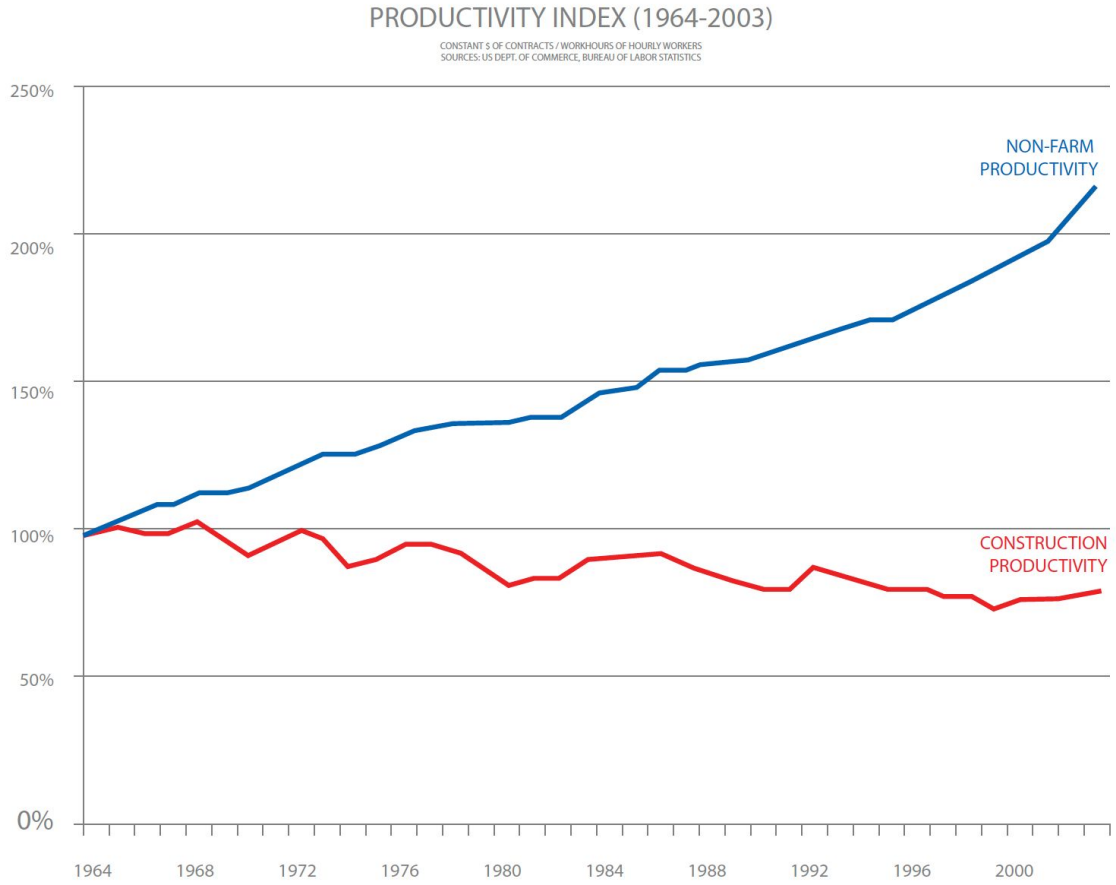
Not Everything is a Nail

Renée Cheng, FAIA
Dean, College of Built Environments
University of Washington

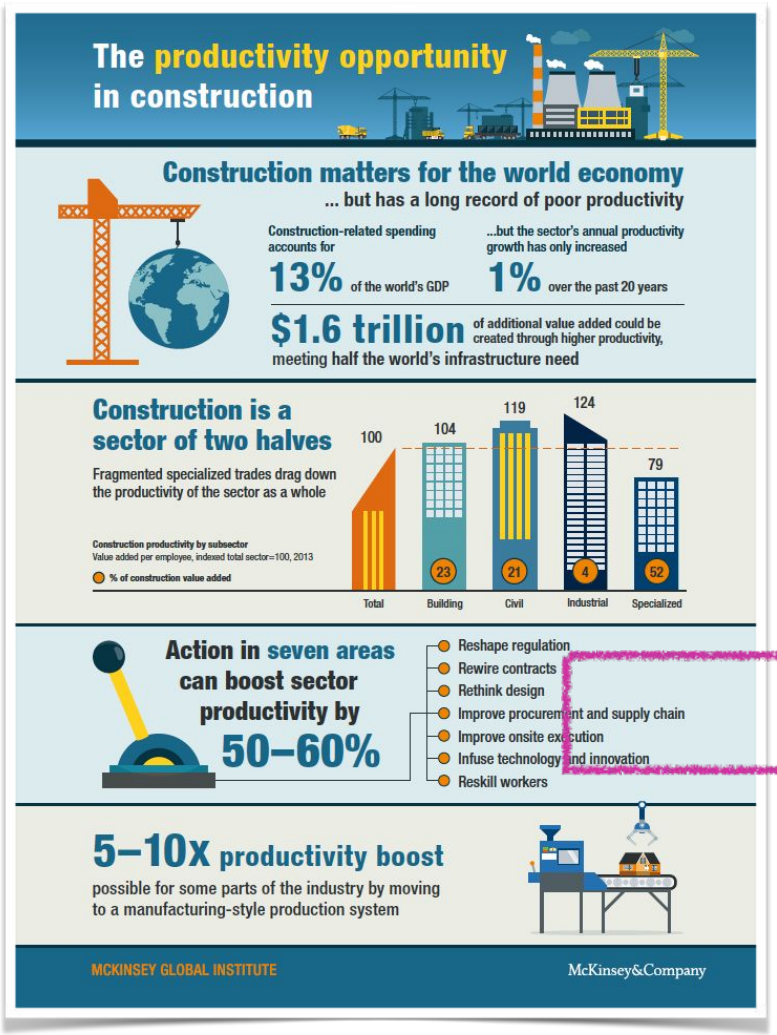
UNIVERSITY *of* WASHINGTON



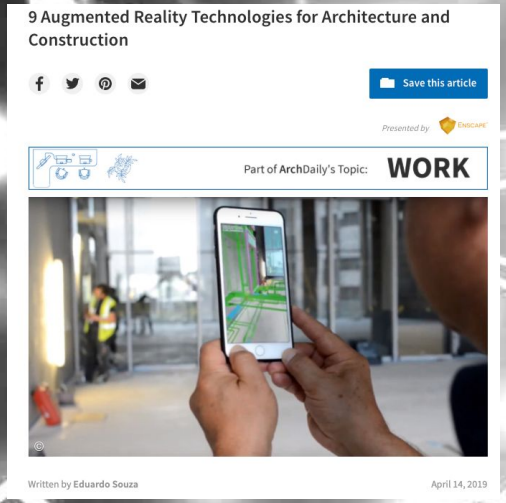
Paul M. Teicholz, CIFE

(December 13, 1999). Reverse Productivity Declines. *Engineering News-Record.* Retrieved from https://advance-lexis-com.offcampus.lib.washington.edu/api/document?collection=news&id=urn:contentItem:3Y44-T500-000K-J0TX-00000-00&context=1516831.

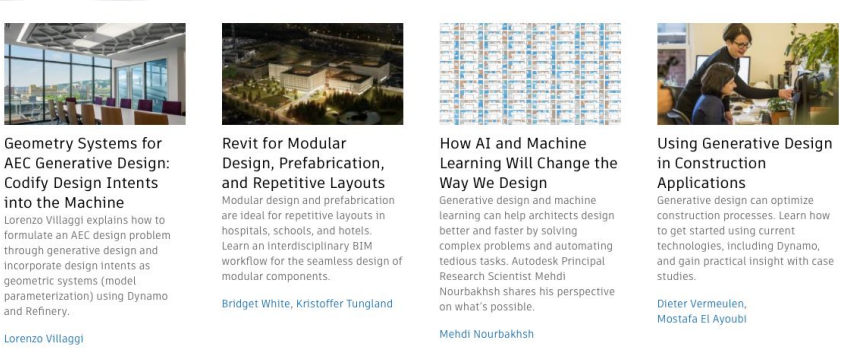
McKinsey Global Institute, Reinventing Construction: A Route to Higher Productivity, 2017, p.vii



areas for architectural education
requiring collaboration and intercultural skill



