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 Dean 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 technologies and practices
2. Open education: build out the MITx on 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
5. Support the Institute-wide Task Force on the Future of MIT Education: collaborate across MIT to implement the recommendations of the task force that pertain to digital learning, pending formation of the Learning Initiative
6. Infrastructure and support: provide infrastructure, tools, and related services that support digital teaching and learning at MIT
7. Resources and stewardship: attract and steward enthusiastic fiscal and organizational support for ODL initiatives and services from colleagues and funding sources at MIT and beyond

This report includes the unit-level reports of the groups that make up ODL. During AY2015, we continued to consolidate and realign units within ODL. Constituent units covered in this report are as follows:

- Residential Education
- Open Education (MITx on edX and OCW)
- Incubation
- Strategic Education Initiatives (SEI)
- Digital Learning Solutions ([DLS] includes Business Development)
- AMPS (Academic Media Production Services) MIT Video Productions (MVP)
- Engineering and Technical Operations (includes Distance Education)
- Business Operations

Highlights of the Year

AY2015 marked the first year in which ODL operated as an integrated organization, under a new structure designed to realize the maximum potential of key business units while also leveraging skills across the department. The following were among the year's major accomplishments.

Residential Education: ODL continued to expand use of the Residential MITx platform. In FY2015, the platform was used in 70 on-campus courses. As of spring 2015, more than 83% of MIT undergraduates had used Residential MITx for a substantial portion of their coursework, and more than 90 MIT faculty and instructors had experimented with the platform. The Residential Education team was formally established during this year as a functional unit within ODL to support MIT faculty in their use of digital learning tools for on-campus education.

MITx on edX: ODL launched 50 online MITx courses (24 new courses and 26 reruns), double the number from last year; about 1.25 million learners from more than 200 countries enrolled, among whom approximately 640,000 (roughly 50%) actually participated in the courses at some level. MITx also established the MITx Grant Program, a new semiannual process for soliciting and evaluating MITx course project proposals. The program launched in May 2015, soliciting course proposals for fall 2015 and spring 2016.

OpenCourseWare: OCW published 113 courses (59 new courses and 54 updates), of which 68 have OCW Educator "This Course at MIT" pages; 11 of the courses have complete video lecture series, and 12 more have other substantial video assets.

Incubation: This group, which experiments with pedagogical innovation based on advanced digital technologies, piloted the MITx Global Entrepreneurship Bootcamp, receiving 561 applications and ultimately educating 47 students. Twelve bootcamp participants formed five teams to continue working on start-ups.

Strategic Education Initiatives: SEI supported the MIT K–12 initiative, producing several K–12 videos and launching a major agreement with the Woodrow Wilson Foundation. SEI made additional progress in its support for an engagement with community colleges and the Advanced Manufacturing Initiative.

Digital Learning Solutions: Officially formed in May 2015, DLS aims to support MIT Professional Education and MIT Executive Education in their digital offerings to corporations, executives, and professionals. In AY2015, MIT launched three versions of BigDataX, attracting over 3,700 professional learners, including more than 200 in a dedicated General Electric cohort.

MIT Video Productions: MVP continued to provide video and post-production services for customers throughout MIT. This year MVP launched a new digital archiving program.

Engineering and Technical Operations: This internal technical support and operations group piloted a new feature, Custom Courses on edX (CCX), that allows teachers to deploy customized versions of massive open online courses (MOOCs) for their students.

It also began work on LORE (Learning Objects Repository for Education), a platform that will enable MOOC components to be tagged, stored, and redeployed. In addition, the group upgraded existing platforms and enhanced assessment capabilities on edX.

Business Operations: The ODL internal administration group developed a process for comprehensive, consistent budgeting; established regular financial reporting; developed and documented numerous human resources processes; and launched a new ODL website.
The reports of the ODL constituent units below provide further details on the year's accomplishments.

Finances and Funding

In FY2015 ODL had total funding of $24.6 million, including $11.9 million of revenue from external sources and $12.7 million of funding from the Office of the Provost. Expenses were $20.6 million, resulting in a net surplus of approximately $4 million. Table 1 provides a summary of ODL financial results for the year.

Table 1. Summary of ODL FY2015 Income and Expenses ($000s)

	Open ED MITx	Open ED OCW	Incub-ation	SEI	Engin-eering	MVP	Business Ops	ODL HQ	Total
Income									
Revenue	1,274	1,339	655	585	880	1,572	—	5,582	11,889
Provost funding	6,086	2,020	196	909	1,489	119	913	964	12,696
Total income	7,360	3,359	851	1,495	2,370	1,692	913	6,547	24,585
Expenses									
Salaries and benefits	2,434	1,992	367	1,354	1,863	1,081	639	793	10,523
10523	5,113	1,529	445	652	628	711	274	282	9,633
Total direct expenses	7,547	3,521	812	2,006	2,490	1,792	913	1,075	20,156
Total indirect expenses	—	138	52	229	—	0.2	—	22	441
Total expenses	7,547	3,659	864	2,235	2,490	1,792	913	1,097	20,597
Net surplus/ (deficit)	(187)	(300)	(13)	(740)	(121)	(100)	—	5,450	3,988

The Resource Development arm of ODL manages major fundraising across the department, including prospect identification, cultivation, and solicitation. It also coordinates with the MIT Office of Resource Development and provides linkage to the MIT Capital Campaign. During FY2015, Resource Development:

- Engaged with more than 100 donors and prospects (individuals, corporations, and foundations) in solicitation and stewardship
- Helped ODL secure support and pledges of $6 million in gifts and grants (a $5 million gift from David Chan '74 Global Educational Initiatives and a $1 million pledge from the Alan G. '73 and Terri Spoon MITx Fund)
- Collaborated across campus (with the MIT Energy Initiative, the MIT Center for Real Estate, and senior administration) on development projects that benefit ODL

Staffing

ODL continued to consolidate and strengthen the organization during AY2015. The department filled remaining gaps in the management team and other senior staff. The transition continued at the unit level with the establishment of the Strategic Education Initiatives group in summer 2014, the creation of the Residential Education and Digital Learning Solutions groups in spring 2015, and consolidation of various technical development and support positions into the Engineering and Technical Operations group throughout the year. Figure 1 shows the resulting organizational structure as it stood on June 30, 2015, and Table 2 summarizes key personnel changes during the year.

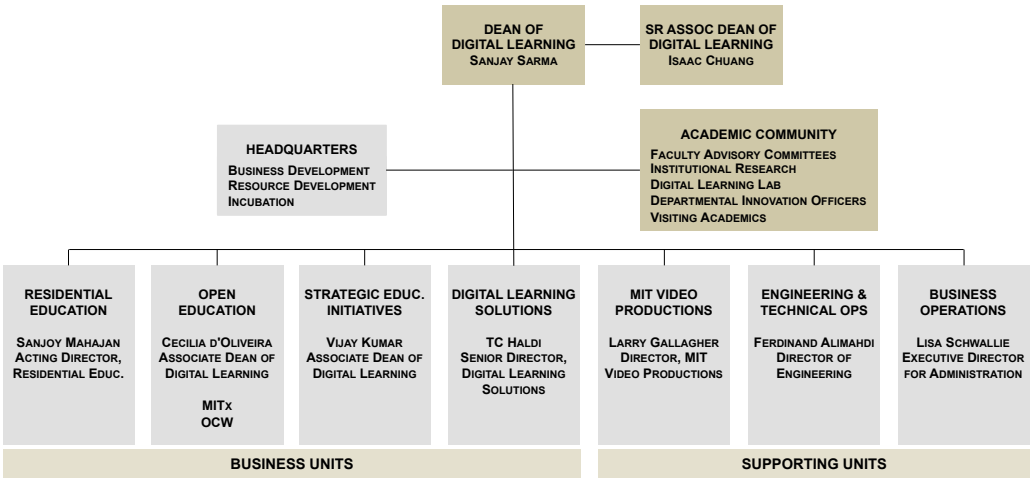

Figure 1. ODL organizational structure as of June 30, 2015.

Table 2. ODL Position and Staff Changes: AY2015

Position	Person or Status	Form of Recruitment	Notes
AMPS			
Operations coordinator	Susan Buice	Outside hire	Replaces Amanda Justice
Post-production archivist and workflow coordinator	Sophia Manos	Outside hire	New position
Senior producer, MIT Video Productions	Joseph McMaster	Outside hire	Replaces some of the functions performed by Chris Boebel
Post-production manager	Barbara Seidl	Outside hire	New position
ODL Engineering			
Senior software engineer	Giovanni Di Milia	Outside hire	Replaces Justin Riley
Senior software engineer	George Schneeloch	Outside hire	Replaces Brian Rowe
Senior software engineer	Shawn Milochik	Outside hire	Replaces Ivan Ceraj
Director of Engineering	Ferdinand Alimadhi	Outside hire	New position
Developmental operations manager	Carson Gee	Internal promotion	Position upgraded from engineer and transferred to Engineering unit

Position	Person or Status	Form of Recruitment	Notes
Associate director of Engineering	Peter Pinch	Internal promotion	Position upgraded from OCW production manager and transferred to Engineering
Senior software engineer	Open	Search in progress	4 positions (one to replace Andrew Shapiro and 3 new positions)
ODL Headquarters			
Executive director for administration	Lisa Schwallie	Outside hire	New position
Financial officer, accounting services and control	Marisol Tabares	Outside hire	New position
Administrative assistant II	Laura White	Outside hire	Replaces Jan Marie Olownia
Associate director, finance strategy and planning	Marine Brown	Internal promotion	Position upgraded from manager, finance and business strategy
Program and community manager	Anine Ward	Internal promotion	Position upgraded from program coordinator
Administrative assistant II	Open	Search in progress	New position
MITx			
Intellectual property coordinator	Colleen Cressman	Outside hire	New position
Intellectual property coordinator	Geoffrey Wilson	Outside hire	New position
Educational technologist	Kyle Boots	Outside hire	New position
MITx community and outreach manager	Lisa Eichel	Outside hire	Replaces Eileen MacMahon
Associate dean of digital learning	Cecilia d'Oliveira	Internal promotion	Position upgraded from executive director
Technical production manager	Joe Martis	Internal promotion	Position upgraded from educational technology specialist; replaces Peter Pinch
Senior educational technology specialist	Shelly Upton	Internal promotion	Position upgraded from educational technologist; replaces Joe Martis
OpenCourseWare			
Project manager, OCW educator	Sarah Hansen	Outside hire	Replaces Kathy Lin
Department liaison	Karmen Chong	Outside hire	Replaces Luke Phelan
Department liaison	Laura Royden	Outside hire	Replaces Molly Deblanc
Residential Education			
Program manager, digital learning in residential education	Sheryl Ann Barnes	Outside hire	New position
Strategic Education Initiatives			
Senior project manager	Sucharita Sahu	Internal promotion	Position upgraded from OCW project manager and transferred to SEI unit
Associate dean of digital learning	Vijay Kumar	Internal promotion	Position upgraded from senior strategic advisor
Incubation			
Manager, Entrepreneurship Program	Open	Search in progress	New position

Residential Education

The mission of the ODL Residential Education unit is to catalyze the revolutionary transformation of teaching at MIT, making it more effective and efficient for MIT students and faculty. We do this by collaborating with MIT faculty to explore, test, and institutionalize pedagogical models that enhance on-campus education through the use of digital technology. Our key strategies are to:

