



Benchmarking University-Industry Technology Transfer in the Inland Northwest

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I. Executive Summary

This monograph presents the first of a two-part research study focused on technology transfer in the Inland Pacific Northwest. The second part will present more detailed findings about the economic impact of start-up companies in the Inland Northwest. This part presents benchmark findings about technology transfer at the Inland Northwest research centers: Eastern Washington University (EWU), University of Idaho (UI), Washington State University (WSU) and Pacific Northwest National Laboratory (PNNL). The study utilizes a survey instrument developed by the Southern Technology Council (STC).

That instrument was used to carry out two types of analysis. First, data for the Inland Northwest institutes were compiled for FY1998, the last available data from the STC study, and compared to the STC findings as well as to findings from two other sources, AUTM and EPSCoR. Second, data for the Inland Northwest institutes were compiled for FY1998-2003 to analyze trends over the last five years.

The STC study examined eight technology transfer benchmarks, divided into three categories:

- Input benchmarks
 - U.S. patent applications
 - U.S. patents awarded
- Output benchmarks
 - Licensing
 - License income
- Economic impact benchmarks
 - In-state licensing
 - Start-up licensing
 - License income from in-state licenses
 - Start-up companies formed

The STC study measured these variables on ratios and absolute levels. The absolute measures showed a bias towards large research universities. Therefore, this study primarily uses ratio measures. Nevertheless, it must be noted that EWU, UI, WSU and PNNL are, based on their classifications, not really comparable.

FY1998 Benchmark Comparisons with the STC Findings

- **EWU** scored at the bottom for each of the benchmark measures. This is no surprise since hardly any of EWU's peer institutions made it into the STC rankings.
- **UI**'s ratio measures were comparable to the other institutes and it seemed to be doing a reasonably good job, considering its relatively small R&D budget in 1998. For the input and output benchmarks, UI scored close to the STC median for the *patent application ratio* and for *license income as a percentage of R&D expenditure*. It showed lower than the STC median values on the *number of patents awarded per \$10 million R&D* and *active licenses per \$10 million R&D*.

For the economic impact benchmarks, UI scored considerably higher than the STC medians on the *percentage of licensees and options to in-state licensees* and for *in-state license income as a percentage of all license income*. This indicates that UI was much more in-state oriented than the institutes included in the STC study. Compared to the other Inland Northwest institutes, a similar observation can be made: UI had a particularly strong focus on regional impact.

- With a research budget of over \$95 million in FY1998, **WSU** was positioned within the top 100 of U.S. research universities. For the ratio measures, WSU scored relatively high on *patent applications* and on the *number of active licenses*. The *number of patents awarded* was comparable to the STC median but lower than the AUTM study median. For license income, WSU scored below the medians of the AUTM and STC studies and below UI. This indicates that although WSU was able to develop patents and license these, it did not necessarily generate a lot of income from these licenses. WSU did not emphasize regional economic impact through start-up companies. Although a good percentage of the active licenses were to in-state licensees, no license income was generated from these licenses.
- Because of the size of its R&D budget, it is not surprising that **PNNL** scored highly on the absolute measurement of the benchmarks. For ratio measures, however, PNNL scored relatively poorly on several of the benchmarks. For the input benchmark *patent applications per \$10 million R&D* and the output benchmark of *license income as a percentage of R&D expenditure*, it scored lower than UI, WSU and the median values of the STC, AUTM and EPSCoR studies. For the *number of patents awarded per \$10 million R&D*, it scored lower than WSU and the median for the STC, AUTM and EPSCoR values. PNNL scored relatively well on the economic

benchmarks for *in-state license income as percentage of all license income* and for *start-up companies per \$10 million R&D*.

Overall, the findings for the FY1998 comparison showed that the Inland Northwest institutes were, with the exception of EWU, “middle-of-the-road” institutes. They performed neither exceptionally well, nor exceptionally poorly.

Inland Northwest Indicators for 1999-2003

- **EWU** is clearly a small institution with regard to research and technology transfer. EWU’s research budget (FY2003: \$1.2 million) and technology transfer office (FY2003: 0.05 FTE) are small compared to the other Inland Northwest institutes. It is therefore not surprising that the benchmark values for the last five years are low for EWU. The one exception is FY2002, when EWU had one patent application. Since EWU has such a small R&D budget, this had a big impact on the ratio measure for patent applications. This shows that for an institute like EWU, it does not take much to start scoring relatively high on ratio benchmark measures.

In general, EWU is trying to improve its position but finds it difficult to do this. The challenge is that EWU’s mission is oriented toward teaching. As a result, it is difficult for faculty to get course releases to carry out research. In addition, a large amount of research is required to develop patents and this research requires funding. It is challenging for EWU to acquire this funding, as it typically requires a reputation. EWU still has to build this reputation.