https://www.archdaily.com/914501/9-augmented-reality-technologies-for-architecture-and-construction



https://www.autodesk.com/autodesk-university/

https://www.thebalancesmb.com/how-internet-affects-the-construction-industry-845320

https://www.constructionblockchain.org

ICD/ITKE ETH Pavilion 2014


Hits ph: 312
nails: 47
fingers: 64
Planar 1.4/50

?

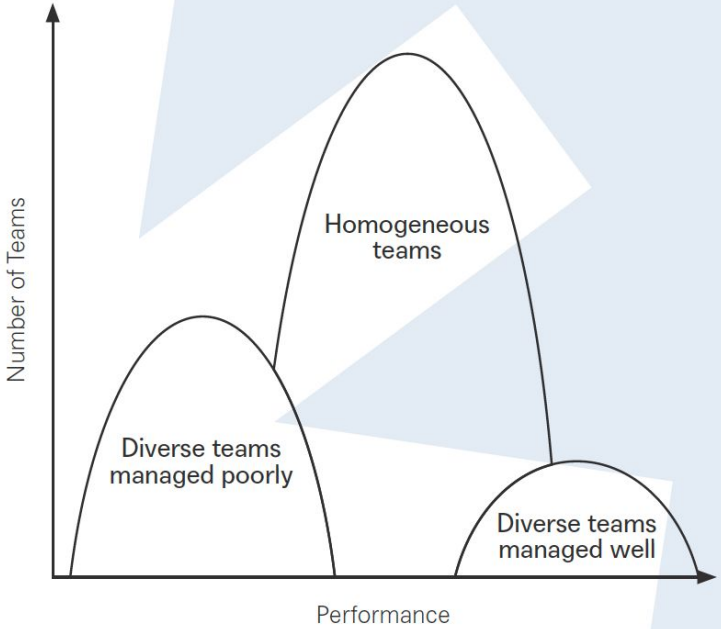
The whole is greater than the sum of its parts

- *meme attributed to Aristotle*

"To return to the difficulty which has been stated with respect both to definitions and to numbers, what is the cause of their unity? In the case of all things which have several parts and in which **the totality is not**, as it were, **a mere heap, but the whole is something besides the parts**, **there is a cause**."

