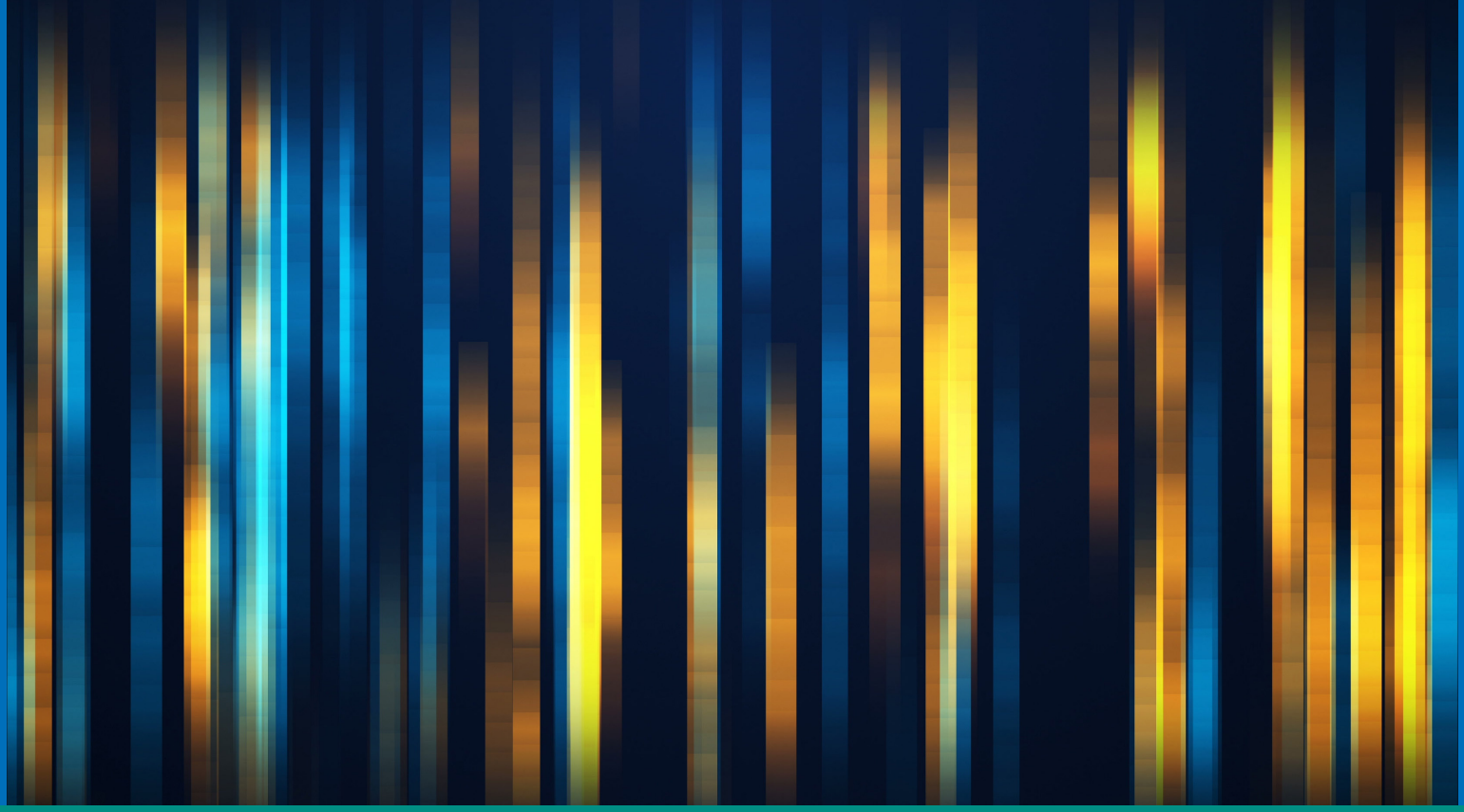

Bridging the Computer Science-Law Divide

April 2022

GEORGETOWN LAW

BOSTON UNIVERSITY

Contents

Introduction

Many pressing societal questions can be answered only by bringing experts from different disciplines together. Questions around misinformation and disinformation, platform power, surveillance capitalism, information privacy, and algorithmic bias, among many others, reside at the intersection of computer science and law.1 We need to develop institutions that bring together computer scientists and legal scholars to work together on issues like these, and to train new innovators, thought leaders, counselors, and policymakers with hybrid training in both disciplines.

In Universities, the disciplines of Computer Science and Law are separated by many wide chasms. Differences in standards, language, methods, and culture impede professors and other academic researchers who want to collaborate with colleagues on the other side of this divide. Universities place computer science departments and law schools in different schools, on different campuses, and on different calendars. Researchers in the two disciplines face differing incentives and reward structures for publishing, teaching, funding, and service.

Despite these many challenges many trailblazers have begun to build bridges between the disciplines. They have devised small fixes, clever hacks, or end-runs tailored to fit the shape of their University's idiosyncratic structure. They have started to redesign their institutional homes, creating new courses, centers, and departments that blur the lines between computer science and law. They have done much of this without institutional support or recognition, often by sacrificing the time they could spend on more conventionally incentivized activities. Even though each trailblazer's actions were tailored to their specific institution, we might benefit from compiling and organizing what they've done into a playbook of strategies that might work elsewhere.

With the generous support of the Public Interest Technology University Network (PIT-UN) researchers from the Georgetown University Institute for Technology Law and Policy and Boston University's School of Law and Faculty of Computing and Data Sciences present this report compiling practical advice for bridging Computer Science and Law in academic environments. Intended for university administrators, professors in computer science and law, and graduate and law students, this report distills advice drawn from dozens of experts who have already successfully built bridges in institutions ranging from large public research universities to small liberal arts colleges.

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1 This is not the only important interdisciplinary intersection that needs to be developed to help us tackle these pressing issues. Just about every discipline has something important to say about technology and society, and important insights can and should be developed by bringing experts from all disciplines together in groups of twos, threes, and larger. We focus on the intersection of computer science and law to document and learn from the work people have already done to connect the two disciplines and because we believe the two disciplines can provide important insights and approaches to tackling these issues.

Given the ubiquity and impact of computer and network technology in our society, it's hard to overstate the importance of educating technology-savvy lawyers and technologists who are sensitive to the legal, policy, and ethical implications of their innovations. Research partnerships between experts from the two disciplines are essential to provide the grounding for reliable and informed decision-making by judges, regulators, policymakers, and private actors in this space.

Universities interested in advancing true interdisciplinary teaching and research must think creatively about hiring, promotion, and faculty incentives, and this White Paper provides examples and ideas. It is intended for those who are already convinced of the need to combine these disciplines and seek advice on how to do so rather than try to convince the reader that these disciplines are worth combining.

The foundation for this report was laid at a Zoom workshop held on April 18, 2020. Thirty-five experts gathered via Zoom (just a month into the COVID-19 pandemic) to compare notes about four topics: Teaching/Pedagogy; Research/Scholarship/Tenure; Culture and Impact; and Funding.[2] At the end of the productive four-hour conversation, volunteers agreed to help the report authors develop the findings into report sections.

We thank Alex Givens for helping us co-conceive and develop this project. Thanks also to Elise Phillips and James Carey for research and writing assistance.

The paper presents its findings and recommendations in two parts. Part I discusses "Research Paths, Hiring, Tenure, and Building Interdisciplinary Community." Part II discusses "Teaching and Pedagogy."

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March 2022

2 For a full list of experts, see Appendix 2.

Executive Summary

For Junior Researchers (1.1.1)

- Seek out strong mentors
- Stick to a principal lane
- Ensure your primary-field work is strong enough for tenure by traditional measures
- True courtesy appointments with no obligations to secondary departments are probably the best option for most pre-tenure faculty members
- Look for institutions that demonstrate commitment to this work through real institutional change
- Look for departments created for the express purpose of supporting interdisciplinary research
- Know tenure expectations

For Senior Researchers (1.1.2)

- While major interdisciplinary initiatives require buy-in from the top, most research or teaching initiatives are bottom up
- Policy papers and commentaries, while not traditional scholarship, can be productive to start with as they move the ball and build bridges between departments
- Look beyond your department and university for other institutions with centers committed to this space and a critical mass of affiliated faculty interested in interdisciplinary engagement
- Define your area of inquiry precisely and start small

For Institutions:

Structural Innovations (1.2.1)

- Appoint high-level academic leaders with the mandate of cultivating interdisciplinary
- Create *new* departments, colleges, or programs that are explicitly interdisciplinary
- Create new faculty lines
- Consider joint hires that involve tenure eligibility in a home department and negotiated teaching or service obligations in a secondary department
- Cluster hiring can build community, teaching, and research as well as amplify the reputational impact of hires
- Tech law clinics produce some of the most innovative work in law and CS
- Supporting post-docs and graduate students adjacent to a law school can bridge disciplines and prepare them for interdisciplinary work

Joint Hires (1.2.2)

- Leadership must communicate to their faculty the value and process of joint hires
- Establish expectations across units before the hiring search
- Ensure both departments have input on the hiring committee
- Negotiations and the offer letter should directly address the workload split