- Support digital learning experiments at MIT by providing technical expertise, consultation, facilities, funding collaboration, training, and support for such experiments
- Encourage wider institutional adoption of pedagogical approaches enabled by digital learning tools by proactively supporting faculty and the MIT community in leveraging digital tools to improve teaching at MIT
- Collaborate with faculty, departments, the Office of the Dean for Undergraduate Education, and the Office of the Dean for Graduate Education to encourage and enable faculty digital teaching and learning tools, to help departments grow their course production capacity, to build academic computing support mechanisms that leverage existing Institute resources, and to explore synergies with other initiatives across MIT

Summary and Highlights

With the creation of the position of residential education program manager and the hiring of Sheryl Barnes to fill that position in March 2015, the Residential Education team was established as a functional unit within the Office of Digital Learning. Prior to March, support for residential education was distributed throughout various areas within ODL. The new unit brings several functions together into a more coherent organization offering more coordinated support for faculty. Functions now provided by the Residential Education unit include:

- Instructional design and assessment consulting for instructors to promote more effective and efficient teaching and learning at MIT
- Support of experimental/innovative learning spaces
- Technical support for the Residential MITx course platform
- Outreach and events (xTalks and others) to promote innovative teaching and learning

Goals and Objectives

As noted, the Residential Education unit strives to make MIT on-campus education more effective and efficient for both students and faculty by supporting digital learning experiments at MIT and encouraging wider institutional adoption of pedagogical approaches enabled by digital learning tools. With the establishment of the unit in March, early priorities for the new program manager were to:

- Set up a team structure and consolidated space for members of the Residential Education group and establish associated team processes (team goal setting and review, team meetings, etc.)
- Establish strong working relationships with other groups in ODL (e.g., MITx and OCW)
- Contribute to the development and implementation of the MITx Grant Program (see MITx section later in this report)
- Establish regular communications with the MIT Teaching and Learning Laboratory (TLL) and other key campus units (e.g., Office of the Dean for Undergraduate Education, library units, ODL Faculty Advisory Council)

Accomplishments

During AY2015, there were many ODL accomplishments in support of residential education both before and after the new unit was established, as described below.

ODL hosted 70 courses on the Residential MITx platform, the on-campus implementation of the edX course delivery platform used for residential education (Figure 2). There were 8,008 MIT student enrollments in these courses.

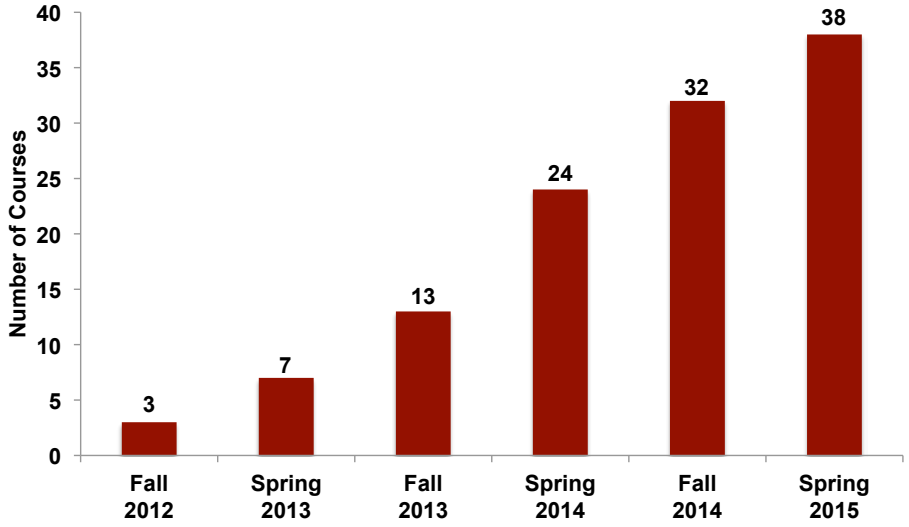

Figure 2. Growth in use of the Residential MITx platform for MIT courses.

We established a robust ticketing system and associated workflow processes for faculty support. Since the start of tracking in January, we have resolved 111 tickets from 59 individual users.

We hosted 15 xTalks during AY2015. The xTalks seminar series facilitates awareness, deep understanding, and transference of educational innovations at MIT and elsewhere. Total attendance for the year was 625, with an average of 42 attendees per session.

Special residential education projects included the following:

- Helped build the new ODL website
- Identified key pathways for faculty use of Residential MITx
- Developed 6.01 as a model for task-centered instruction
- Worked with senior MIT leaders on learning initiatives to help faculty translate the latest best practices and educational research into concrete learning gains for students in their classes
- Continued to facilitate development of the STAR CellBio software tool

In terms of collaborations and committee work, we established and improved links with the MIT Teaching and Learning Laboratory, served on the Carnegie Online Educational Policy Initiative Committee (Sanjoy Mahajan), participated in the redesign of the introductory biology and chemistry curriculum at the Singapore University of Technology and Design (SUTD), served on the MITx Faculty Advisory Committee (Sanjoy Mahajan), and collaborated actively in all phases of the MITx grant proposal process.

In addition, we supported innovative MIT learning spaces and related equipment, as follows:

- Space, technology, and secure network implementations for 3.091r
- Online assessment of overflow space support for 6.0001 and 6.0002
- Space and technology accommodations for several courses, including 16.99 (Aeronautics and Astronautics), 3.016 and 3.017 (Materials Science and Engineering), 2.086 and 2.086 (Mechanical Engineering), and 11.188, 11.205, and 11.520 (Urban Studies and Planning)

Lourdes Aleman served as an instructor for TLL's Kaufman Teaching Certificate Program, and Sanjoy Mahajan made a number of presentations at different venues (e.g., Edx Global Forum, Brandeis University, Family Weekend) on digital learning, flipped classrooms, and other innovations. In addition, Mahajan published *The Art of Insight in Science and Engineering* (MIT Press, 2014; based on 6.055/2.038), which is available to the public at no cost.

Administrative Accomplishments

- Filled the program manager position
- Brought the Residential team together, physically and functionally; established regular team meetings; and consolidated the group into one space
- Built bridges with other ODL groups
- Actively participated in the transition of MITx to a services structure, creating a coordinated "orientation" for course teams
- Served on the ODL space planning committee
- Initiated a process to track use of and experience with residential platforms and advocated for priority changes and improvements

MITx

MITx on edX is the Institute's interactive learning initiative that offers online versions of MIT courses on edX, a partnership in online education between MIT and Harvard University. MIT instructors teach MITx courses to learners around the world. With support from the Residential Education team, and using the resources, platform, and pedagogical innovations of MITx, faculty also develop digital learning courses and modules for use in on-campus education.

Many people refer to MITx courses as MOOCs (massive open online courses). The learning experience features multimedia and video content, embedded quizzes with immediate feedback, online laboratories, and peer-to-peer communications. Course materials are organized and presented in ways that enable learners to proceed at their own pace and allow for individual assessments of each person's work. Learners who demonstrate their mastery of subjects can earn certificates of completion. MITx on edX operates on a cost-free, open-source, scalable software infrastructure. MITx and edX are building a global community of online learners.

The MITx platform is also used in a growing number of on-campus MIT courses to bring advanced digital learning technologies to residential education. MITx residential modules support online assessments with rapid feedback, active learning classrooms, flexibility in course delivery, and other emerging digital teaching and learning innovations. A digital learning ecosystem is emerging whereby a faculty member can develop a course on the MITx platform to support teaching and learning in the classroom. Building on the experience, and benefiting from student feedback, the faculty member can then decide to transform the course for use on edX by global learners.

The vast array of data gathered through MITx global and residential use is helping educational researchers better understand how learners learn and how technology can facilitate effective teaching both on campus and online. Research findings are then introduced into new generations of learning tools, creating a continuous loop of educational innovation.

Summary and Highlights

During the 2014–2015 academic year, MITx on edX continued building more courses, supporting growth, and settling in to more structured operational processes. The MITx team had a number of accomplishments over the past year. For example, we:

- Launched 50 online courses (24 new MOOCs and 26 MOOCS that had previously run in prior semesters), double the number from last year, along with three small private online courses (SPOCs).
- Enrolled about 1.25 million learners from more than 200 countries across these 50 MOOCs. Of these individuals, approximately 640,000 participated in the courses.
- Generated $962,000 in net revenue through verified certificates and SPOC sublicensing arrangements.
- Established the MITx Grant Program, a new semiannual process for soliciting and evaluating MITx course project proposals. The program launched in May 2015, soliciting course proposals for fall 2015 and spring 2016.

- Published three working papers.
- Partnered across the MIT community (e.g., with MIT Libraries and the MIT Press), hosted international guests, and provided tours of MITx production facilities.
- Hired and trained six new team members to provide central course development services.

Table 3 shows the cumulative impact of MITx on edX since its inception in 2012.

Table 3. Cumulative Worldwide Impact of MITx

Metric	Total
Cumulative total enrollment	2.699M
Cumulative total participation	1.559M
Certificates of completion	103.5K
ID-verified certificates	28.5K

By the end of AY2015, MITx on edX had developed and offered a cumulative total of 50 unique courses via the edX interactive teaching and learning platform since the inception of the MOOC program; 24 more are in the pipeline for launch in fall 2015.

Learners 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, there have been more than 2.7 million course enrollments, with nearly 1.6 million participants (some people register for a course but then fail to follow through with any studies or use of course materials). Individual registrants come from more than 200 different countries, as shown in Figure 3.

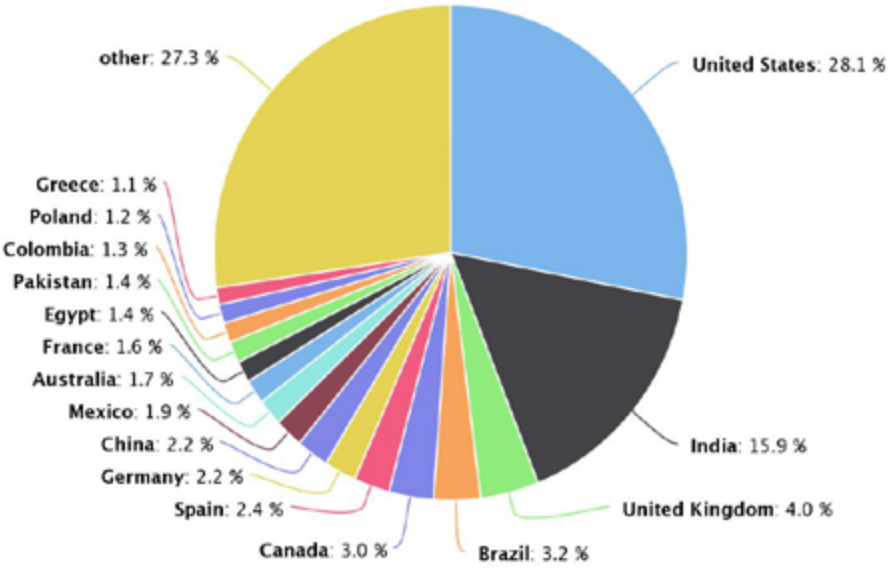

Figure 3. MITx registrations by country.