- *Aristotle, Metaphysics*

Aristotle. *Metaphysics*, Infomotions, Inc., 2000. ProQuest Ebook Central, https://ebookcentral.proquest.com/lib/washington/detail.action?docID=3314330. p99.



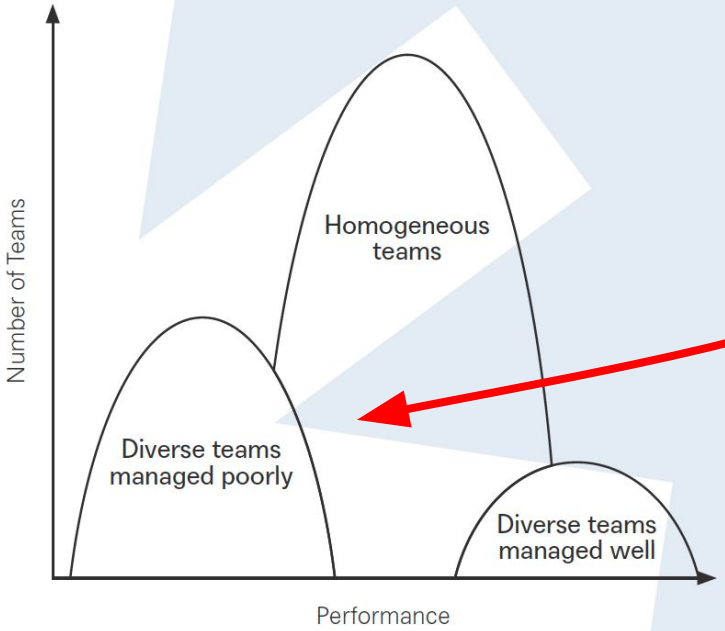
TEAM PERFORMANCE AND DIVERSITY
Research has shown that well-managed homogeneous teams outperform poorly-managed diverse teams while well-managed diverse teams outstrip all others.[1]

Performance of homogeneous teams follows a typical bell curve

performance measured on creativity, ability to generate more and better alternatives, more and better criteria for evaluating alternatives

homogeneous defined as team members share same national identity

Joseph J. Distefano and Martha L. Maznevski, “Creating Value with Diverse Teams in Global Management,” *Organizational Dynamics* 29, no. 1 (September 2000): 45–63.



TEAM PERFORMANCE AND DIVERSITY
Research has shown that well-managed homogeneous teams outperform poorly-managed diverse teams while well-managed diverse teams outstrip all others.[1]

Diverse teams follow a very different pattern

Conflict: the energy that could have been channeled into effective work was drained into negative stereotyping...the "team" destroyed value rather than creating it.

or

Mediocrity: by not allowing the differences to surface in any way, the teams suffered because they couldn't leverage them for innovation or performance advantages.

Value Creation: Differences are explicitly recognized and accepted, even nurtured, and their implications are incorporated into every facet of the group's processes.

Joseph J. Distefano and Martha L. Maznevski, "Creating Value with Diverse Teams in Global Management," *Organizational Dynamics* 29, no. 1 (September 2000): 45–63.

The researchers also discovered which variables were *not* significantly connected with team effectiveness at Google:

- Colocation of teammates (sitting together in the same office)
- Consensus-driven decision making
- Extroversion of team members
- Individual performance of team members
- Workload size
- Seniority
- Team size
- Tenure

rework.with.google.com

Robert E. Levasseur (2017) People Skills: Building the Perfect Team—A Change Management Perspective. INFORMS Journal on Applied Analytics 47(3):270-272. https://doi.org/10.1287/inte.2017.0896

shared belief held by members of a team that the team is safe for interpersonal risk taking

...an integrative perspective in which both team structures, such as context support and team leader coaching, and shared beliefs shape team outcomes.