- Over the last five years, **UI** has increased its R&D budget (FY2003: \$85 million) and technology transfer FTEs (FY2003: 3 FTEs). Its performance on the *number of patent applications* and the *ratio for patent applications per \$10 million R&D* has fluctuated, varying from 1.0 to 2.8 applications per \$10 million of research expenditures. The *ratio of patents awarded per \$10 million of research expenditures* has declined. The *active licensing ratio* has improved, although UI’s *license income as a percentage of R&D* has fluctuated. *In-state licensing* decreased from 1999 to 2002 but improved in FY2003. The *income generated by in-state licenses compared to all licenses* has been around 10%. Although data for start-up licensing are mostly absent,

UI created a higher number of start-up companies between 2001 and 2003 than WSU. This is quite impressive considering UI's smaller R&D budget.

Compared to the other Inland Northwest institutes, UI is performing, as expected, between EWU and WSU. The noticeable exception is that UI has continued to perform better with regard to start-ups and in-state licensing. UI will probably increase its technology transfer activities such as patenting and licensing in the future. An obstacle has been the number of technology transfer FTEs available. With more technology transfer FTEs available, higher outcomes may be reached at UI.

- Over the last 5 years, **WSU** has increased both its R&D budget (FY2003: \$175 million) and technology transfer FTEs (FY2003: 5.5 FTEs). The *number of patent applications* and the *number of patents awarded* have, in general, declined since 1998. The number of patents awarded went from 0.94 in FY1998 to 0.80 patents per \$10 million research expenditures in FY2003. The active *licensing ratio* has declined and *license income as a percentage of R&D* has fluctuated. *In-state licensing* has been around 45%, and start-up licensing has improved. The *number of start-up companies per \$10 million R&D* has fluctuated between 0 (FY1998 and FY2001) and nearly 0.20 (FY2000).

Compared to the other Inland Northwest institutes, WSU is generally performing better than UI and PNNL. WSU scores higher than PNNL on input benchmarks -- patent applications and patents awarded. WSU has also, for most of the research period, performed above PNNL on output benchmarks -- number of active licenses and license income. Yet for the ratio of active licenses, WSU shows a decreasing trend while PNNL's has been increasing. For the economic impact benchmarks, WSU performed better than the other institutes on the ratio of start-up companies formed, whereas WSU performed less well on in-state license income.

UI has performed better than WSU on the ratio of start-up companies in the last two years. Due to changes in the WSU administration, interest in technology transfer in the last couple of years has increased. There is more push for industry sponsored research and faculty involvement. WSU is also trying to find more licensees within the state but the number of in-state licenses was and is limited. Much of WSU's research and intellectual property is oriented toward agriculture and the regional impact of this is limited.

- **PNNL** is clearly the largest institute included in this study. Its research expenditures (FY2003: \$582 million) and emphasis on technology transfer (FY2003: 25 FTEs) are quite high compared to the other institutes. For both input and output benchmarks, PNNL's FY2003 performance improved compared with FY1998. Especially for *license income as a percentage of R&D expenditure*, this improvement has been substantial, from 0.11% to 0.34%. For the economic benchmarks, PNNL has a relatively low *ratio of in-state licenses in effect* and *ratio of in-state license income*. However, its *ratio of start-up licenses in effect* is much larger than at the other institutes although declining. The *ratio of new start-up companies formed* is also relatively low.

Compared to the other institutes, PNNL clearly outperforms in absolute terms. However when ratio measures are used, WSU performs better than PNNL on most measures. A problem with the PNNL ratio measurement is that all R&D investments are included. For PNNL, R&D investments include large, expensive equipment. Organizations with heavy equipment investments may be disadvantaged in these comparisons.

Overall, the findings for the last five years show that the University of Idaho and Washington State University are still “middle-of-the-road” institutes. Over this interval, they performed neither exceptionally well nor exceptionally poorly. EWU is an institute that has not scored high, but this is reasonable since it is not a research university. PNNL performs very well on the absolute measures but a little less on the ratio measures.

With regard to specific regional impacts, the ratio of in-state licenses in effect has declined at all four institutes. The percentage of new licenses awarded to start-up and small companies has also declined.

Research focuses vary among the regional institutes. Biotechnology has been an important field for both UI and WSU, and will probably remain important for WSU. Information technology and energy have become more important for PNNL, and together with materials, will probably remain important.

Furthermore, the Inland Northwest institutes receive low industrial support for their research. Roughly 4% of their total research expenditures is supported by industry, whereas this average for U.S. universities is closer to 7%.