- Both units should commit to provide support for the hire and predetermine who will pay for it
- Clearly lay out tenure expectations to hires
- Even if courtesy hires do not include formal obligations to the secondary department, wants and expectations should be discussed
- Both fields should broaden their conception of what 'counts' as research, and that shift needs to affect the standards for appointments

Tenure and Promotion (1.2.3)

- Seek departmental buy-in for modifications to conventional tenure expectations for interdisciplinary hires
- Do not require or expect grant development but still recognize its value

Creating an Interdisciplinary community (1.2.4)

- Ensure a critical mass of faculty members in both departments interested in tech policy
- Develop new publication options accepted in both fields
- Create a pool of experts on both sides of the Law/CS divide who can serve as scholarship reviewers and provide input to lateral appointment and tenure
- Urge funding agencies to consider more joint projects

Curriculum Development (2.1)

- The entity housing a course dictates important constraints on the nature and substance of the course
- Consider interdisciplinary graduate degree programs in CS and Law housed within a law school
- Classes can benefit from diverse enrollment, with students from both law and CS
- Consider the benefits and drawbacks of importing skills or concepts relatively intact from an outside discipline instead of melding disciplines together

Learning Outcomes (2.2)

- Consider courses that provide basic interdisciplinary knowledge transfer, teaching law students a bit of computer science and computer science students a bit of law
- Consider enrolling every law student in a "demystifying technology" course
- Emphasize the development of skills as well as substantive knowledge
- Consider courses that teach lessons from the other discipline, such as legal ethics into a computer science curriculum
- Consider "extradisciplinary" courses that break out of traditional legal or CS thinking to find new solutions and approaches

1. Research Paths, Hiring, Tenure, and Building Interdisciplinary Community

This Part focuses on research, talent, and scholarly community. In particular, it considers the tools that Universities can use to cultivate, recruit, and support faculty members and researchers whose work engages both CS and Law. We also discuss strategies for building a Law/Tech community within a University.

We begin with some reflections from the CS and Law scholar's perspective, based on interviews and conversations with faculty members who have successfully engaged in this research space. We hope to offer concrete strategies for individuals interested in joining this field, as well as for institutions seeking to support them. From there, we turn to institutional innovations that can help Universities to bridge the Law/Tech divide and to build strength in their interdisciplinary faculties. We consider (a) structural and strategic options for Universities that seek to become leaders in this space, (b) strategies for hiring faculty who are interested in interdisciplinary collaboration, (c) necessary reforms to tenure process and standards to support such faculty, and (d) proven methods for cultivating community among students and researchers interested in the intersection of Law and Computer Science. We close with some observations about what the "discipline" can do to encourage these efforts and to help ensure their success.

The insights below are drawn from comments made at the April 2020 workshop, along with subsequent phone and video interviews of attendees and other experts identified by workshop participants. While we have attempted to capture a range of views from both CS and Law experts, and from different types of institutions, our inquiry does not purport to be comprehensive.

1.1: Individual perspectives: Paths toward research at the intersection of CS and Law

Despite increased attention to tech law and policy in recent years, most respondents described interdisciplinary research as a labor of love that receives little institutional support or encouragement, and that earns minimal credit toward tenure. At least in traditional CS and Law departments, most respondents recommend that junior scholars focus their energies on research in their principal fields; interdisciplinary work can constitute "an extra feather in the cap," but rarely counts as more than that in tenure or promotion decisions. While some universities are making structural changes to address these limitations (as discussed below), most elite institutions have yet to make meaningful progress toward valuing and prioritizing this kind of interdisciplinary work. Until they do so, scholars interested in pursuing research at the CS and Law intersection have two choices: to do it on top of excellent, tenure-worthy research in their core discipline, or to wait until after tenure.

Virtually all of the researchers that we interviewed pursued their interdisciplinary research out of personal interest, rather than as a result of external demand or institutional encouragement. One respondent described persevering in the interdisciplinary field despite being told "you'd be insane to do that." Some of the Law scholars had a CS background, which piqued their interest in tech policy issues; others found their way to the field through their substantive area of interest (e.g., privacy, intellectual property, criminal law). For CS scholars, most began their academic lives with core CS research. At least early on, they did not publish outside traditional publications in their field. Real interdisciplinary work came post-tenure.

1.1.1: TIPS FOR JUNIOR RESEARCHERS.

TAKEAWAYS:

- Seek out strong mentors
- Stick to a principal lane
- Ensure your primary-field work is strong enough for tenure by traditional measures
- True courtesy appointments with no obligations to secondary departments are probably the best option for most pre-tenure faculty members
- Look for institutions that demonstrate commitment to this work through real institutional change
- Look for departments created for the express purpose of supporting interdisciplinary research
- Know tenure expectations

Despite these challenges, many of our respondents have engaged successfully in research that bridges law and CS. They offered the following advice for junior scholars interested in pursuing this work:

- **Seek out strong mentors.** Respondents noted the importance of strong mentors in their principal field, who advised them on publication strategies and helped them to navigate the road to tenure.
- **Stick to a principal lane, at least initially.**
    - Law faculty members who have tenure in law schools noted that, to achieve tenure, they had to "play by the law school rules" regarding publishing standards, despite also doing a lot of other collaborative and interdisciplinary research across CS and Law. Law school respondents described law school hiring as "stuck in norms 50 years old. It is not really interdisciplinary at all." Methodologically, legal scholarship falls into a narrow set of traditional categories. Too many kinds of scholarship don't count (for hiring as well as promotion). Candidates (for appointment and tenure) need to "fit into" the old mold to be seen as a law professor candidate, which perpetuates the problem. Our respondents who are successful interdisciplinary scholars on the law side had great mentors who told them to write what look like traditional law review articles to get hired and to make it through tenure. Some of them managed to shape interdisciplinary work into the law-review format, thus enabling it to count toward tenure. Others waited until after tenure, after which they had the freedom to "spread out."
    - Likewise, CS faculty members warned against relying on interdisciplinary work as a basis for tenure in traditional CS departments. As one senior CS professor said, "Make sure that your CS output is good enough to justify tenure. The papers can have vast implications for law and I urge you to pursue that, but make sure that your CS work can stand by itself."
    - All respondents describe the extra work to be an interdisciplinary scholar as part of what they signed up for, but lament it as a flaw in the system.
- Look for institutions that demonstrate commitment to this work through real institutional change.
    - Respondents noted the importance of institutional fit. "If you want to do more on the law/policy side, make sure you find a place where that's going to be valued." Ask probing questions about how the department incentivizes or rewards interdisciplinary research. Currently, even those departments that value tech policy work almost all still apply the traditional tenure requirements of the discipline; but it helps to have colleagues and a community that values this type of work.

- Consider joining a department or faculty that was created for the express purpose of supporting interdisciplinary research, such as BU's faculty of Computing & Data Sciences or Berkeley's Division of Computing, Data Science, and Society. As discussed below, some universities are beginning to take steps that should create more opportunities for interdisciplinary researchers, including in the CS and Law space; this White Paper and other initiatives of PIT-UN aim to foster this kind of innovation. At the moment, however, this is still a small market, and very much in development. If you pursue these opportunities, make sure that the tenure expectations are clear, and spelled out in writing.
- There are upsides and downsides to joint appointments as an entry-level or junior scholar. They create opportunities for interesting research and relationships, but they also create a risk of fragmentation and over-burdening. These challenges are daunting but not insurmountable, if the University and both departments take a creative, flexible, and forward-looking approach. In rare cases, Universities have offered joint appointments that explicitly anticipate and address these concerns by, for example, reducing overall teaching load, specifying service requirements in each department, setting clear tenure standards, and offering flexibility in the tenure process by allowing the candidate to decide, over time, whether to seek tenure in one or both departments. Positions like these may provide an excellent opportunity for junior scholars interested in interdisciplinary work. In the absence of this kind of innovation and flexibility, however, true courtesy appointments - with no obligations to the secondary department - are probably the best option for most pre-tenure faculty members.

- **Bottom line: know the tenure expectations.** Whichever path you take, make sure that you understand the tenure expectations of the department or faculty that you are joining, and that your research agenda fits comfortably within them.

1.1.2: TIPS FOR SENIOR RESEARCHERS.

TAKEAWAYS:

- While major interdisciplinary initiatives require buy-in from the top, most research or teaching initiatives are bottom up
- Policy papers and commentaries, while not traditional scholarship, can be productive to start with as they move the ball and build bridges between departments
- Look beyond your department and university for other institutions with centers committed to this space and a critical mass of affiliated faculty interested in interdisciplinary engagement
- Define your area of inquiry precisely and start small

Because most respondents ramped up their interdisciplinary work post-tenure, they had a number of observations and suggestions for senior researchers interested in exploring this space:

- **Bottom-up collaborations.** A consistent theme was that, while major interdisciplinary initiatives (including hires, centers, and new programs) require buy-in from the top, most interdisciplinary research or teaching initiatives happen from the bottom up. As one law faculty member put it, "particular faculty members simply take an interest and build something." Another senior scholar described interdisciplinary work at their university as "largely opportunistic" - i.e., not the product of central institutional initiative; valued but not driven from central admin. At the very top institutions, in particular, research and teaching partnerships seem to emerge only when individual faculty members doggedly pursue them, and in the face of the University's lack of institutional support.
- **The challenge of symmetry:** Substantively, respondents described two essential strands of scholarship that can work at the CS and Law intersection:

- Legal scholarship "informed" by real CS (co-written with CS faculty to ensure that the tech aspects are accurate and informed), and
- CS research that fills a need created by the law or legal constraints. This can include research that helps entities to comply with privacy regulations, for example, or that enables data analysis without violating legal and ethical limits on access to personal data.

