SHORT- AND LONG-TERM ECONOMIC IMPACTS OF S&T INVESTMENTS: DATA ISSUES

Science of Science Policy Interagency Group

Background

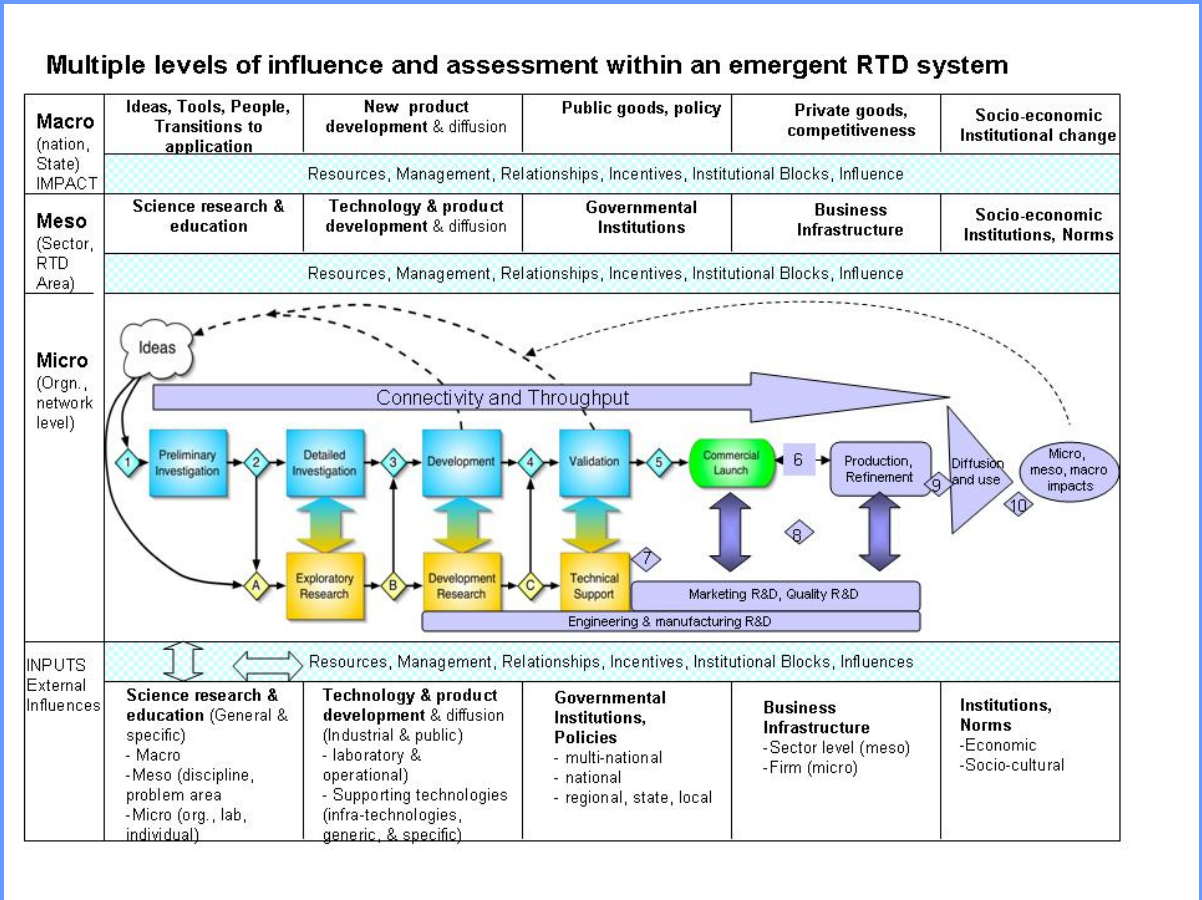
- SOSP Roadmap and workshop
  - Data module
  - Input on data infrastructure
- Data Infrastructure working group
  - NSF, NIH, IRS, BEA
  - January "next steps" memo
- The new importance of science in economic growth
  - America COMPETES
  - ARRA
  - Congressman Holt's letter

