



pSCANNER's Value: Beckstrom's Law at Work

- The network and the network effect
- Measuring the value of the network
 - › Metcalfe's Law
 - › Reed's Law
 - › Beckstrom's Law
- Opportunities that may leverage pSCANNER
 - Beckstrom's Law at work
 - › California Department of Public Health
 - › Athena Breast Health Network



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Network Effect

“When network effect is present, the value of a product or service is dependent on the number of others using it”

What is the “value” of the network?

- Davis Sarnoff was a pioneer business man in radio and television

“the value of the broadcast network is proportional to the number of viewers”



“The value of an (ethernet) network is proportional to the square of the number of connected users of the system (N^2)”

- A way of measuring the “network effect”
- Reflects the ability of individuals to connect to others
- The value increases as the number of users increases
- Does not quantify the “value” itself

Metcalfe's Law

$$V_j = n^2 * p$$

Where:

V	= value of network j
n	= the number of end points or nodes
p	= some constant

Bob Metcalfe

- Electrical engineer
- Co-invented Ethernet
- Founded 3Com
- Formulated Metcalfe's Law



- The utility of large networks sales exponentially with the size of the network
- Developed because Metcalfe's law understates the value of a group-forming network as it grows

What is Reed's Law?

The number of possible sub-groups of network **participants** is

$$2^n - n - 1$$

...where **n** is the **number of participants**.

Harvard
Business
Review

LEADING TEAMS

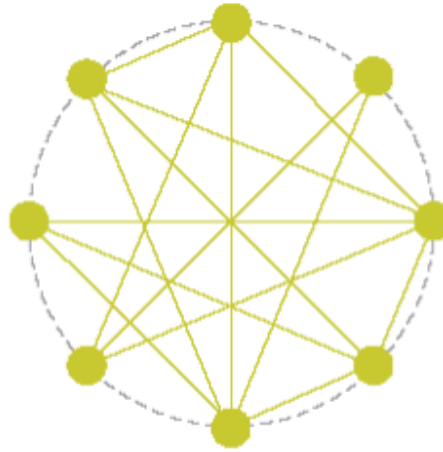
The Law of the Pack

by David P. Reed

FROM THE FEBRUARY 2001 ISSUE



Sarnoff
 $V=n$



Metcalf
 $V=n^2$



Reed
 $V=2^n$

- Theorem formulated by Rod Beckstrom (CEO of ICANN)

“the value of a network equals the value added to each user’s transactions conducted through that network, summed over all users”

$$\sum_{i=1}^n V_{i,j} = \sum_{k=1}^n \frac{B_{i,k}}{(1+r)^{t_k}} - \sum_{l=1}^n \frac{C_{i,l}}{(1+r_l)^{t_l}}$$

Where

$V_{i,j}$ = net present value of all transactions of $k = 1$ through n to individual i with respect to network j

i = one user of the network

j = identifies one network or network system

$B_{i,k}$ = the benefit value of transaction k to individual i

$C_{i,l}$ = the cost of transaction l to individual i

r_k and r_l = the discount rate of interest to the time of transaction k or l

t_k or t_l = the elapsed time in years to transaction k or l

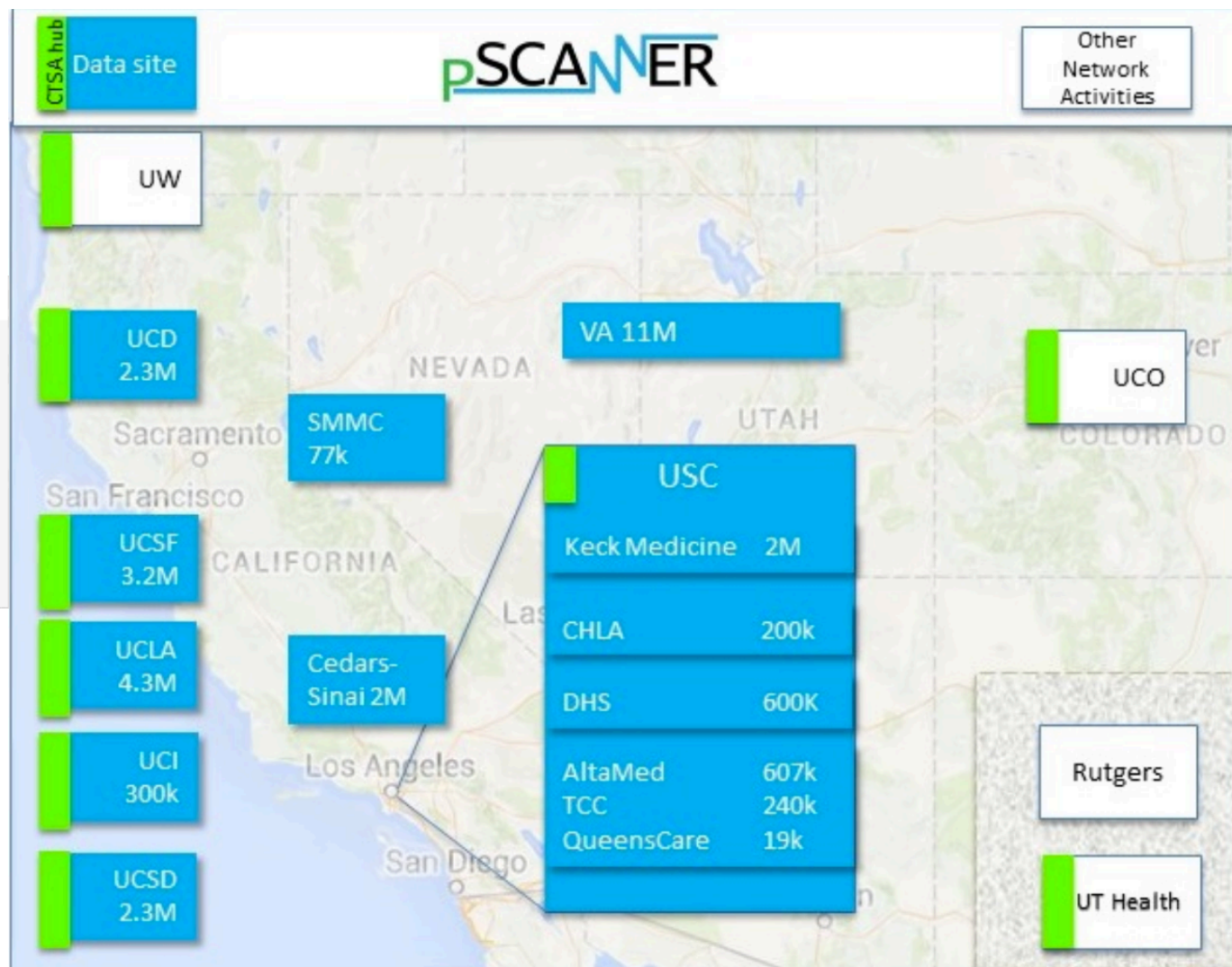
- Can we measure the value of “clinical data and science networks”?
 - › PCORNet
 - › pSCANNER
 - › Athena Breast Health Network

