the National Academy of Television Arts and Sciences awarded us a New England Emmy in the "Outstanding Arts/Entertainment" category for our production of *Awakening: Evoking*

the Arab Spring Through Music, a performance documentary featuring the MIT Wind Ensemble. This was, we believe, the first time that MIT has received an Emmy Award for the production of a television program.

Goals and Objectives

AMPS MVP provides media production and publication services to the MIT community in support of education, research, and outreach. These services include:

- Lecture capture
- Event support
- Custom video production
- Video editing
- Video publication
- Duplication services
- Video conferencing
- Connection to media outlets

MVP produces a diverse variety of video content, and during the past year the staff of MVP participated in over 2,000 separate production events. We captured more than 30 courses in support of MITx, OCW, the MIT Skoltech Initiative, and several academic and administrative departments. MVP works on a fee-for-service cost recovery basis.

A primary objective in FY2014 was to position and leverage our resources in support of ODL's overall mission. We added staff, both term and temporary, to serve the growing demand for production and postproduction services. We edited several courses for publication on edX and produced a number of video programs promoting MITx courses.

Accomplishments

We continue to work with departments throughout the Institute in crafting custom video programs in support of their communication objectives. We are particularly proud of the contributions we make to events that promote and celebrate community at MIT. Examples this past year included the events honoring fallen MIT police officer Sean Collier, commencement, the MIT Excellence Awards, the Charles Vest memorial service, and the Martin Luther King Jr. annual breakfast. Also, we produced several programs celebrating the arts at MIT, including *Awakening: Evoking the Arab Spring Through Music*, which was broadcast multiple times on WGBH.

In addition, MVP launched a new website in fall 2013, Teaching Excellence at MIT. The Teaching Excellence website highlights the extraordinary teaching and learning that take place at MIT, documented by MVP over several decades. For example, the site features a complete set of 1995 recordings of professor Amar Bose teaching 6.312 Acoustics. These remarkable lecture recordings may serve as the foundation for the creation of a MOOC featuring the recently deceased MIT alum and founder of the Bose Corporation. The site also includes a generous sampling of current work.

Administrative Accomplishments

During FY2014, we made several major upgrades to the AMPS MVP postproduction infrastructure. This infrastructure now supports file-based capture of events, courses, and special projects; media meta-tagging and management; project editing with outside collaboration via a browser tool; and media archiving to LTO 6 tape supported by two databases. The core components of the expanded infrastructure are a 200-terabyte high-speed storage area network for centralized editing and course media management, eight fiber-connected editing workstations, eight GigE-connected editing support workstations, an AXLE media asset management system with remote collaboration via web browsers, and a Xendata archive server supported by a 24-tape LTO-6 robotic library.

We also added to our inventory of production equipment. We made significant headway in the ongoing process of transitioning to a totally digital and tapeless workflow. Toward that end we purchased two new file-based studio cameras, two high-end DSLR (digital single-lens reflex) cameras, and several file-based recording systems. Our client base and many of our videographers prefer the "filmlike" quality produced by the ever increasing options in DSLR videography. And our key clients, our MITx and OCW colleagues within ODL, are requesting multistream lecture recordings to use in crafting MOOCS for delivery via the edX platform.

Finances and Funding

AMPS MVP is charged by the provost with providing its products and services on a cost-recovery basis. We were successful in accomplishing that objective during FY2014. We finished the year with surpluses in both our production and postproduction business lines.

In December 2013, Jane and A. Neil Pappalardo '64 made the last of five annual payments toward a generous gift commitment that began in 2010. The final gift payment was $225,000 and included a $25,000 "bonus," as Mr. Pappalardo reported that he had been particularly pleased with the ways in which his gift had been applied. During FY2014, the Pappalardo gift helped to fund production of the *Awakening* documentary and the Teaching Excellence website.

Distance Education

The Distance Education group operates and maintains four advanced technology–enabled classrooms that offer the ability for MIT classes and other events to be recorded and broadcast to audiences on campus and around the world, either in real time or asynchronously. DE also manages the Institute-wide MIT TechTV video platform and service, providing video upload, hosting, and delivery services for MIT departments, faculty, and students.

