If You Build It, Will They Come?
(and can you prove it?)

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Assessment Fall 2013

- Moved into B.E.S.T. Library in Fall 2011
- Assess use of this new physical plant: what aspects are successful; what is poorly used; what surprises?
  
  "Getting to know the space"

- Simple core questions: How many people do you have in the library at a given time, and where are they?

- Conducted by statistics grad asst Michael LaTour as final master’s project
Assessment Fall 2013

- Purely quantitative, census/headcount method
- Objective investigation, rather than reliance on anecdote and hearsay (of often disparate points of view)
- Take a few minutes to look at the spaces we’ll be discussing
Basement
Second Floor
Methodology

• X marks the spot
• Marked on paper map, later transferred points by hand to database
• Randomized starting floor
• Followed the same footpath for each floor
• Tried to alternate 12-2 pm and 2-4 pm every other week for a given day
  • e.g. 12-2 pm Monday of Week 1, 2-4 pm Monday of Week 2
  • Several points taken 4-6pm
First Floor
Study Room 110
Study Rooms and Vending
South Hallway
Study Rooms 118-119
Study Rooms 120-122
Foyer
Printing Stations
Digital Den
North Wing
Howe Writing Center
North Wing facing Foyer
Basement
Main Study Area
Comfy Chairs
South Hallway
Study Area South
Study Area South
Study Area Southeast
Main Hallway
Northeast Alcove
Maps Room
Second Floor

Day of Week: [Day]
Date: [Date]
Time: [Time]
NE Alcove/Elevator Lobby
Suite 208 Study Rooms
Main Hallway
South Hallway
Room 217
Room 215
Suite 213 Open Study Rooms
Patron Count by Time Period

- Census count taken 4x each day, each count at random time within 4-hour time block
- Determined that 12n-4pm is our busiest period on weekdays
  *boxplot data display
- Contrary to stereotype of night-owl students, late evening is our slowest period
  - effect of 24/7 hours at King Library attracting night owls?
- Outlier data near end of semester
Gate count data reflects coming and going, not necessarily staying.

Interpretation of gate count confounded by other units in building including classrooms, another “back door” entrance to building.

Similar interpretation though: afternoon is peak time.

Mid-afternoon “dip” in gate count data can now be interpreted as feet coming in and staying for the afternoon.

Spring 2014 data.
Patron Count by Day of Week

- Which days of the week have the highest patron counts?
- Unsurprisingly, Mondays, Tuesdays, Wednesdays higher use than Thursdays and Fridays
- Saturdays and Sundays (not shown) have lower use yet
Over the Course of a Semester

- Facility becomes progressively busier as the semester goes on, reaching a plateau the last ~3 weeks.
- May be periodic bumps at weeks 5, 8 – first exams, midterms?
- Week 14 = Thanksgiving
“Natural” Experiments

- Focused remainder of work on discrete situations in facility layout, where we could ask relatively well-controlled questions and make comparisons:
  - Rooms-by-reservation vs open door study rooms
  - Computer areas
  - Various seating/furniture types
Rooms-by-Reservation vs Open Rooms

- Second floor space unrenovated, former office spaces utilized as library study rooms
- 5 lock-and-key, available by reservation (shown in tan)
- Nearby, 5 open door, first-come-first served (shown in green)
- Similar sizes, conditions, furnishings
  - Caveat: not a complete “free choice” situation, other reserved rooms are available in library, but no other open study rooms; i.e. open rooms a more limited resource
Rooms-by-Reservation vs Open Rooms

- Overall use rates are similar, assessing either by patron count or % of seats occupied
- Use of open rooms more regular, i.e. less spread in data
- Reserved rooms have greater variability in use/more spread in data
- Open rooms more consistently in use, while reserved rooms are unused some times and heavily used at others
  - little use of reserved rooms in mornings, more heavily used later in day
Use of Computing Areas

- Three computing areas on first floor – two open use, one computer lab/instruction room
- Mix of Macs and PCs in open areas; all PCs in computer lab
- Open areas within sight of front door, while computer lab down a corridor, low visibility

*Tracked whether it appeared computer was in use, vs just using the seat; turned out to be a negligible issue*
Use of Computing Areas

- Use of the two free range areas similar, about 30% seats occupied on average.
- Use of computer lab very low. Often 0/40 seats used.
- Have since reduced # computers in lab, some efforts to increase awareness of the lab
- Overall, is 30% utilization of computers at a given time “good”?
  - at peak of day (12n-4pm), rate is ~40%
  - climbs later in semester – 4th quartile of data stretches to ~70% utilization
Use of Various Furniture/Seating Types

- New furniture purchased for facility predominantly small round tables
- We brought four old “high-sided” carrels from the old building to the new facility
- Looked at use rate of these eight seats, compared to other furniture closeby
- Again, real world experiment so imperfectly controlled
  - “old and busted” vs. “new hotness”
  - Carrels a limited resource while other furniture widely available

*but that was kind of the point*...
Use of Various Furniture/Seating Types

- Occupancy rate of carrels and of larger tables higher than the small tables nearby...despite being “old and busted”
- Many weeks occupancy of carrels highest (approaching 50%) during second half of semester
- Anecdotally, patrons asked for carrels and were often unaware we had any
- Changes implemented since...
Conclusions from 2013 Study

- Peak hours are 12-4pm
- Use ratio of library floors is consistently 1 basement : 2 main floor : 1 upper floor
  - contrasts with “evening migration upstairs” seen at old facility
- Argument for providing both free-range study rooms and reserved study rooms
  - similar overall levels of use, but different patterns of use
- Computer lab is mostly unused by walk-ins
- Some students want carrel seating, got some additional “less old and busted” ones
Spring 2015 Study

