How University Technology Transfer Offices at US Medical Schools Value Innovation

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Technology Management for Social Innovation

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Abstract

Commercializing innovations remains essential to meeting societal goals. The licensing of university discoveries offers important benefits; in 2014, academic research in the US led to $28 billion in product sales and 965 new products from licensed university work (AUTM). Each of the top 15 institutions collected at least $100 million; some over $400 million. Valuation strategies used in the licensing process have important implications for universities and their prospective licensing partners. A school's financial and IP-related objectives color the innovation portfolio, as well as the willingness of external enterprises to license innovations. Medical schools offer particular opportunities to improve the world's standard of living, and this study focuses on methods used to establish a priori value for their university-sponsored research. Technology licensing offices in US institutions were interviewed. Overall, about one-third of the respondents' technology is licensed; respondents represent about 40% of all licensing revenue reported by AUTM. Generally, about one-half of the medical institutions estimate the value of their IP prior to licensing, primarily via comparison with comparable technologies. About 50% consider non-financial metrics in the process: noting both the value to society and the nature of the technology, per se. Implications and lessons learned are discussed.

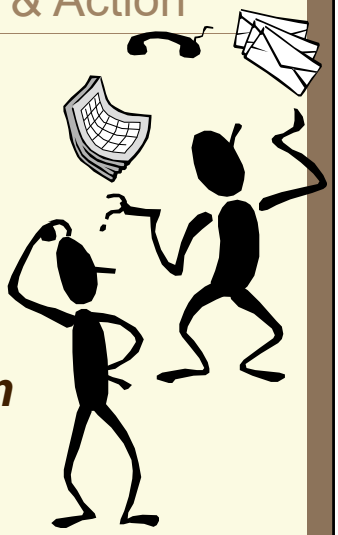
Presentation Flow

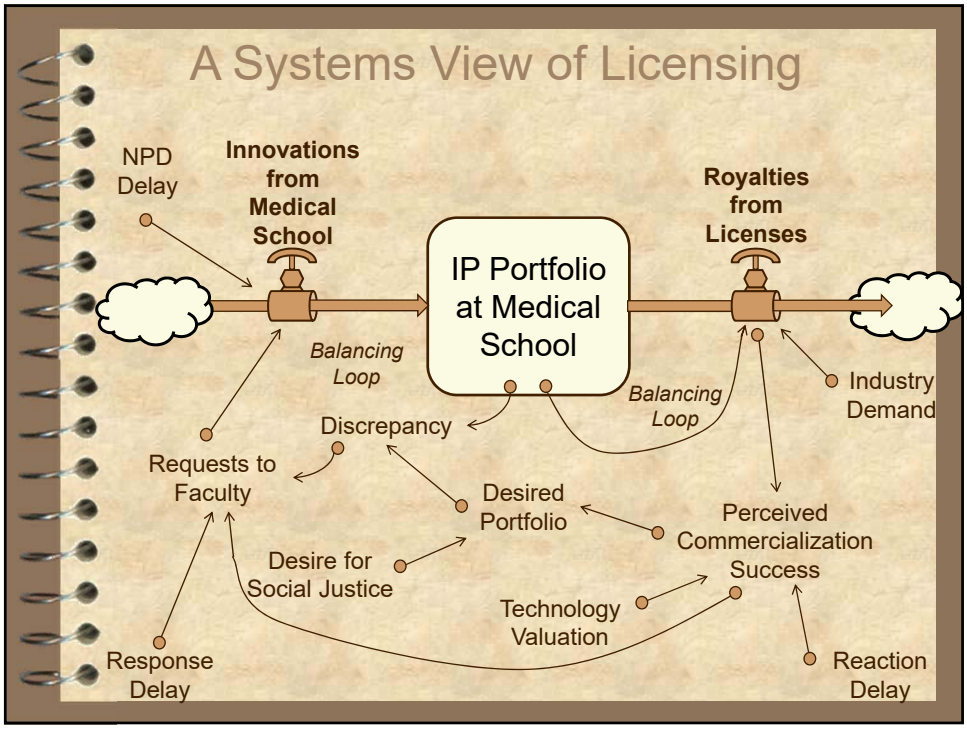
- A Systems View of Valuation
- Valuation Strategies
  - Heuristic as Pundit
  - Infringer as Dictator
  - Product as Oracle
- Surveying US Medical Schools
- Results
- Implications & Lessons Learned

