REGIONAL INNOVATION MODELS AND DATA NEEDS:

INSIGHTS FROM ACCELERATORS & ANGEL GROUPS

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NCSES/CNSTAT Workshop on Advancing Concepts and Models of Innovative Activity and STI Indicator Systems

May 19-20, 2016

Washington, DC

OVERVIEW

An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a ***new organizational method in business practices, workplace organization*** *or external relations.*

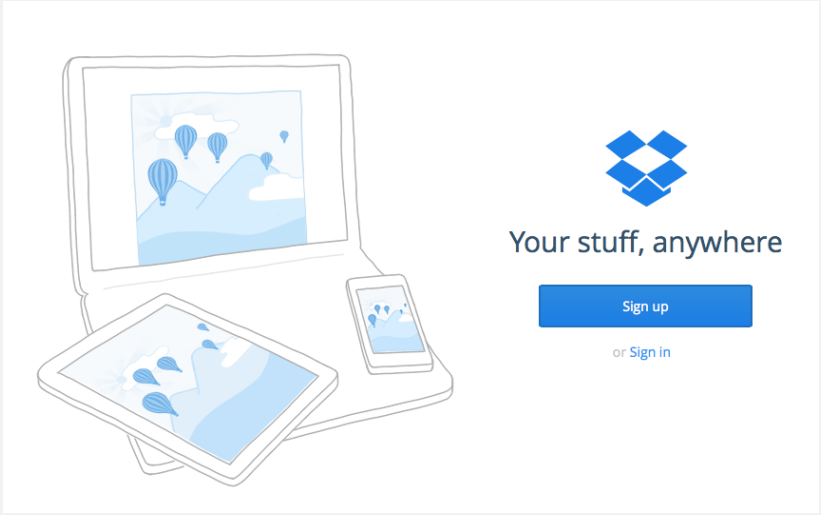
- Increasingly important empirical setting => seed accelerators
  - Rapidly emerging institutional form => business model innovation
  - Novel data and sources
- Focus on data and what we can learn
  - What types of novel data can be collected and analyzed in order to gain deeper insights into *innovation* and *entrepreneurship*?
- Insights
  - Lessons learned about regional innovation through lens of seed accelerators
  - Changing face of innovation/entrepreneurship
    - Shifts in early-stage ecosystem
    - Potential to change: who/what/where/how

CHANGES IN ECOSYSTEM

- Changes in early stage entrepreneurial ecosystem
  - Shifts at early stage
    - Especially financing => implications for
      - who enters STEM entrepreneurship
      - trajectories of new ventures
    - Regional implications
- How can we think about this in innovation indicators framework?
  - Institutional form => Business model innovation
    - Are we capturing this?
  - Sources of data => what sources of data can we bring to bear?
    - Innovation in *sources* of data => *opportunities, caveats, and cautions*
      - E.g., Crunchbase, LinkedIn,
      - Plus Kickstarter, AngelList, Twitter, etc.

EARLY STAGE: ENTRY POINT TO ECOSYSTEM/FINANCING

- Seed capital
  - Informal funding goes only so far
- Angel capital: traditional next step for formal equity financing
  - Varies from individuals to professionalized angel groups
  - Established
  - Regionally distributed
- Seed accelerators: shift in ecosystem at early stage
  - Distinct model
    - Cohorts
    - Short, finite time-period (~3 months)
    - Culminating pitch event (Demo Day)
      - Exposure to investors
      - competition within cohort
    - Mentorship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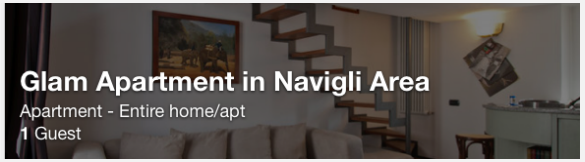
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HOW BIG IS THIS TREND?