Summary and Highlights

FY2014 was a transitional year for ODL Distance Education. During this year, DE:

- Restructured its reporting line into the Technical Operations group in ODL.
- Undertook a major reexamination of MIT TechTV to determine its future direction, culminating in an extensive analysis and report on TechTV's strengths and weaknesses, usage, and alternatives. At this writing, the report and its recommendations are under review by key stakeholders and Institute leaders.
- Upgraded technology-enabled classrooms for high-definition (HD) video capture.
- Added or enhanced numerous user features on TechTV.

Goals and Objectives

DE provides advanced video and related services to the MIT community, as follows.

- Operation of technology-enabled classrooms: As noted, DE runs and maintains four advanced technology–enabled classrooms on campus in support of MIT distance education initiatives. These rooms have video conferencing, Webex, and videotaping capability, with remote-controlled HD cameras and other technology to enable streaming media capture and/or transmission of lectures and presentations.
- Provision of live and on-demand audio/video streaming services for audiences around the world: These services support synchronous distance education courses that allow local and international instructional collaboration, delivery of webcasts of Institute events, and asynchronous on-demand video and rich media streaming.
- Operation of MIT TechTV, the Institute-wide platform for hosting video content from departments, groups, and individuals across MIT: The video inventory comprises about 23,000 videos in more than 2,700 "collections" that include course materials, events, lectures, presentations, research materials, and personal videos. Related services include video upload/editing, MIT-specific security and privacy controls, MIT branding, search capability, and streaming delivery. A custom-developed player presents TechTV videos for viewing.
- Consultation with and training of MIT users in connection with all DE services.

Accomplishments

FY2014 began with a renovation of the distance education triad classrooms in Building 9 (9-057, 9-151, and 9-152). The upgrade from standard definition to HD video technology increased the quality of recording for ODL and distance education courses. We also integrated Webex web conferencing and virtual collaboration capabilities to expand the classroom experience for students at a distance. This upgrade was completed in August 2013, with the classrooms seeing first use on Labor Day (for the first synchronous course

to Moscow with professor Jacob White for the MIT Skoltech Initiative). The renovation was accomplished with financial support from the Skoltech program and the System Design & Management program.

Machine learning with professor Jacob White in the Skoltech Hypercube classroom, Moscow

During the year, 47 courses utilized these classrooms, logging 1,500 hours of time. Programs involved included System Design & Management, the MIT/Woods Hole Joint Program in Oceanography and Applied Ocean Science and Engineering, and the MIT Skoltech Initiative, as well as several collaborative distance courses in various departments on campus. Figure 4 summarizes usage over the year.