Goals and Objectives

The mission of MITx is to support the development of free, openly licensed, scalable, MIT-quality courses for academically talented learners worldwide; support the use of digital learning tools and techniques in the delivery of MIT residential programs; 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
- Research: advance teaching and learning through educational research
- Revenue: generate revenue to help sustain MITx and other ODL units

Accomplishments

Reach

As noted, MITx launched 50 online courses (24 new MOOCs and 26 that had previously run in prior semesters) and three SPOCs.

We enrolled about 1.25 million learners from more than 200 countries across these 50 MOOCs, with roughly 640,000 individuals participating in the courses. Table 4 provides both enrollment (number of people who sign up for a course) and participant (number of people who have clicked into the courseware at least once) numbers. Our experience, similar to that of most other institutions that offer MOOCs, has been that only a fraction of enrollees (about 50% for MITx on edX) actually work with the course materials. Participant numbers are a better indicator, although still imperfect, of the number of learners in a course.

We awarded a total of 34,638 edX certificates (honor code plus identity verified) to learners across 50 MOOCs. Honor code certificates signify that the learner has successfully completed a course and has complied with the edX honor code. Identity-verified certificates additionally indicate that the learner's identity was verified via a photo and ID card or document; ID-verified certificates are available for only selected courses for a fee.

Also, we established the MITx Grant Program, a new semiannual process for soliciting and evaluating MITx course project proposals. Forty MIT faculty submitted statements of interest in response to the first call for proposals and then followed up with 25 full proposals and budgets. The MITx Faculty Advisory Committee selected and funded eight projects out of the 25 submitted. The new grant program, proposal process, and selection criteria are designed to:

- Reduce barriers to faculty participation
- Support both global outreach and residential education
- Ensure that MITx courses better meet the needs and preferences of learners

- Allow experimentation with and adoption of innovative teaching techniques that may improve learning outcomes
- Align with Institute and departmental priorities and directions

MITx course teams created numerous educational innovations, tools, and new learning pathways, as follows.

- 18.01.1x: developed and integrated Sketch Tool, in which learners sketch functions to reason through problems and apply calculus as a problem-solving tool.
- 8.05x: effectively implemented increased the potential for learner subject mastery by successfully eliminating live lectures and utilizing MITx online sequences and homework for residential quantum mechanics students. The online format will increase the Physics Department's flexibility and allow for the course to be offered twice a year with a single faculty member and no graders.
- 15.S23x: incorporated five live, synchronous multimedia sessions, allowing the course team to create a blended community experience that included illustrations and Twitter and Facebook interactions.
- 10.03x and 7.28.1x: used extensive animation to help communicate complicated biological concepts. A DNA structure animation produced for 7.28.1x won the BioCommunications Association Medical Education Award for Motion Video at the BioImages visual media competition.
- 0.111x: integrated a third-party tool called Voicethread to serve as the environment for image-based assignments. Learners were automatically placed into small groups. They then uploaded the photos they took for each week's assignment and shared feedback (via video, text, or audio) with each other using Voicethread's comment feature.

Residential

We held two faculty special interest group events to bring the digital community together to share best practices and innovations. Also, we collaborated with the newly formed Residential Education unit to assist with residential digital learning projects and to make the unit a partner in the new MITx Grant Program.

Research

We published three working papers: "HarvardX and MITx: Two Years of Open Online Courses", "Teacher Enrollment in MITx MOOCs: Are We Educating Educators?", and "Privacy, Anonymity, and Big Data in the Social Sciences." The teacher enrollment paper, a survey of educators in 11 MITx on edX courses, showed that one in four respondents identified as past or present teachers, while nearly one in ten identified as current teachers. Although educators represented only 4.5% of the 250,000 enrollees, they generated 22.4% of discussion forum comments. The privacy and anonymity paper highlighted the tension between privacy and releasing high-quality open data. Federal law governing student privacy and the release of student records suggests that anonymizing learners' data protects their privacy. Guided by this standard, MITx and HarvardX de-identified and released a data set from 16 MOOCs on the edX platform.

Revenue

MITx on edX generated $1.3 million in edX gross revenue through ID-verified certificates and SPOC sublicensing arrangements. MITx realized $962,000 in net revenue after edX overhead and fees. ID-verified certificates and SPOC sublicenses are the primary channels through which MITx generates revenue.

Table 4. AY2015 MITx on edX Courses (MOOCs and SPOCs)

Course	Title	Instructor(s)	Enrollment	Participants	Honor Certificates	ID-Verified Certificates
		Summer 2014				
6.002x	Circuits and Electronics	Anant Agarwal, Chris Terman, Gerald Sussman	30,359	18,843	482	270
6.00.1x	Introduction to Computer Science and Programming Using Python	Eric Grimson, John Guttag	31,134	20,708	2,127	1,058
		Fall 2014				
3.032x	Mechanical Behavior of Materials	Lorna Gibson	15,966	9,886	502	122
3.091x	Introduction to Solid State Chemistry	Michael Cima	9,731	5,233	164	0
VJx	Visualizing Japan (1850s-1930s): Westernization, Protest, Modernity	John W. Dower, Andrew Gordon, Shigeru Miyagawa	13,191	7,350	1,184	0
8.EFTx	Effective Field Theory	Iain Steward	8,474	5,778	12	0
4.605x	A Global History of Architecture	Mark Jarzombek	12,722	6,874	543	227
24.00x	Introduction to Philosophy: God, Knowledge and Consciousness	Caspar Hare	23,874	12,273	488	171
CTL.SC1x (ESD. SCM1x)	Supply Chain and Logistics Fundamentals	Chris Caplice	39,674	23,800	2,185	1,307
6.832x	Underactuated Robotics	Russ Tedrake	15,975	9,411	136	60
JPAL101x	Evaluating Social Programs	Rachel Glennerster, Marc Shotland	9,258	5,267	565	0
11.132x	Design and Development of Educational Technology	Eric Klopfer	20,492	11,463	1,630	582
6.00.2x	Introduction to Computational Thinking and Data Science	Eric Grimson, John Guttag	20,183	11,333	1,259	710
11.126x	Introduction to Game Design	Eric Klopfer	29,069	17,029	1,480	364
9.01x	Light, Spike, and Sight: The Neuroscience of Vision	Sebastian Seung	10,134	5,549	505	0
15.390.1x	Entrepreneurship 101: Who Is Your Customer?	Bill Aulet	65,405	30,106	2,690	3,433

Course	Title	Instructor(s)	Enrollment	Participants	Honor Certificates	ID-Verified Certificates
15.390.2x	Entrepreneurship 102: What Can You Do for Your Customer?	Bill Aulet	29,101	12,878	574	853
		Spring 2015				
15.S23x	ULab: Transforming Business, Society, and Self	Otto Scharmer	33,082	19,532	2,416	0
6.00.1x	Introduction to Computer Science and Programming	Eric Grimson, John Guttag	76,779	49,296	4,738	1,834
8.MechCX	Advanced Introductory Classical Mechanics	David Pritchard	13,207	6,846	201	0
15.390.1x	Entrepreneurship 101: Who Is Your Customer?	Bill Aulet	23,107	12,872	206	218
15.390.2x	Entrepreneurship 102: What Can You Do for Your Customer?	Bill Aulet	5,747	2,291	11	26
3.086x	Innovation and Commercialization	Gene Fitzgerald	24,177	10,186	241	240
7.QBWx	Quantitative Biology Workshop	Jeff Gore, Paul Blainey, Eric Lander, Ernest Fraenkel, Mary Ellen Wiltrout, Nathaniel Schafheimer	6,598	3,998	257	94
6.002x	Circuits and Electronics	Anant Agarwal, Chris Terman, Gerald Sussman	29,101	19,131	202	106
21W.789x	Building Mobile Experiences	Frank Bentley, Ed Barrett	27,910	15,024	45	170
14.73x	The Challenges of Global Poverty	Esther Duflo, Abhijit Banerjee	14,592	6,683	594	300
6.041x	Introduction to Probability—The Science of Uncertainty	John Tsitsiklis	28,300	17,533	410	139
6.341x	Discrete-Time Signal Processing	Alan V. Oppenheim, Tom Baran	12,978	7,211	145	58
3.072x	Symmetry, Structure and Tensor Properties of Materials	Eugene Fitzgerald	7,518	3,984	31	13
8.05x	Mastering Quantum Mechanics	Barton Zwiebach	20,535	10,302	393	109
3.091x	Introduction to Solid State Chemistry	Michael Cima	6,026	3,464	65	0
15.071x	The Analytics Edge	Dimitris Bertsimas, Allison O'Hair	42,884	26,138	3,101	1,295
16.00x	Introduction to Aerospace Engineering: Astronautics and Human Spaceflight	Jeffrey Hoffman	16,826	9,756	885	433

Course	Title	Instructor(s)	Enrollment	Participants	Honor Certificates	ID-Verified Certificates
6.004.1x	Computation Structures—Part 1: Digital Circuits	Chris Terman, Steve Ward	24,767	13,968	805	638
6.00.2x	Introduction to Computational Thinking and Data Science	Eric Grimson, John Guttag	24,458	13,939	1,656	534
7.28.1x	Molecular Biology: DNA Replication and Repair	Stephen Bell, Tania Baker	12,549	7,475	430	112
15.662x	The American Dream for the Next Generation	Thomas Kochan	8,434	4,496	277	52
11.127x	Design and Development of Games for Learning	Eric Klopfer	22,136	11,863	513	343
		Summer 2015				
JPAL 101X	Evaluating Social Programs	Rachel Glennerster, Marc Shotland	6,676	3,805	404	0
3.15x	Electrical, Optical and Magnetic Materials and Devices	Caroline Ross	14,200	7,749	113	32
uINOV8x	User Innovation: A Path to Entrepreneurship	Eric von Hippel	55,222	20,326	0	412
CTL.SC1x	Supply Chain and Logistics Fundamentals	Chris Caplice	26,491	15,853	NA	1,291
8.MechCx	Advanced Introductory Classical Mechanics	David E. Pritchard	10,137	6,228	201	0
15.071x	The Analytics Edge	Dimitris Bertsimas	26,766	17,545	0	923
18.01.1x	Calculus 1A: Differentiation	David Jerison, Gigliola Staffilani	27,309	13,375	NA	189
24.118x	Paradox and Infinity	Agustin Rayo	15,073	9,481	NA	46
6.00.1x	Introduction to Computer Science and Programming	Eric Grimson, John Guttag	96,577	51,251	2,535	0
0.111x	Making Science and Engineering Pictures: A Practical Guide to Presenting Your Work	Felice Frankel	10,309	4,818	0	76
6.00.1x	Introduction to Computer Science and Programming	Eric Grimson, John Guttag	NA	NA	NA	NA
7.00x	Introduction to Biology: Secret of Life	Eric Lander	NA	NA	NA	NA

In addition, we collaborated on translations of the following MITx on edX courses:

- 15.390.1x Entrepreneurship 101: Who Is Your Customer? (to Spanish and Turkish)
- 15.390.2x Entrepreneurship 102: What Can You Do for Your Customer? (to Spanish and Turkish)
- JPAL101x Evaluating Social Programs (to Spanish)

Administrative Accomplishments

AY2015 was a year of important advances in bringing structure and good management practices to the MITx enterprise, with the development of the following policies, processes, and collaborations.