- Size/magnitude: Glance at established accelerators (Vator News, 2014)
  - Techstars
    - Companies average over $1.6 million in outside VC after leaving
    - Average valuation Techstars alumni: $4.3 million, total of $1.5 billion
  - Y Combinator
    - Total "valuation" of all YC companies: >$65 billion
    - Total money raised by all YC companies: >$7 billion
    - Number of YC companies worth more than $1 billion: 8
- Compare to angel groups (Halo Report, 2014)
  - Median pre-money valuation: $3.0M
  - angel group investment trends for 2014: total of 870 deals and $1.65B in total rounds (including co-investors)

MEASUREMENT QUESTIONS-1

- Measuring entrepreneurship => skewed distribution (Guzman and Stern, 2015)
  - A lot of failure/ quitting
  - A few (potentially) big successes
  - Middle?
  - => really we should be interested in the full distribution
- Issues with typical milestones
  - Focus on (very) rare events: IPO, VC investment, etc.
  - NOT characteristic path of most new ventures
    - even just focusing on those that are high-growth *potential* at the start

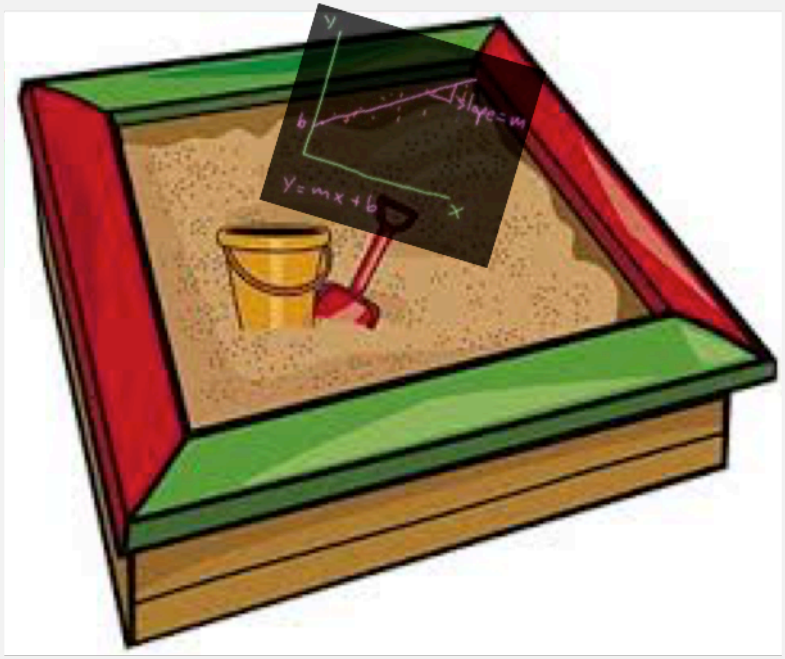
MEASUREMENT QUESTIONS-2

- Financing
  - TYPE & SOURCE matters
  - Not just $ (fungible)
  - INTANGIBLES may matter even more
    - Learning
    - Competition
    - Mentorship
    - Follow-on network

- Gap: We need to capture all of this
  - How?
  - What levels?

EMPIRICAL SANDBOX: SEED ACCELERATORS

- *How do the incentives and institutional structure of accelerators affect the trajectory of new ventures?*
  - Explicit design of cohorts
    - modeled to a large extent on the university experience
  - Short, intense "boot camp" periods
    - portfolio firms interact extensively
  - Culminate in "demo day" experience
  - *Plus*:
    - Selective application process
    - Equity investment



WHAT QUESTIONS SHOULD WE ANSWER?

- Accelerators
  - Cohorts
  - Duration
  - Mentorship
  - Ecosytem
- Other early stage

INSTITUTIONAL
Structure
Incentives

- Role of accelerator(s)
- Network and syndication ties
- Job creation
- Founders cycle back in=>
  - New startups, new investors, more mentors

REGION
Ecosystem
Short and long term impact

WHAT QUESTIONS SHOULD WE ANSWER?

- Prior experience
- Networks
- STEM Background
- Education

PEOPLE
Founders
Hires

- Founding team and early hires
- Evolution and growth
  - Funding
  - Exit through acquisition
  - Exit through quitting
  - Hiring
  - Location