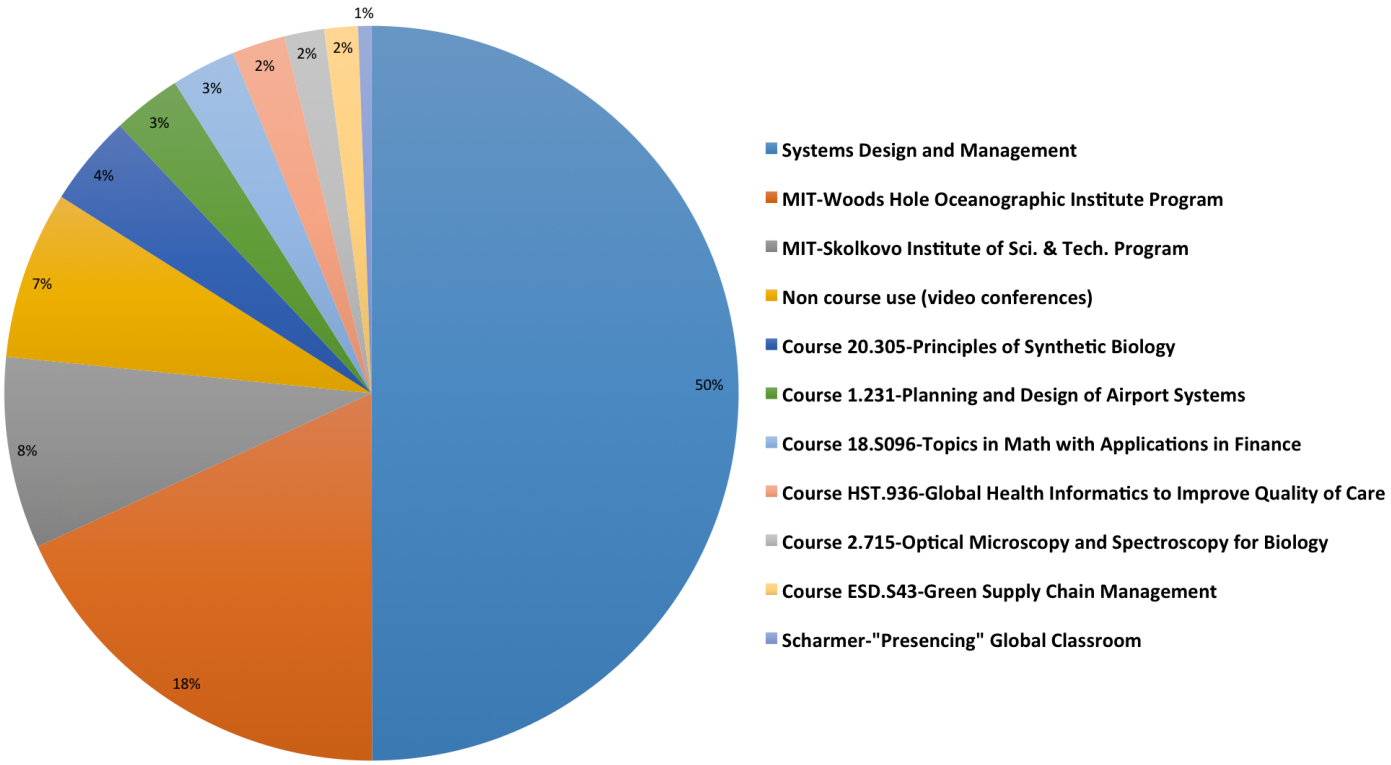
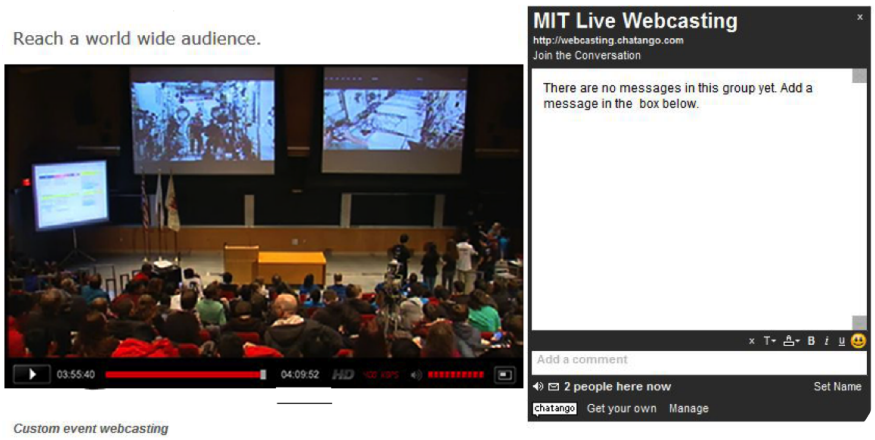


Figure 4. DE technology-enabled classroom use in FY2014.

DE supported webcasting of some 65 live events during the year, from monthly interactive alumni "chatcasts" to Institute events such as the Diversity Summit, commencement, and the Sean Collier memorial service. More than 30 departments and centers sponsored live webcast events; examples include courses such as 6.270, 6.370, and 2.007; outreach to middle and high school students for the Zero Robotics programming competition in conjunction with the International Space Station; a White House–sponsored big data conference on campus; and a two-day Abdul Latif Jameel Poverty Action Lab event with Andrea Bocelli. Audiences representing more than 55,000 unique IP addresses viewed these events during the year.