-Amy Edmondson, 1999

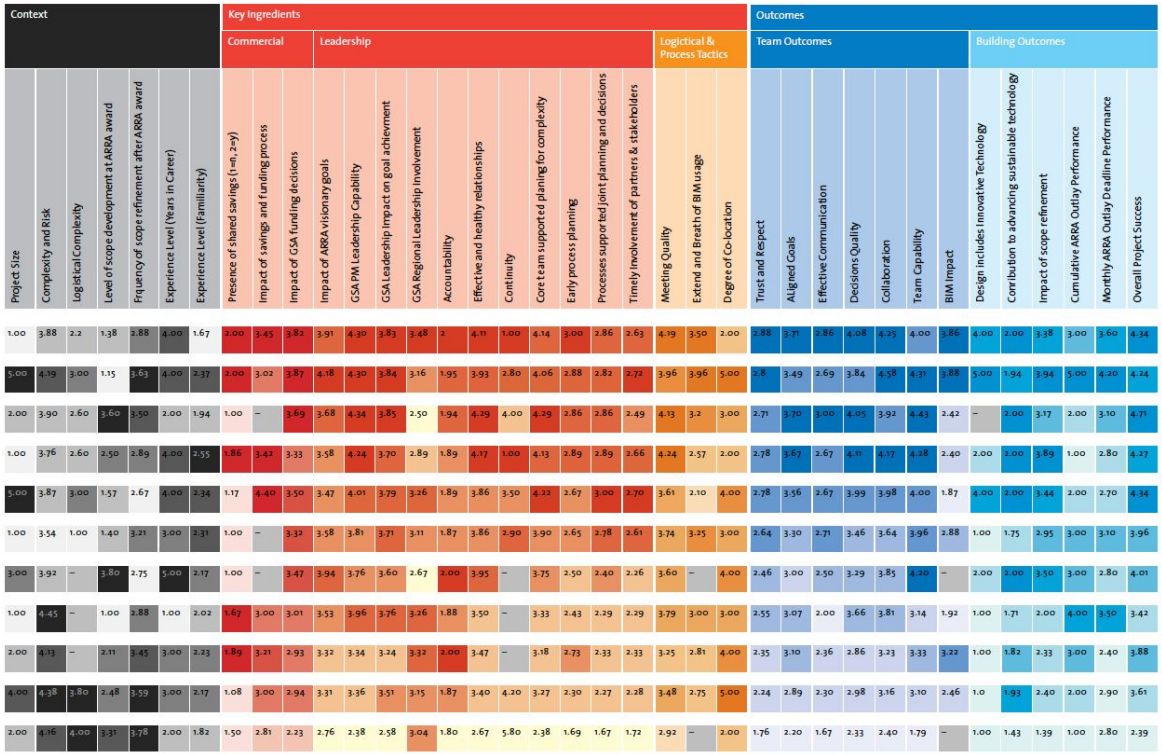
Edmondson, A. (1999). Psychological Safety and Learning Behavior in Work Teams. *Administrative Science Quarterly, 44*(2), 350-383.

TEAMS MATTER: LESSONS FROM ARRA

GSA REGION 5 AND THE AMERICAN RECOVERY AND REINVESTMENT ACT

RENEE CHENG, AIA, PROFESSOR, SCHOOL OF ARCHITECTURE UNIVERSITY OF MINNESOTA
PUBLISHED MAY 2016, SPONSORED BY GSA REGION 5 AND 4240 ARCHITECTURE