A Systems View … Intent: Balance Thought & Action

- ***Everything must be made as simple as possible. But not simpler.***

Einstein





Nuances of Medical Patents

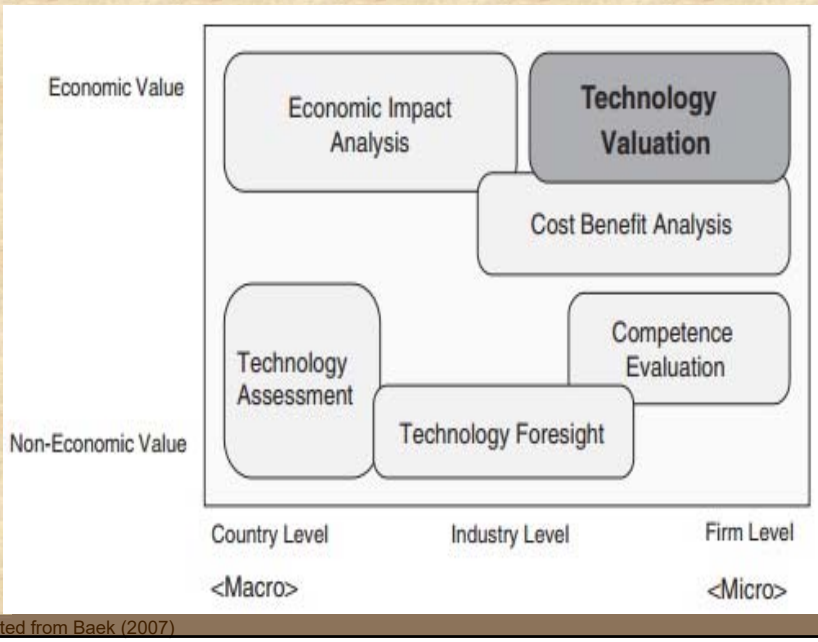
- Arduous & Lengthy Process
  - Δ *Impacts Risk*
    - Ω Post-Grant Review
    - Ω Patent Term Extension
- Variability in IP exclusivity impacts perception of commercial success, hence value
  - Δ *Job to be Done*

Valuation Strategies…
Intent: Balance Thought & Action

- ***Cheshire Puss, asked Alice. Would you tell me, please, which way I ought to go from Here? That depends a good deal on Where you want to go, said the Cat. I don't much care Where, said Alice. Then it doesn't matter which way you go, said the Cat.***