- Several small-scale changes made to furnishings between 2013, 2015
  - Digital projector install in basement
  - Additional carrels basement and 2nd floor
  - Mix of tables, lounge chairs on 1st floor north
  - Big round tables 2nd floor rm 215

- Assess these changes and use of space overall
- Heat Map data viz approach
- Focused on afternoon time point
The “Armstrong Effect” Hypothesis: Fall 2013 vs. Spring 2015

- Armstrong Student Center opened January 2014
  - 24/7 facility, 16 study rooms
  - some concern it would impact popularity of B.E.S.T.
- Fall 2013 mean patron count M-F
  - 12n-4pm time point = 100
  - 4-8pm time point = 80
- Spring 2015 mean patron count M-F
  - 12n-6pm = 90.1

No obvious change -- if Student Center has had an impact, it is subtle
2015 Study: Heat Map: 1st Floor
2015 Study: Heat Map: Basement
2015 Study: Heat Map: 2nd Floor

Day of Week: 
Date: 
Time:
Future Research Directions

- Qualitative survey and focus groups this fall (with Matt Benzing)
- Additional questions using zone analysis
  - How often are “group” study rooms used by one person, vs a group?
  - How many computers per table are used simultaneously?
- Micro changes to furniture layout
  - Provide more seating around power outlets, fewer computers on tables
- Continue to collect into 2015/2016 using our new web app
- Long-term, use data in decisions for 2nd floor remodel
Getting at Why: Points of Interest for Upcoming Qualitative Study

First floor:
- Lowish use of computers, lab in particular: what can improve this? Are they aware of the lab? Is it too far from printers?
- What fxns are our computers used for?
- What do people like about the popular north end common area seating?

Basement:
- Why is map room popular? Sunlight? Seclusion?
- Why are seats in middle of the main basement area so poorly used?
Getting at Why: Points of Interest for Upcoming Qualitative Study

Second Floor:
- Rm 217: Why are carrels so popular compared to lounge chairs, despite not being near outlets
- What drives preferences for first-come-first-served study rooms, vs. rooms-by-reservation?

General:
- Do we have the right kinds and mix of seating? (size of tables, carrels, round vs square, lounge chairs vs upright, other considerations?)
- Why are carrels seemingly so popular?
- What functions are study rooms wanted for? (studying, eating, other?)
- Do different “types” of students like the 1st vs. 2nd floors?
Creating the Heat Map Web App

- HTML5
  - local storage to hold data before sending
  - using new “data-*” feature to store counts
- JavaScript
  - dynamically generating grid elements
  - providing interactivity
  - page controls
- AJAX
  - sending/receiving data to server-side PHP using JSON
- CSS3
  - basic styling classes
- PHP
  - connect to MySQL database to store data long-term
  - query database to return previous counts
function sendQuery() {
    var xhr = new XMLHttpRequest();
    var url = "http://127.0.0.1/phpmyadmin/dev.php?rawSql=" + mySql; // Set the URL of the PHP script
    if (xhr.open("POST", url, true)) {
        xhr.setRequestHeader("Content-Type", "application/x-www-form-urlencoded");
        xhr.onreadystatechange = function() {
            if (xhr.readyState == 4 && xhr.status == 200) {
                var response = xhr.responseText;
                mySql = response;
                document.getElementById("sqltext").innerHTML = response; // Display the response in a div element
                // Add code to handle the response or display it in a modal dialog
            }
        }
        xhr.send();
    }
}

function mySqlDirectory(response) {
    var arr = JSON.parse(response);
    for (var i = 0; i < arr.length; i++) {
        var name = arr[i].name;
        var type = arr[i].type;
        if (type == "table") {
            document.getElementById("sqltext").innerHTML += "\n\nCREATE TABLE IF NOT EXISTS " + name + " (\n";
        } else if (type == "column") {
            var column = arr[i].column;
            var type = arr[i].type;
            var constraints = arr[i].constraints;
            if (constraints != null) {
                document.getElementById("sqltext").innerHTML += column + " " + type + " CONSTRAINT " + constraints + "\n";
            } else {
                document.getElementById("sqltext").innerHTML += column + " " + type + "\n";
            }
        }
    }
}

function createTable() {
    if (document.getElementById("sqltext").value) {
        var xhr = new XMLHttpRequest();
        var url = "http://127.0.0.1/phpmyadmin/dev.php?rawSql=" + document.getElementById("sqltext").value; // Set the URL of the PHP script
        xhr.onreadystatechange = function() {
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                // Add code to handle the response or display it in a modal dialog
            }
        }
        xhr.send();
    } else {
        alert("Please fill all fields!");
    }
}

function createFields() {
    if (document.getElementById("sqltext").value) {
        var xhr = new XMLHttpRequest();
        var url = "http://127.0.0.1/phpmyadmin/dev.php?rawSql=" + document.getElementById("sqltext").value; // Set the URL of the PHP script
        xhr.onreadystatechange = function() {
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        }
        xhr.send();
    } else {
        alert("Please fill all fields!");
    }
}

App Development: Where Do We Go Next?

- Heat Map Features
- Zones with statistics by each zone
- New Data Visualization Tools
  - native option
  - could create API for HighCharts, D3, Google Charts, JS InvoVIS Toolkit, etc.
- Quick Reports
- Turn our build into a full framework for other facilities