- One of the challenges with this kind of interdisciplinary research is that it's hard to achieve truly cutting-edge work in both disciplines. As one senior computer scientist noted, there's often asymmetry in collaborations/coauthorship, in which the principal role of the scholar in one discipline (sometimes a faculty member, sometimes a graduate student or postdoc) is to *inform* the other, rather than really advancing the ball in their own discipline. This is not necessarily a bug, but it's important to be realistic about expectations; in many cases, joint research endeavors end up being "on the side" projects for one of the partners. Given these challenges, it can be productive to start with policy papers and commentaries - they're not traditional scholarship, but they are useful, move the ball, and build bridges between scholars and departments that can mature into more meaningful research collaborations.
- Look beyond your department and university. A strategy for researchers who want to be engaged in CS and Law research but lack collaborators, community, or support within their university is to find partners in a university or center that has a commitment to this space, as well as a critical mass of affiliated faculty interested in interdisciplinary engagement. Organizations like Berkeley's Simons Institute, and the Alexander von Humboldt Center for Internet & Society in Berlin, offer opportunities to collaborate with other scholars through workshops, conferences, research projects, etc.
- Define the area of inquiry precisely, and start small. It can be difficult to develop and sustain collaborations at a broad level (such as "CS and Law"). Individuals and institutions who are interested in developing meaningful collaborations may want to think more precisely (e.g., "Privacy-Enabling-Technologies and Law," "Security and Law," "Bias and Law").

1.2: Institutional perspectives

All of our respondents agreed that universities and/or departments seeking to make inroads at the CS and Law intersection cannot do so without buy-in from the highest levels. From structural innovations like the creation of new programs, to successful interdisciplinary hiring, to the modification of tenure standards to accommodate scholars whose work bridges disciplines, real change requires enthusiasm and investment at the President and Provost level. To attract that high-level attention, it is essential for interested faculty to develop partnerships and to seek out allies across campus. There is power in finding committed allies with convergent interests, who can collaborate and shape proposals; but the leadership has to become interested for institutions to move forward.

Of course, implementation of these institutional goals requires more than bold vision in the central administration. As one respondent observed, "To really move the needle within an institution requires both prioritization from the leadership - a real sense that the project is important and deserves serious investment - and individuals who can execute that vision through leadership within the relevant units." These individuals may be existing faculty members who have been building support for these programs (e.g., Julie Cohen and Paul Ohm at Georgetown; Pam Samuelson, Diedre Mulligan, Rebecca Wexler, and Shafi Goldwasser at Berkeley; Stacey Dogan, Andy Sellars, Ran Canetti, Mayank Varia and Azer Bestavros at BU; Woody Hartzog and Alan Mislove at Northeastern; Christopher Yoo at Penn; Jason Hartline at Northwestern), or they may be hired to lead an interdisciplinary program (e.g., Phil Weiser at Colorado; Daniel Linna at Northwestern; James Grimmelman at Cornell; Jennifer Chayes at Berkeley). But execution requires committed institution-builders who have the respect of colleagues within their school or department and within their discipline.

1.2.1: STRUCTURAL INNOVATIONS

TAKEAWAYS:

- Appoint high-level academic leaders with the mandate of cultivating interdisciplinarity
- Create *new* departments, colleges, or programs that are explicitly interdisciplinary
- Create new faculty lines
- Consider joint hires that involve tenure eligibility in a home department and negotiated teaching or service obligations in a secondary department
- Cluster hiring can build community, teaching, and research as well as amplify the reputational impact of hires
- Tech law clinics produce some of the most innovative work in law and CS
- Supporting post-docs and graduate students adjacent to a law school can bridge disciplines and prepare them for interdisciplinary work

Respondents identified a number of structural changes that universities can make to foster and support research, teaching, and other collaboration at the CS and Law intersection. For these efforts to succeed - and for interdisciplinary research to be viewed as on par with traditional disciplinary work - university leadership must consistently communicate the value of this work and reward the work in visible ways.

- **Appointment of high-level academic leaders with the mandate of cultivating interdisciplinarity.** One respondent suggested the creation of a vice provost-level position focused on interdisciplinary research and teaching, to facilitate the creation of joint degrees (including JD/PhD), joint coursework, and research collaborations across the disciplines.
- **Creation of new programs/faculties.** In the past few years, a number of universities have created new departments, colleges, or programs with an explicit interdisciplinary focus that encompasses (or could encompass) CS and law.[3] These initiatives have research and teaching objectives, but many are designed, at least in part, to allow for the hiring and promotion of faculty whose work is innovative and important, but does not fit standard disciplinary expectations. As one respondent observed, "this kind of building from the ground up rather than integrating is ideal because it starts its own norms instead of fighting against old ones." This approach requires careful planning and messaging, because the substantive overlap between new faculty and existing ones creates a risk of redundancy, tension, and implicit hierarchy. Done well, however, it may prove the perfect vehicle to enable faculty to bridge disciplines throughout their academic careers.
- **Interdisciplinary Centers.** Several respondents emphasized the importance of interdisciplinary centers in elevating reputation, attracting funding, facilitating research, and enabling coordination between clusters of faculty with similar interests. When the creation of a center comes with one or more faculty lines, it provides an opportunity to recruit faculty members who have the interest and the skill set to support the university's interdisciplinary goals. At the CS and Law intersection in particular, at least one respondent noted the importance of having *both* unit-based Centers and

3 Cornell Tech; BU's Faculty of Computing and Data Sciences; Columbia's Data Science Institute; Carnegie Mellon's Public Policy department; MIT's Schwarzman College of Computing.

campus-wide Centers. One reason is that funding sensibilities and practices are different in the different disciplines. Also, law centers often have more explicitly advocacy or policy-focused orientations; the existence of a campus-wide initiative enables integration of the localized (specialized) initiatives into the broader one. Another respondent suggested that centers can be successful even when "built on a shoestring," by a group of passionate and like-minded individuals. In particular, they can harness and give identity to the individual efforts of faculty members who are active in this space, and can (as discussed below) foster community.

- **New faculty lines and cluster hires.** Another option, which promotes interdisciplinarity while preserving existing school/departmental structure, is to create new faculty lines that require appointment (and qualitative review by faculty) in multiple departments. At Georgetown, for example, the University President put out a call for proposals for joint lines; departments had to find partners and make joint proposals, with the new line(s) allocated to winning teams. The creation of new lines, of course, requires substantial financial investment by the university, but it can be a powerful mechanism for change, for several reasons. First, it can enable cross-pollination between the departments, because the jointly appointed faculty members bring ideas and relationships back and forth between their two homes. Second, and relatedly, these relationships can (at least in theory) lead to opportunities for research and teaching partnerships between the two schools/departments. And third, the substantial investment - particularly when communicated effectively (as described below) can send a powerful message about the central administration's commitment to this type of work (and to the cultural adjustments necessary to support it).

    - **Full joint appointments** involve tenure (for post-tenure lateral hires) or tenure eligibility (for entry-level or junior positions) in both departments. For reasons discussed above, tenure-track hires that bridge CS and Law departments are highly unusual. Particularly in the foundational years of a scholar's career, given current disciplinary expectations, it's challenging to meet the standards for tenure, independently, in each department. Northwestern has devised a "dual tenure" system, discussed below, that partially addresses this concern, though it still requires candidates to meet traditional tenure standards in their home department.

    - **Secondary appointments.** The more common form of joint hire involves tenure (or tenure eligibility) in a home department, with negotiated teaching and service obligations in a secondary department.

    - **Cluster hires.** A growing trend among major research universities is "cluster hiring" - the recruitment of faculty across multiple departments, but with a set of related, interdisciplinary research interests. These hires often - but not always - involve joint appointments. Cluster hiring can be an effective mechanism for building community, teaching, and research across departments and disciplines. It can also amplify the reputational impact of hires. Cluster hiring offers a promising option for universities interested in building strength in the CS and Law space, given the breadth of disciplines whose work bears upon technology policy - including (among others) business, philosophy, communications, and public health.

    - **Non-tenure-track positions.** Another alternative is to increase the use of non-tenure/tenure-track positions - such as Lecturer, Research Professor, Professor of the Practice, etc - for people who teach and write across disciplines. Given the hierarchy of existing faculty culture, there's a legitimate concern that faculty in these positions can suffer second-class-citizen treatment. Overcoming those cultural challenges is a long-term project. Over time, however, this diversification can help break down barriers, not only between academic departments, but between the academy and the "real world" of government, industry, and other non-profit sectors.