Lewis Carroll

Perspectives on Value of Technology

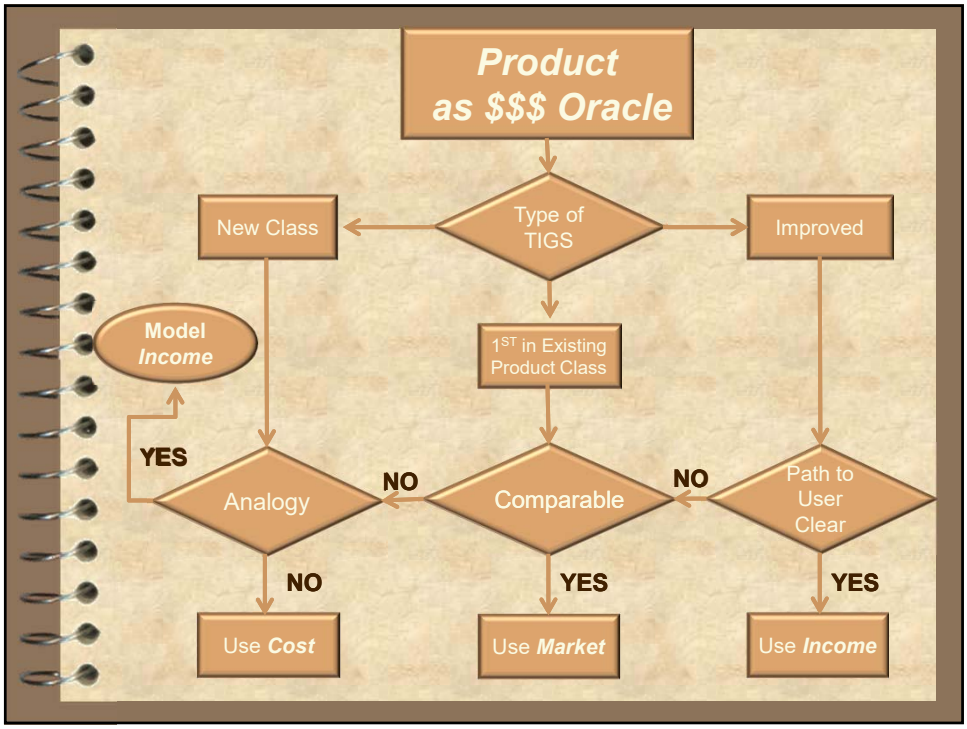


Adapted from Baek (2007)

	Heuristic as Pundit		
FACTOR	*Point Evaluation (1-5)*	*Value*	*Total*
Scope of IP	1	0.2	0.2
Stage of NPD	2	0.2	0.4
Market Size	3	0.2	0.6
Sustainable vs Disruptive	4	0.2	0.8
Profit Margin	5	0.2	1.0
	Technology Valuation		***3.0***

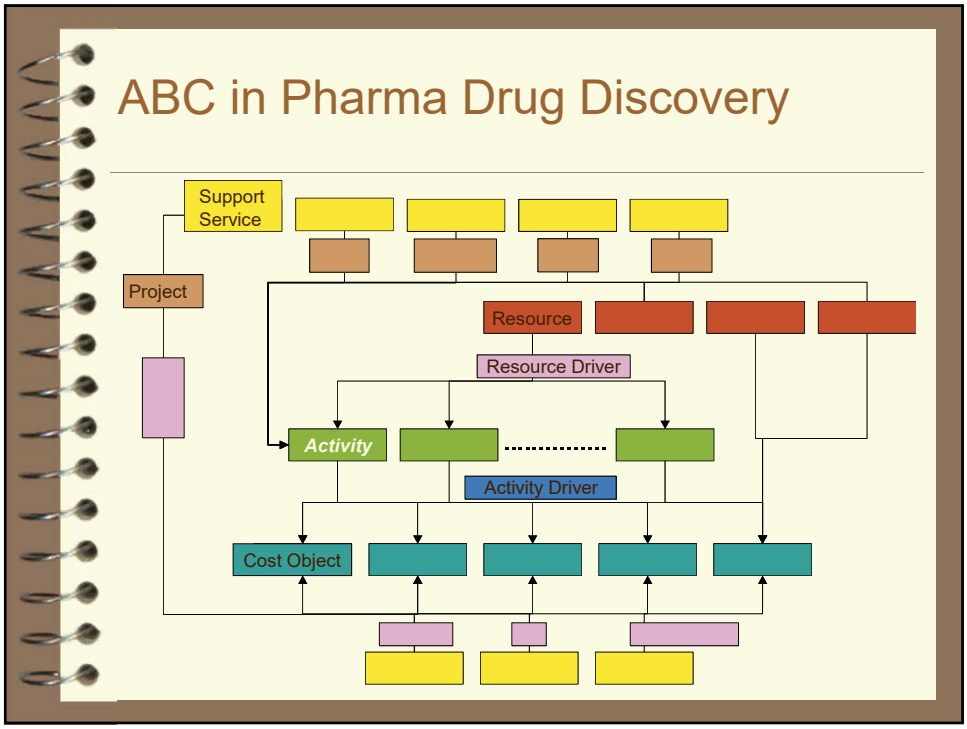
Adapted from Anson (2007)