Zero Robotics competition webcast from 10-250.

DE logged 229 hours of consultation over the year for the following projects and customers: relocation of the Operations Research Center/Industrial Liaison Program (ILP), WHOI classroom move from Building 24 to Building 54, the Office of Corporate Relations, and a second video conferencing room for the Department of Earth, Atmospheric and Planetary Sciences.

DE worked with MITx to host a Synology network attached storage file server for use by professor Erdin Beshimov's experimental group initiative, providing hardware, software, and backup support for this system, which is hosted in the 9-045 Video Network Operations Center.

In FY2014, DE upgraded the MIT TechTV video platform and service with the following new features and enhancements:

- Protected collections feature: We increased the security of course content by creating collaborative accounts for sharing content. The collection owner controls protected collections via a Moira list (Moira is MIT's database and application programming interface containing user, machine, list, file system, and other essential information to manage the MITnet, MIT email, and Athena infrastructures).
- Performance enhancements: We improved uptime capability through query caching, reducing timeout incidences by 80%; integrated 3PlayMedia scrolling transcript capabilities using 3PlayMedia captioning; and upgraded embedded video support to enable hosting on secured (HTTPS) sites.
- Flipbook feature: We updated the video player to include the ability to scrub visually through the toolbar.

- Transcoding enhancement: We upgraded from FFmpeg transcoding in the cloud to the Amazon Elastic Transcoding process, thereby improving video quality. (Transcoding refers to converting video formats, of which there are many. Choice of format determines quality of video resolution, what players a given type of material can be viewed on, delivery speeds, and so forth.)

Table 4 summarizes TechTV operations during FY2014.

Table 4. FY2014 TechTV Operating Metrics

Metric	Total
Number of video uploads	**4,544**
Number of new user accounts	**677**
Number of new collections	**253**
Number of videos (as of June 30, 2014)	**23,679**
Number of user accounts	**9,433**

TechTV Review

In FY2014, ODL undertook a major review of MIT TechTV. The purpose of the study was to determine whether TechTV should continue to be supported by the Institute going forward andc if so, what its mission, business model, organization, and technology should be. ODL director Sanjay Sarma convened a review committee with the following members: Cecilia d'Oliveira of ODL (chair), Larry Gallagher of AMPS, Elaine Mello of AMPS/TechTV, Peter Pinch of OCW, and Jeff Lazarus of OCW. He requested that the study be carried out because AMPS, then the organizational home of TechTV, moved out of the MIT Libraries and into ODL effective July 1, 2013; funding for TechTV, amounting to $75,000 from Institute general funds, falls short of the actual operational cost (about $250,000); and other video services, both outside MIT (e.g., YouTube, Vimeo, iTunesU) and internal (MIT Video, hosting/streaming services from AMPS Distance Education, and various department-based solutions), that were not available when TechTV was first implemented now exist and may provide alternatives to TechTV services.

The committee gathered input from more than 30 MIT faculty and staff in focus group sessions, individual meetings, and email and phone communications. Consultations included users and nonusers of TechTV representing a broad range of academic disciplines and administrative roles. The committee reviewed 21 previous reports and studies concerning TechTV and video use at MIT and surveyed 13 other universities to learn how they have approached video issues in their environments.

Key results of the review are elaborated extensively in the May 2014 report *MIT TechTV Review: Findings and Recommendations*. To summarize:

- Use of video at MIT is extensive and growing beyond current capability, especially for teaching and learning.
- There is no center of leadership for video technology and service planning at MIT or alignment with strategic directions.

- TechTV has never been fully supported as an Institute resource.
- Certain features of TechTV are advantageous for MIT users—indeed, vital for some—and not generally available with other technology options.
- TechTV is used extensively across MIT departments and programs and accessed heavily by audiences on campus and around the world.
- Video technologies and platforms other than TechTV are also in use at MIT.
- Other universities generally have approached video in ways similar to MIT.
- Many in the MIT community, both users and nonusers of TechTV, feel strongly that there should be a robust, seamlessly integrated, Institute-wide video platform option accompanied by a reasonable level of user service.
- The committee offered three recommendations:
- Establish a video infrastructure and services advisory board to advise on Institute video infrastructure, technologies, systems, and support services.
- Replace or upgrade TechTV with a robust Institute-wide enterprise video platform along with a video service staffing level of two full-time equivalents (technical lead and user support).
- Identify a home department for TechTV and the video support staff that has sufficient organizational breadth and technical depth to administer this MIT resource with the attention and expertise it demands.