- **Establish clinical programs.** Some of the most innovative work in CS and Law comes from faculty who teach in technology law clinics. Some of these programs are also explicitly designed to forge relationships across university departments and schools. BU's Technology Law Clinic, for example, which provides free legal advice to student-innovators at both BU and MIT, has provided a platform for policy and research collaborations between law and CS faculty and students on both campuses.
- **Support cross-disciplinary post-docs and graduate students.** Developing a culture of post-docs and graduate students as adjacent to, or part of, a law school can help to bridge disciplines and to prepare young scholars for faculty positions that involve interdisciplinary work. Post-docs are often eager to branch out beyond their own work and be exposed to other methods and epistemologies; bringing them from CS to law, or from Infoscience to law, for example, can grow the connections. Fit is important; post-docs hired with a broadly defined focus (e.g., CS and Law) may struggle to find the right niche and mentors. But a number of law faculty, such as Stanford's Mark Lemley, have successfully and repeatedly hired post-docs in the CS and Law space. It's important to clearly define the project(s) and the respective roles of the post-doc and other members of the research team.

1.2.2: MAKING JOINT HIRES: STRATEGIES AND CHALLENGES

TAKEAWAYS:

- Leadership must communicate to their faculty the value and process of joint hires
- Establish expectations across units before the hiring search
- Ensure both departments have input on the hiring committee
- Negotiations and the offer letter should directly address the workload split
- Both units should commit to provide support for the hire and predetermine who will pay for it
- Clearly lay out tenure expectations to hires
- Even if courtesy hires do not include formal obligations to the secondary department, wants and expectations should be discussed
- Both fields should broaden their conception of what 'counts' as research, and that shift needs to affect the standards for appointments and tenure

The process of making a real joint hire - one in which the faculty member is expected to contribute meaningfully to both departments - requires careful planning and clear communication. The principal challenge, which comes up in one conversation after another, is the issue of research and tenure expectations, particularly for tenure-track candidates. Without directly addressing (and changing) tenure expectations, interdisciplinary researchers can find themselves in an impossible position. For candidates hired into a home department, colleagues in that department expect them to meet the traditional tenure expectations for that department, and view work in other disciplines as sur-

plusage - valuable, but not relevant to whether they satisfy the standard for tenure. Junior candidates with two home departments experience the same problem in *both* departments; without any clear guidance on how to evaluate them for tenure, both departments are left with their ordinary tenure standards -- which rarely "count" work whose value bridges disciplines.

Here again, to overcome these obstacles to an interdisciplinary hire, it is critical to have both enthusiastic support and formalized commitment from the highest levels of the University. Before a hiring process begins, it's essential to have clarity about - and documentation of - the University's expectations for a particular line; and the negotiation process with individual candidates must address very specific questions about both substantive expectations and process.

- **Leadership must communicate to faculty why joint hires are important, and how they work.** One respondent urged that, if the university leadership expects faculty members to embrace colleagues with an interdisciplinary focus and commitments to other departments, it's critical for the Provost and/or President to discuss these hires and their strategic importance directly with the faculty before the process begins. "An ideal situation" involves the Provost explaining, "both in writing and in person, to the relevant departments/schools that this is what we mean when we have a person in two departments." The Provost should be establishing expectations, and working with the two units to develop clear standards and processes for tenure and promotion. It's also critical for leadership to send a message that "this is a matter of community values. I expect this person not to be treated like a second class citizen," even if they are not carrying a full-time teaching or service load in the particular school. Such provostial direction can come with a carrot or a stick. The promise of new lines for interdisciplinary hiring is the most obvious incentive; disincentives could consist of revoking hiring privileges or imposing other repercussions if expectations of full "citizenship" are not maintained.

- **Establish expectations between units before any search.** Before the search begins, the two schools/departments should discuss - and reach tentative agreement on - the essential terms of the joint hire, including the acceptable range of credentials, methodologies, and research agendas; tenure home(s) (if any); the split of teaching and service obligations to each department; and the process for tenure and promotion, including the extent of the secondary department's participation. Some of these terms may be flexible, depending on which candidates emerge. A joint CS and Law hire, for example, could yield a legal expert with a focus on technology policy, or a computer scientist focused on tech solutions to regulatory challenges; their appropriate tenure homes and teaching loads would likely differ. But the partner units should have a shared understanding of the range of options, as well as a process for reaching consensus on the open terms.
    - Cluster hiring and norms alignment. A number of respondents mentioned cluster hiring as ideal, because it builds communities and ramps up norm alignment faster. This helps with communication between departments/schools and with culture.

- **Hiring committee.** Respondents agreed on the need to have input from both departments in any hiring. For joint hires with tenure homes in both departments, most respondents agree that hiring committees should have equal representation from both departments. For secondary appointments involving departmental obligations (i.e., something other than a pure courtesy hire), most respondents view it as important to have both departments involved in the search to some extent. Some schools include representatives on the committee; others solicit input on CVs and invite faculty members from the other department to participate in the interview process. At Northwestern, no joint committees are established; applicants interested in CS+X hire must submit applications to both departments who run generally separate processes, with some coordination. The intention is to allow either department to hire even if the other is uninterested. If both departments are interested, the candidate splits their visit between the two departments.

- **Negotiations and offer letters.**
  - General.
    - **Workload split.** The negotiations should directly address - and the offer letter should spell out - what percentage of teaching and service obligations the faculty member owes to each department. Northwestern and Northeastern, for example, both of which make frequent joint hires, complete pre-negotiation on the teaching split (⅓ / ⅔ is most common); service obligations tend to be with the principal department. The primary department also drives the tenure process, although the faculty in the secondary department also votes on tenure (see below).
    - Because interdisciplinary research is inherently collaborative, the units should determine what types of support will enable the candidate's research agenda, and should commit to provide that help and indicate who will pay for it. According to multiple respondents, building the expectation of post-docs, PhD students, and other teaching and research assistants into the hiring process (and tenure track process) is critical.
  - Tenured hires. Tenured hires are, in many ways, more straightforward than tenure-track joint hires; not surprisingly, most senior scholars agreed that cross-disciplinary hiring is more likely to succeed at the associate or full-professor level rather than tenure-track or entry level. Most joint hires with tenure involve tenure in a home department; the critical points of negotiation involve teaching and service loads. For an elite group of senior researchers (such as Matt Blaze at Georgetown), it's possible to make a joint hire with tenure in both departments. Even in these cases, the faculty member usually has a principal field. Tenure letter requests to experts in the secondary field should assure the reviewer that the candidate is also being reviewed in her primary field.[4]
  - Tenure-track hires. Many respondents suggested that for tenure-track hires, individual negotiations with candidates - and offer letters - should lay out clearly the tenure expectations, including field(s) of research and requirements of quantity and type of publication for each field. The negotiations and letter should also address the nature of the external reviewer pool (number and type of reviewer) and the tenure committee. (See below.) Most entry-level hires would likely benefit from having a single tenure home, rather than having to meet the tenure standards of two departments. Some schools - most notably Northwestern - allow faculty the flexibility to change their tenure home before their pre-tenure (third-year) review.
  - Courtesy hires. While courtesy hires typically do not involve any formal obligations to the secondary department, it is good practice to discuss with candidates what they want and expect from the department, and vice versa. In some universities, faculty with affiliate status in a second department can count their teaching in that department as part of their overall teaching load. It can also confer privileges such as participation in faculty workshops and access to Westlaw/Lexis and other licensed technologies and research tools.
- **Other challenges/risks**
  - Narrow, conventional measure of research quality. Conventional law departments and CS departments have conventional expectations about what research in their discipline looks like, and what expertise is required to teach their students. Many law schools do not hire faculty members

4 See Appendix 3 for a sample solicitation for tenure review.

without a JD; the rare faculty member without a JD tends to have a PhD in Economics, History, or Philosophy. As a result, candidates steeped in technology policy but coming from CS, data science, or information school backgrounds have little chance of landing a primary appointment in a law school. Even when these candidates complement the school's substantive strategic objectives, law schools only want a piece of them, because they are not seen as fulfilling core teaching needs. Secondary appointments provide an option, if the candidate is well suited for a principal appointment in a different department; but to make substantial progress toward supporting interdisciplinary scholarship, both of these fields need to broaden their conception of what counts as research, and that shift needs to penetrate the standards for appointments.

- **Titles.** Several interviewees described inconsistencies in institutional titles and promotion policies as a significant problem. Many law schools, for example, hire entry-level candidates as associate professors, with promotion to full professor occurring simultaneously with tenure. In most other departments, faculty members begin as assistant professor, are promoted to associate professor upon receiving tenure, and apply for full professor several years later. As one respondent lamented, "if you want people to truly serve both schools, these titles matter."