STARTUP
Team
Growth

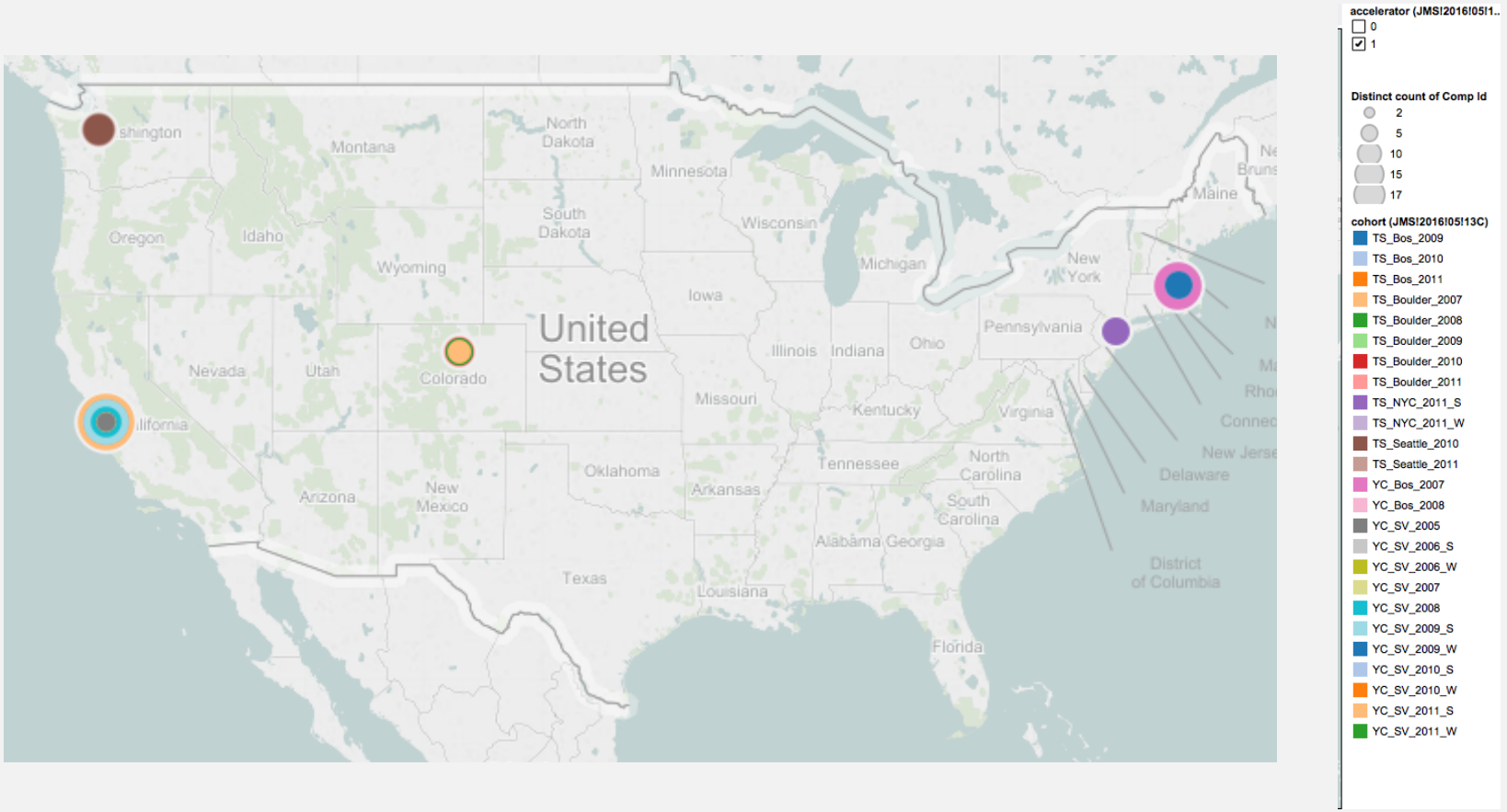
HOW DO WE STUDY EARLY STAGE VENTURES? DATA ISSUES & NEEDS

- Some issues we face:
  - Sampling on "successful" outcomes
    - VC investment, high valuations, acquisitions
  - Hard to get data on "failures"
    - Quitting quickly => is this failure or helpful in long run?
    - Stagnation => also hard to measure
  - Hard to get complete picture