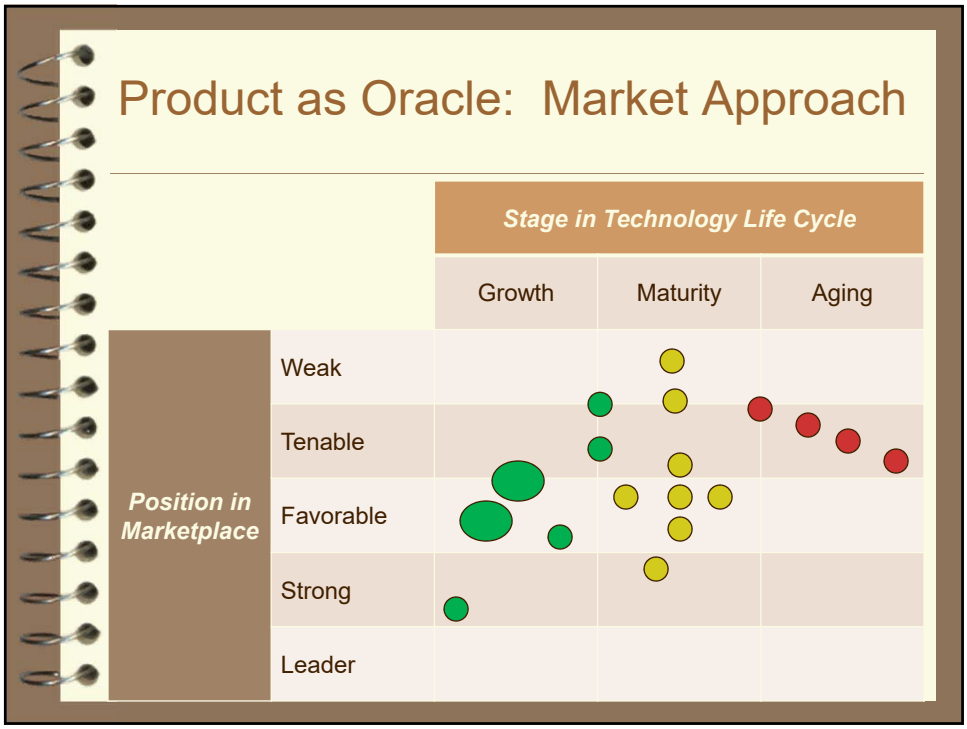
	Infringer as $$$ Dictator			
The Patent	Duration	Nature & Character		
A License	Commercial Relationship	Nature & Scope		
Possible Infringement	Benefits to Infringer	Innovation's Use	Payments	
The Market	Competitive Advantage	Testimony of Experts	Sales Power	Monopoly Potential
Possible Profit	Established Royalties	Similar Royalty Rates	Profitability of Patented IGS	Profit Attributed to Patent, per se



Product as Oracle: Cost Approach, Activity-Based Costing (ABC)

- ABC
  - Δ Allocates Cost Depending on Activity
    - Ω Complex TIGS Receive More Cost since They Require Many Activities
  - Δ Links Activity & Contribution to Process
- Focus Management Attention on Value Added by an Activity
- Link Cost with Performance


ABC in Pharma Drug Discovery
Support Service
Project
Resource
Resource Driver
Activity
Activity Driver
Cost Object


Product as Oracle: Market Approach
Stage in Technology Life Cycle
Growth
Maturity
Aging
Position in Marketplace
Weak
Tenable
Favorable
Strong
Leader

