University Investments
In the Library:
What’s the Payback?
A Case Study at the University of Illinois at Urbana-Champaign
The Need

It used to be that the way you put together a library budget was to look at like-institutions and then argue for a little more. Now my provost is saying to me, “If I give you ‘X’ dollars, what is the return on investment to the University?”

—T. Scott Plutchak, Librarian, University of Alabama at Birmingham
Study’s Objective

For every $ spent on the library, the university received ‘X’ $ in return.

- Articulate value in terms of institutional objectives
  - Measurable effects
  - Replicable
  - Meaningful & compelling
Administration Values

- Focus on new intellectual directions
- Strengthen interdisciplinary work
- Find resources
- Connect with community, state, nation, globally
- Efficiency in all we do

“Funding does not regenerate funding. But reputation does.”
– Charles Zukoski, Vice Chancellor for Research

Increase impact of university’s research
- Attract & retain outstanding faculty

Faculty = Funding
Quantifying for the University

ROI:

*Income as a proportion of the amount invested in an asset.*

Faculty generate income for the institution. Faculty use the library and its collections. What role do information resources serve in the income generation process?

\[
\frac{\% \text{ of grant } \}$ \text{ using library resources}}{\text{Library budget } \}$} = "X"
\]
My Role
And To Rely on These Experts to Produce Results

- Judy Luther, Informed Strategies
- Carol Tenopir, UTK
- Tina Chrzaszkowski, Illinois
- Karen Schmidt, IWU
- Everyone else at Illinois who helped
- Chrysanne Low, Elsevier
- Kira Cooper, Elsevier
Explaining the Study

- **Not** trying to claim an allocation back to library!
  - **Not** a budget argument
  - **Not** a cost/time savings exercise

- **Demonstrate** that library research collections contribute to income-generating activities
  - Quantifying a return on University’s investments in its library
  - Focus on library’s role in externally funded research process

- **Show “correlations”** rather than prove “cause-&-effect”
  - **Not** creating a predictive model
Constructing the Framework
Faculty Grant Research Cycle

- Conduct Research
- Obtain Grants
- Write Articles
- Write Reports & Proposals

LIBRARY
Hypothesis ...

Investment in e-Resources

University impact/administration satisfaction

Time Spent Gathering

Time Spent Analyzing

Grants awarded to institution

Paper output/citations

Grant applications w/ citations from library-funded resources

Research accessed via university network/Library Gateway

Prestige = Resource funding

* Source: Outsell’s Buyer Market Database, Dr. Carol Tenopir

\[ \text{2001 v. 2005 Sci. / Eng.} \]

\[ 54\% \quad 58\% \]

\[ 46\% \quad 42\% \]
ROIs for Public Libraries

- **Reports**
  - *Worth Their Weight* – Americans for Libraries Council

- **Examples**
  - Southwestern Ohio: $1 = ROI $3.81
  - Florida: $1 = ROI $6.54


Library Research Service, Peer-Based Return on Investment Calculator
Were any ROIs found for other libraries?

<table>
<thead>
<tr>
<th>Measurement (per library interaction)</th>
<th>Corporate</th>
<th>Government</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue generated</td>
<td>$6,570</td>
<td>Not calculated</td>
<td>Not calculated</td>
</tr>
<tr>
<td>Money saved</td>
<td>$3,107</td>
<td>$2,575</td>
<td>$683</td>
</tr>
<tr>
<td>Time saved</td>
<td>9.4 hours</td>
<td>12.2 hours</td>
<td>8.4 hours</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Method</th>
<th>What It Is</th>
<th>Why Discarded</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multivariate statistical methods</strong></td>
<td>Observation and analysis of more than one statistical variable at a time</td>
<td>Not designed to calculate an ROI</td>
</tr>
<tr>
<td><strong>Productivity measures</strong></td>
<td>Expresses in terms of savings</td>
<td>Not designed to calculate an ROI</td>
</tr>
<tr>
<td><strong>Social/Behavioral models</strong></td>
<td>Assigns numerical values to social &amp;/or behavioral phenomena</td>
<td>Not designed to calculate an ROI</td>
</tr>
<tr>
<td><strong>Social Return on Investment (SROI)</strong></td>
<td>Assesses value to society</td>
<td>Focus on “the greater good” (subjective value) of research</td>
</tr>
<tr>
<td><strong>Contingent valuation</strong></td>
<td>Survey-based economic technique for valuing non-market resources</td>
<td>Delivers “stated preference” models rather than ROI</td>
</tr>
<tr>
<td><strong>Regression analysis</strong></td>
<td>Statistical technique for relation between single dependent variable and specified multiple variables</td>
<td>Used to establish a predictive equation</td>
</tr>
</tbody>
</table>
Methodology and Data
Constructing A Model