- MITx Digital Learning Lab (DLL): continued to develop a strong community of practice with the MITx fellows, who are MIT employees with dual appointments between an academic department and ODL. This year we renamed the fellows community the Digital Learning Lab and created new job descriptions for senior- and junior-level community members (e.g., digital learning scientists, fellows). MITx held the first DLL professional development retreat in March 2015 and continued to convene the community biweekly to share knowledge, best practices, and innovations.
- MITx Grant Program: established a new grant program through a call for proposals process to strategically manage the MITx portfolio. The program helps identify and control projects to align them with ODL strategic priorities and department goals. The initial call for proposals (April through June 2015) generated 40 statements of interest, followed by 25 full proposals and budgets. The MITx Faculty Advisory Committee selected and funded eight of the 25 projects in June 2015 for development and launch in FY2016.
- MIT departments: as part of the MITx Grant Program and faculty events, MITx increased departmental outreach and one-on-one meetings with department heads.
- Finance: reviewed current cost accounting practices and established a new financial policy for faculty and course teams on use of ODL funds and a revised MITx revenue sharing policy. We also revisited our cost allocation formulas to establish a new time tracking and resource allocation tool that will be implemented in FY2016.
- Budgeting: refined and standardized the budgeting process for rerun courses to improve cost management control and sustainability.
- edX: reviewed our edX relationship and identified key areas for improvement; reviewed the effectiveness of edX and MITx customer relationships using the Net Promoter Score, a management tool for measuring customer interest and loyalty; continued to play a key role on the edX Product Council; and helped establish a new course authoring/issue workflow system with edX support services.
- edX Consortium: participated in a semiannual meeting and an Open edX meeting (both in November 2014 in Boston) and partnered closely with founding member HarvardX on a number of issues such as accessibility and product roadmaps.
- Services: began implementing new centralized services for three critical course development functions: intellectual property (IP), accessibility, and instructional design. Implementation included hiring an IP team, creating an IP policy, and working closely with MIT's Assistive Technology Information Center (ATIC) on accessibility policies and best practices for both MIT and Harvard.

- Process: created and documented a number of new processes, procedures, and policies, including a course production process; a database/business management system proposal; a time tracking system; an MITx Grant Program process and tracking system; a new ODL Dropbox server; and a new ODL website.
- ODL internal support: participated in cross-functional projects such as space planning for the ODL move (FY2016), the Blue State Digital project, and marketing/communications for the ODL website.

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 is considered; the budget, timing, and sustainability of each module (learning unit), subject, or subject sequence proposed are assessed based on the strategy described by each department; and each proposal is 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 evaluates and facilitates innovative new approaches proposed for MITx courses and experiments in digital learning. Also, it guides 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, novel approaches to video, animations, simulations, or production tools.

Membership

The committee's co-chairs are Sanjay E. Sarma, professor of mechanical engineering and dean of digital learning, and Hazel L. Sive, professor of biology. Members are as follows:

- W. Craig Carter, professor, Department of Materials Science and Engineering
- Isaac Chuang, professor, Department of Electrical Engineering and Computer Science, and senior associate dean of digital learning
- Elfatih A.B. Eltahir, professor, Department of Civil and Environmental Engineering
- Woodie Flowers, professor, Department of Mechanical Engineering
- Denny Freeman, professor, Department of Electrical Engineering and Computer Science, and dean for undergraduate education

- David Gossard, professor emeritus, Department of Mechanical Engineering
- Steven Hall, professor, Department of Aeronautics and Astronautics
- Mark Jarzombek, professor, Department of Architecture
- S.P. Kothari, professor, Sloan School of Management
- Sanjoy Mahajan, acting director of digital residential education, ODL
- Iain Stewart, professor, Department of Physics

OpenCourseWare

MIT OpenCourseWare is a free, open, publicly accessible web-based resource that offers high-quality educational materials from more than 2,200 MIT courses—virtually the entire MIT graduate and undergraduate curriculum—reflecting teaching in all five MIT schools and 33 academic units. This near-total coverage in all disciplines makes OCW unique among open education offerings around the world. MIT continually updates OCW, adding new courses as they become available and refreshing existing courses with new materials. More than 800 MIT OCW courses have been independently translated into at least 10 other languages.

Through OCW, MIT faculty share their teaching materials with a global audience of teachers and learners. Educators use these resources for teaching and curriculum development, while students and self-learners draw upon the materials for self-study or supplementary use. OCW attracts about 3 million visits in a typical month, and to date more than 200 million people from virtually every country on earth have accessed these resources.

Beyond its service to a worldwide audience, OCW has a significant impact at MIT, where both faculty and students embrace it. Students use OCW resources such as problem sets and exams for study and practice. New freshmen often report that they checked out MIT by looking at OCW before deciding to apply. Instructors often refer students to OCW for part of their coursework. OCW staff work extensively with faculty to develop and refine course materials for publication, and faculty frequently use these updated materials in their classroom teaching. Alumni access OCW materials to continue their lifelong learning.

OCW course content includes thousands of individual resources such as syllabi, lecture notes, course calendars, problem sets and solutions, exams, reading lists, selected readings, videos, simulations, animations, sample programming codes, and more. Nearly 100 courses include complete, captioned video lectures for the entire course. Beyond core academic content, a relatively new feature known as OCW Educator allows MIT faculty to share their pedagogical insights, with tips on how they teach their courses to students on campus.

Course materials contained on the OCW website are offered under a Creative Commons license and can be freely used, copied, distributed, translated, and modified by anyone, anywhere in the world, for noncommercial educational purposes.

Summary and Highlights

The following were among the major highlights during AY2015:

- Published 113 courses (59 new courses, 54 updates).
- Published the first OCW course with interactive reading questions and assessments (18.05 Introduction to Probability and Statistics).
- Published 68 OCW Educator This Course at MIT pages, of which 47 include instructor insights.
- Held the first Educator Roundtable (online discussion of a This Course at MIT page with educators). The course discussed was 18.05 Introduction to Probability and Statistics.
- Logged an average of 2.2 million visits per month. OCW materials continue to be made available through other sites such as YouTube, iTunes U, VideoLectures.net, and the Internet Archive as well as through translation affiliates. Figure 4 shows how traffic to the OCW website has grown over the years.

Table 5 summarizes OCW's publication status as of June 30, 2015.

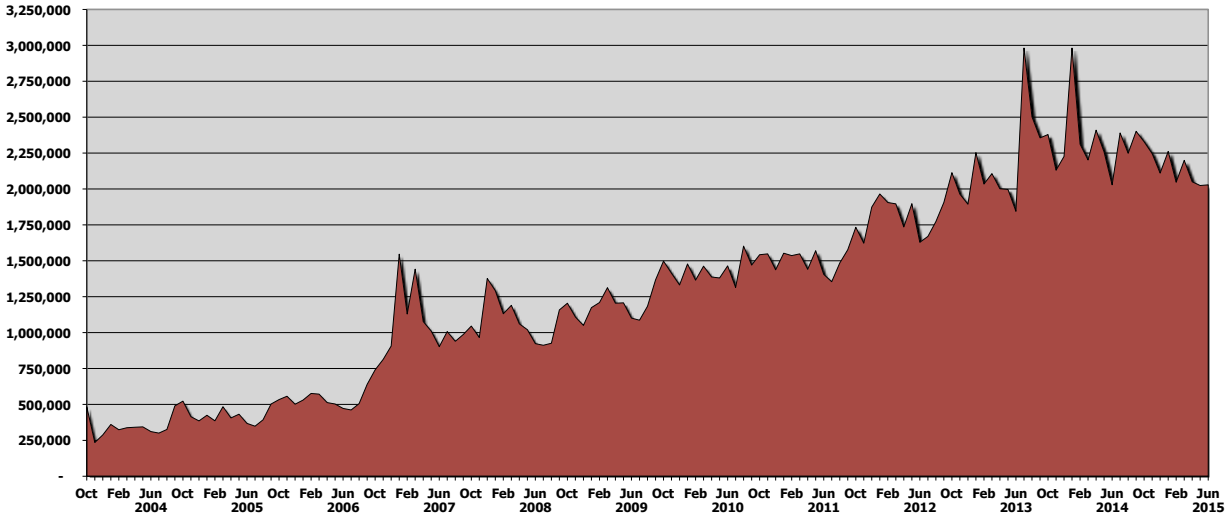

Figure 4. Monthly traffic to the OCW website through June 30, 2015.

Table 5. OCW Publication Metrics as of June 30, 2015

Metric	Total
Courses published on OCW website	2,281
OCW courses archived on DSpace	914
Full video lecture series*	97
Full audio lecture series	13
Exemplary video lectures (partial series)	58
Exemplary audio lectures (partial series)	4

*80 courses and 17 supplemental resources.

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

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, we:

- Published 113 courses (59 new courses, 54 updates) with the following distribution across MIT schools: Architecture and Planning, 7; Engineering, 22; Science, 29; Humanities, Arts, and Social Sciences, 48; and Sloan School of Management, 7.

- Published three supplemental resources (RES.6-011, RES.10-001, and RES.16-001). (In addition to publishing MIT course materials, OCW undertakes many special projects to produce supplemental resources that enrich its educational content. As of June 30, 2015, there were 47 substantial supplemental resources on OCW.)
- Added 37 courses, now in the pipeline.
- Processed/cleared about 2,200 intellectual property objects.
- Published 23 courses and supplemental resources with video assets and three with audio assets (e.g., 6.849, 7.91J, 9.04, 8.286, CMS.608). Others are in the pipeline and nearing publication.
- Published the first OCW course with interactive reading questions and assessments (18.05 Introduction to Probability and Statistics). The instructors overhauled the course structure and pedagogy to flip the classroom, and they mounted the course on the Residential MITx platform to support on-campus instruction. OCW successfully experimented with replicating the interactive assessments and reading questions from the MITx platform. The course site has full texts of assigned readings, interactive reading questions, full problem sets with solutions, and an interactive problem checker that gives immediate feedback. Other interactive courses and features are in the pipeline and nearing completion (e.g., 16.90, the first course ported from the edX platform into OCW CMS, includes interactive assessments, videos, and measureable outcomes linked to locations in the course content).

Highlights for High School

In addition to the regular course publication, OCW also offers Highlights for High School (HFHS), 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 more than 4.3 million visits and currently averages more than 42,000 visits per month.

During AY2015, OCW made several enhancements to HFHS, including updating the rotator on the main page with new features and updating the introductory course lists on all subject pages. In addition, we began discussions for a new course that will be published in the fall.

OCW Educator

OCW Educator was conceived by the OCW Faculty Advisory Committee in 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 innovative classroom teaching, both at MIT and around the world.

The primary component of OCW Educator is This Course at MIT, an 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 new section also includes insights from instructors on how they structured and taught the course.

Segments with instructor insights often have 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.

During AY2015 we greatly expanded OCW Educator, as follows:

- Published 68 This Course at MIT pages, of which 47 have instructor insights.
- Added a list of course introduction videos to the Educator portal.
- Began work on a new organization of This Course at MIT by pedagogic topic.
- Held the first Educator Roundtable, focusing on 18.05 Introduction to Probability and Statistics.
- Published 18.915 Graduate Topology Seminar: Kan Seminar, a mathematics reading seminar. This is the second experiential course (the other being 18.821) whose site explains how the course works. Students read, discuss, and write about mathematical papers, after which they give practice presentations and then final presentations on certain papers. The site includes a list of readings, sample student written responses to readings, and sample instructor responses to students.
- Initiated a collaboration with the Teaching and Learning Laboratory to explore how OCW Educator can better serve MIT educators.

Three of the four 2015 MacVicar Fellows have This Course at MIT pages with instructor insights.