MICRODATA

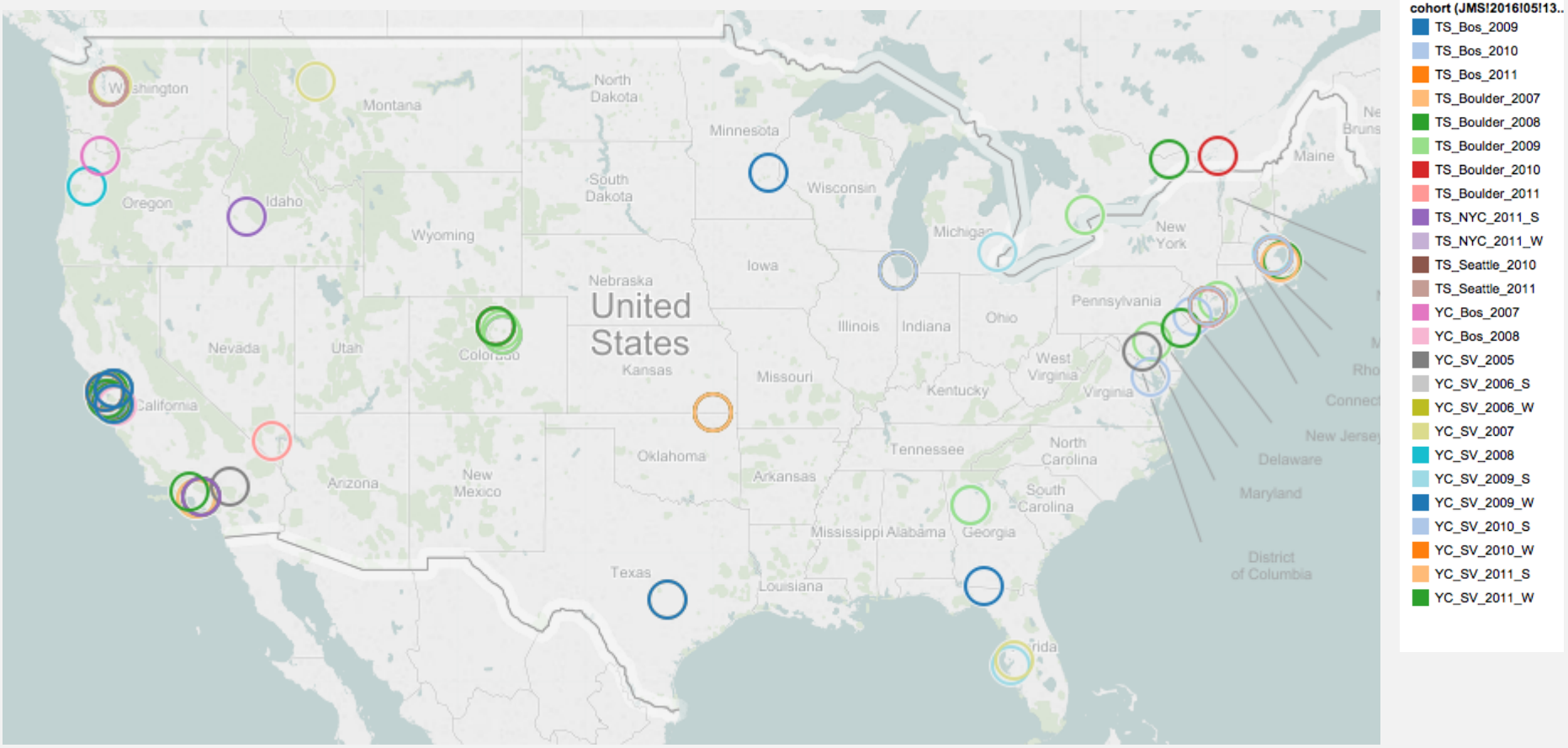
- Novel microdata
  - Full census (25 cohorts), 2 established accelerators (Y Combinator, Techstars) 2005-2011
  - Outcomes tracked through 2016
    - 394 startups, 933 founders, >15,000 hires
    - Geographically diverse
    - Diverse industry focus
- Comparable angel group sample
  - Similar range of industries and geographic locations, same time period