- Inspired by *Demonstrating Value and Return on Investment: The Ongoing Imperative*

- Quantitative metrics
  - Time saved by library users
    - Value derived if salaries of users are known
  - Money users save by using library
  - Revenue generated with assistance of the library

Revenue-Generated ROI

Corporate Library Model

XX% of respondents report generating revenue w/ library’s support

XX% of instances when library was used, revenue was generated

$XX median revenue generated

= $XX avg. revenue generated per library use

[no extension]

Adapted Model for Academic Library

XX% faculty w/ grants using citations

XX% grant award success rate using citations obtained through library

$XX avg. grant income

= $XX avg. grant income generated using citations obtained through the Library

# grants expended

÷ $ library budget

= $ grant income for each $1 invested in library (ROI Value)
### Criteria for Data:
- Reliable, Accessible (campus or national), Clearly defined

#### Data sources
<table>
<thead>
<tr>
<th>Data sources</th>
<th>Research Faculty</th>
<th>Grant Proposals</th>
<th>Grant Income</th>
<th>UIUC Articles</th>
<th>Library Budget</th>
<th>Resource Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>UIUC Research Office</td>
<td>UIUC Research Office</td>
<td>NSF Federal R&amp;D expenditures; UIUC Grant Expenditures</td>
<td>Scopus Data</td>
<td>ARL Library Budget; ARL Library Materials Budget</td>
<td>Usage from publisher stats; Survey data</td>
<td></td>
</tr>
</tbody>
</table>

#### Data decisions & challenges

**Faculty involved in grants**
- Include tenure system faculty (~80% grants);
- Exclude academic professionals (~5% grants)

**Grants**
- All types: Research, instruction, scholarships, institutional support, academic support, public services, student services

**Grant award data**
- Installation of Banner system (2004);
- Grant awards Multiyear, unfunded, extended

**Grant expenditures data**
- Number of grants managed; Direct & indirect costs; Detail for broad subject areas (chemistry inc. in College of Liberal Arts & Sciences)

**Budget for electronic resources not isolated**

**Project COUNTER too new; No consolidated ‘all publisher’ data**
Faculty Survey and Outcomes
Representative Sample

16% Response Rate
3,083 Total Sent
328 Responses

Tenure System
- 36% Full Professor
- 29% Assoc Professor
- 24% Asst Professor
- 11% Other

Time at UIUC
- 0-5 years: 35%*
- 5-15 years: 36%
- 16+ years: 29%
- *10% new in 2007

Disciplines
- 33.8% Soc Sci
- 28.4% Phys Sci
- 20.2% A & H
- 17.6% Life & Health

50%+ spend time on research
60% received peer recognition or an award
References Are Vital in Grants

- 75.3% Essential
- 12.3% Very important
- 7.3% Important
- 4.0% Somewhat important
- 1.0% Not important

95%
In physical and life sciences, it would be unthinkable to have a grant application without literature references.

A sure way to kill a proposal is not to give proper credit or to not update new developments.

Without ... references the grant proposal would likely not be reviewed.

“ABSOLUTELY ESSENTIAL!”
94% report using library resources in grant proposals

75% of references accessed through library

94% obtain proposal citations via campus network/Library Gateway

For every reference cited in 2006, faculty estimate they read 4-5 more articles or books … Many more abstracts are scanned
Impact of e-Resources

270 of 328 (82%) respondents offered comments

- Fewer trips to the library
  - More time reading, less time finding
  - More resources reviewed, better ones cited
  - More efficient access (from home, while traveling, etc.)
  - Less use of print content (convenience of electronic)
  - Less serendipitous discovery

- Integrated with their work
  - Read, write, find, share
  - Searching & reading blend together

- Supports interdisciplinary exploration

- Better quality; more competitive research & proposals
Comments About e-Efficiency

“It has made much of the process easier and faster, and has enriched the quality, and especially the breadth of the material I can access and share with others.”

“I spend more time exploring works…less directly related to my research topic…This has been very beneficial in identifying links between my work and work in allied fields.”

“Absolutely essential for modern research. The sheer size of the published literature makes it impossible to do this work the old fashion way.”

“I can evaluate far more papers and more deeply… I can also traverse the literature much faster and follow chain of citations … It is one of the biggest time savers in my life.”
“I could not submit as many grants. With grant funding levels at 4-6% of submitted proposals I would not have achieved my current funding level.”

“Completely changed the way I work by increasing my productivity. I … spend more time reading [articles].”