More Background

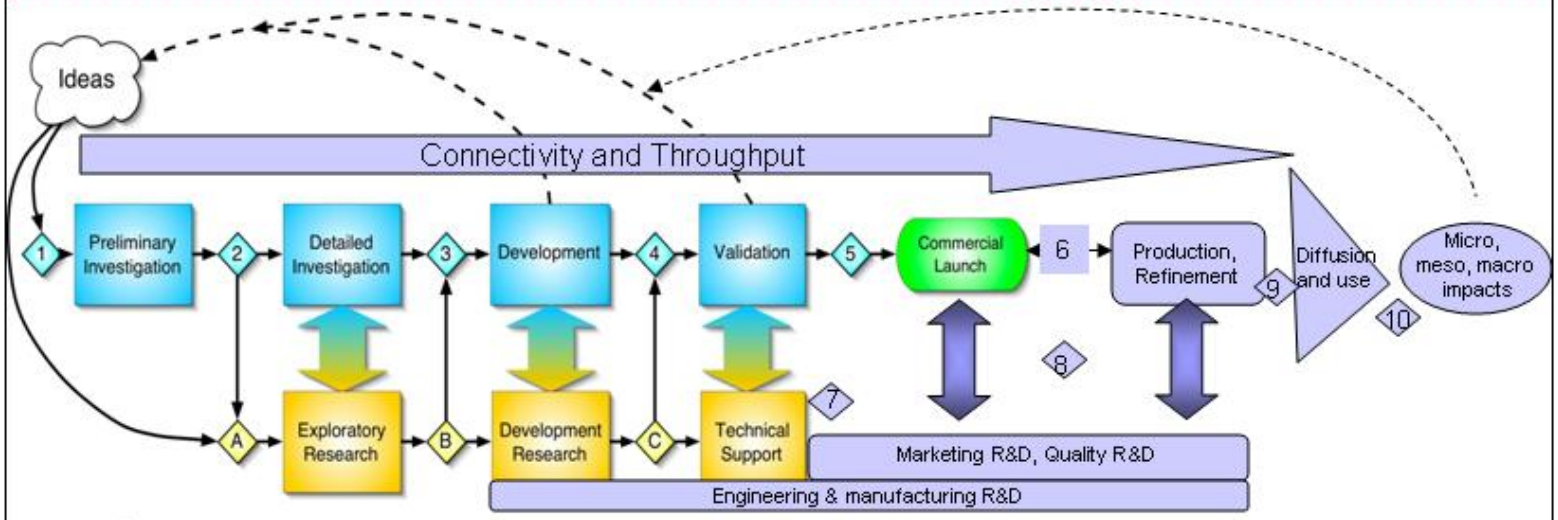
- Challenge with job creation estimates
  - Identifying informed respondent
    - HR?
    - Finance?
    - SRO?
  - Identifying appropriate concept
    - What is a job
    - What is a “created” job
    - What is due to stimulus, given churn in jobs
  - Getting good estimate
    - Experience with employment surveys
  - Burden and confusion

Conceptual Challenges

- **Describing the process: Economics, sociology, political science, psychology, domain disciplines**



Multiple levels of influence and assessment within an emergent RTD system

Macro (nation, State) IMPACT	**Ideas, Tools, People, Transitions to application**	**New product development** & diffusion	**Public goods, policy**	**Private goods, competitiveness**	**Socio-economic Institutional change**
	Resources, Management, Relationships, Incentives, Institutional Blocks, Influence				
Meso (Sector, RTD Area)	**Science research & education**	**Technology & product development** & diffusion	**Governmental Institutions**	**Business Infrastructure**	**Socio-economic Institutions, Norms**
	Resources, Management, Relationships, Incentives, Institutional Blocks, Influence				
Micro (Orgn., network level)					
INPUTS External Influences	Resources, Management, Relationships, Incentives, Institutional Blocks, Influences				
	Science research & education (General & specific) - Macro -Meso (discipline, problem area -Micro (org., lab, individual)	**Technology & product development** & diffusion (Industrial & public) - laboratory & operational) - Supporting technologies (infra-technologies, generic, & specific)	**Governmental Institutions, Policies** - multi-national - national - regional, state, local	**Business Infrastructure** -Sector level (meso) -Firm (micro)	**Institutions, Norms** -Economic -Socio-cultural

Empirical Challenges

- Unit of analysis
- Time Lags
- Disciplinary differences
- Science Data Infrastructure targeted towards proposal administration, rather than management information or analysis

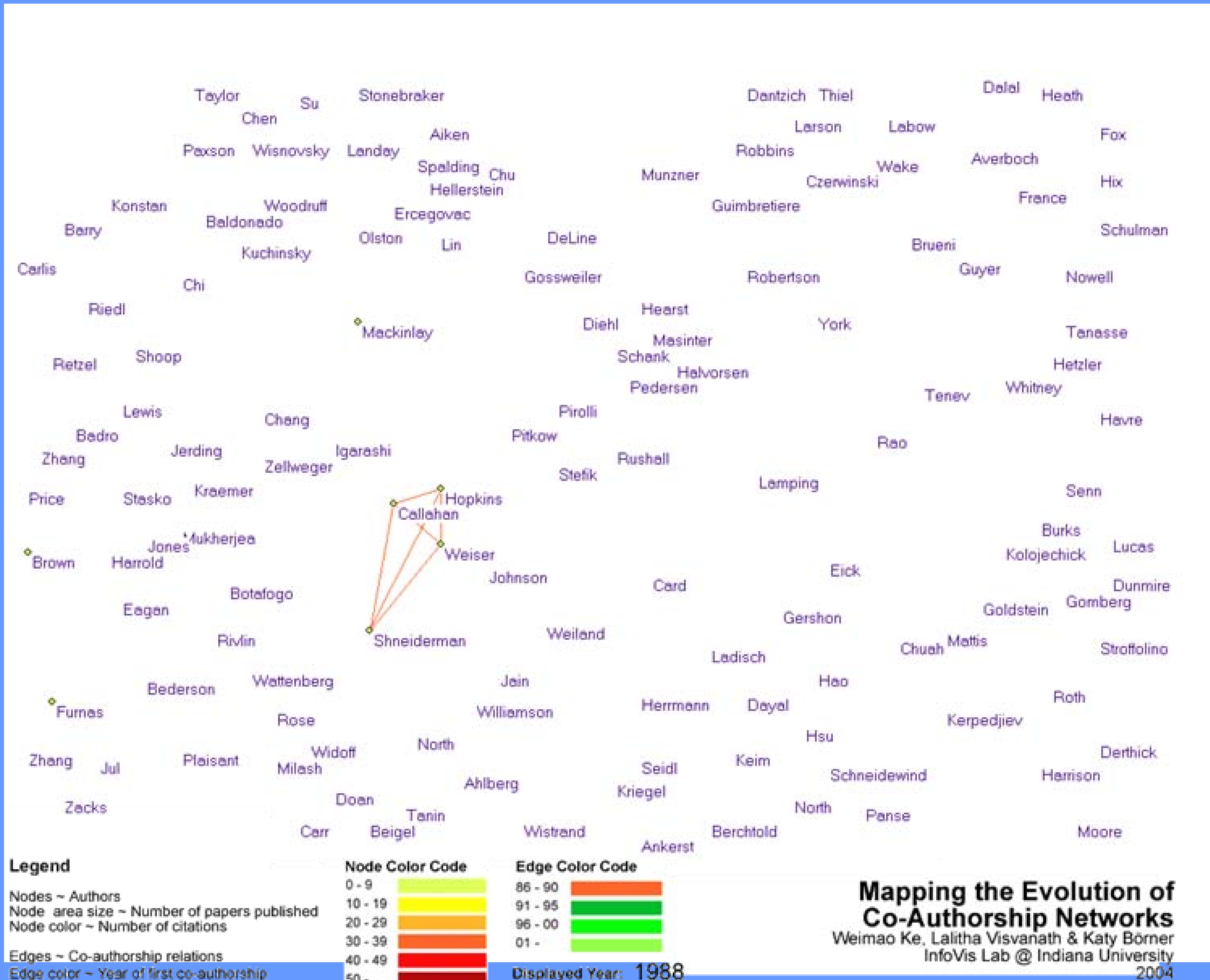
=> No coupling of science investments with scientific and economic outcomes