At the end of FY2014, the report and its recommendations were under review by key TechTV stakeholders and senior Institute academic and administrative leaders. Table 5 shows the results of some of the principal analyses included in the report. All statistics and metrics are as of the report date (May 20, 2014) unless otherwise noted.

Table 5. Overall TechTV Size and Scope

Metric	Total
Number of videos on TechTV	**22,942**
Number of videos watched at least once in last 12 months	**17,629**
Number of videos watched more than 10,000 times	**12**
Number of videos not watched	**5,313**
Number of plays ("viewing events") in last 12 months	**1,916,319**
Average number of plays per day	**5,250**
Number of plays of most popular video	**60,123**
Average number of plays per video viewed (excludes videos not watched)	**109**
Percentage of traffic from US	**57**
Percentage of traffic from MIT campus (estimated)	**9**

Examples of use of video at MIT are as follows:

- Same-semester lecture capture for use by enrolled students (outside-of-classroom viewing)
- Lecture capture for future use and use by other audiences via OCW, MITx, and so forth
- Student assignments (uploading, viewing, and commenting on other videos)
- Student projects (uploading of projects)
- Special projects (e.g., Blossoms projects)
- Public symposia, lectures, and presentations
- Members-only/restricted materials (e.g., lectures for ILP members)
- Informational/marketing uses (for subject departments/labs/centers)
- Instructional/how-to resources
- Research/experiments (as part of research study or for outreach/exposition)
- Faculty candidate presentations and interviews
- Student life/sports/recreation video blogging

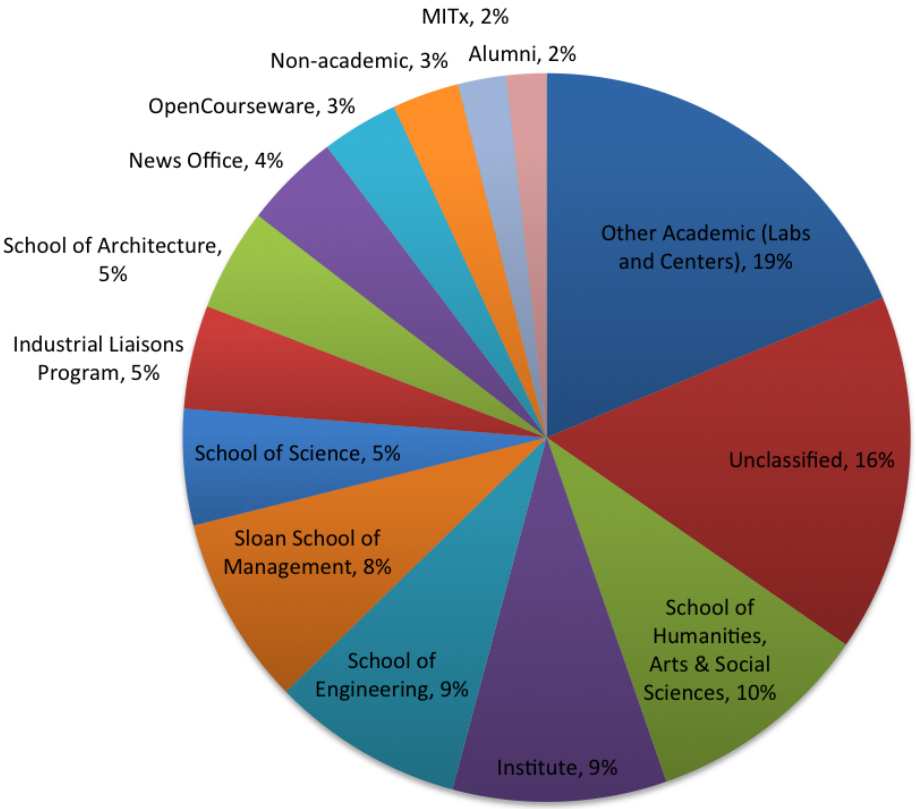


Figure 5. TechTV video inventory by organizational grouping.