CONTEXT KEY INGREDIENTS OUTCOMES



Context							Key Ingredients																			Outcomes											
							Commercial			Leadership												Logictical & Process Tactics			Team Outcomes							Building Outcomes					
Project Size	Complexity and Risk	Logistical Complexity	Level of scope development at ARRA award	Frquency of scope refinement after ARRA award	Experience Level (Years in Career)	Experience Level (Familiarity)	Presence of shared savings (1=n, 2=y)	Impact of savings and funding process	Impact of GSA funding decisions	Impact of ARRA visionary goals	GSA PM Leadership Capability	GSA Leadership Impact on goal achievement	GSA Regional Leadership involvement	Accountability	Effective and healthy relationships	Continuity	Core team supported planing for complexity	Early process planning	Processes supported joint planning and decisions	Timely involvement of partners & stakeholders	Meeting Quality	Extend and Breath of BIM usage	Degree of Co-location	Trust and Respect	Aligned Goals	Effective Communication	Decisions Quality	Collaboration	Team Capability	BIM Impact	Design includes Innovative Technology	Contribution to advancing sustainable technology	Impact of scope refinement	Cumulative ARRA Outlay Performance	Monthly ARRA Outlay Deadline Performance	Overall Project Success
1.00	3.88	2.2	1.38	2.88	4.00	1.67	2.00	3.45	3.82	3.91	4.30	3.83	3.48	2	4.11	1.00	4.14	3.00	2.86	2.63	4.19	3.50	2.00	2.88	3.71	2.86	4.08	4.25	4.00	3.86	4.00	2.00	3.38	3.00	3.60	4.34
5.00	4.19	3.00	1.15	3.63	4.00	2.37	2.00	3.02	3.87	4.18	4.30	3.84	3.16	1.95	3.93	2.80	4.06	2.88	2.82	2.72	3.96	3.96	5.00	2.8	3.49	2.69	3.84	4.58	4.31	3.88	5.00	1.94	3.94	5.00	4.20	4.24
2.00	3.90	2.60	3.60	3.50	2.00	1.94	1.00	–	3.69	3.68	4.34	3.85	2.50	1.94	4.29	4.00	4.29	2.86	2.86	2.49	4.13	3.2	3.00	2.71	3.70	3.00	4.05	3.92	4.43	2.42	–	2.00	3.17	2.00	3.10	4.71
1.00	3.76	2.60	2.50	2.89	4.00	2.55	1.86	3.42	3.33	3.58	4.24	3.70	2.89	1.89	4.17	1.00	4.13	2.89	2.89	2.66	4.24	2.57	2.00	2.78	3.67	2.67	4.11	4.17	4.28	2.40	2.00	2.00	3.89	1.00	2.80	4.27
5.00	3.87	3.00	1.57	2.67	4.00	2.34	1.17	4.40	3.50	3.47	4.01	3.79	3.26	1.89	3.86	3.50	4.22	2.67	3.00	2.70	3.61	2.10	4.00	2.78	3.56	2.67	3.99	3.98	4.00	1.87	4.00	2.00	3.44	2.00	2.70	4.34
1.00	3.54	1.00	1.40	3.21	3.00	2.31	1.00	–	3.32	3.58	3.81	3.71	3.11	1.87	3.86	2.90	3.90	2.65	2.78	2.61	3.74	3.25	3.00	2.64	3.30	2.71	3.46	3.64	3.96	2.88	1.00	1.75	2.95	3.00	3.10	3.96
3.00	3.92	–	3.80	2.75	5.00	2.17	1.00	–	3.47	3.94	3.76	3.60	2.67	2.00	3.95	–	3.75	2.50	2.40	2.26	3.60	–	4.00	2.46	3.00	2.50	3.29	3.85	4.20	–	2.00	2.00	3.50	3.00	2.80	4.01
1.00	4.45	–	1.00	2.88	1.00	2.02	1.67	3.00	3.01	3.53	3.96	3.76	3.26	1.88	3.50	–	3.33	2.43	2.29	2.29	3.79	3.00	3.00	2.55	3.07	2.00	3.66	3.81	3.14	1.92	1.00	1.71	2.00	4.00	3.50	3.42
2.00	4.13	–	2.11	3.45	3.00	2.23	1.89	3.21	2.93	3.32	3.34	3.24	3.32	2.00	3.47	–	3.18	2.73	2.33	2.33	3.25	2.81	4.00	2.35	3.10	2.36	2.86	3.23	3.33	3.22	1.00	1.82	2.33	3.00	2.40	3.88
4.00	4.38	3.80	2.48	3.59	3.00	2.17	1.08	3.00	2.94	3.31	3.36	3.51	3.15	1.87	3.40	4.20	3.27	2.30	2.27	2.28	3.48	2.75	5.00	2.24	2.89	2.30	2.98	3.16	3.10	2.46	1.0	1.93	2.40	2.00	2.90	3.61
2.00	4.16	4.00	3.31	3.78	2.00	1.82	1.50	2.81	2.23	2.76	2.38	2.58	3.04	1.80	2.67	5.80	2.38	1.69	1.67	1.72	2.92	–	2.00	1.76	2.20	1.67	2.33	2.40	1.79	–	1.00	1.43	1.39	1.00	2.80	2.39

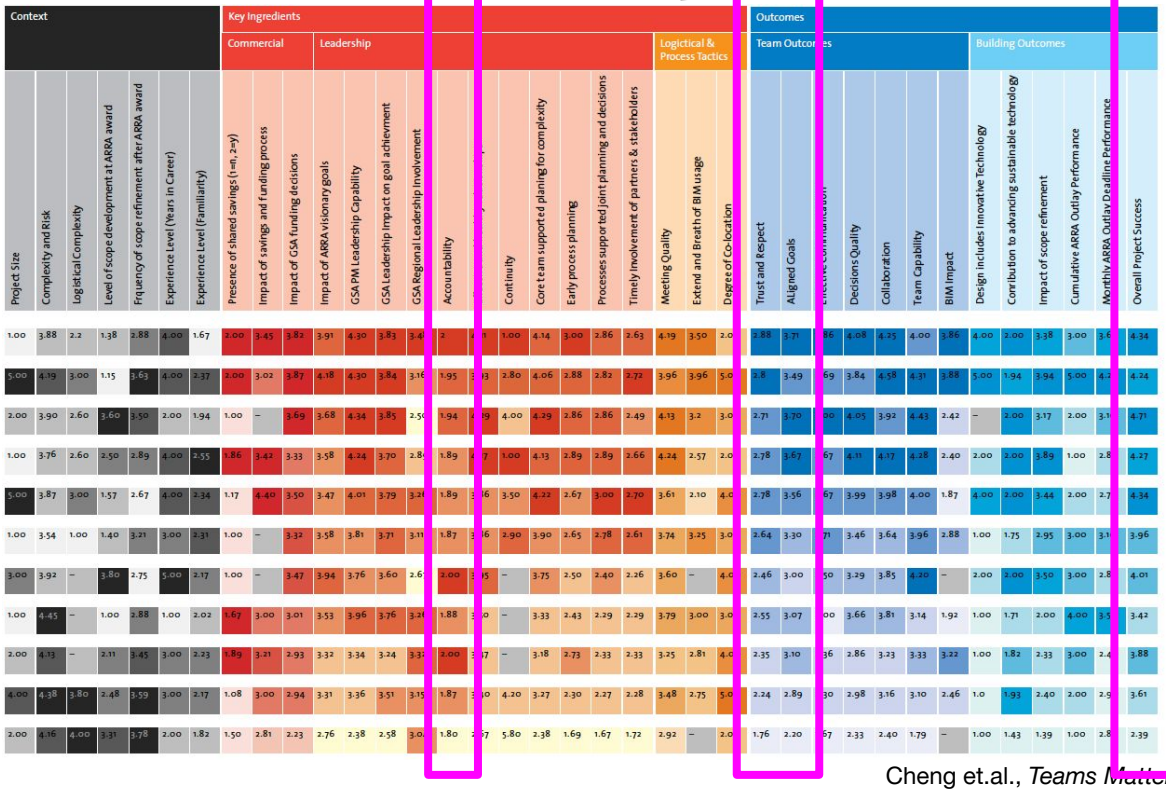
Cheng et.al., *Teams Matter*, 2019. http://hdl.handle.net/11299/201406