1.2.3: TENURE AND PROMOTION: PROCESS, STANDARDS AND EXPECTATIONS

TAKEAWAYS:

- Seek departmental buy-in for modifications to conventional tenure expectations for interdisciplinary hires
- Do not require or expect grant development but still recognize its value

With the increase in interdisciplinary hiring, more universities are formalizing the tenure and promotion process for jointly appointed faculty. Northeastern, for example, revised its tenure procedures specifically to address jointly appointed faculty.[5] The process is largely driven by the primary department, but with heavy involvement by any secondary department: a faculty member from the secondary department sits on the candidate's tenure committee, and the department chair (and/or dean) provides written input to the candidate's tenure dossier. At Northwestern, joint hires go up for tenure in both departments, but in a single process. The home department drives the tenure process, forming the committee, getting letters, etc. Sometimes the committee will ask the other department for potential letter writers, but building the list is largely up to the committee. Once the tenure packet is assembled, it gets reviewed and voted on by the non-home faculty first. If the non-home faculty denies, then the home department must choose whether to grant the person tenure as a 100% appointment. Because the tenure committee is housed in the home department, the incentives are clear: candidates should focus on the publishing culture of the home department. There isn't any upfront negotiation or discussion about what counts as a publication or how a CV will be evaluated --- it's up to the committee. When the committee sends the packet to the non-home department, however, they may provide some context about the publishing culture in the home department.

5 https://faculty.northeastern.edu/handbook/appointments-promotion-and-tenure/tenure-and-promotion-of-jointly-appointed-faculty/

While these innovations may standardize the *procedure* for tenure and promotion of joint hires, differences in the *substantive standards* and disciplinary norms between law and CS mean that scholars often postpone their most fulfilling interdisciplinary projects, or complete them on top of their other work. Universities hoping to bridge that gap, and to enable scholars to engage in meaningful interdisciplinary research throughout their pre-tenure years, will need to achieve departmental buy-in (and faculty consensus) on modifications to conventional tenure expectations for interdisciplinary hires.

- **Publication quality and expectations: law reviews vs peer review/conference proceedings.** Among legal scholars, student-edited law reviews from top-ranked schools are the most coveted and prestigious placements for their work. CS, in contrast (along with every other scholarly field apart from the US legal academy), values peer-reviewed journal articles and conference proceedings. One respondent described the lack of widespread peer review in legal scholarship as detrimental to the field of law and policy, and one of the things that makes other departments resist joint hiring with law. The law reviews don't look like good scholarship in CS or information science -- "they look like a hack job." Peer review could go a long way to help with joint appointments and promotion once hired. Learning how to engage with peer review panels is critical to success in fields other than law; legal scholars would benefit from developing this skill. Law schools could address this problem by committing, in appointment letters for interdisciplinary candidates, to count legal and policy-related publications in peer reviewed journals toward tenure. Normalizing peer review early in the tenure process and expecting it is important for the joint hire to succeed.
    - Relatedly, one respondent noted the different norms - in terms of format, length, and co-authoring traditions - between legal and CS publications. CS involves many short papers with student co-authors, while law typically involves long, single-authored papers. When anticipated early and incorporated into the tenure plan, these differences can be addressed; but they require attention from the beginning.
    - In CS, on the other hand, it is virtually impossible to get tenure based on qualitative or less-technical works. It is theoretically possible to do CS scholarship on topics like "history of computing" or "CS education," but such work supports tenure only rarely, and not in top departments. These standards in traditional CS departments are not likely to change. As one leading CS scholar opined, CS departments "should not tenure based on shallow 'non-technical' contributions, even if they may have significant impact."
- **Grants and impact.** Some respondents bemoaned the fact that grants and lab research do not formally count in tenure and promotion in law schools. Of course, the business models of law schools and CS departments are different; the salaries of law faculty members have historically been almost exclusively tuition-supported, whereas CS faculty are expected to raise grants to support their research and graduate students. A move toward the CS model — with its *expectation* of active grant-seeking — would put pressure on law faculty to raise grants, and could distort the nature of legal scholarship in undesirable ways. On the other hand, a middle ground - in which law schools do not require or expect grant development, but recognize its value for interdisciplinary faculty members who engage in it - would make a big difference in supporting this kind of work. A number of respondents indicated that their most substantial and impactful research contributions were published in nontraditional (for law) publications, and thus receive little weight toward tenure. Again, this mismatch could be overcome by including grants and impact as relevant tenure considerations in hiring agreements.
- **Service requirements and administrative overloads** were complained of by virtually all interviewees. One described teaching across departments as "an administrative nightmare; this should be made easier." "Being on double the amount of committees," moreover, "was inhuman." Here, too, clear communication — and setting expectations realistically and early — may at least partially address the concern.

1.2.4: CREATING AN INTERDISCIPLINARY COMMUNITY

TAKEAWAYS:

- Ensure a critical mass of faculty members in both departments interested in tech policy
- Develop new publication options accepted in both fields
- Create a pool of experts on both sides of the Law/CS divide who can serve as scholarship reviewers and provide input to lateral appointment and tenure
- Urge funding agencies to consider more joint projects

The existence of an interdisciplinary Law/CS community within a university can serve a number of interrelated goals: it fosters relationships that can generate research and teaching partnerships; it creates the opportunity for discussion groups and speaker series that expose students and colleagues to the interdisciplinary conversation; and it elevates the importance of tech policy issues on campus. *When the conditions are right*, it is possible to achieve these goals with fairly small but targeted investments.

- **Interested faculty.** The most important condition is a critical mass of faculty members in both departments who are interested in tech policy issues.
- **Other factors.** Beyond a critical mass of engaged scholars, other conditions are more idiosyncratic:
    - Relative parity in reputation/strength of departments. Collaboration across Law and CS seems to work better when the two departments are comparable, in terms of program reputation and strength of faculty and students. Particularly at the most elite universities, respondents reported that a perceived difference in stature can lead to a lack of interest, among the higher-ranked faculty, in engagement with colleagues in the other department.
    - Geographic proximity. Roundtables and small-group meetings, which can generate exciting research and teaching ideas, are easier when the two faculties are geographically close to one another. At BU, for example, the School of Law building is a 5-minute walk from the offices of the CS and CDS faculties. Of course, now that so much of our work has moved to Zoom, these geographic factors may play a less significant role.

The following strategies have helped to facilitate CS and Law communities:

- **Roundtables and speaker series.**
    - At Boston University, several years ago, the Provost's office provided seed money to support a series of lunch meetings of interested faculty from Law and CS. The meetings began with roundtable introductory sessions, in which faculty from each department introduced themselves and offered high-level introductions to their research and teaching interests. The second phase involved the same participants, but more formal (albeit accessible) presentations of particular research. After several months of these roundtable discussions, a robust internal community had developed, and the leaders of the initiative began to invite outside speakers to present to the community. This speaker series — the "Cyber Alliance" speaker series — now includes Law, CS, and the Questrom School of Business, and regularly attracts an audience of faculty, post-docs, and graduate and undergraduate students from all three departments. Speakers switch off between CS scholars interested in policy, and legal/business researchers exploring issues raised by technology.
    - The Haifa Center for Cyber Law and Policy in Tel Aviv also has a weekly workshop/speaker series that is very popular and effective at building community. To generate interest and attendance, Niva Elkin-Koren recommends good food and *individual* outreach to people within the university who might have an interest. "The regular process of gathering together, sharing ideas, etc., has generated joint research, relationships, and courses."

- **Mini-grants for grad students and post-docs.** Haifa's CCLP offers mini-fellowships/grants to graduate students to support research projects related to technology policy. As part of the grant requirements, students must regularly attend the weekly speaker series. These grants thus have a dual impact: they generate relevant research, and they help to fortify the law/CS community.

- **Faculty research grants.** Several respondents noted that their universities had generated both research, teaching, and community by offering grant opportunities to interdisciplinary faculty teams interested in building courses or research projects. In some cases, this seed funding generated projects that led to NSF or other external grants.

- **Mini-retreats.** Off-campus mini-retreats offer another opportunity to engage substantively and personally. In 2019, several faculty members from BU's Law and CS departments held a 36-hour off-site retreat to share their research and to discuss potential collaborations. Attendees used their individual faculty research funds to pay room and board, making it a low-cost way to broaden and deepen interdisciplinary connections.

- **Anchoring conferences.** Anchoring conferences (such as We Robot, the ACM FAT* Conference, Privacy Law Scholars Conference, and Symposium on CS and Law, and others) that bring the communities together have been key to some successes and in building the fields. Having institutions support these conferences might be a way forward.

- **Cross-departmental sabbatical.** Faculty members seeking to deepen their research and teaching engagement with colleagues in the other discipline may want to consider doing a "sabbatical swap" or spending a sabbatical or research leave resident in the other department.

1.3: The Discipline

Finally, respondents offered reflections on how leaders in the two disciplines can foster the development of Law/CS as a joint discipline.

- **Publication outlets:** Given the centrality of publishing to the tenure and hiring processes, one of the most critical goals is to develop publication options that are accepted in both fields. Outside of law schools, many academic units do not recognize law reviews, given the nearly universal lack of peer review. The creation/support/recognition of peer reviewed interdisciplinary publications (such as Artificial Intelligence and Law), and acceptance of those publications in law schools, would go a long way toward encouraging researchers to engage in interdisciplinary work. For more on CS versus legal publishing, see this entry in Steve Bellovin's blog.