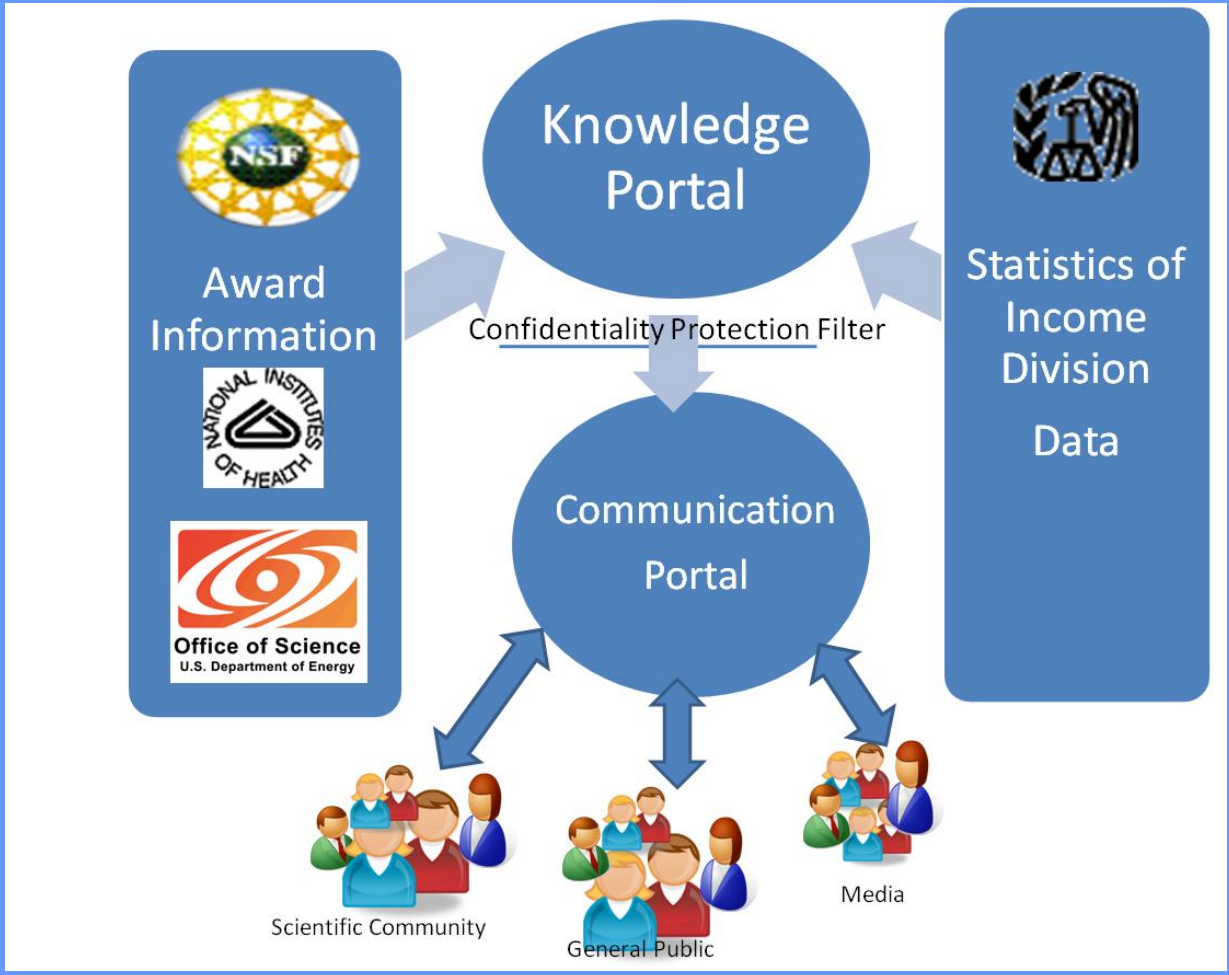
Pragmatic Challenges

- Timeliness of estimates
- Informing key constituents
- Engagement of scientific community