CAUSAL FACTORS = PROJECT SUCCESS

TRUST & RESPECT

ALIGNED GOALS

ACCOUNTABILITY



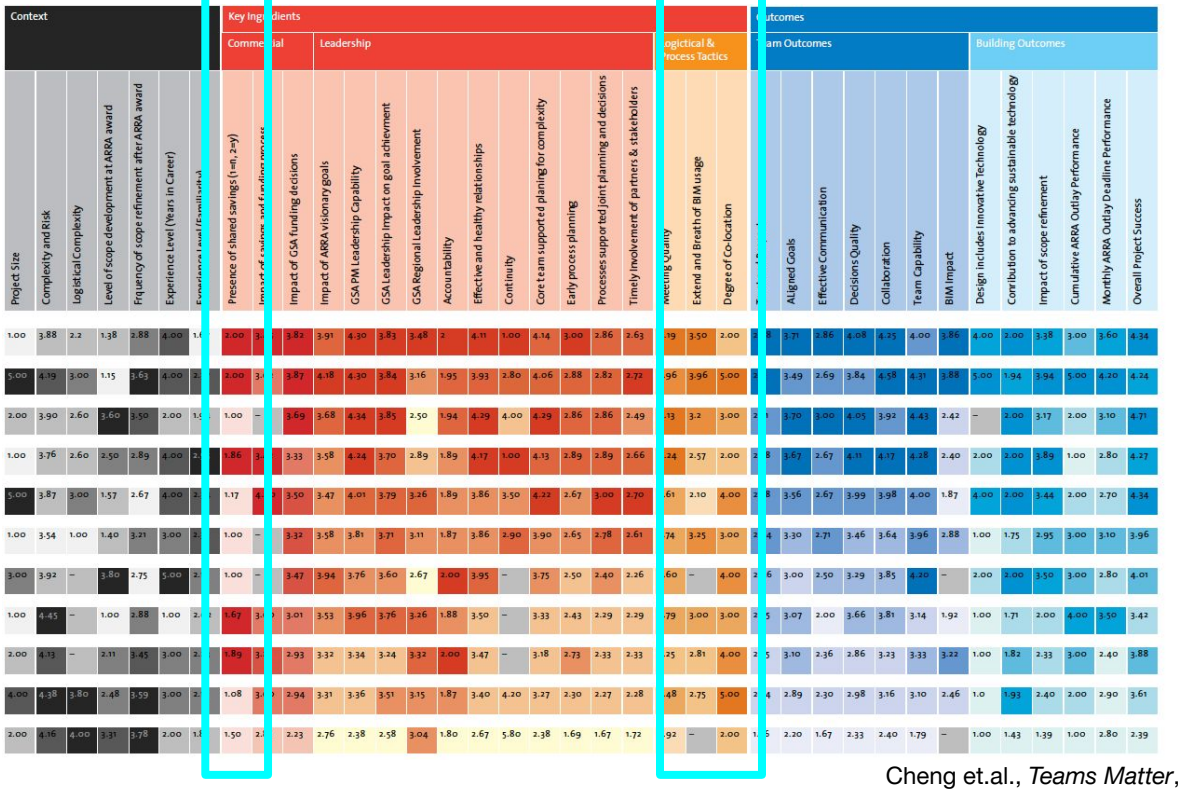
Cheng et.al., *Teams Matter*, 2019. http://hdl.handle.net/11299/201406

NON-FACTORS

SHARED SAVINGS

USE OF BIM

CO-LOCATION



Cheng et.al., *Teams Matter*, 2019. http://hdl.handle.net/11299/201406

MOTIVATION AND MEANS:
How and Why IPD and Lean Lead to Success

Research Report
November, 2016

University of Minnesota in collaboration with University of Washington, University of British Columbia, Scan Consulting

Sponsored by Integrated Project Delivery Alliance (IPDA) & Lean Construction Institute (LCI)

Our conclusion is that **IPD** sets the terms and provides the **motivation** for collaboration; **Lean** provides the **means** for teams to optimize their performance and achieve project goals.