NUMBERS

24 MILLION PATIENTS
diverse, representative population

14 DATA SITES
federal, state, community institutions

29 INVESTIGATORS
clinicians, researchers, leaders



Participating institutions

- UCSF
- UCLA
- UCD
- UCSD
- UCI
- Sanford

Areas of Focus

- Screening and Prevention
- Diagnosis and Treatment
- Survivorship

2016

- Data collected and risk assessments - 90,000 women
- WISDOM trial starting (100,000)



A UNIVERSITY OF CALIFORNIA PROGRAM



We are women, physicians, and researchers building a more personalized solution for breast cancer prevention, screening, and treatment. Your story holds the cure.

Share it.

1

Come to a UC Medical Center to join Athena

2

Fill out a health questionnaire

3

Receive a personalized risk profile

4

Develop an individual plan with your provider

How to measure (create) value?

- Supports healthcare quality improvement
- Adds knowledge to biomedical science
- Facilitates population science
- Facilitates (or enables) the work of others who perform the prior to activities

- Some proposed initiatives that could create/add “value”
 - › Athena breast cancer care quality assessment initiative
 - › California Public Health Department (CDPH) population health queries
 - › Updating vital status with CDPH file

- Athena breast cancer care quality assessment initiative
 - » Provide the ability for Athena to perform breast cancer quality assessment queries across its network using pSCANNER (UC sites)
 - » Perform breast cancer quality assessment queries across the entire network and provide benchmarking (QOPI ASCO measures, for example)

- Collaboration with CDPH to explore the feasibility and utility of CDPH issuing population health based queries across pScanner (California nodes)
 - › Population based queries (de-identified)
 - › pScanner sites determine whether they will approve the query execution

- Collaboration with CDPH to provide a identified death file for the purposes of setting the vital status correctly in the institutional EHRs, and pSCANNER databases
 - › File has been obtained and is available to any UC site
 - › File includes name, address, date of death, date of birth
 - » does not currently include SSN or cause of death but we are discussing a request to add those to a file that is recurrent and provided in the monthly feed

- What is CancerLinQ?
 - › A major initiative by the American Society of Clinical Oncology (ASCO)
 - › A 501c(3)
 - › Data submitted by ASCO CancerLinQ sites to a central repository
 - » June 2016 (24months of operation): 1,500 practices submitting data, 1M patient records
 - » Insights on quality performance (QOPI program)
 - » Access to de-identified CancerLinQ data set for research (2017)
- We can facilitate participation of pSCANNER institution by creating a way to submit data efficiently
 - › No Cost (CancerLinQ provides support – paid by philanthropic contributions to CancerLinQ)
 - › The can work with multiple different EHR types
 - › OMOP is also a supported data model

CancerLinQ LLC and CI4CC Launch
Collaboration to Transform Cancer Data
Collaboration convenes the medical and data science
communities to drive focused efforts in oncology
informatics and advance solutions for cancer care

FOR IMMEDIATE RELEASE

June 5, 2016

ASCO and CancerLinQ Participated in
Landmark Cancer Moonshot Summit

June 30, 2016

- pSCANNER is a successful CDRN
- It has value to PCORI and institutions gain value by being able to participate in PCORI pragmatic trials
- Long-term sustainability
 - › Relying on a single funding source is suboptimal for long-term sustainability
- Need to think about 'value'
 - › And ideally think of what provides value and how to measure it
 - › Need to align value proposition with potential sustainable funding

- Why pScanner and not do these collaborations through the UC Health Centralized Database or UC-ReX?
 - › A strategy that only includes the University of California has many shortcomings
 - › Collaborations need to be state-wide (or beyond)
 - › pScanner is a large network with established clinical repositories that can be of value to many other state-wide or national disease centered organizations (ie, national registries for rare diseases, etc..)
 - › pScanner is up and running today
 - › pScanner uses a common data model and has harmonized its data to that model