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:

- Added an "Other Versions" tab to selected courses, providing links and a brief explanation of why there are other versions of the same course on OCW. Other versions also include links to current MITx courses focusing on the same subject.
- Featured new courses and "hidden gems" in course rotators on the main homepage and on every department page.
- Updated the About OCW and Help/FAQ pages, with information such as latest usage statistics, team structure, and accessibility policies.
- Published lists of related OCW courses for every MITx on edX offering.
- Renumbered many courses in both CMS and FileMaker in accordance with new number schemes from the MIT registrar. Most special programs numbers were redistributed to the Edgerton Center, the Experimental Study Group, Concourse, and Women's and Gender Studies. Course 21W (Writing) and Comparative Media Studies were combined into a single department.
- Continued analytics analysis to understand usage trends and fine-tune outreach and promotion efforts.
- Audited and updated our FileMaker data for new and retired subjects, using information from the MIT Data Warehouse.
- Began investigating faceted search, a more robust search capacity for the entire OCW collection, expected to be added to the site in the coming year.

Accessibility

Accessibility features broaden the reach of OCW to learners with disabilities. During AY2015, we:

- Published all new media assets with subtitles
- Retrofitted three existing courses with subtitles (2.003SC, 2.627, and 6.189)
- Began work on uploading all subtitle files to iTunes U and the Internet Archive (the work will be completed over the summer)
- Began work on adding interactive searchable transcripts (all transcripts on the site will be synced to their videos, taking the user to the exact place in the video where the searched term appears)
- Consulted with ATIC on website accessibility throughout the year

At present, 53 courses with full lectures have subtitles, up from 40 last year.

Singapore University of Technology and Design

Work for the SUTD project is performed under a contract with that institution. OCW derives revenue from this effort to help sustain the OCW program. We delivered 22 more courses over the past year, for a grand total of 96, exceeding the contractual goal of 87. Also, we began preliminary work on an additional eight courses under a new contract.

Communications

- Maintained the OCW newsletter and blog and the OCW Twitter, Facebook, and Pinterest accounts
- Processed more than 5,000 user feedback emails

MITx and ODL Support

- Gave presentations and otherwise participated in numerous ODL, MITx on edX, and Residential MITx meetings and events
- Interviewed ODL job candidates
- Participated in ODL website meetings, contributed website content, and maintained the OCW portion of the ODL website
- Supported promotion of MITx, including managing MITx Twitter and Facebook accounts, writing blog and newsletter pieces promoting MITx courses, and promoting MITx courses on the OCW homepage
- Reviewed MITx module proposals and participated in advisory meetings
- Began a dialogue with the Residential Education team and secured access for the team to all Stellar course sites

Other Activities

- Ported the OCW Intranet to a new software system and re-architected and updated the content
- Worked with the Department of Physics to address gaps in OCW physics courses resulting from the removal of Walter Lewin materials in December 2014

Administrative Accomplishments

During the past year, the OCW executive director was promoted to associate dean of digital learning, and her responsibility was expanded to include both OCW and MITx.

In the area of online fundraising, OCW received 3,341 donations in FY2015, an increase of 30% from last year. These donations totaled $314,108 (up 24%) and were provided by 2,406 individual donors (up 31%). The donations included small online gifts as well as matching gifts from donors' employers. The number of repeat supporters continues to climb at a steady pace, up 24%. While these increasing participation levels encourage us, the median gift size (now $25) decreased again this year.

In FY2015, we launched another participation challenge for the spring campaign. The goal was to have 1,000 OCW learners make a donation, at any level. A small group of core supporters offered a gift of $30,000 contingent on reaching that goal. OCW supporters brought us over the goal with two days to spare in the 38-day campaign. We raised $68,992 from 1,134 donors, the most successful and best-performing online campaign to date.

Working with the MIT Alumni Association, we ran this challenge campaign as a pilot on the new MIT crowdfunding platform. Despite a few minor glitches, the new platform worked fairly well, and our feedback to the Alumni Association will help strengthen the platform and encourage future use of and experimentation with this Institute-wide fundraising tool.

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 AY2015 were as follows:

- Hal Abelson, Class of 1922 Professor, Electrical Engineering and Computer Science
- Marcus Boorstin, Undergraduate, Electrical Engineering and Computer Science
- Cecilia d'Oliveira, Associate Dean of Digital Learning, Office of Digital Learning
- Eric Klopfer, Professor, Urban Studies and Planning
- Vijay Kumar, Senior Strategic Advisor and Director, Office of Educational Innovation and Technology
- Stuart Madnick, J.N. Maguire Professor of Information Technology, Sloan School of Management
- Haynes Miller, Professor, Mathematics
- Shigeru Miyagawa, Professor, Foreign Languages and Literatures
- Hazel Sive, Professor, Biology
- Karen Willcox (Chair), Professor, Aeronautics and Astronautics
- Dick Yue, Philip J. Solondz Professor of Engineering, School of Engineering

Incubation

The Incubation group experiments with advanced digital learning technologies and helps transition developments into practical applications. The group integrates technology, media, and community into education; works to make MIT the online education platform for the world; and develops new MOOC business models to achieve financial sustainability.

Goals and Objectives

The Incubation group's goals during AY2015 included the following:

- Sharpen the focus on learner-driven MOOC product development by understanding learners and building MOOCs and other educational initiatives that respond to their needs.
- Continue developing the Incubation team's model of being a full-cycle educational media production and delivery group. Under this model, the group partners with MIT faculty, designs MOOC curricula, develops MOOC

assessments, plans production activities, produces MOOCs, conducts post-production activities, and ultimately delivers the course, interacts with students, and analyzes results (quantitatively and qualitatively) for further refinements in MOOC product development.

- Expand the portfolio of MIT's MOOCs in entrepreneurship and innovation.
- Achieve expertise in online course marketing.
- Use the growing marketing strength and expertise in MOOC product development to scale a model of a financially sustainable, profitable MOOC.
- Refine, replicate, and scale the MITx Global Entrepreneurship Bootcamp.
- Conduct regional entrepreneurship bootcamps (in the Middle East, Latin America, Europe, and Asia) in addition to the Global Entrepreneurship Bootcamp at MIT.
- Further develop and finalize sponsorship agreements in the area of entrepreneurship education and build a strong financial foundation to support new experimental work.

Accomplishments

Accomplishments in AY2015 included:

- Developed two additional MOOCs in the area of entrepreneurship and innovation (15.390.2x Entrepreneurship 102: What Can You Do for Your Customer? and uINOV8x User Innovation: A Path to Entrepreneurship).
- Established the MITx Global Entrepreneurship Bootcamp, the pioneering and financially self-sustaining MIT program in blended learning.
- Reran the Incubation group's 15.390.1x MOOC (Entrepreneurship 101: Who Is Your Customer?) in winter 2015, leading to approximately 4,000 verified certificate purchases, the highest number for any single offering of a MOOC on edX.
- Prepared to run two additional MITx Global Entrepreneurship Bootcamps, one for entrepreneurs and one for entrepreneurship educators.
- Greatly increased applications for the Global Entrepreneurship Bootcamp, with a total of 800 applications, up from 265 last year. Bootcamp tuitions are $6,000 for entrepreneurs and $9,000 for educators.
- Developed a successful student internship program. This program enables smart and ambitious students from Boston-area universities who are interested in education to join our team for a semester or during the summer. The interns learn and experiment with us, enabling the Incubation group to expand our scope of work and amplify our impact.

Strategic Education Initiatives

Strategic Education Initiatives supports MIT's efforts and partnerships with other universities, foundations and trusts, nongovernmental organizations, and national

governments to experiment with and implement digital learning. Some SEI projects span across nations and hundreds of schools, helping to advance the field of digital learning for practitioners, researchers, and learners at MIT and around the world.

SEI also partners with MIT faculty to create new digital tools for use in MITx courses and in residential teaching. SEI's work in other settings can lead to new pedagogy and curriculum design at MIT. Through these initiatives, MIT is furthering its mission of advancing learning worldwide.

Summary and Highlights

In AY2015, SEI made significant headway in addressing its mission through contributions that will help to shape the future of education at MIT and elsewhere by means of an increased emphasis on digital learning. Notable SEI accomplishments have included:

- Advancing key initiatives to establish MIT's engagement with pre-K–12 education through funded partnerships with the Woodrow Wilson National Fellowship Foundation and the Jamsetji Tata Trust in India
- Partnering with community colleges in support of their efforts to address competency-based and market-relevant education, with sponsorship from the US Department of Labor
- Conducting a symposium funded by the National Science Foundation to advance scholarship and practice in online learning through the learning sciences
- Developing multiple collaborations in support of the Institute's strategic initiatives, including collaborating with the MIT Office of Resource Development on a large initiative with Saudi Aramco in the area of digital learning; collaborating with the Office of the Vice President for Research and the Research Laboratory of Electronics on the AIM Photonics project, which proposed the development of an integrated photonics institute for manufacturing innovation; and collaborating with the Jet Propulsion Laboratory to propose a project supporting the education programs of the National Aeronautics and Space Administration's Science Mission Directorate

Goals, Objectives, and Priorities

During AY2015, SEI's broad goals were to:

- Develop new strategic education initiatives on behalf of the Institute
- Help launch the Institute-wide MIT PK12 Initiative
- Manage multiple ongoing initiatives, including the MIT-Woodrow Wilson Academy of Teaching and Learning, the Connected Learning Initiative (CLIx), the Learning Sciences and Online Learning Symposium, and the Transformation Agenda Collaboration
- Plan and implement the xTalks speaker series

Accomplishments

MIT PK12 Initiative and MIT-Woodrow Wilson Academy of Teaching and Learning

The MIT PK12 Initiative in ODL, with collaborators across MIT, is designed to combine MIT's "mind and hand" approach to learning with recent breakthroughs in cognitive science and digital learning to help develop and support excellent STEM (science, technology, engineering, and mathematics) teachers and school leaders. The PK12 Initiative was launched through the work of a faculty group, facilitated by ODL, that articulated the foundational principles of this effort, which are to change the world *through* learning with access to quality STEM education for all and to change the world *of* learning through rigorous research. The initiative has been bootstrapped by $9.9 million in seed funding from the Woodrow Wilson National Fellowship Foundation for a new collaboration aimed at supporting teachers in their efforts to use emerging digital learning tools and environments, especially in STEM areas. The effort will promote new ideas, technologies, and curricula along with research related to educator preparation, with a focus on STEM subjects for students from pre-kindergarten through the senior year of high school.

Connected Learning Initiative

CLIx, a collaboration among MIT and the Tata Institute for Social Sciences (TISS) with funding from the Jamestji Tata Trust, aims to improve the professional and academic prospects of high school students in underserved communities in India. The goal of the initiative is to reach a total of approximately 1,000 schools and 150,000 students in four states during 2015–2017, as well as conduct professional development activities for approximately 2,700 teachers.

At MIT, SEI is collaborating with Professor Eric Klopfer and his team in the Education Arcade to design and develop modules in English, science, and mathematics for grades 8, 9, and 11. The MIT team is leading the design of a number of modules and is mentoring the development of several additional modules through capacity-building efforts based on an annual design camp and on the 11.132x Design and Development of Educational Technology course.

In April 2015, an operational planning workshop was held at TISS in Mumbai, India, with participants from MIT, the Tata Trust, and TISS along with their development and implementation partners from India. An annual working plan was co-developed between TISS and MIT in June 2015. Planning is under way for a design camp that will be held at MIT during the first two weeks of August 2015.