“My productivity would drop at least four fold if I had to go to the library for all my needs.”

“It has increased the strength of my grant proposals … by allowing for …thorough evaluation of the literature on any particular topic.”
“It would be impossible to be competitive internationally without electronic access to publications.”

“Finding’ and ‘Accessing’ is synonymous with ‘reading’ when access is via the online gateway.”

“Our success at UIUC in attracting external research funds has and will become ever more competitive. Thus, our access to electronic information will become all the more necessary.”

“I would leave this university in a microsecond if the library deteriorated to the point of making me uncompetitive for research and funding.”
Model By the Numbers
A look at 2006
ROI Model for UIUC

78.14% faculty w/ grants using citations

X

50.79% grant award success rate using citations from library

X

$63,923 avg. grant income

= $25,369 avg. grant income generated using citations from library

X

6232 grants expended

÷ $36,102,613 library budget

= $4.38 grant income for each $1.00 invested in library (ROI Value)
### Calculations Used in the Model

<table>
<thead>
<tr>
<th>Calculation</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td># Tenure System Faculty</td>
<td>2045</td>
<td></td>
</tr>
<tr>
<td># Principal Investigators</td>
<td>1700</td>
<td><em>(Survey Q11 - 94% faculty use citations in grant proposals)</em></td>
</tr>
<tr>
<td>A) = % of faculty using citations in grant proposals*</td>
<td>78.14%</td>
<td><em>(1700x94%)/2045</em></td>
</tr>
<tr>
<td># Grant proposals</td>
<td>2897</td>
<td><strong>(Survey Q10 - 95% faculty state citations important or essential in grant awards)</strong></td>
</tr>
<tr>
<td>B) = % proposals inc citations obtained through library**</td>
<td>50.79%</td>
<td><em>(1456x95%)/(2897x94%)</em></td>
</tr>
<tr>
<td>$ Average size grant</td>
<td>$63,923</td>
<td></td>
</tr>
<tr>
<td>C) = $ proportion of grant $ secured using library materials</td>
<td>$25,369</td>
<td><em>(78.14%x50.79%</em>$63,923)*</td>
</tr>
<tr>
<td># Grants (expended) in year</td>
<td>6232</td>
<td></td>
</tr>
<tr>
<td>D) = $ proportion of grant income using library materials</td>
<td>$158,099,608</td>
<td><em>(25,369x6232)</em></td>
</tr>
<tr>
<td>$ Total Library Budget</td>
<td>$36,102,613</td>
<td></td>
</tr>
<tr>
<td>E) = University return in grant $ on library</td>
<td>$4.38</td>
<td><em>(158,099,608/$36,102,613)</em></td>
</tr>
</tbody>
</table>
“Overall the model is valid”*

- Worthwhile to replicate this model at other universities
- Worthwhile to measure the complete system of inputs—library resources, faculty, staff, students—and determine the influence of each on the system

Benefit of the library is more than the impact on research grants

Expand to reflect the ROI of an additional dollar of library budget

* Dr. Bruce Kingma, Associate Provost, Syracuse University
## Faculty Savings Uncovered During This Study

<table>
<thead>
<tr>
<th>Median time spent by UIUC researchers</th>
<th>With e-Resources</th>
<th>Without e-Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finding &amp; accessing</td>
<td>2 hours</td>
<td>7 hours</td>
</tr>
<tr>
<td>Reading articles &amp; books</td>
<td>10 hours</td>
<td>10 hours</td>
</tr>
</tbody>
</table>
Administration Values: Measuring Up

- Attract & retain outstanding faculty
- Increase impact
  - 28.8% more articles per tenured faculty
  - “Faculty with more publications and citations have higher propensity of obtaining more grants.”*
  - “Faculty who read more articles tend to receive awards.” *(Donald W. King, UPitt Study, 2004)

* Ali & Bhattacharyya, “Research Grant and Faculty Productivity Nexus: Heterogeneity among Dissimilar Institutions.” Academic Analytics

“I would leave this university in a microsecond if the library deteriorated …”
E-Productivity

- 95% of faculty cite references are important to grant proposals
- +7.7% # grant proposals
- +14.8% # grants per faculty
- +66% $ grant expenditures
Looking Ahead
Next Steps?

- Implement with multiple institutions?
  - Determine benchmarks
  - Assess trends
  - Challenge: Model dependent on survey to validate use

- ROI for patents and tech transfers, other income?

- ROI for teaching?

- Valorization?
  - Calculate impact to local/community economy
  - Countrywide analysis

- Forecasting model?
  - If change X, what impact ROI $
Questions?