- **Convenings.** Several respondents suggested that the community in general (not in any given institution) should earmark venues on both sides of the CS and Law scholarship spectrum – venues that are seen as "welcoming" of work in the field informed by the other. For CS, new venues – e.g., "Foundations of Responsible Computing" are forming. We need more.

- **Tenure reviewers.** It is essential to develop a pool of experts on both sides of the Law-Tech divide to serve as scholarship reviewers, at the time of lateral appointment and tenure.

- **Nudging funding agencies.** In CS, grants are critical for both junior and senior scholars. Yet the funding agencies rarely support this kind of interdisciplinary research. As a long-term effort, leaders in the field - and government relations groups within universities - should urge funding agencies to consider more joint projects. Given the recent interest in such issues as election security, platform regulation, and encryption backdoors suggest that the government may well take an increased interest in this space over time. Private foundations, too - such as Hewlett, Knight, New America, and others - are investing in joint research.

2: Teaching and Pedagogy

This Part surveys courses that bring together Computer Science and Law being offered by Universities around the United States and the world. We hope to offer a snapshot in time of this interdisciplinary activity, and we hope to provide models, advice, and inspiration for educators who want to bring courses like these, or improvements on them, to their own institutions.

2.1: Surveying the Landscape: Methodology

TAKEAWAYS:

- The entity housing a course dictates important constraints on the nature and substance of the course
- Consider interdisciplinary graduate degree programs in CS and Law housed within a law school
- Classes can benefit from diverse enrollment, with students from both law and CS
- Consider the benefits and drawbacks of importing skills or concepts relatively intact from an outside discipline instead of melding disciplines together

We begin by surveying several representative courses that fit under the broad umbrella of "Law and Computer Science."

Even as the fields of Law and Computer Science have increasingly come to intersect in society, the economy, and culture, both Legal education and Computer Science education, to a great extent, continue to operate as silos within the academy. While this is partially due to structural differences (for example, law in the US is a graduate program while most CS education is undergraduate), institutional incentives continue to push away from interdisciplinary teaching. Even in the face of such barriers, many academics, solo or in concert with their peers across campus, have managed to build and run courses that straddle the CS and Law divide, offering successful educational models for cross-disciplinary offerings.

To get a better feel for the courses that are being offered, we asked the fifty-five experts who had been invited to the April workshop to submit course syllabi that brought together Law and Computer Science. The submitted syllabi include courses from institutions such as Georgetown University, Boston University, University of Colorado - Boulder, Cornell University and UC Berkeley. These courses are offered in law schools, CS departments, or in other data or information sciences schools or departments. Several courses are joint classes, accepting students from both schools and departments.

We supplemented this collection of syllabi by searching for additional offerings on the web. We by no means claim to have conducted a comprehensive survey, and we are certain we missed many courses at the CS-Law intersection. Our aim was to identify and comment upon broad trends at this intersection, as opposed to making authoritative claims about the number of courses being offered or characteristics of the institutions that have adopted such courses.

We started with the simple search terms "Law","Computer Science," and "course" and/or "class" discovering several additional syllabi that covered these topics.[6] As both fields can be broadly interpreted, we used more specific search terms to find additional courses. For courses in computer science departments, we found that words that elicited syllabi in addition to "law" included "ethics" and "privacy," which when added generated applicable course offerings such as Harvard University's course "CS 108: Intelligent Systems: Design and Ethical Challenges."[7] Likewise, in law schools, specific terms related to law and technology, such as "intellectual property" drew relevant results, e.g. NYU Law's course "Law of the Startup Seminar"[8] or University of Pennsylvania's "Detkin Intellectual Property and Technology Legal Clinic."[9]

By supplementing the syllabi we obtained from our experts with those found via search, we diversified our pool of syllabi, for example leading us to a course offered outside the United States (Law and Computer Science at Oxford University) as well as to a professional education course (Computer Science for Lawyers at Harvard Law School - Executive Education). We are sure we missed plenty of courses through this search process--both Computer Science and Law are broad issue areas with myriad intersections--but we feel we found enough to allow us to identify some broad trends.

We start by simply mapping these courses across a few descriptive dimensions that seem to be important distinguishing characteristics. We have identified three: in which department or school is the course offered? Is the course open to students from one department or more than one? Does the course appear to import concepts from the other field or does it integrate the two?

2.1.1: WHICH DEPARTMENT OR SCHOOL?

The most obvious distinction across these courses is where they are offered: a Law School, Computer Science Department, or Interdisciplinary School or Department, such as a School of Information. This is an important dimension, because the entity housing a course dictates some of the most important constraints on the nature and substance of a course.

For example, Law School courses take place in a background of the norms and traditions of legal education, while CS courses adopt a very different set of norms. To name only a few: Law School courses tend to be assessed with a single summative assessment in the form of a final exam, while CS courses tend to focus on continuous formative assessments, often in the form of graded problem sets. Law School courses tend to assign detailed reading while Computer Science courses do not. Law School courses often involve discussion and debate, while CS courses tend more toward lecture. Law School courses emphasize ambiguity while CS courses focus more on provably true or false propositions. Law School tends to emphasize experiential learning courses such as clinics, practica, and externships, while CS departments offer fewer experiential opportunities.

Courses housed in interdisciplinary schools are much more difficult to characterize, because each such school is a product of the departments, colleges, and universities in which they were formed. At the risk of overgeneralization, however, most interdisciplinary schools with one foot in technology tend to originate from CS departments and Engineering schools, and their norms and traditions seem closer to those disciplines than law or the humanities.

A more recent development is the creation of interdisciplinary graduate degree programs in Computer Science

6 see Appendix 1: CS and Law Syllabus Database.

7 see CS 108: Intelligent Systems: Design and Ethical Challenges

8 see The Law of the Startup Seminar.

9 see Detkin Intellectual Property and Technology Legal Clinic.

and law, typically housed in law schools. For example, the Georgetown University Law Center recently launched two degree programs: An LL.M in Technology Law and Policy, offered to international and U.S. students possessing a law degree and a Masters of Law and Technology (MLT), offered to international and U.S. graduate students who do not possess a law degree. Other examples include American University's Master of Legal Studies in Technology;[10] Cardozo School of Law's online Masters in Data and Privacy Law;[11] Drexel University's Master of Studies in Law in Cybersecurity & Information Privacy Compliance;[12] (similar to Cybersecurity programs at Albany,[13] Cleveland State[14] and Roger Williams[15]); and George Washington University's Master of Studies in Intellectual Property.[16]

As programs like these proliferate, we anticipate they will increase the demand for courses at the interaction of Law and CS. Because these programs tend to be housed in law schools, we expect these new courses to share more in common with law school classes rather than CS departments.

2.1.2: STUDENT MAKE-UP

A second dimension that distinguishes these classes is the make-up of the enrolled students. Typically, students hail from only the school or department housing the class, with law students taking classes in law schools and CS students taking CS classes.

Less often, classes attract students from both disciplines, building intentional bridges across campus on the theory that students will learn more in a class with diverse classmates. These cross-listed or hybrid courses can be further divided by whether they assign the same material, assessments, and expectations to all students regardless of their home discipline, or instead assign different roles based on degree type. Examples of the former, joint courses where all students are situated similarly with collective learning objectives, include the Law and Computer Science at Oxford,[17] Internet Law, Privacy, and Security at Cornell Tech, and Law for Algorithms, a course taught jointly by Law and CS faculty from Boston University and Berkeley.[18]

One example of the latter, having students assigned to separate disciplinary tracks--is the Privacy Legislation Practicum, a partnership between Georgetown Law and MIT. Law students and undergraduate and graduate MIT students attend seminar lectures on emerging issues of technology and the law. The law students act as budding attorneys and the CS students as technical experts. The students are divided into teams to draft a bill, craft a legislative proposal, and a white paper. The course challenges all students to consider how technology and the law informs their respective disciplines. The Technology Law Clinic at BU and MIT also engages law and CS students according to their expertise, but in the context of an attorney-client relationship. The clinic, which serves student-clients at both MIT and BU, offers an opportunity for BU Law students to advise CS students on legal issues related to their research and innovation-related activities. The Technology Law and Policy Clinic at University of Colorado-Boulder and Legal Analytics II at Georgia State are additional examples in which course objectives are different for law students and technology students.

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10 https://onlinelaw.wcl.american.edu/legal-studies/curriculum/technology-concentration/.

11 https://onlinelegalstudies.cardozo.yu.edu/masters-in-legal-studies-data-privacy-online/.

12 https://drexel.edu/law/academics/masters-certificate-programs/mls/concentrations/cybersecurity-and-information-privacy-compliance/.

13 https://graduate.albanylaw.edu/masters-of-law/online/cybersecurity-and-data-privacy.

14 https://www.law.csuohio.edu/academics/mls/cybersecurity_track.