Learning Sciences and Online Learning Symposium

In May, SEI convened the Learning Sciences and Online Learning Symposium with support from the National Science Foundation; the event brought together faculty and researchers at MIT and from across the United States to discuss the intersection between the learning sciences and online learning. It is expected that the outcomes of the symposium will not only inform digital/online learning activities at participants' institutions but also influence development policy, practice, and scholarship in an area that is becoming central to the discourse on educational change. In particular, the

symposium addressed how online learning might help meet the persistent challenges that discipline-based educational researchers have identified in teaching within their disciplines. The symposium focused on three themes: threshold and difficult-to-learn concepts, as well as common misconceptions, that online and digital environments can address; unique and different opportunities that are afforded in online and digital environments; and community interaction in online and digital learning experiences.

Transformation Agenda Collaboration

SEI collaborated in the Massachusetts Community Colleges and Workforce Development Transformation Agenda project funded by the US Department of Labor's Trade Adjustment Assistance Community College and Career Training program. In collaboration with several Massachusetts community college partners, SEI's design and development of innovative technology enabled learning modules in advanced manufacturing and created a proof-of-concept for integration between community colleges and career centers.

- Data Bus: SEI collaborated with Quinsigamond, Bristol, and Middlesex Community Colleges; the Massachusetts Department of Higher Education (DHE), and Department of Career Services; and representatives of Massachusetts One Stop Career Centers to prototype innovative software services for increased data sharing and streamlining of processes among colleges, DHE, and the workforce system. The Data Bus has been designed, piloted, and demonstrated to partners and stakeholders, who recognize the large-scale impact and great potential of shared services, data, and tools. The initial project was completed and successfully demonstrated to Transformation Agenda partners and stakeholders in August 2014. The Data Bus promises large-scale potential and is garnering interest from other states and government organizations. SEI is collaborating with Quinsigamond Community College to extend the project and is in discussions with a number of other colleges and universities across the United States.
- Online case studies: SEI developed two online case study modules, Introduction to Problem Solving and Improving Observation Skills, whose goal is to help provide students with opportunities to integrate their knowledge and tackle real-world issues that face advanced manufacturing companies. Both case studies are designed to supplement existing curricula and will be used as homework assignments (followed with in-class discussions) to encourage student to think about the importance of soft skills. The Introduction to Problem Solving case study outlines the importance of problem-solving skills, introduces students to different strategies for tackling problems, and incorporates an interactive choose-your-own-adventure activity. Improving Observation Skills helps students understand how observation skills and mindfulness are emphasized in shift changes, in workplace safety awareness, and for a company's financial stability.
- Ortho-to-3D: SEI developed a module to help improve students' 3D visualizing skills. Three-dimensional "thinking" skills are required for many things that advanced manufacturing students and employees are expected to do, whether understanding a technical drawing or programming routing paths to send to a multi-axis milling machine. The Ortho-to-3D online learning module is a set of

assessments in which students are tested on whether they can find the correct 2D projection after analyzing an interactive 3D rendering of an object, and vice versa.

Backstage, MIT Core Concept Catalog, and QBank

SEI continued to develop and enhance its Backstage suite of educational software services. The MIT Core Concept Catalog (MC3), designed to help the MIT community manage and share information about curricular topics, learning goals, and related content within and across disciplines and subjects of the Institute, entered its third year of production. It provided a crucial foundation for two exciting software projects, MITocs and Crosslinks 3.0, delivered this year.

MITocs was designed to document, group, and connect learning outcomes across the undergraduate curriculum at MIT. This project is being led by Professor Karen Willcox in the Department of Aeronautics and Astronautics. MITocs currently catalogs over 1,000 learning outcomes in Course 16, with linkages to outcomes in a handful of other disciplines.

Crosslinks 3.0 is a community-based authoring tool for establishing connections between academic topics taught in the undergraduate curriculum at MIT. While the tool is not new, this is the first version designed with input from users and intended to be a scalable resource for supporting the academic needs of MIT students. Crosslinks is being led by Professor Willcox and Professor Haynes Miller (Department of Mathematics).

A new service, QBank, was released in fall 2014. QBank helps manage and track assessment content, including assessment items (problems), and information about when and to what populations of learners assessment items have been given. QBank is the engine behind a new application, MecQBank (developed in collaboration with Professor Pedro Reis in the Department of Mechanical Engineering), designed to manage and reuse previous years' assessments developed for 2.002 Mechanics and Materials II and elsewhere.

SEI is responding to the growing interest in Backstage services beyond MIT, such as that from Stanford University, the Open University of Catalonia, and edX.

MIT-Haiti Initiative

The National Science Foundation is funding a recent MIT-Haiti Initiative project ("INSPIRE: Kreyòl-based Cyberlearning for a New Perspective on the Teaching of STEM in Local Languages") intended to develop a language of STEM in Haitian Kreyòl. The project is co-led by Professor Michel DeGraff of the Department of Linguistics and Dr. Vijay Kumar of SEI, with project management and support through SEI. The MIT team is working with Haitian faculty to deepen their expertise in the use of digital resources for active STEM learning, specifically in physics, biology, and math.

In its third year, the MIT-Haiti team conducted two workshops during June 2014 and January 2015. The January 2015 INSPIRE workshop, held in Port-au-Prince, focused on

current views of learning and, in particular, pedagogies related to active learning for Haitian high school and university faculty. This was the fifth workshop in the project's educational series and was the largest to date, with 90 participants.

INK-12 Project

The INK-12 Project, funded by the National Science Foundation, joined SEI from the MIT Center for Educational Computing Initiatives in March 2015. The project is investigating two questions related to educational technology: (1) How can technology that allows young students to both draw and use representational tools support their learning of mathematics, in particular multiplication and division? and (2) How can technology that enables teachers to view and share student work with their classes support students' learning, and what tools can help teachers accomplish these tasks?

In FY2015 the project focused on developing and testing its tablet-based "digital notebook" technology, called Classroom Learning Partner, in Boston-area elementary classrooms, with two goals in mind: understanding how use of the project tools affects students' understanding of multiplication and division and identifying what human analysis of student-created representations, and of the process of creating those representations, tells teachers and researchers about student understanding. In FY2016, the human analysis will guide the development of machine analysis routines designed to provide teachers easily and quickly with information about what their students do and do not understand.

The project team worked with students and teachers in second-, third-, and fourth-grade classrooms at a local elementary school in Waltham, MA. In ongoing analyses, the project's goal is to identify interesting patterns in the ways in which students use the various project tools as a means of determining how the tools may or may not support students' understanding of multiplication and division.

iLab Project

The MIT iLab Project also joined SEI from the MIT Center for Educational Computing Initiatives in March 2015. The iLab Project is dedicated to the proposition that online laboratories—real laboratories accessed through the Internet—can enrich science and engineering education by greatly expanding the range of experiments to which students are exposed in the course of their education. Unlike conventional laboratories, iLabs can be shared across a university or across the world. The iLab vision is to share lab experiments as broadly as possible within higher education and beyond. The ultimate goal of the project is to create a rich set of experiment resources that make it easier for faculty members around the world to share their labs over the Internet. Examples of recent work include the following.

- Integration of the iLab shared architecture with the edX platform: Over the past year, the iLab client code was restructured and converted from Java applets to Java applications, and the iLab Servicebroker code was then modified and updated to add the ability to launch a Java Webstart application to enable integration with OpenEdX. This work will allow edX students to have seamless access to remote laboratory equipment delivered via the iLab platform, will track user access to labs, and will enable user input of experimental results for edX evaluations.

- Experimental Lab Server Architecture (ELSA): ELSA, a new National Instruments LabVIEW-based software module that will extend the iLabs shared architecture, was developed in early fall 2014. The module is designed to manage interactions and communications between an experiment client and a LabVIEW-based experiment using only web services. ELSA replaces the older LabVIEW implementations that required the download and installation of a large LabVIEW plug-in.
- Switching circuit energy balance in iLabs: In February 2015, a new switching circuit energy balance iLab was developed that aims to teach students about the function and heat dissipation of switching electronic circuits.

iCampus Student Prize

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. In 2015, the competition asked students to explore living and learning at MIT 30 years from now.

SEI, on behalf of the MIT Council on Educational Technology, awarded the grand prize in the 2015 competition to graduate students William Li and Dhruv Jain for AccessMIT, a vision for a more accessible MIT. The competition also recognized Colin McDonnell ’16, John Peurifoy ’18, Gabriel Ginorio ’18, and Sam Van Cise ’18 of Team a14z for their exploration of the exponential future provided by computers and virtual reality to change the campus experience.

MIT+K12 Videos

FY2015 was a year of expansion of MIT+K12 Videos viewership and programming, with 1,819,202 views, nearly 6 million minutes watched, 11,686 additional subscribers to the MIT+K12 Videos YouTube channel, and about 2,000 additional Facebook likes. Major projects during FY2015 included the following.

- Release of *Science Out Loud* seasons 2 and 3 and educational resources: The SEI team produced and released 12 new episodes of our original web series *Science Out Loud* on YouTube, racking up almost 70,000 views. Season 3 premiered at the Cambridge Science Festival with student-hosts on hand to answer audience questions after the screening. With episodes no longer than five minutes, these videos take the traditional concepts taught in middle and high school science, engineering, and math classes and place them in a context completely outside the classroom. The SEI team worked with 14 undergraduate students, graduate students, and recent alumni to produce episodes on a range of topics. Additionally, SEI compiled and released accompanying educational resources, research, and related materials from MIT for every episode and a next-generation science standards alignment guide so that educators could use *Science Out Loud* in their classrooms. As one of our viewers commented, “This is how science should be taught.”

- MIT+K12 Videos educational media fellow: The SEI team created and launched the Educational Media Fellowship, a paid, semester-long appointment for current MIT undergraduate and graduate students seeking to grow in the arenas of educational media, outreach, and/or technology and contribute at large to program development for MIT+K12 Videos. The two inaugural fellows co-led outreach events, taught educational media classes to middle school students, and served as production assistants and editors on our new video series.
- 20.219 Becoming the Next Bill Nye and OpenCourseWare Educator: The SEI team created and launched 20.219 during the 2015 IAP. This class focuses on using video production techniques to engagingly convey students' passions for science, technology, engineering, and/or math. Class participants script and then host five-minute science-, technology-, engineering-, and/or math-related shows on YouTube to inspire youth to consider a future in science. Seven students took part in the course, which was documented for OpenCourseWare; OCW also developed coordinated educational modules for educators to give insight into MIT's teaching pedagogy and approach.
- Creation and launch of MIT physics demos: The SEI team created and launched two pilot videos—one on an exploding wire to illustrate Ohm's Law and the other on a bike wheel to illustrate conservation of angular momentum—for a new YouTube web series developed in partnership with the Department of Physics. The videos, which feature large-scale demos relating to high school physics topics, are hosted by MIT students.
- Creation and launch of #askMIT and continued outreach with SciVids101. The SEI team created and launched the new #askMIT outreach initiative/web series, a Q&A series with MIT researchers and students, with seven videos. The SEI team invited K–12 students from all over the world to submit videos through email, Twitter, and Facebook asking questions on a science, technology, engineering, or math topic. The questions were incorporated into videos that provided answers from roboticists, chemists, rocket scientists, and geneticists, giving K–12 students a glimpse into who these researchers are and how their world looks. The SEI team continued our outreach programming for SciVids101, a crash-course workshop on making science videos for middle and high school students. We visited seventh graders at the Arthur T. Cummings School in Winthrop, MA, who had the opportunity to write, direct, host, and produce these videos. They later visited MIT to serve as course consultants and provide feedback for students in 20.219.
- Creation and launch of Q's View: The SEI team produced and released three pilot episodes of Q's View, an original interview web series hosted by Quinton MacArthur, associate director of undergraduate admissions at MIT. It seeks to challenge people's ideas of who engineers are—not just their educational background but their other interests.
- SciEx: The SEI team sponsored and mentored the student-run SciEx extreme science video competition. The final event was held at the Cambridge Science Festival. Twelve original videos were reviewed by a panel of middle school, high school, undergraduate, and graduate students, in addition to video production staff.

xTalks

The xTalks speaker series continues in its second year to foster community among education innovators as well as to provide a forum for sharing experiments and achievements in online and face-to-face education. Early in the year, colleagues from TLL, RELATE, OCW, STAR, the Education Arcade, and other groups gathered to discuss topics of interest, speaker ideas, and thematic synergies. There were 15 xTalks during AY2015, and the total attendance for the year was 625.