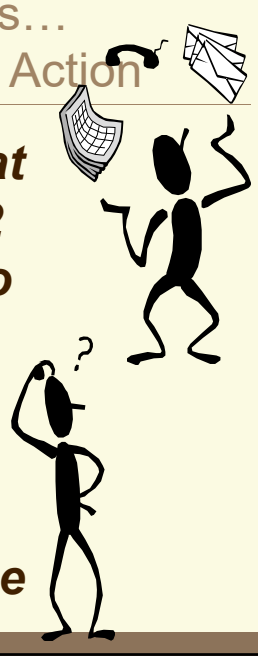
Product as Oracle: Income Approach

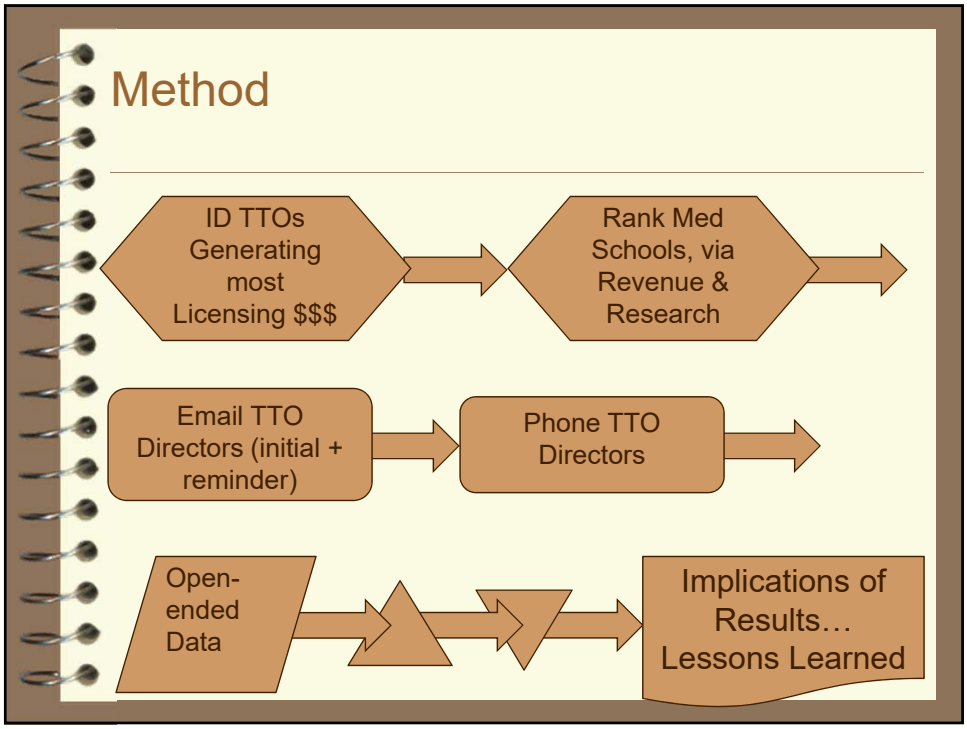
XYZ Pharma: DCF Peak Sales Model	Year 1	Year 2	Year 3	Year 4	Year 5
Patients	45000	45000	45000	45000	45000
Market Share	0.25	0.35	0.5	0.5	0.5
Treated Patients	11250	15750	22500	22500	22500
Drug Price	$10,000	$10,000	$10,000	$10,000	$10,000
Annual Drug Price	$120,000	$120,000	$120,000	$120,000	$120,000
Revenue	$1,350,000,000	$1,890,000,000	$2,700,000,000	$2,700,000,000	$2,700,000,000
Disc. By 70%	$405,000,000	$567,000,000	$810,000,000	$810,000,000	$810,000,000
Disc. By 40%	$243,000,000	$340,200,000	$486,000,000	$486,000,000	$486,000,000
Disc. By 8.17%	$224,646,390	$290,750,620	$383,986,345	$354,984,140	$328,172,451
Total Adj. Value	$224,646,390	$290,750,620	$383,986,345	$354,984,140	$328,172,451
XYZ Pharma: DCF Peak Sales Model	Year 6	Year 7	Year 8	Year 9	Year 10
Patients	45000	45000	45000	45000	45000
Market Share	0.5	0.5	0.5	0.5	0.5
Treated Patients	22500	22500	22500	22500	22500
Drug Price	$10,000	$10,000	$10,000	$10,000	$10,000
Annual Drug Price	$120,000	$120,000	$120,000	$120,000	$120,000
Revenue	$2,700,000,000	$2,700,000,000	$2,700,000,000	$2,700,000,000	$2,700,000,000
Disc. By 70%	$810,000,000	$810,000,000	$810,000,000	$810,000,000	$810,000,000
Disc. By 40%	$486,000,000	$486,000,000	$486,000,000	$486,000,000	$486,000,000
Disc. By 8.17%	$303,385,829	$280,471,322	$259,287,531	$239,703,735	$221,599,090
Total Adj. Value	$303,385,829	$280,471,322	$259,287,531	$239,703,735	$221,599,090