15 https://law.rwu.edu/academics/msl-program/cybersecurity-law.

16 Id.

17 See https://www.cs.ox.ac.uk/teaching/courses/2019-2020/LawandCS/. Note that Oxford has the benefit that both Law and Computer Science are primarily undergraduate programs in the UK.

18 See https://drive.google.com/file/d/1XgrABakNWN-k4j6rTI8PIIDLF8BDuGji/view.

2.1.3: IMPORT/EXPORT VERSUS INTEGRATION

A third dimension with which to distinguish courses is the extent to which they attempt to import skills or concepts relatively intact from another, outsider discipline as opposed to instead melding the disciplines together. One test for measuring this dimension is to ask whether the pedagogical approach of a course mimics courses seen in the other discipline.

For example, some courses attempt to teach technical skills to law school students, sometimes modeled on other, more established courses that teach accounting to future tax lawyers or business skills to future corporate lawyers. One example is Computer Programming for Lawyers at Georgetown Law, a course that tries to teach law students programming skills and concepts such as web scraping, APIs, data structures, and regular expressions. Additionally, it may follow that courses provide technical background to those who might practice in tech-related areas (e.g., The Law of the Startup Seminar at NYU)[19] or teach the application of technology to other areas of the law (e.g., Big data for lawyers at Miami).[20]

Similarly, in Computer Science departments, some courses teach legal doctrine to CS students. Steve Bellovin's course at Columbia University "Computers and Society" discusses privacy, ethical issues for practitioners, and national security. Course assignments include short essays on legal topics such as intellectual property and free speech. The course operates in both substance and style much like a traditional law school class. Additional examples of CS courses that borrow from law school pedagogy include: "Law of Computer Technology" at Carnegie Mellon University[21] or Computer Science for Public Policy and Law at Princeton. A recent textbook focuses on teaching law to computer scientists.[22]

We do not mean to suggest that this approach is too narrow or insufficiently ambitious. Students must learn to walk before they can run, and there is value in introducing students to a skillset from the other discipline, taught in a relatively unadulterated way. For one thing, it might be easier to convince a home department to add a course that borrows approaches that have been road tested in another discipline, rather than pursue something integrated. In addition, focusing on the skills or concepts of a single discipline might allow students to delve more deeply into the material; a course that tries to bring in both law and CS in near equal measure risks being more watered down.

To be clear, the mere act of importation changes a course. The Georgetown Law course places computer programming in the context of legal practice; problem sets are styled as "memos from the Partner" and students focus more on text manipulation and less on math and statistics than in a typical CS class. Likewise, the Columbia University course explores history and legal concepts in the context of Computer Science, focusing on the legal and policy implications.

Classes that are more integrated are often built around a theme, such as privacy or criminal justice.

19 See http://its.law.nyu.edu/courses/description.cfm?id=25356

20 See https://lawapps2.law.miami.edu/clink/course.aspx?cof_id=2409

21 See http://euro.ecom.cmu.edu/program/law/08-732/

22 Mireille Hildebrandt, Law for Computer Scientists, https://lawforcomputerscientists.pubpub.org/.

2.2: Learning Outcomes

TAKEAWAYS:

- Consider courses that provide basic interdisciplinary knowledge transfer, teaching law students a bit of computer science and computer science students a bit of law
- Consider enrolling every law student in a "demystifying technology" course
- Emphasize the development of skills as well as substantive knowledge
- Consider courses that teach lessons from the other discipline, such as legal ethics into a computer science curriculum
- Consider "extradisciplinary" courses that break out of traditional legal or CS thinking to find new solutions and approaches

American Legal Education and CS education have both focused in recent years on stating explicit "learning outcomes" for each course. For example, as a condition of American Bar Association accreditation, law schools must go so far as to require professors to recite learning outcomes in course syllabi. This shifts the focus from what to why we are teaching the subjects and skills we are teaching. What are the learning outcomes we have identified from the early forays into legal education we have surveyed above?

We ask this question of Law and CS courses: what are the learning outcomes for these courses? This lets us delve a bit more deeply into these courses than the descriptive mapping of Part I. Unlike Part I, this is a bit more of an exercise in interpretation, because many professors do not list learning outcomes explicitly in their syllabi. We have identified at least four possible learning outcomes we glean in these syllabi: basic interdisciplinary knowledge transfer; skills training; integrating the lessons of one field into the other; and what we are calling, "reinventing the future." Let us consider each in turn.

2.2.1: BASIC INTERDISCIPLINARY KNOWLEDGE TRANSFER

Some of the courses we reviewed focus on basic, baseline knowledge transfer across disciplines, teaching law students a little bit of Computer Science, or teaching Computer Science students a little bit of law.

Some law school subjects seem especially well suited to courses that emphasize straight knowledge transfer from CS. Consider the following possibilities:

- **Criminal practice:** As law enforcement agencies make investigation decisions based on link analysis and techniques such as geofencing, prosecutors and defenders alike will need to understand the process of investigation, the procedural and substantive assumptions built into the decision model in order to ensure the integrity of the justice system.
- **Evidence:** As people conduct more of their lives on computers, and as our environment becomes surrounded by sensors, lawyers must be able to understand where evidence resides, how to collect it, and how to make sense of it.
- **Environmental practice:** As governments release large, open datasets of climate information, lawyers practicing in this field will have to understand graduate-level statistical techniques, and be able to collect, manipulate, and make sense of datasets.
- **Professional responsibility:** Even the largest, most prestigious law firms have suffered from client confidentiality breaches because of a lack of facility with information technology. All lawyers must hold their clients' secrets carefully, and in the 21st century, this duty includes an understanding of technical mechanisms to safeguard data confidentiality and integrity.

More broadly, perhaps every law student should enroll in a "demystifying technology" course. This course should provide them with the elements necessary to produce current day systems. This includes:

- how software is produced: development methods, programming languages, some understanding of a technical stack, licensing models (legal and economic).
- how and where data is gathered, stored, and processed.
- how services are designed: networking, server-client models, cloud infrastructures, mobile systems (and their alternatives)
- cross-cutting issues: security, privacy, as well as quick touch on social, environmental, economic, and organizational impact of today's systems.
- technology futures: a dip into some of the forthcoming developments in the industry to prepare them for technologies that might upset existing assumptions about our legal and social relationships and responsibilities.

Any efforts should address the fact that technology has a certain valence and is likely to attract people already comfortable with dominant technological paradigms. Hence, the suggestion to call it "demystifying" technology, rather than a technology course. To ensure a more equitable tech future, it is pertinent that all of these efforts are designed to not only attract mostly white male students but are designed and promoted in a way so that they can become an accessible resource especially to women, minorities, and people with disabilities.

Similarly, some classes teach computer science students basic legal principles they might need to understand as practicing industry participants. For example, programmers building web scrapers may need to understand contract law as well as federal and state laws such as the Computer Fraud and Abuse Act and the Digital Millennium Copyright Act. Computer science students destined for careers in the technology industry might benefit from courses on the basics of intellectual property, civil rights, or antitrust law.

2.2.2: SKILLS TRAINING

Other courses emphasize the development of skills rather than substantive knowledge. A key example is Georgetown's Computer Programming for Lawyers course. Professor Ohm describes the goal of the course as teaching Python to budding lawyers in order to make them a tiny bit more efficient at being a lawyer. For example, he focuses for three weeks teaching future lawyers how to unlock data available as HTML-formatted tables on websites (using web scraping tools and API calls), believing that some day, some of these students will use this technique in their legal practice.

Skills training can run the other direction. Law schools are full of courses that emphasize the skills a lawyer needs to practice, from the mandatory first-year legal writing and research course that all law students take, to deeper dives in upper-class clinics. Some classes designed for computer scientists teach technical students how to read a case or a statute or how to conduct legal research. Other courses might delve into slightly more abstract skills such as how to craft a legal argument or take part in a negotiation.

2.2.3: INTEGRATING THE LESSONS OF ONE FIELD INTO THE OTHER

Other courses seem built on the idea that one field has much to learn from the other. These are attempts to make the law better by learning from Computer Science or the other way around. A prominent example are efforts to inject ethics into the Computer Science curriculum, such as by accreditation organizations like ABET. Proponents believe that some of what ails the technology industry (or society writ large) can be cured if we taught our budding technologists to be more ethical, and they may import ethical training from law. (To be clear, these efforts more often import from ethics as it is taught in undergraduate philosophy courses rather than in legal ethics courses.)

The theory sometimes runs the other way. A key example are courses that teach Cryptography to lawyers on the theory that there is something important to be learned about confidentiality, privacy, power, and surveillance by introducing law students to these concepts.

Another example would be courses that help the next generation of law students to understand how to practice law in a world that is powered by a few tech giants. If the past 10 years provide some evidence, this will be a world in which the tech industry's practices of "disruption" and "institutional unbundling" may be accelerated. It would be very helpful for these students to have a basic understanding of the dominant architectures, design approaches, market designs including funding models of tech companies. Such an understanding will help these students to grasp and respond to the ways in which technology companies have been reconfiguring organizations, with also an understanding of how this is impacting legal institutions. This will also prepare them to critique or maybe oppose injustice.