Lessons From Previous Experience

- Measuring job creation from administrative records feasible
  - Requires buyin
  - Legal, technical and operational barriers, but surmountable
  - Necessary to address perceptions up front
- Disseminating public use data for use by recipients feasible
- Two examples below


Taylor
Su
Stonebraker
Chen
Dantzich
Thiel
Dalal
Heath
Larson
Labow
Paxson
Wisnovsky
Landay
Aiken
Robbins
Fox
Averboch
Spalding
Chu
Hellerstein
Munzner
Wake
Czerwinski
Hix
France
Konstan
Woodruff
Baldonado
Ercegovac
Guimbretiere
Barry
Olston
Lin
DeLine
Schulman
Kuchinsky
Brueni
Guyer
Carlis
Gossweiler
Robertson
Nowell
Chi
Riedl
Hearst
Mackinlay
Diehl
York
Masinter
Tanasse
Schank
Retzel
Shoop
Halvorsen
Hetzler
Pedersen
Whitney
Tenev
Lewis
Pirolli
Chang
Havre
Badro
Pitkow
Jerding
Igarashi
Rao
Zhang
Zellweger
Rushall
Stefik
Lamping
Kraemer
Senn
Price
Stasko
Hopkins
Callahan
Burks
Mukherjea
Jones
Lucas
Kolojechick
Weiser
Brown
Harrold
Eick
Johnson
Card
Dunmire
Botafogo
Goldstein
Gomberg
Eagan
Gershon
Weiland
Shneiderman
Rivlin
Chuah
Mattis
Stroffolino
Ladisch
Wattenberg
Jain
Hao
Bederson
Roth
Furnas
Williamson
Herrmann
Dayal
Rose
Kerpedjiev
Hsu
North
Widoff
Derthick
Zhang
Jul
Plaisant
Milash
Seidl
Keim
Schneidewind
Harrison
Ahlberg
Kriegel
Zacks
Doan
North
Tanin
Panse
Carr
Beigel
Wistrand
Berchtold
Moore
Ankerst
Legend
Nodes ~ Authors
Node area size ~ Number of papers published
Node color ~ Number of citations
Edges ~ Co-authorship relations
Edge color ~ Year of first co-authorship
Node Color Code
0 - 9
10 - 19
20 - 29
30 - 39
40 - 49
50 -
Edge Color Code
86 - 90
91 - 95
96 - 00
01 -
Displayed Year: 1988
Mapping the Evolution of
Co-Authorship Networks
Weimao Ke, Lalitha Visvanath & Katy Börner
InfoVis Lab @ Indiana University
2004


Knowledge Portal
Award Information
NSF
NATIONAL INSTITUTES OF HEALTH
Office of Science
U.S. Department of Energy
Statistics of Income Division
Data
Confidentiality Protection Filter
Communication Portal
Scientific Community
General Public
Media

Example - ARRA

Example: Estimating Job Creation

- Identifying informed respondent
  - HR?
  - Finance?
  - SRO?
- Identifying appropriate concept
  - What is a job
  - What is a "created" job
  - What is due to stimulus, given churn in jobs
- Getting good estimate
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Possible Approach

- Automatically generate job creation measures
  - Create administrative tracking system
    - Existing payroll management systems
    - Unemployment insurance wage records
  - External validation and accountability
    - Credible researchers (not Fed estimates)
    - External tagging

UIA 1017 (Rev. 1-06)

PICA ELITE

Wage Detail Report

STATE OF MICHIGAN, DEPARTMENT OF LABOR & ECONOMIC GROWTH
UNEMPLOYMENT INSURANCE AGENCY
See reverse side for detailed instructions and penalty provisions.

Authorized by MCL 421.1, et seq.

PICA ELITE

BY USING "ALIGNMENT BOXES" TYPED & LINE PRINTED DATA WILL FALL WITHIN ALL FIELDS

Report Quarter Ending:

Return by:

Mail original form to:
(Do not mail a copy)

RESET FORM

UIA Wage Record Unit
P.O. Box 9052
Detroit, MI 48202-9052
1-313-456-2760
(TTY customers use 1-866-366-0004)