ACCELERATORS ARE LOCATED IN MULTIPLE LOCATIONS



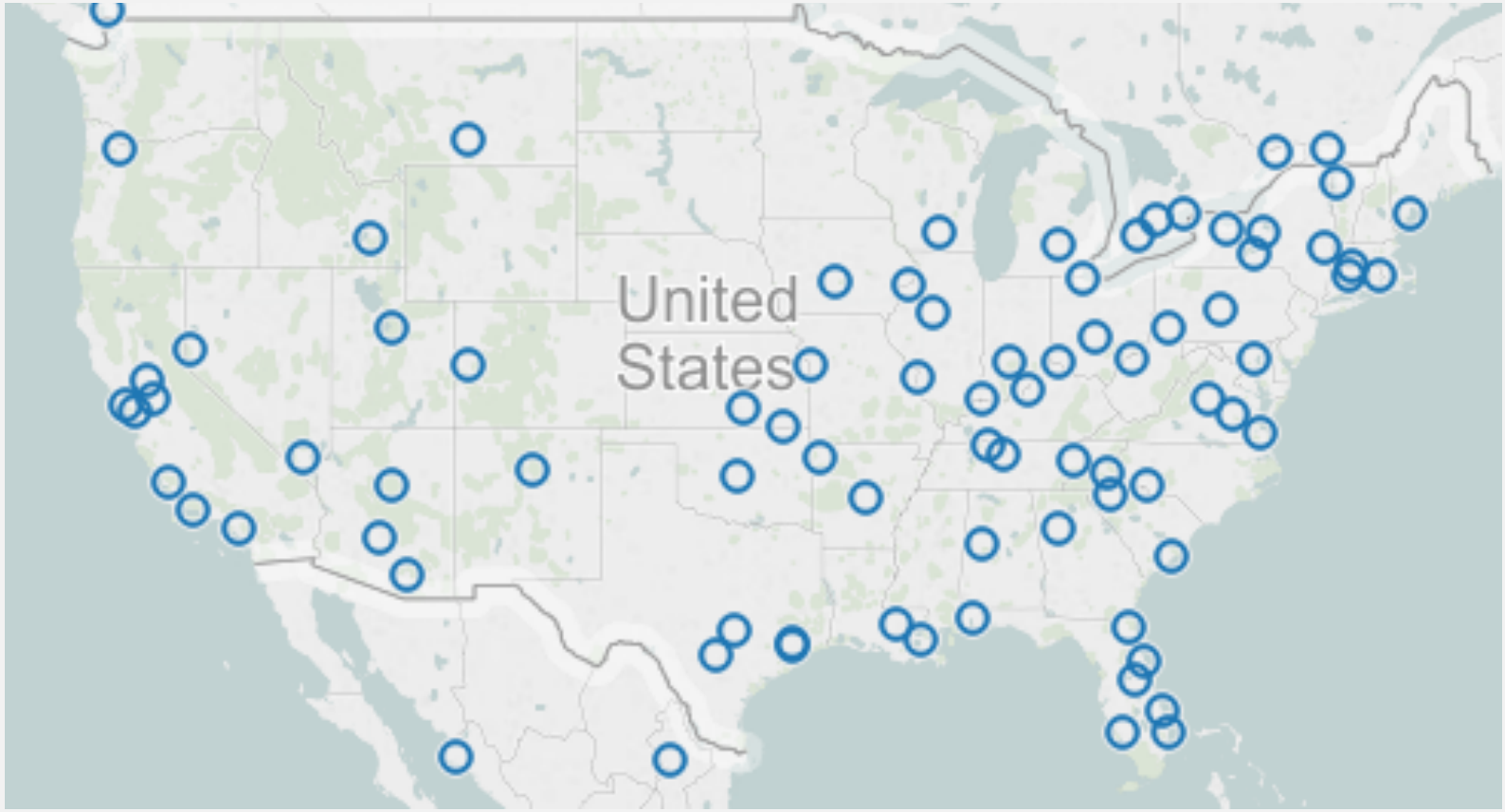
INSTITUTIONAL

STARTUPS COME FROM GREATER VARIETY OF LOCATIONS TO GO THROUGH ACCELERATORS



STARTUP

HIRING BY ACCELERATOR BACKED STARTUPS IS EVEN MORE WIDESPREAD



PEOPLE

DATA AND SAMPLE: SOURCES

Microdata sources:

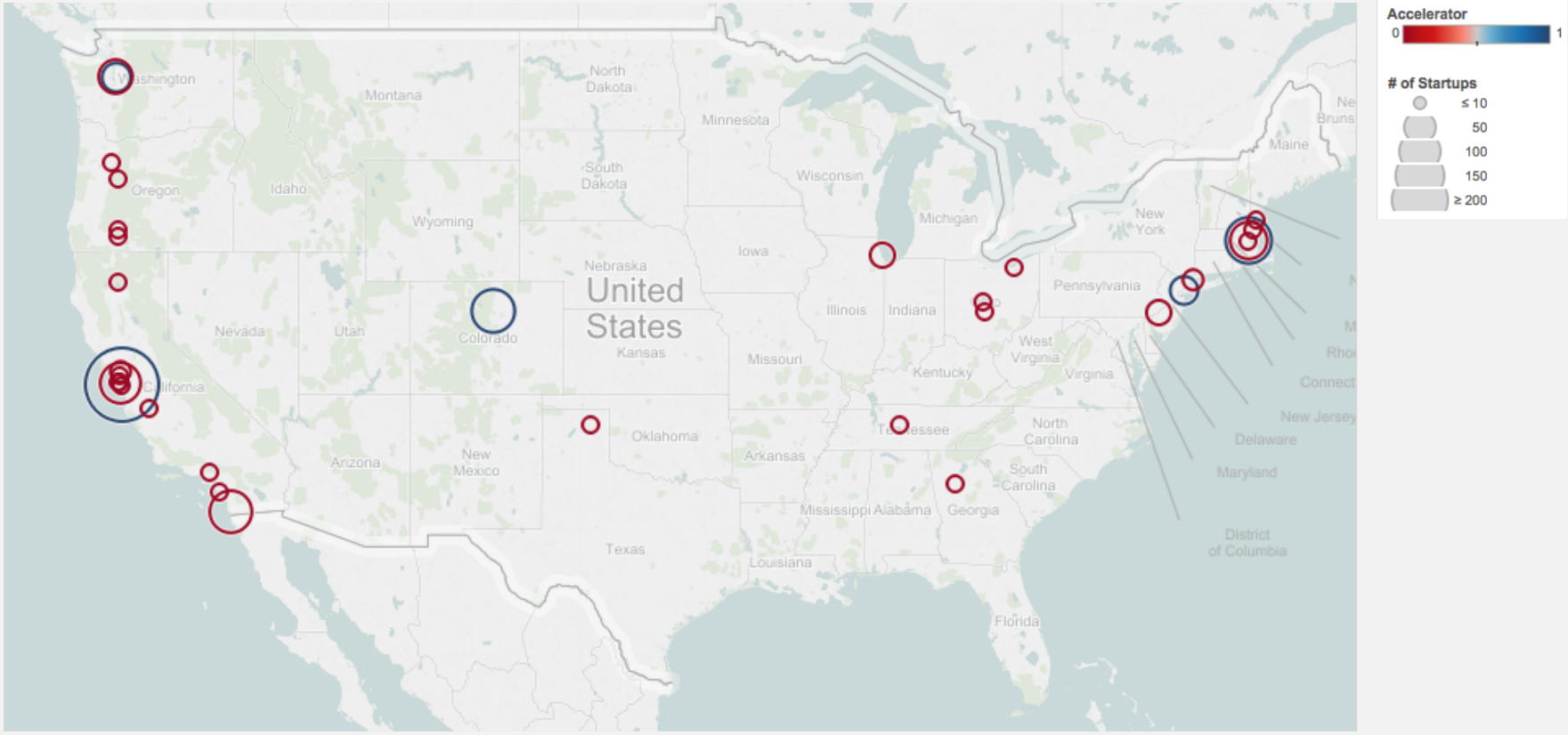
- Web-scraped data + hand collected
  - Triangulate sources to trace the trajectory of start-ups from inception/seed round
    - *Crunchbase*
    - *LinkedIn: founder backgrounds – education, work history*
    - *CB Insights*
    - *Thomson One's VentureExpert*
    - *Technology blogs: Deal history, founder backgrounds*
  - No one source is complete!
- For each startup and founding team we track
  - Outcomes:
    - Quit, acquisition, follow-on funding from VC
    - Hiring: First hiring choices- function, timing, generalist vs. specialist; long term growth
  - Startup level: Founding date, entry, industry, location
  - Founder level: Work history, education history
  - Founding Team Level: Functional Diversity, Cohort Balance
  - Hires: Education, Prior experience, location

MATCHED SAMPLE: ACCELERATORS AND PROFESSIONAL ANGEL GROUPS

- Matching
  - Stage, industry, location
  - Also, non-parametric Coarsened Exact Matching (CEM) for derive a more stringent matched sample (Azoulay et al., 2010, Iacus et al., 2012)
- Final sample: n=654 startups
  - Accelerator sample: Y Combinator, TechStars
    - Full census of cohorts, 2005-2011
    - Consistently top ranked
  - Angel investor sample: 19 angel groups
    - No comprehensive ranking, rank by deals
  - Geographically diverse
    - Si-Val, Cambridge, Boulder, DC, LA, NY, Austin, Toronto
  - Industry
    - Music, Gaming, and Media; Social Media, Location, and Mobile Apps; Payment and Commerce; Web Business; and Underlying Technology