2.2.4: REINVENTING THE FUTURE

Finally, some courses are premised on the idea that neither Law nor Computer Science are up to the challenges to governance, democracy, speech, or the rule of law that have arisen over the past decade. These classes try to reframe problems in search of new solutions and approaches. Many of these classes are expressly extradisciplinary more than interdisciplinary, encouraging Law students to look for Computer Science as a way to break out of traditional legal thinking (and vice versa) but hoping that once liberated, these students will look for answers beyond either CS or Law. Owing to this "extradisciplinary turn," many of these classes import lessons from a third field, say sociology or STS or philosophy or history.

It would be valuable for law students to understand the way that they and their profession is being reconfigured through technology, they way they are always already implicated in the technologies they use, and their field is already very different from what it used to be before the rise of computing in almost all domains of life. For example, technology may be reconfiguring law through:

1. tools that are used in the making of law, e.g., digital repositories or increasing use of NLP to organize, search, and interpret sources;

2. the metricization and therewith the technocratization of legal practice, e.g., through the increasing use of datasets and analytics;

3. to the enforcement of law, e.g., anywhere from the use of license plate readers to predictive policing. At the same time, law and courts can produce situations that can implicate the design, deployment, or removal of technology in unexpected ways, e.g., cryptographic back-doors to section 230 and hopefully GDPR, too. It would be wonderful if legal practitioners and law scholars had developed this intuition during their degrees.

Conclusion

In compiling best practices from dozens of experts and organizing them in a logical structure, we may have given the misimpression that we have figured everything out. On the contrary, nobody we talked to for this report suggested that they had found all of the answers. Even those who had made great strides emphasized that there was much more work to do. Consider this more of a progress report than a finalized road map.

For readers at institutions that have just started to explore how to bring together computer science and law, understand that the first steps are among the most difficult. In our experience, success breeds success, by building momentum and political support. We hope that our report can help you develop initial ideas and can be something you can share with colleagues and administrators looking for proof that similar ideas have worked elsewhere. The most important thing is to adapt our global advice for your local conditions. Every University has its own organization, history, values, power dynamics, and politics. What has worked elsewhere may not work at all in your particular setting. Nobody outside your institution knows as much as you do about what is possible, so pick-and-choose the advice and models that you think will work where you are.

Finally, understand that you are part of a large and growing community of computer-science-lawyers and law-focused-computer-scientists who are here to provide advice and support. Reach out to us or to people you know or recognize from our list of contributors. And when you experience success, pay it forward by sharing what you have done and how you accomplished it to those who will follow.

Appendix 1: Syllabi Database

A database with copies of the CS and Law course syllabi listed below are available at https://repository.library.georgetown.edu/handle/10822/1064429

University	Professor	CS or Law	Course Name	Credits
Carnegie Mellon	Michael I. Shamos	CS	**Law of Computer Technology**	-
Columbia	Steven Bellovin	Both	**Cybersecuity: Technology, Policy and Law**	-
Columbia	Steven Bellovin	CS	**Anonymity and Privacy**	-
Columbia	Henning Schulzrinne	CS	**Internet Technology, Economics and Policy**	-
Columbia	Steven Bellovin	CS	**Computers and Society**	-
Cornell	Karen Levy	Both	**Surveillance and Privacy**	3
Cornell	James Grimmelmann	Law	**Internet Law, Privacy, and Security**	3
Cornell	James Grimmelmann	CS	**Fundamentals of Modern Software**	1.5
Cornell	Solan Barocas	CS	**Ethics and Policy in Data Science**	3
Georgetown	Paul Ohm	Law	**The Technology of Privacy**	3
Georgetown	Paul Ohm	Law	**Computer Programing for Lawyers**	3

University	Professor	CS or Law	Course Name	Credits
Georgia State	Charlotte Alexander & Susan Smelcer	Both	**Legal Analytics II**	3
Harvard	David J. Malan & Doug Lloyd	Law	**Computer Science for Lawyers**	-
Harvard	Milind Tambe & David Gray Grant	CS	**Intelligent Systems: Design and Ethical Challenges**	-
Northwestern	Kristian Hammond	CS	**Innovation Lab: Building Technologies for the Law**	-
NYU	David Pashman, Vinay Jain	Law	**The Law of the Startup Seminar**	2
Oxford University	Rebecca Williams, Tom Melham	Both	**Law and Computer Science**	-
Princeton	Jonathan Mayer	Both	**Technology Policy and Law**	3
Princeton	Jonathan Mayer	CS	**Computer Science for Public Policy and Law**	-
UC Berkeley	Dierdre Mulligan & Daniel Griffin	CS	**Technology and Delegation**	3
UC Berkeley	Dierdre Mulligan	CS	**Behind the Data: Humans and Values**	3
UC Berkeley & Boston University	Stacey Dogan	Both	**Law for Algorithms**	2
Univ. of Colorado Boulder	Blake Reid	Law	**Samuelson-Glushko Technology Law & Policy Clinic**	-
Univ.of Illinois Chicago	Richard Warner, Robert Sloan	Law	**CS 111: Law**	3
University of Iowa	Paul Gowder	Law	**Introduction to Quantitative & Computational Legal Reasoning**	3
University of Miami	Tarek Sayed	Law	**Big Data for Lawyers**	3
Univ. of Pennsylvania	Cynthia Dahl	Law	**Detkin Intellectual Property and Technology Legal Clinic**	7
Virginia Tech	Ross Dannenberg	CS	**Introduction to Computer Law**	1

Appendix 2: Workshop RSVP List

The following experts were a part of the April 18, 2020 workshop vital to this report:

Expert	University or Organization	Affiliation
Ran Canetti	Boston University	Faculty
Azer Bestavros	Boston University	Faculty, Associate Provost for Computing & Data Sciences
Mayank Varia	Boston University	Faculty
Felix Wu	Cardozo School of Law	Faculty
Alissa Cooper	Cisco	Engineer
Blake Reid	Colorado Law	Faculty
Steven M. Bellovin	Columbia University	Faculty
James Grimmelman	Cornell	Faculty
Karen Levy	Cornell University	Faculty
Solon Barocas	Cornell University	Faculty
Farida Lada	CUNY	Faculty, Administrator
David S. Gerstl	Farmingdale State College (SUNY)	Faculty
Michael Brennan	Ford Foundation	Senior Program Officer
Chris Frascella	George Washington University Law School	Student at PIT-UN Member Org
Dawn C Nunziato	George Washington University Law School	Faculty

Expert	University or Organization	Affiliation
Ashkan Soltani	Georgetown University	Researcher
Kobbi Nissim	Georgetown University	Faculty
Nitin Vaidya	Georgetown University	Faculty
Susan Smelcer	Georgia State University	Faculty
Wendy Seltzer	MIT	Researcher, W3C Counsel and Strategy Lead
Jessica Silbey	Northeastern University School of Law McCormick School of Engineering	Faculty
Dan Linna	Northwestern Pritzker School of Law &	Faculty
Maria Grau Ruiz	Northwestern University School of Law	Faculty
Mihir Kshirsagar	Princeton University	Faculty
Jonathan Mayer	Princeton University	Faculty
Shaanan Cohney	Self-Affiliated	Researcher
Seda Gurses	TU Delft	Faculty
Chris Hoofnagle	UC Berkeley	Faculty
Deirdre K. Mulligan	UC Berkeley	Faculty, Administrator
Jennifer Mangold	UC Berkeley	Administrator, Researcher
Kimberly Claffy	UC San Diego	Faculty
Jasmine McNealy	University of Florida	Faculty
Ryan Calo	University of Washington	Faculty
Harlan Yu	Upturn	Executive Director

Appendix 3: Sample Hiring Letter

Below is a sample tenure letter solicitation for hiring process involving law school hire of computer scientist:

From: Paul Ohm <ohm@law.georgetown.edu>

Subject: Confidential tenure letter request

To: xxxxx

Hi xxxxx,

I'm writing to see if you'd be willing to write a tenure letter about xxxxx of xxxxx Computer Science Department for Georgetown Law's laterals committee. xxxxx's candidacy isn't public, so please help us respect the confidentiality of this search.

Yes, a law school is thinking of hiring a computer scientist without a JD. Given that xxxxx has co-authored a few law review articles about the intersection of technology and search and seizure law, I thought you'd be great for this.

Last year, we were charged jointly by the law school and main campus administrations to find a candidate we could appoint to professorships in both the Computer Science Department and the Law Center. xxxxx has applied for the job and will be giving a job talk here soon.

We would be primarily interested in your assessment of his legal scholarship, although we would also welcome any thoughts you had about his other work, too.

If you're able to write this letter, the chair of our lateral appointments committee, xxxxxxxx, would follow up with a formal request, including the wording of all of the applicable standards. We would ideally like a letter by October 1st, although we might be able to get some more time, if that's the only thing preventing you from writing for us.

I'm attaching his CV with a list of all of his publications.

Thanks for considering this request.

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UNIVERSITY