FEIN

UIA Account Number

Multi-Unit

Please Type Or Print All Information

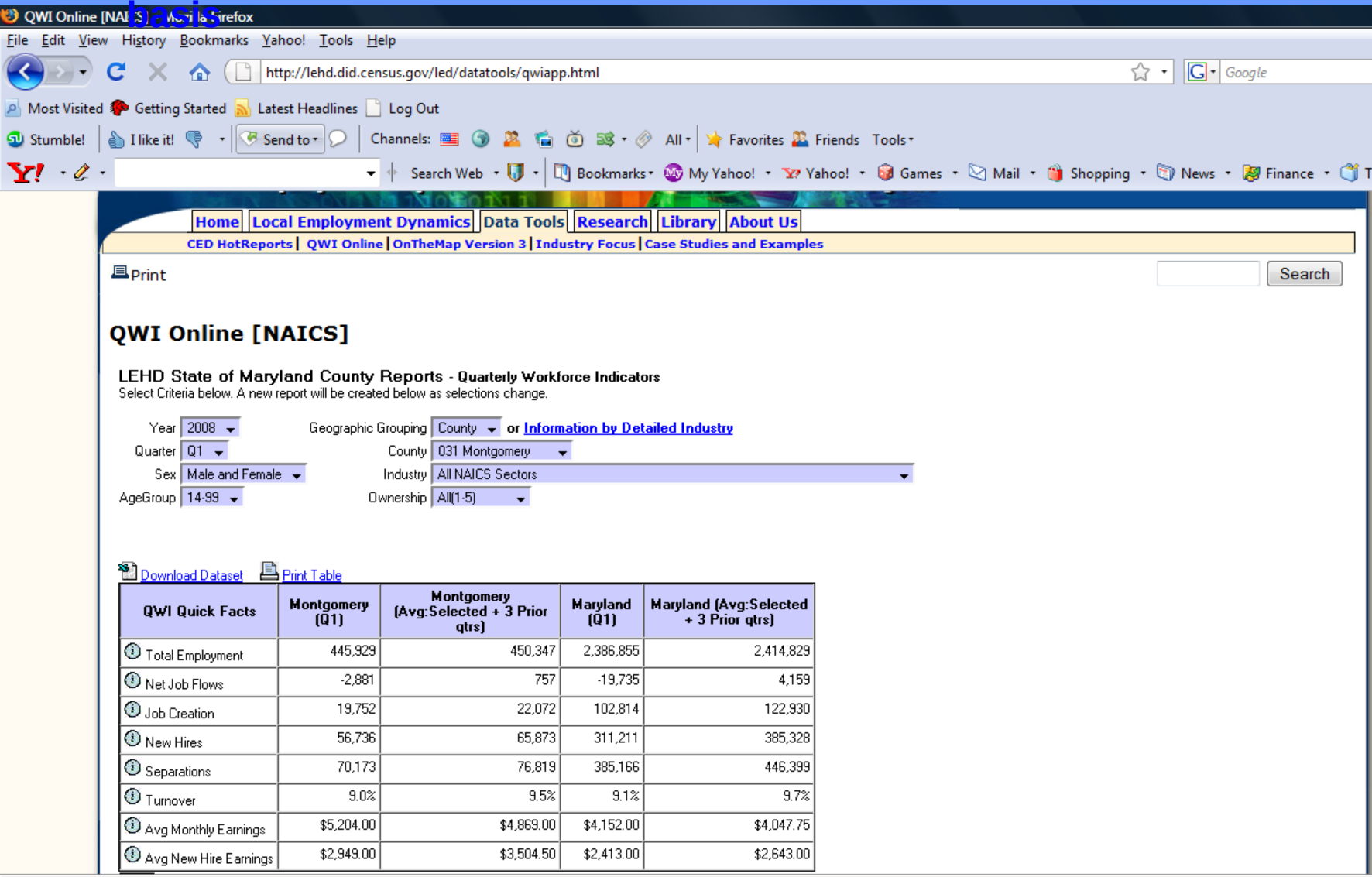
STATUS	DELETE (X)	SOCIAL SECURITY NUMBER	EMPLOYEE NAME LAST NAME	EMPLOYEE NAME FIRST NAME	GROSS WAGES PAID THIS QUARTER
					$
					$
					$
					$
					$
					$

Additional Steps

- Work with willing agencies
- Pilot with some academic institutions

  - Federal Demonstration Project
- Pilot with some HR packages
  - E.g Peoplesoft
- Develop useful and interesting end products

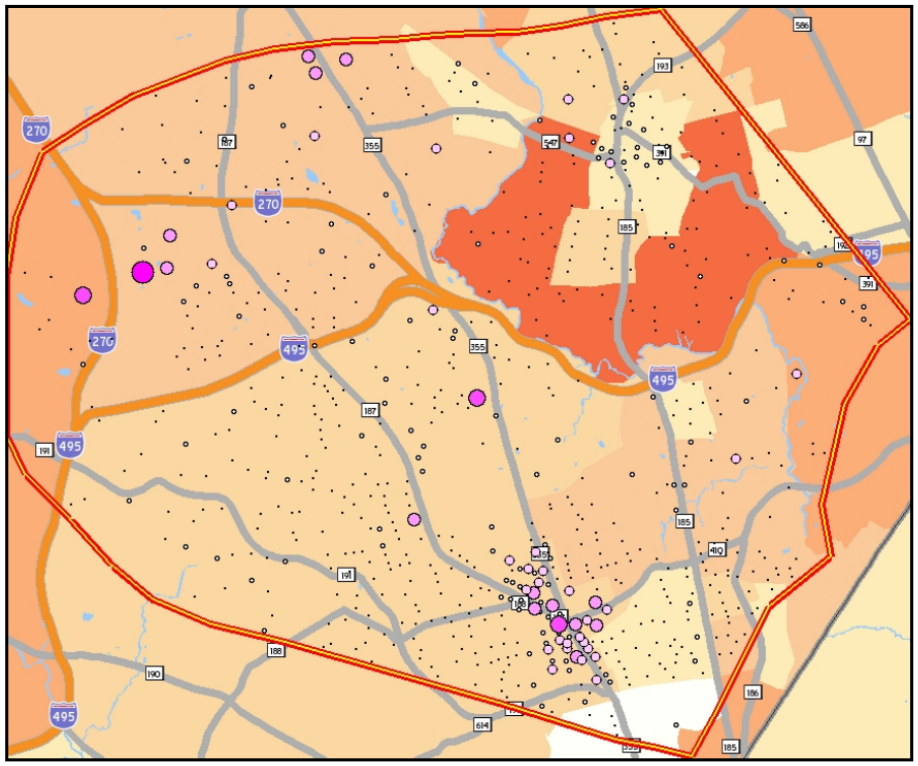
1. “products” to get buy in
2. Administrative measures of job creation (and earnings) on flow basis