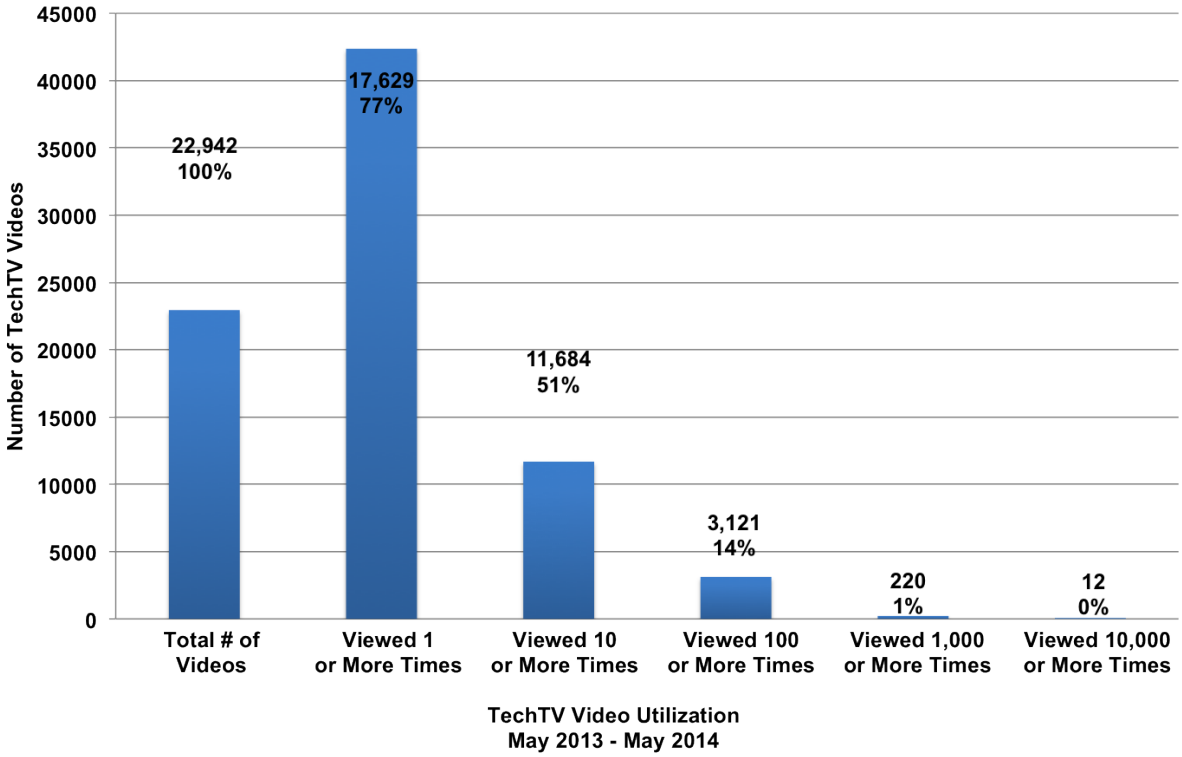


Figure 6. TechTV video utilization, May 2013–May 2014.