TARGET COST
Akron*
Autodesk
Mosaic
Quail Run
Rocky Mountain**
St. Anthony*
Sutter Los Gatos
Sutter Sunnyvale
T. Rowe Price*
Wekiva Springs
2 months savings on 24 month schedule
6 months late on 6 month schedule
4 months savings on 16 month schedule
1 month late on 8 month schedule
0 months savings on 12.5 month schedule
2 months savings on 18 month schedule
0 months savings on 12 month schedule
2.5 months savings on 30.5 month schedule
0 months savings on 8 month schedule
0 months savings on 6 month schedule
Final project cost
* Significant project savings were used to increase project scope
** Target comparison to final cost not available
One month construction schedule
One month schedule savings
Over schedule by one month

• Industry adoption of Lean tools and processes is uneven and weighted towards construction over design.

• Teams with more Lean were:

➔ more likely to have slightly more positive team and building outcomes.

➔ rate their projects as less complex.

This may be perception, since Lean tools and processes can make tasks clear and straightforward.

	Lean Tools and Processes					
	Lean Team Formation					
	Team Formation	Team Development	Goals	Workplace and Meeting	Cost and Decision	Project Management
Akron	●	●	●	●	●	●
Autodesk	○	○	○	●	◐	○
Mosaic	●	◐	◐	◐	◐	◐
Quail Run	●	●	●	●	●	●
Rocky Mountain	◐	◐	◐	●	●	●
St. Anthony	●	◐	●	●	●	●
Sutter Los Gatos	●	◐	◐	●	●	◐
Sutter Sunnyvale	◐	○	◐	◐	◐	◐
T. Rowe Price	●	◐	◐	◐	◐	●
Wekiva Springs	●	●	●	●	●	●

● Done well, used often, helpful to the team
◐ Done, but only somewhat helpful or mixed comments about its effectiveness
○ Did it, but it was not seen as particularly effective by most of the team
■ Did not have it

New Hypothesis:

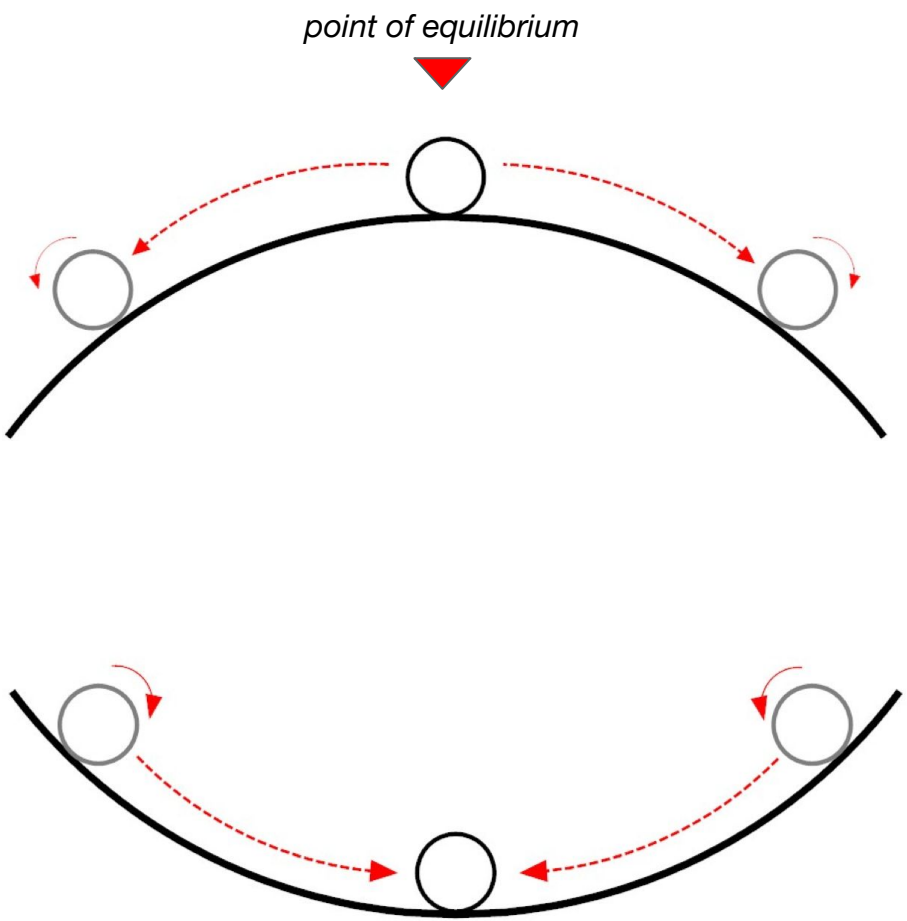
Lean tools and processes **BUILD** and **RELY UPON**

- Trust
- Communication
- Accountability
- Psychological Safety

Lean and IPD teams discuss intention and differences in agendas, priorities and practices – assume not every firm or individual is the same, but goals are shared.