Many programs focused on the impact of the learning sciences on digital learning. For example, xTalks sessions explored issues in cognitive psychology, learning engineering, online degree programs, active learning, and the emergence of engineering and design as core curricular subjects. Josh Goodman, Laura Schulz, John Gabrielli, Karl Szpunar, Marsha Lovett, Norman Bier, Leigh Abts, Logan McCarty, Louis Deslauriers, Dan Butin, Shanna Smith-Jaggars, and Bror Saxberg presented sessions on these topics.

Other xTalks programs centered on emerging innovations in the digital learning arena. Topics included maker spaces, K–12 video initiatives, the MITOces curricular mapping tool, and various annotation tools. Sessions were presented by Nadya Peek, Nancy Ouyang, Aaron Ramirez, Alban Cobi, Jonathan Hunt, Elizabeth Choe, George Zaidan, Karen Willcox, Joseph Seering, Kurt Fendt, Jamie Folsom, Phil Desenne, and David Karger.

Lastly, xTalks presented sessions on diverse topics such as the use of MOOCs in diverse populations, a comparison of academic and private-sector educational partnerships, a computer scientist's look at open learning, a book release party, and a discussion of access and equity issues in the global digital world. Jeff Haywood, Lori Breslow, Alan Mille, Sanjoy Mahajan, Jenny Stine, and Laura Czerniewicz presented sessions on these topics.

The xTalks series serves to engage people in discussions on issues pertinent to the Learning Sciences Online Learning Symposium (LSOL) as well as MIT's involvement in the Online Education Policy Initiative (OEPI). Scholars already coming to MIT for LSOL or OEPI activities have been recruited to deliver xTalks during their visits (e.g., Lovett, Bier, Czerniewicz, Smith-Jaggars, Butin, and Saxberg).

Administrative Accomplishments

In FY2015, SEI added three staff to support its K–12 initiatives (Connected Learning Initiative and PK12 Initiative). Staff involved in two related projects (iLab and INK-12) and staff from MIT's Center for Educational Computing Initiatives joined the SEI group.

Vijay Kumar was appointed associate dean of digital learning and was also appointed to serve as a member of the International Advisory Committee.

Digital Learning Solutions

The Digital Learning Solutions group develops and delivers online, fee-based programs targeted to adult learners who wish to expand their knowledge and build

their skills, primarily in the context of professional education. DLS also partners with the Professional Education Program in the MIT School of Engineering to oversee that program's digital learning efforts. Launched in May 2015, DLS is the successor to the ODL Business Development group.

Early in 2014, ODL undertook numerous visits and firsthand interviews with global Fortune 2,000 organizations to explore needs and interests in the area of professional education. DLS and its predecessor (Business Development) were formed in response to the categorical market demand for MIT professional education, especially in rapidly changing technology and business disciplines, where MIT is recognized as a leader.

Summary and Highlights

Digital Learning Solutions had several major accomplishments over the past year, including the following:

- Identified and began cultivating several large corporate prospects
- Negotiated contracts and began work with GE and Boeing
- Partnered with MIT Professional Education to oversee its digital programmatic efforts
- Mapped out a preliminary product strategy and portfolio development approach

Goals and Objectives

The initial focus in the past year was to create an operating plan and budget for this new unit. The plan focused on MIT's digital learning offerings to the corporate market and included an initial set of corporate prospects for cultivation as well as the outlines of selected pilot programs.

As of June 30, 2015, significant planning work is under way to develop DLS business activities during FY2016.

Accomplishments

DLS had an auspicious first year, as follows.

- Pilots: We sourced, signed, and launched a corporate course pilot with GE for "BigDataX." We also signed a contract with Boeing that brought in an initial $400,000 to fund the development of a multicourse certificate program, to recruit a faculty director, and to shape the program in collaboration with edX. The potential upside of the Boeing opportunity could exceed $10 million over the life of the program.
- Revenue pipeline: We began the multiyear process of evolving a sales pipeline. We developed and managed a pipeline of corporate prospects including GE, Fidelity, the BT Group, Accenture, EMC, MathWorks, Airbus, Schneider Electric, and others. In conjunction with this process, we created corporate and professional promotional collateral to facilitate discussions. As a consequence of our GE pilot and related relationship cultivation, ODL was invited to GE's

annual learning retreat, and we were asked to present all of our corporate offerings (including our pipeline of prospective classes) for inclusion in the company's internal catalog that it will market to over 350,000 employees. In addition, we created a value-added reseller (VAR) strategy to address the decision not to staff up the sales team; developed, in concert with the Office of the General Counsel, standardized terms for a pilot VAR agreement with Unnivers (an organization that assists educational institutions with their internationalization efforts) for international sourcing; and crafted an initial presentation platform with educators from the University of Guadalajara (Mexico).

- New program development: We created an idea for a platform to bring forward the "neuroscience of learning" to raise awareness of MIT's learning innovation research. In parallel, we conceptualized a neuroscience of learning corporate research consortium and stimulated initial interest from Accenture, GE, Fidelity, Schlumberger, Dell, Citi, and Schneider Electric, among others. John Gabrieli was recruited to serve as co–principal investigator (with Sanjay Sarma) for the initial pilot, and other faculty were identified for program expansion.

Administrative Accomplishments

At the beginning of the year, we obtained approval from the MIT provost and the MIT chief financial officer to begin operations with start-up seed funding. In May, we successfully transitioned to the new Digital Learning Solutions structure.

AMPS MIT Video Productions

MIT Video Productions provides video support for academic programs, departments, and Institute initiatives. MVP offers a variety of services on a cost recovery basis, including video production, distance education support, and post-production.

Summary and Highlights

FY2015 was a year of significant growth and transition for AMPS MIT Video Productions. For example, we significantly enhanced our custom video production capability, proposing and securing a number of projects with deliverables throughout FY2016, primarily in support of MIT's fundraising efforts and the upcoming MIT2016 celebration; installed a robust automated, multisource lecture capture and delivery system in MIT lecture hall 34-101; continued to digitize, catalog, and digitally archive selections from the MVP analog videotape library, which contains video recordings MVP has captured of MIT events and educational content over the past 30 years; and implemented a single streamlined scheduling/work order/invoicing system.

In addition to capturing and delivering key Institute events, both live and on demand, MVP continues to help departments, labs, and centers across MIT tell their story. Examples of the past year's videos include *Aero/Astro at 100*, *Women in Science at MIT*, and *The Making of the Collier Memorial*.

Goals and Objectives

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 has produced a diverse variety of video content for more than 30 years. With ongoing support from the Office of the Provost, we have continued the process of systematically preserving our vast analog tape library by digitizing and archiving the digital files. This archive will become accessible to the greater Institute community and beyond via a digital asset management system that is currently in the conceptual planning stage.

A significant goal in the coming year will be to leverage our story-telling skills in support of ambitious institutional and mission-centric fundraising and outreach objectives.

Accomplishments

An ongoing objective of MVP is to implement systems and processes that allow us to deliver services more efficiently and less expensively. To that end, MVP researched, identified, and installed a fully automated multisource lecture capture and delivery system. The system was installed in one of MIT's most heavily used lecture halls, 34-101. During the spring 2015 semester, we captured the 6.045 Automata, Computability and Complexity and 6.046 Introduction to Algorithms courses. Student feedback was positive.

We continued to apply our collective years of experience to significantly improving our coverage of events, to the degree that the content we produce itself becomes an integral part of the event. Examples include Commencement and the 2.007 Competition. We continued 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 have made to events that promote and celebrate community at MIT. Examples this past year included the Aero/Astro 100th anniversary, Women in Science at MIT, and the dedication of the Collier Memorial. In addition, we provide ongoing and valued support for annual events such as the President's Convocation, the Excellence Awards, and the Martin Luther King Jr. annual breakfast.

During FY2015, MVP archived over 150 terabytes of original digital content from our active or more recent projects. In addition, we digitized more than 900 of our most vulnerable assets from our analog tape library. We have identified an additional 2,000

analog assets for digitization and archiving during the first half of FY2016. We will publicly share selections from this archive via an updated version of our "From the Vault" website. This website will be featured during MIT's upcoming 2016 centennial celebration.

Administrative Accomplishments

During FY2015, we identified and implemented a streamlined work order/scheduling/invoicing application. This system allows us to eliminate redundancies in our work order/scheduling processes and significantly facilitates client invoicing and uploads to SAP. In addition, we have developed a new MVP website that we will be launching prior to the fall semester. The website provides a much more attractive and compelling presentation of the services we offer. More importantly, a significantly enhanced online order form will further streamline client request processing.

In October 2014 a new position was added to the MVP team, digital archivist/post-production coordinator. This position was created with funding support from the Office of the Provost to focus on the ongoing development, maintenance, and operation of our postproduction and archiving infrastructure. Over time, MVP has created and is responsible for the largest videotape library on campus. The creation of this position facilitates the process of systematically digitizing our extensive tape library while thoughtfully tagging and archiving the many hours of new content we capture on a daily basis.

Finances and Funding

AMPS MVP is charged by the provost with providing its products and services on a cost-recovery basis. During FY2015, we were required to draw upon reserves in our operations and equipment accounts in order to cover our annual expenses. We applied significant staff time and effort during the year to develop proposals around projects that will not generate revenue until FY2016. We anticipate continuing to provide our services and produce projects on a cost-recovery basis throughout FY2016.

In December 2014 Jane and A. Neil Pappalardo '64, long-time benefactors, made a generous new gift of $225,000. Even after completing payment on a multiyear pledge in 2013, they were moved to make this additional gift to support the recording and delivery of events and lectures that would not otherwise be captured and shared. We are enormously grateful for their continuing commitment.

Engineering and Technical Operations

The Engineering and Technical Operations group develops and maintains the technology infrastructure that supports development and delivery of digital learning content and tools. The group also consults internally with other ODL units on technical matters.