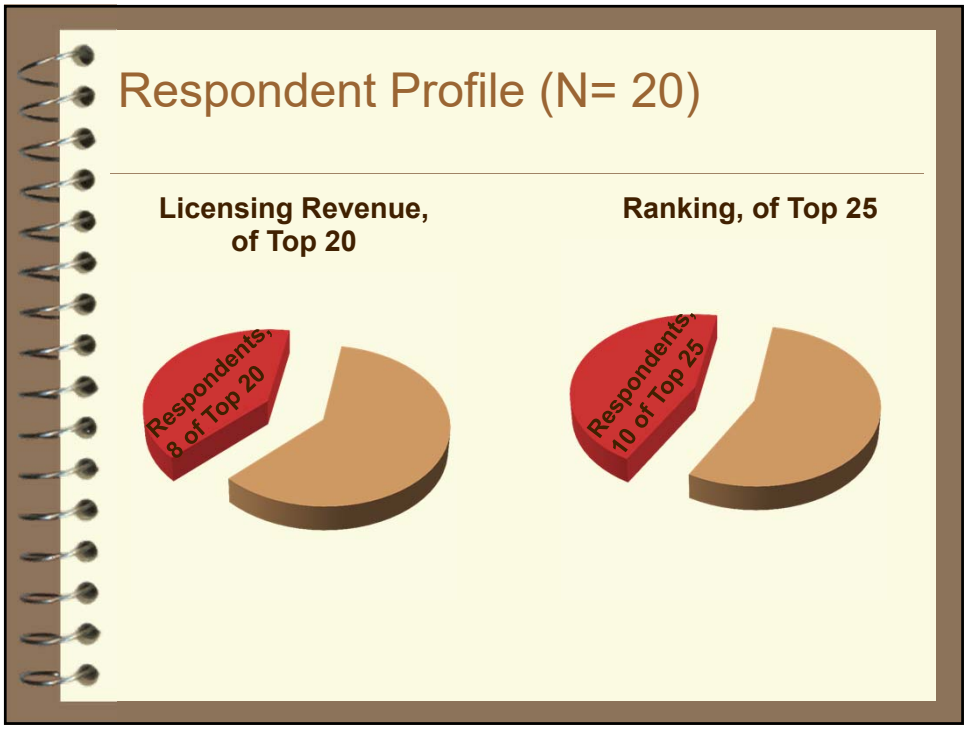
Surveying Medical Schools… Intent: Balance Thought & Action

- ***You may have read that I went to M.I.T. In 1982 I filled out a Who's Who survey with joking responses, and they never bothered to check the facts.***

Chevy Chase




Method
ID TTOs Generating most Licensing $$$
Rank Med Schools, via Revenue & Research
Email TTO Directors (initial + reminder)
Phone TTO Directors
Open-ended Data
Implications of Results… Lessons Learned


Respondent Profile (N= 20)
Licensing Revenue, of Top 20
Respondents, 8 of Top 20
Ranking, of Top 25
Respondents, 10 of Top 25

Licensing Profile

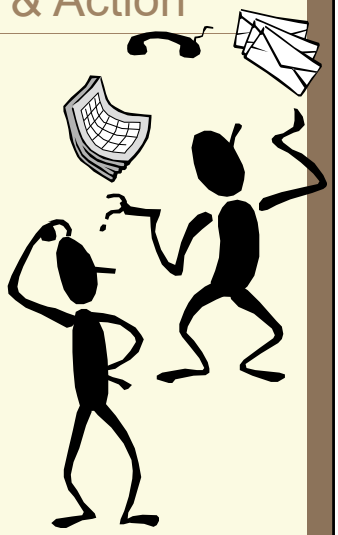
Total Revenue ~ $ 3 Billion, per year

IP Portfolio Licensed

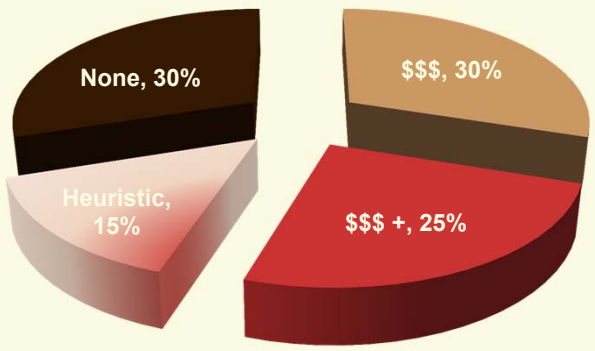
Results…
Intent: Balance Thought & Action