QWI Quick Facts	Montgomery (Q1)	Montgomery (Avg:Selected + 3 Prior qtrs)	Maryland (Q1)	Maryland (Avg:Selected + 3 Prior qtrs)
Total Employment	445,929	450,347	2,386,855	2,414,829
Net Job Flows	-2,881	757	-19,735	4,159
Job Creation	19,752	22,072	102,814	122,930
New Hires	56,736	65,873	311,211	385,328
Separations	70,173	76,819	385,166	446,399
Turnover	9.0%	9.5%	9.1%	9.7%
Avg Monthly Earnings	$5,204.00	$4,869.00	$4,152.00	$4,047.75
Avg New Hire Earnings	$2,949.00	$3,504.50	$2,413.00	$2,643.00

1. Customized areas of impact (freehand for zip 20814)
2. Public use data at block level

Work Area Profile Report



This map is for demonstration purposes only. For a more detailed and customizable map ouput, please use the "Print Map" tool located above the Map Viewer.

2006
- 1 - 44 Workers
- 45 - 358 Workers
- 359 - 1210 Workers
- 1211 - 2870 Workers
- 2871 - 5605 Workers
- 5606 - 9687 Workers

Automatic and customized reports possible

Total Primary Jobs	2006	
	Count	Share
Total Primary Jobs	84,169	100.0%

Jobs by Worker Age	2006	
	Count	Share
Age 30 or younger	22,046	26.2%
Age 31 to 54	49,297	58.6%
Age 55 or older	12,826	15.2%

Jobs by Earnings Paid	2006	
	Count	Share
$1,200 per month or less	15,703	18.7%
$1,201 to $3,400 per month	27,189	32.3%
More than $3,400 per month	41,277	49.0%

Jobs by Industry Type (2-digit NAICS)	2006	
	Count	Share
Agriculture, Forestry, Fishing and Hunting	73	0.1%
Mining, Quarrying, and Oil and Gas Extraction	8	0.0%
Utilities	29	0.0%
Construction	5,127	6.1%
Manufacturing	2,698	3.2%
Wholesale Trade	1,705	2.0%
Retail Trade	8,386	10.0%
Transportation and Warehousing	952	1.1%
Information	2,551	3.0%
Finance and Insurance	7,052	8.4%
Real Estate and Rental and Leasing	3,714	4.4%
Professional, Scientific, and Technical Services	14,175	16.8%
Management of Companies and Enterprises	4,171	5.0%
Administration & Support, Waste Management and Remediation	6,300	7.5%
Educational Services	2,889	3.4%
Health Care and Social Assistance	9,269	11.0%
Arts, Entertainment, and Recreation	1,805	2.1%
Accommodation and Food Services	7,087	8.4%
Other Services (excluding Public Administration)	5,772	6.9%
Public Administration	406	0.5%