Table 6. Twenty Most Popular Videos on TechTV, May 2013–May 2014

Entity	Program/Collection	Video Title	Viewing Events
Department of Physics	Technical Services Group	*Waves on a Chain*	60,123
Department of Mechanical Engineering	Micro/Nano Fluidics	*Water Filtration Using Plant Xylem*	32,188
Department of Physics	Technical Services Group	*Lenz's Law with Copper Pipe*	26,627
News Office	MIT World	*The World Is Flat*	20,657
Institute	2013 Commencement	*MIT Commencement 2013—Speeches*	19,262
Institute	From The Vault	*Dr. Amar G. Bose—Last Lecture of Fall '95 Acoustics Course*	19,254
News Office	MIT World	*The World Is Flat 3.0*	19,015
OCW	ChemLab Boot Camp	*Episode 1: Great Expectations*	17,389
Alumni Office	MIT Alumni Association	*2013 MIT Alumni Holiday Card*	15,360
Environment, Health, and Safety Office	Prototype Machining	*Machine Shop 1*	14,212
Department of Physics	Technical Services Group	*The Coriolis Effect*	11,987
Center for Transportation and Logistics	About CTL	*Get In, Get Out, Get Ahead*	11,428

Entity	Program/Collection	Video Title	Viewing Events
Environment, Health, and Safety	Prototype Machining	*Machine Shop 10*	9,671
News Office	MIT World	*The Wonders of Electricity and Magnetism*	9,563
Department of Physics	Technical Services Group	*Tuning Forks: Resonance & Beat Frequency*	9,395
Engineering Systems Division	Blossoms	*The Physics of Boomerangs*	9,005
Unclassified	Dunoyer Cuts	*LumninAR UROP*	8,613
McGovern Institute for Brain Research	McGovern Institute	*Optogenetics: Controlling the Brain with Light*	8,568
School of Humanities, Arts, and Social Sciences	Writing Across the Curriculum	*No One Writes Alone: Peer Review in the Classroom, A Guide for Students*	8,292
News Office	MIT News	*RoboClam*	8,206

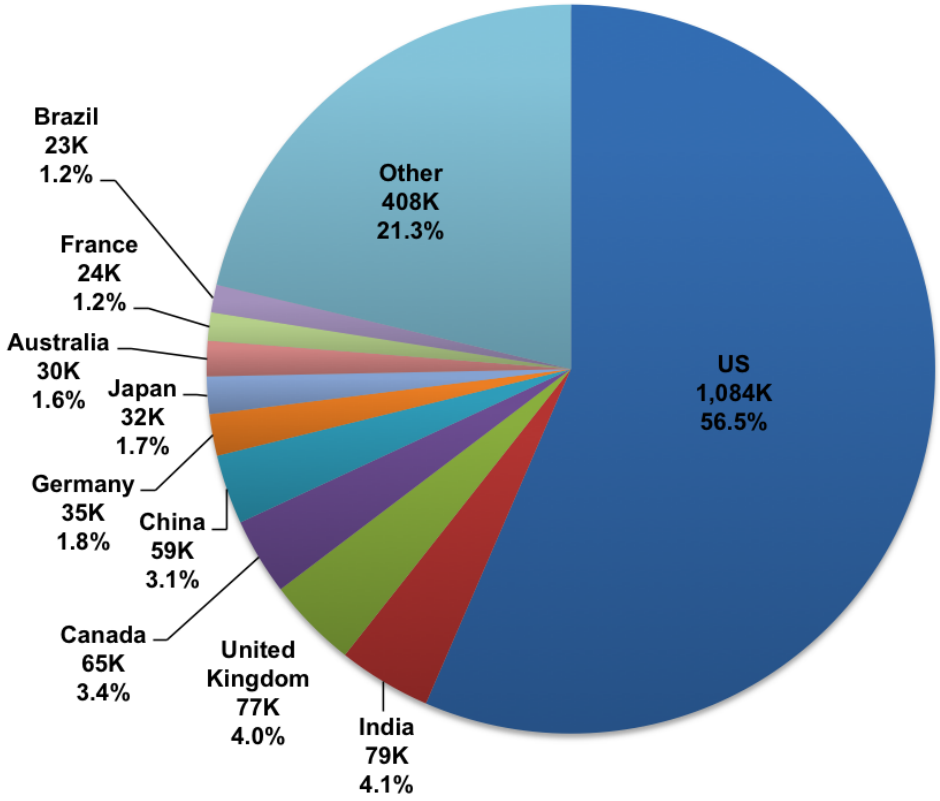


Figure 7. TechTV viewer locations.

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