- ***Facts are stubborn things, but statistics are pliable.***

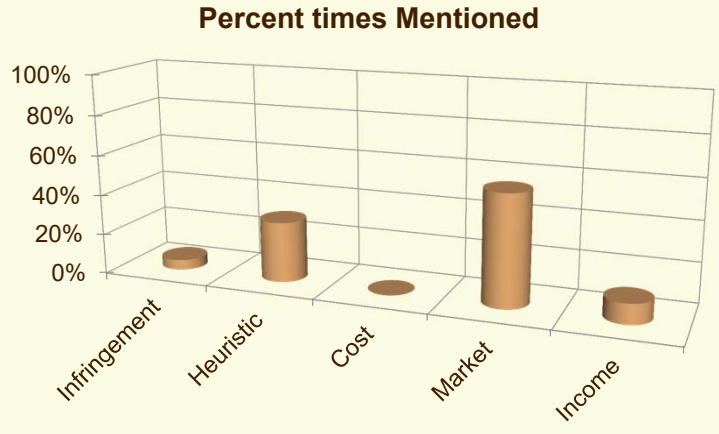
Mark Twain



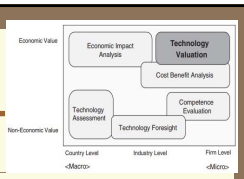
Determining Technology Value, Prior to Licensing



Technology Valuation Method: Focus on $$$ Prior to Licensing



Other Ideas Mentioned…

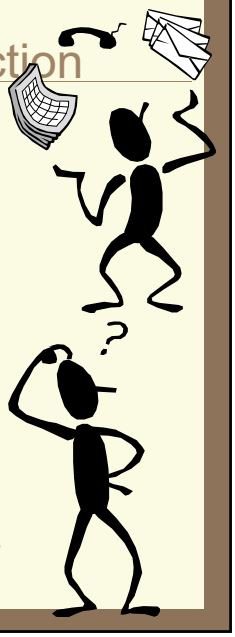


- ***Economic Impact***
  - *Value to Society*
    - *Economic Development*
- ***Technology Assessment***
  - *Roadmaps*
    - *Used to judge market value*
    - *Discussions held with both inventors and field experts*
- ***Cost Benefit (Risk)***
  - *Technical*
  - *Market*
- ***Competence Evaluation***
  - *Prospective Relationships*
    - *Prospective Licensees*

Lessons Learned…
Intent: Balance Thought & Action

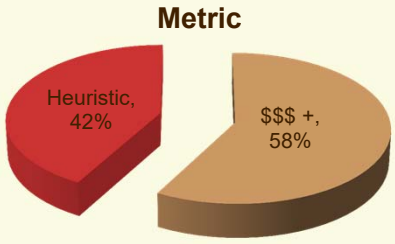
- ***In the long run, we shape our lives, and we shape ourselves. The process never ends until we die. And the choices we make are ultimately our own responsibility.***

Eleanor Roosevelt



Results *Similar* to "Practices of European R&D Institutions"?

- WIPO
  - World Intellectual Property Association
- Survey of European "TTO Circle"
  - 2011



Unintended Consequences of Avoiding Valuation

reComplicating… Solution requires more vigilance & craftsmanship by someone	reCongesting… Solution results in so much more of something that delays in the system result	Repeating… Solution results in more & more of same	reArranging… Solution requires that effort be refocused to a different location	reGenerating… Solution causes a different problem
• Craft *pro forma* license by legal (include indemnification by Licensee) • Mitigate risks for diffusion of innovation (mitigate potential side effects) • Validate outsourced efforts • Develop cost control system for Inventors	• Overflow of applications by prospective licensees • Increased time for Negotiation • Demand for increased "face time" with inventors by prospective licensees	• Outsourcing interactions • Number of Infringement cases increases • R&D focus on "low-hanging fruit" • Monitoring of licensees	• Focus on negotiation, not valuation • Portfolio management key skill, not valuation • Search for "best practices" in licensing to standardize process	• Ethical dilemmas (misuse of innovation) • Product liability • Royalty stream lower without validation of value (delays before royalty stream begins, also) • Incremental innovations dominate portfolio • Lose valued employees • Less $$$ for Breakthroughs

Lessons, Lessons…

- ***US & European Approaches More Similar, than Different***
- ***Technology Valuation Important Task before Licensing Negotiations ???***
  - ***Financial Valuation Performed, Sometimes***
    - ***Combination of Approaches Used***
      - ***Except, Cost Valuation, at least from ABC perspective, is non-issue in University Environments***
  - ***Some Med Schools Allow Prospective Licensees to Value Technology***

Lessons, Lessons…

- ***Few TTOs noted Proprietary Methodology (about 10%)***
- ***Another Few noted Metrics that Extended Technology Valuation into a Broader Context***
  - ***Economic Impact***
  - ***Technology Assessment***
  - ***Cost Benefit***
- ***Avoiding Valuation can have Unintended Consequences***

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