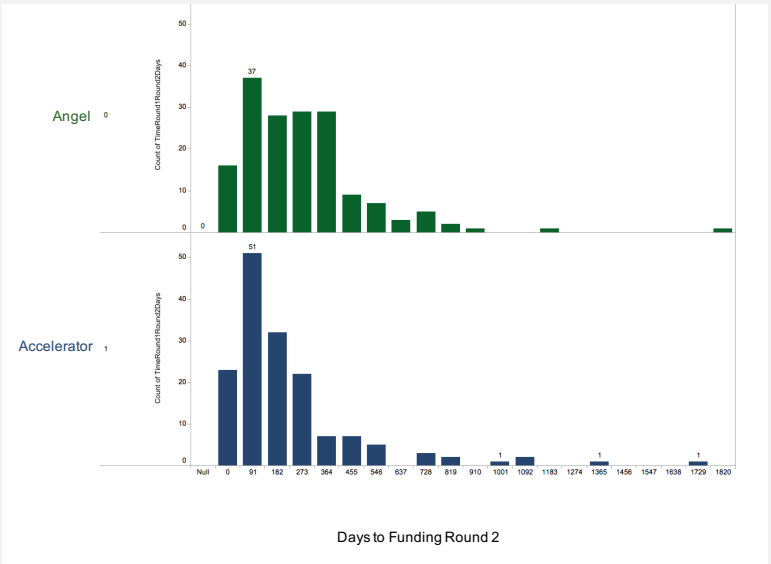
ANGEL GROUP

- Create matched sample of startups that instead get first formal investment from professional angel groups



WHAT DO ACCELERATORS ACCELERATE?

- Acceleration of exit through multiple channels
- Exit through acquisition
  - *1.75 x faster*
- Exit through quitting
  - *4.07 x faster*
- Acceleration of VC funding multifaceted
  - *Short term effect*
    - *acceleration of VC follow-on funding-"Demo Day"*
    - *2.68 X faster after 120 days*
  - *Longer term impact*
    - *deceleration of VC follow-on funding*
    - *0.645 X after 195 days*
    - *0.440 X after 500 days*



INSTITUTIONAL FEATURES: WHAT DO WE KNOW?

- What do we know? What should we know more about?
  - Accelerators impact outcomes we care about: Exit through acquisition & exit through quitting, funding from VCs (Winston Smith and Hannigan, 2015)
- What happens inside the "box"?
  - Cohorts = a defining characteristic of accelerators
    - Lack clear understanding so far of the real significance of cohorts
    - Peer effects=> Learning, competition (Winston Smith, Hannigan, and Gasiorowski, 2016)
  - ACCELERATOR COHORTS influence the direction of startups and founding teams (in progress, Winston Smith, Dutt, and Williams)
    - Early hiring and growth
    - Exit and funding decisions

STEM CAREERS IN ENTREPRENEURSHIP

Founder Background	mean	min	max
FT Share SciTech	0.3304	0	1
FT Share Coder	0.3639	0	1
FT Share Business	0.5449	0	1

- STEM entrepreneurs make up large share of founding team backgrounds
- Isolate Sci/Tech and Coders
  - Insight into distinctions within STEM
  - Accelerator preference and CS programs (selection model)
    - Intriguing evidence of broader impact of universities and CS programs

HOW DISTANT IS THE FOUNDING TEAM FROM THE COHORT?

- Cohort Heterogeneity
  - Distance between founding team and cohort (cosine similarity)
  - range from 0.47 (least similar) to ~1.0 (same)
    - Mean=0.85, Median =0.88
  - Opportunity for learning + competition

Cohort Backgrounds	mean	min	max
Cohort Share SciTech	0.3408	0.1333	0.4615
Cohort Share Coder	0.3661	0.1905	0.4771
Cohort Share Business	0.5468	0.2941	0.7931

LIMITATIONS AND FUTURE STEPS

- Generalization to broader ecosystem
  - Tracks well-established programs, selective
  - Programs attract high-growth potential startups
    - Not one-size-fits-all for all types of founders/startups
  - Selection concerns
    - Mitigate with matched sample, selection model
- Suggests "best practices"
- Future steps
  - Scaling up
  - Compare to other sources
    - Kauffman Firm Survey
    - Census

THANK YOU!

Acknowledgements: NSF Grant #1360152

National Science Foundation
WHERE DISCOVERIES BEGIN