A related subunit within Engineering and Technical Operations is Distance Education (DE). The DE group operates and maintains four advanced technology–enabled classrooms that offer recordings and broadcasts of MIT classes and other events 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

During AY2015, the ODL Engineering and Technical Operations unit coalesced into a more formally structured team, with a director, team leads, and a staff of nine, including the DE unit. The group also consolidated operations into two office locations from four. This year, Engineering continued to support the growth of MITx residential courses at MIT and increased the production of MITx courses for edX. Specifically, the group:

- Released new versions of two existing products, SGA XBlock and STAR CellBio
- Released two new code libraries, PyLTI and PyLmod
- Began piloting a major new edX feature known as Custom Courses on edX
- Began work on a new platform, the Learning Objects Repository for Education
- Worked with several MITx course teams to develop and integrate new tools and assessment features

In addition, the DE group transitioned its organizational reporting line from the Open Education group to Engineering and Technical Operations as of July 1, 2014, and has now completed its first year under this new umbrella. Over the past year, DE:

- Hosted assessment sessions for 3.091r in classrooms 9-151 and 9-152 (approximately 1,690 hours of classroom time were reserved for this use)
- Collaborated with MIT Video Productions on an experimental lecture capture system in 34-101 that allowed for both student viewing and high-definition (HD) capture of individual camera angles for later editing
- Supported MITx faculty in interactive webcasts for 15.S23x and 15.662x and provided technical support for 20.305x and HST.936x
- Supported over 3,000 hours of distance and recorded sessions on campus for more than 30 residential courses
- Provided webcasting services for more than 60 events (including the Diversity Conference, Climate Change Conversations, and Zero Robotics) as an on-campus bridge with remote audiences
- Restructured the unit's staff to reduce costs
- Modified MIT TechTV to comply with responsive design principles for embedding videos into websites

Goals and Objectives

ODL Engineering creates educational technology tools and applications and provides technical support for ODL units and MIT faculty/course teams developing MITx courses. Engineering also provides distance education services for the MIT community. Goals for AY2015 were to consolidate and strengthen the Engineering team, work with MITx to improve the MITx offering and help move it toward a financially sustainable model, and

provide educational technology services (such as MITx) at scale, using automation, to the entire student and faculty body.

Distance Education

DE provides advanced video and related services to the MIT community, supporting academic programs and Institute initiatives 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 classrooms 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: As of June 30, 2015, the video inventory comprised 26,138 videos in 3,061 "collections" that included 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.

Accomplishments

MITx Support

ODL Engineering continued to support a growing number of MITx online courses, more than double the number from last year, both on campus and hosted at edX. To make this possible, we collaborated with edX to improve its support of Open edX and establish the product as reliable.

New Code Libraries

ODL Engineering released a python code library (PyLTI) using the LTI industry standard for connecting digital learning resources to learning management systems. We did this to make it easier for software developers and course teams to integrate interactive simulations with the edX platform. Almost immediately the course team for 9.01.1x The Neuroscience of Vision used the library, and within a few days they were able to connect their neuroscience simulation to their edX course.

ODL Engineering also wrote a code library, called PyLmod, for integrating Open edX with the MIT campus information technology systems. This gave us a more stable,

sustainable platform for integrating with the MIT Gradebook and systems such as Stellar. We expect that we will use this library in the future for streamlining other integrations.

Staff Graded Assignments

We released an updated version of the Staff Graded Assignment (SGA) XBlock, which is now a standard component of Open edX and is available at edx.org. SGA allows edX students to upload files for grading, which are reviewed, commented on, and graded by staff. The course team for 24.118 is using SGA in a sustainability experiment offering staff grading as a value-added feature for paid certificates.

STAR CellBio

One project that ODL Engineering inherited from the former Office of Educational Innovation and Technology (OEIT) was STAR CellBio. We have continued development of this simulator for biology experiments, and we delivered an updated version in support of a course run at SUTD in the spring. We are continuing efforts to make it self-service so that biology faculty can design their own experiments for the simulator.

Mastery-Based Assessment System

All of Engineering, including the Distance Education unit, worked closely with Residential Education and the 3.091 course team to implement an innovative mastery-based assessment system that included randomized problem banks and integration with the MIT ID card system. DE provided classroom support, which required space for up to 60 students at a time for 65 hours per week, totaling 1,690 hours of classroom time. This approach to assessments was credited with dramatically reducing the number of fifth-week flags in the course while improving student outcomes.

Reuse of Digital Learning Content and Tools

We released a pilot version of CCX, an edX feature that makes it easier to reuse edX course materials, particularly for smaller, unique audiences. The design came from the many requests we have received from educators who wished to use portions of our MOOCs with their own classes. We plan to develop a licensing model for these customized courses to help with financial sustainability.

We also began work on a more ambitious and powerful tool for reusing course materials. LORE allows edX course authors to create repositories of problems, videos, and other learning resources from multiple edX courses, combining them with analytic data from our research systems. Resources can be reviewed, searched, and tagged so that users can find them in the process of creating new courses. We have only recently begun this project, but we expect it to be a key tool in creating courses this fall.

Distance Education

Residential Education Support

As noted, DE collaborated with Residential Education to provide classroom support for 3.091r course assessments. The Ford and Kaufman classrooms (9-151 and 9-152) were reserved for this use. Of the 30 courses supported for distance education this past year,

26 were both residential courses on campus and distance education collaborations with partner universities around the world.

Lecture Capture Experiment

We co-led a working group with MIT Video Productions that resulted in the installation of an experimental autonomous lecture capture system in 34-101 for the spring 2015 semester, allowing capture of 6.045 and 6.046. The U-Switch technology enabled students to select from four sources for viewer control of the lecture capture experience. The individual camera sources were recorded separately and archived for later editing of source content.

The lecture capture, along with the hosting and streaming of content, was completely automated for seamless delivery through the DE video servers into the Stellar course management system.

Mitx Course Support

The DE group also provided classroom support and interactive webcast services for several MITx courses over the past year. Professor Otto Scharmer's 15.S23x U-Lab: Transforming Business, Society and Self had over 25,000 remote participants, who were able to interact with the classroom via Twitter for a truly interactive learning experience.

In the spring semester, Professor Thomas Kochan taught 15.662x: The American Dream for the Next Generation, and the DE group also provided live video conferencing, Webex, and streaming support for two residential courses recorded for MITx: 20.305x Principles of Synthetic Biology with Professor Ron Weiss (a collaboration with the University of California, Berkeley) and HST.936x Global Health Informatics to Improve Quality of Care with Dr. Kenneth Paik (using both Webex and video conferencing streaming).

Distance Education and Classroom Recording

Over the past year, 30 courses utilized the DE technology-enabled classrooms, logging 1,640 hours of time (not including 3.091r). Programs included System Design and Management, the MIT/Woods Hole Oceanographic Institute 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.

Webcasting

DE supported webcasting of more than 60 live events during the year, from monthly interactive alumni "chatcasts" to Institute events such as the Diversity Summit, Commencement, and the Collier Memorial dedication. More than 25 departments and centers sponsored live webcast events, including the Zero Robotics programming competition in conjunction with the International Space Station and interactive webcast support for MITx courses such as 15.S23x and 15.662x. In the case of 15.S23x, more than 25,000 viewers interacted in real time in classroom 9-152.

Video Conferencing

DE supports video conferencing systems on campus and provides contracted services to more than a dozen clients, servicing over 70 different video conferencing systems

installed on campus. These systems allow collaboration over vast geographic distances, reduce travel costs, and optimize use of faculty time.

MIT TechTV

In FY2015, DE upgraded the MIT TechTV video platform and service with several new features and enhancements. For example, the TechTV website code was modified to a responsive design to enable improved mobile device viewing; modifications were also made to allow for improved responsiveness when embedding videos in websites such as Drupal. In addition, the search engine was upgraded to incorporate Websolr, allowing better search functionality for users. Finally, we added the ability to do large file uploads to TechTV for MIT Video Productions and power users on campus using a DE server as an intermediary staging area.

Table 6 summarizes TechTV operations during FY2015.

Table 6. FY2015 TechTV Operating Metrics

Metric	Total
Number of video uploads	2,888
Number of new user accounts	524
Number of new collections	202
Number of videos (as of June 30, 2015)	26,187
Number of user accounts	9,953

Administrative Initiatives and Accomplishments

To consolidate and strengthen the Engineering team this year, we hired a director of engineering and three new senior software engineers. In addition, we brought together staff from the former OEIT and AMPS DE units, as well as the MITx developmental operations engineers, and promoted the production manager from OCW to be the associate director of engineering. Also, we moved the platform team (software engineers and developmental operations engineers) to One Main Street so that they would be co-located and could collaborate effectively.

We have worked very closely with Information Services and Technology (IS&T) to pilot an infrastructure-as-a-service offering that would allow us to use IS&T hardware for cloud computing and improve the security and privacy of our services for MIT students. The pilot has also helped IS&T understand the requirements of a modern, automation-driven IT infrastructure. In addition, we collaborated with IS&T to bring GitHub, a "social coding" platform, to the MIT community.

The Distance Education group transitioned its organizational reporting line from Open Education to Engineering and Technical Operations as of July 1, 2014.

Business Operations

Business Operations includes strategy and planning, finance, human resources, space, administration, marketing and communications, internal communications, and special projects.

Goals and Objectives

During AY2015, the priorities of Business Operations were to support ODL in developing strategic, operational, financial, project, and evaluation plans; support ODL in transitioning to a more mature, developed organization; and support the Business Operations team members in achieving high performance and growing professionally.

Accomplishments

Business Operations achieved important results in all three goal areas over the past year, as follows.

Developing strategic, operational, financial, project, and evaluation plans:

- Led strategic planning processes resulting in the establishment of Digital Learning Solutions and clarification of the Residential Education strategy
- Initiated a cross-organizational process to establish clear goals, beginning with a set of overarching ODL goals and then drilling down at the business unit level to define supporting goals (overarching goals are to build scalable support for faculty to experiment and succeed; invest in areas that promote financial sustainability and monitor costs; support a healthy, productive ODL; and support strategic initiatives)
- Established quarterly financial reports that include budgets, actual expenditures, and projections
- Performed video scans and began to move towards integrated video strategies

Transitioning to a more mature, developed organization:

- Reviewed HR processes to ensure that every ODL staff member has a job description, performance review, and goals for FY2016
- Built a set of on-demand self-serve reports that allow MITx managers to track costs and budgets
- Built and launched the ODL website
- Established an ODL internal communications program comprising town halls, sharing of work among business units, and brown bag lunches
- Documented HR processes to create sharable checklists for employee hiring, on-boarding, and off-boarding

Supporting Business Operations team members:

- Clarified roles and accountability for the finance and administrative team
- Cross trained the staff on financial and administrative practices
- Established team operating processes to share information and to identify and resolve issues as they arise

Administrative Accomplishments

The following were among the administrative accomplishments in AY2015:

- Instituted time tracking for MITx and fellows so that the costs of an MITx course can be tracked with more accuracy
- Codified policies for paying the provost, departments, and faculty for MITx courses and executed the first round of payments
- Established new policies in the areas of filing, food purchasing, and hiring of contractors
- Created ODL Box, a shared Dropbox site, so that ODL individuals and teams can share information
- Established hierarchies for finance and HR systems to manage permissions and approvals
- Worked with the Office of the Controller to classify and document different types of revenue (e.g., non-degree tuition, fee for service) and communicated to financial staff within and outside of ODL
- Enhanced Cognos reporting to enable self-serve reporting
- Developed and enacted processes for accruing costs and revenues at the end of the fiscal year
- Formed a space committee to begin planning for the move to Building NE49 in the summer of 2016

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