GETTING INTO THE DETAILS: AGENCY AND UNIVERSITY GRANT HANDLING COMPLEXITIES

John Voeller

Generic Agency Investment Schematic

Standards Steps and New Recovery Steps Shown

Investment Selection, Prioritization, Posting And Award

Award Recording, Management, Reporting

Place On Agency Public Access Site

Transmission Of FAADS Records To Census Site

Closure and Archive of Investment Retain Record On Public Access Site

Standards Steps

Recovery Steps

Identification Of Investment As Recovery Funded and Estimate Value

Tagging Investment As Recovery Related In Accounting

Provide ARRA Extraction And Update Path to Recovery.gov

ARRA Analysis Performed Reviewed And Posted

Figure 1

Agency Project Info Access Schematic

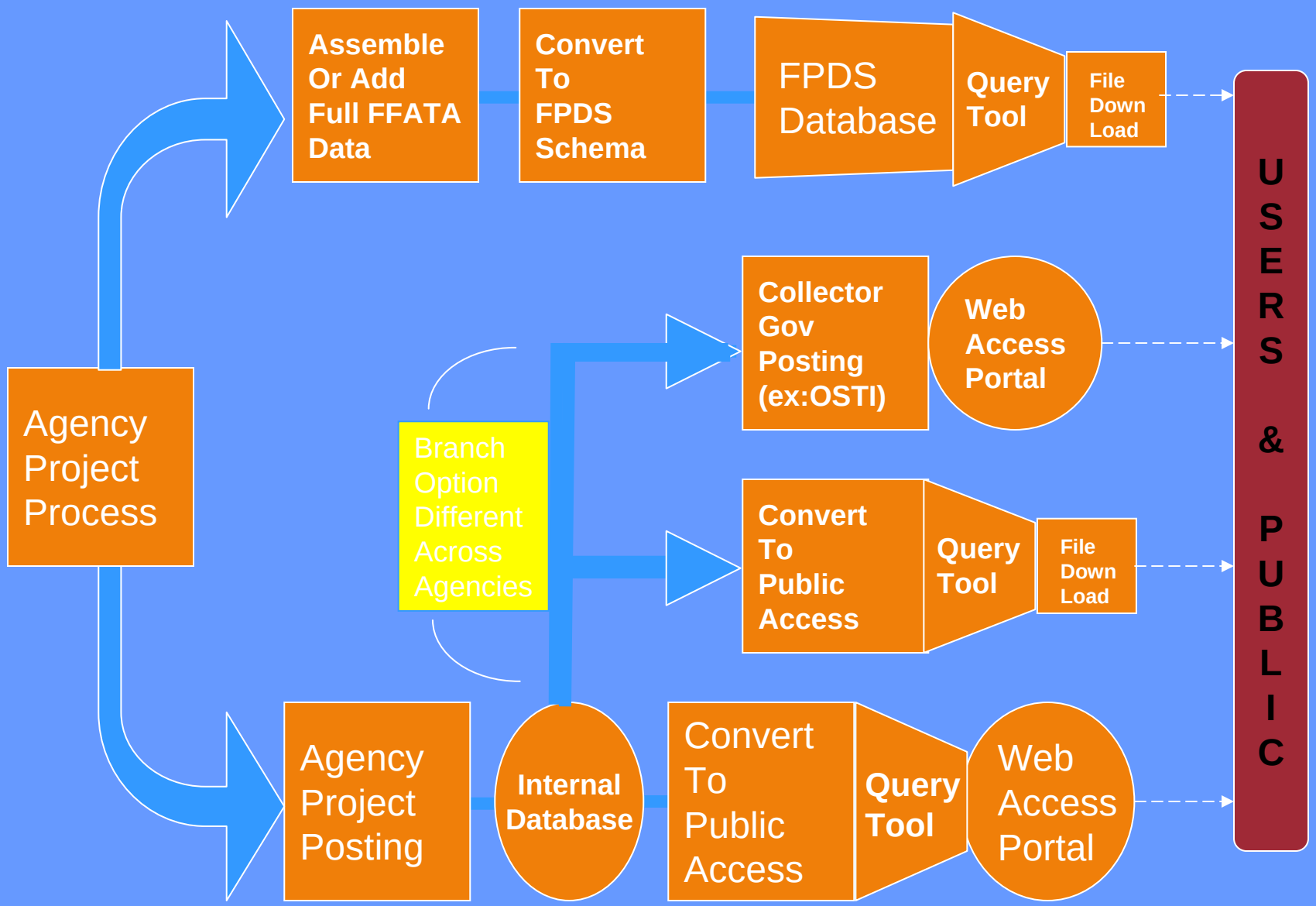
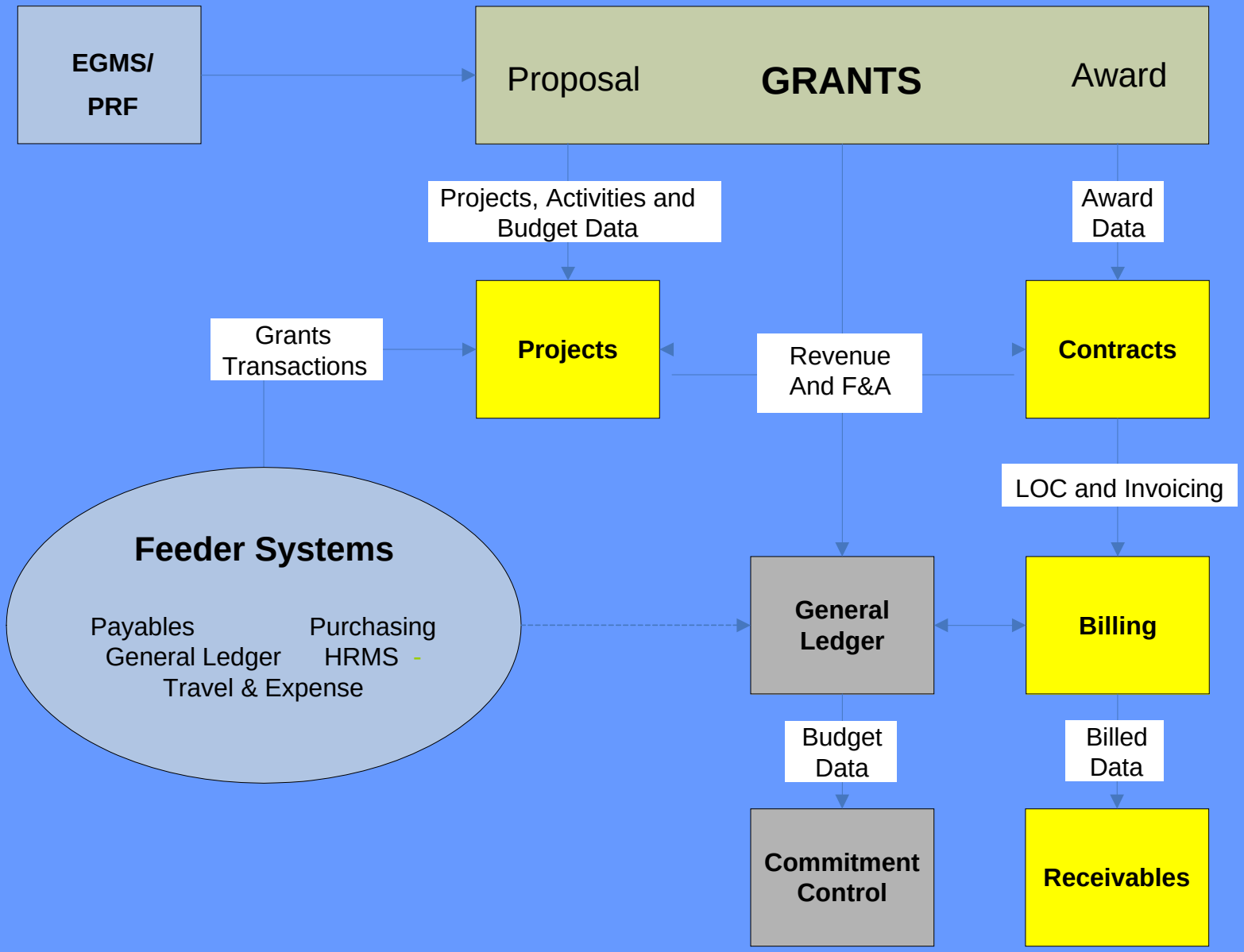
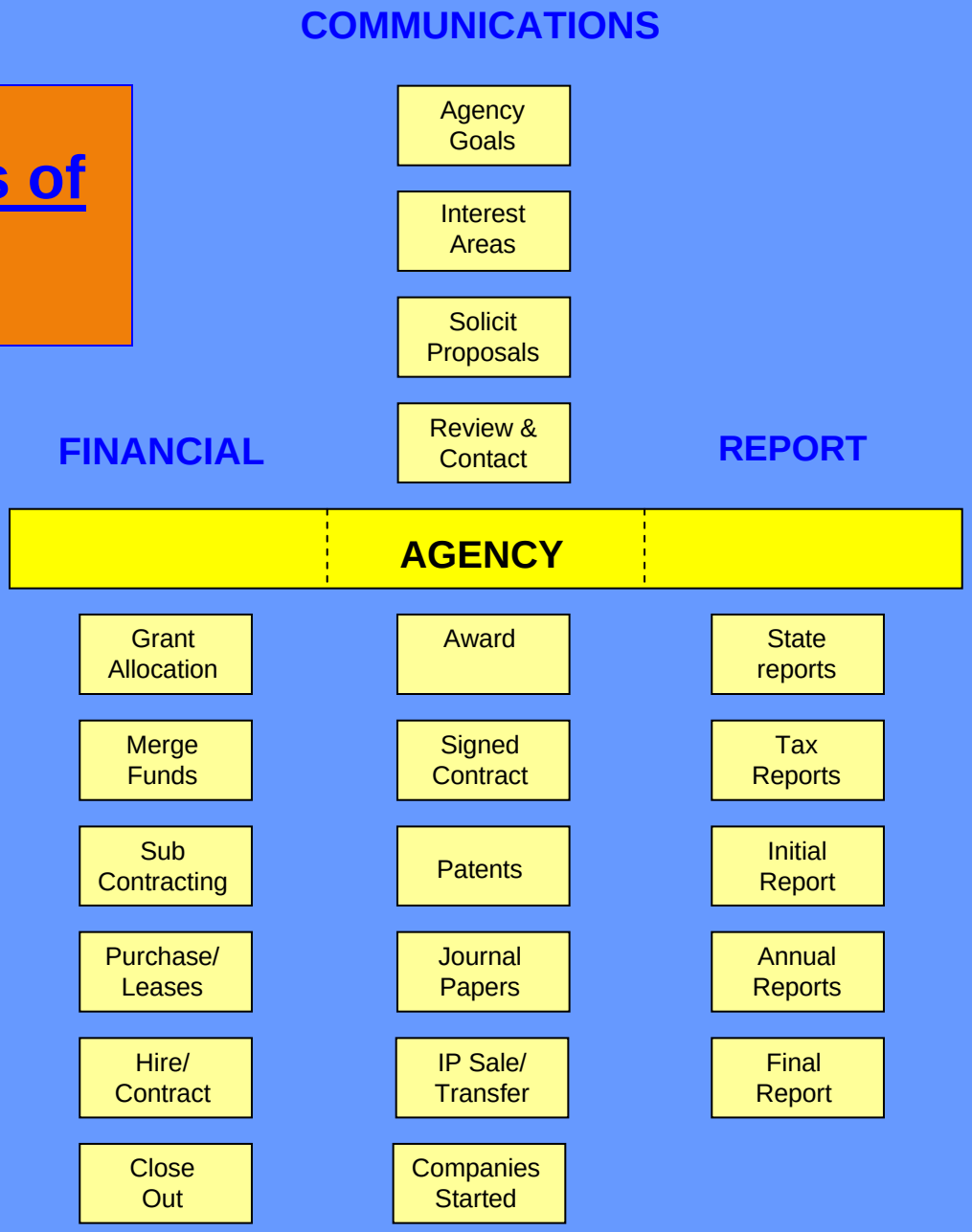


Figure 4

General University Grants Process Model



Three Channels of Knowledge



Other Key Issues

- Agencies overloaded with reporting requirements
- Recipients overloaded with reporting requirements
- Financial reporting is top priority

Broader Vision

- Create science of science policy data infrastructure
  - Leverage existing systems to minimize burden
  - Create flow estimates of awards, outcomes within a single administrative system
  - Match to other administrative and survey data in secure environment (e.g. student flows to firms, PI activities; firm outcomes: patents; r&d tax credits; IPOs)
  - Generate consistent, evidence based, open and transparent estimates of economic and societal impact
  - Cumulate impacts over time and by discipline

End View

- Dissemination: create capacity for scientists, businesses, and public to provide input into, and understand, the results of the scientific enterprise
  - Web 2.0
    - (collaborative tagging)
    - RSS feed
    - Visualization Zappos http://www.zappos.com/map/

Next steps: partnership

- Possible pilot on developing administrative data infrastructure (role for FDP)
  - Developing functional specs
- Agency and institutional support critical
- Open discussion