Use tools to intentionally build equitable culture on your team:

- Team performance metrics such as plan percent complete
- Communication protocols such as A3
- Decision protocols such as CBA
- Attitude of continuous improvement and project first priorities
- Benefits from challenging concepts such as last responsible moment



Conceptual Model

forces acting upon project & team

contract “gravitational assist”

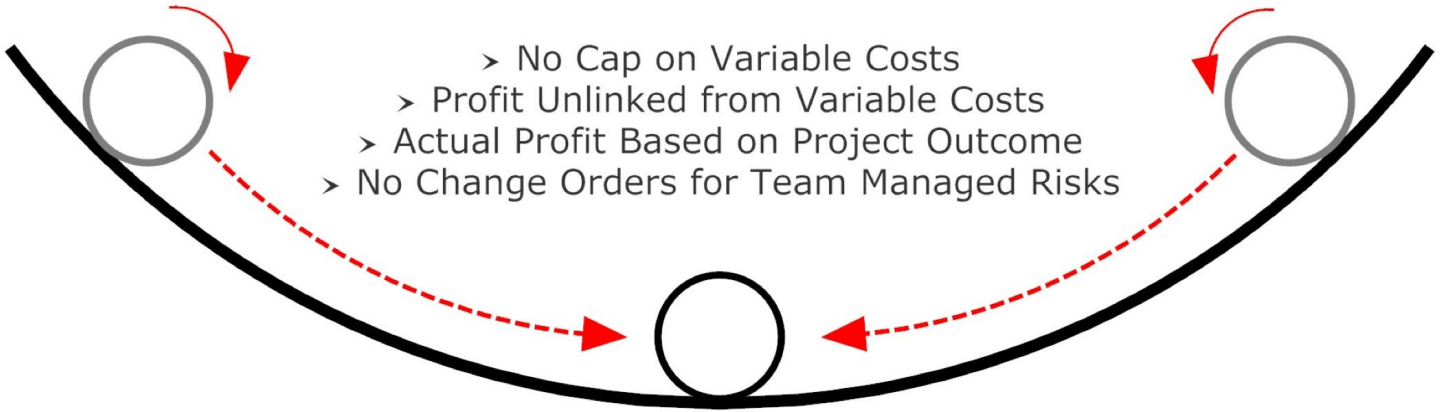
project

Design Bid Build,
CM@Risk, Design Build

Integrated Project Delivery (IPD)

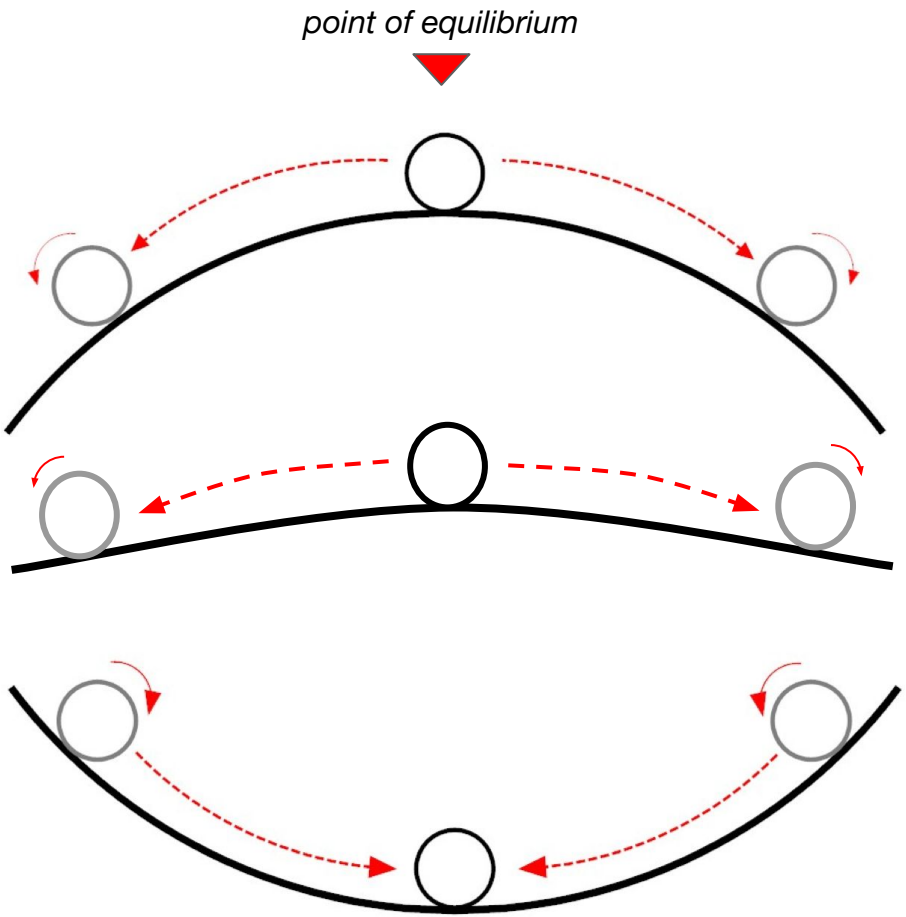
Howard Ashcraft, 2019

Self-Centering System



Howard Ashcraft, 2019

Conceptual Model (adapted)



Design Bid Build

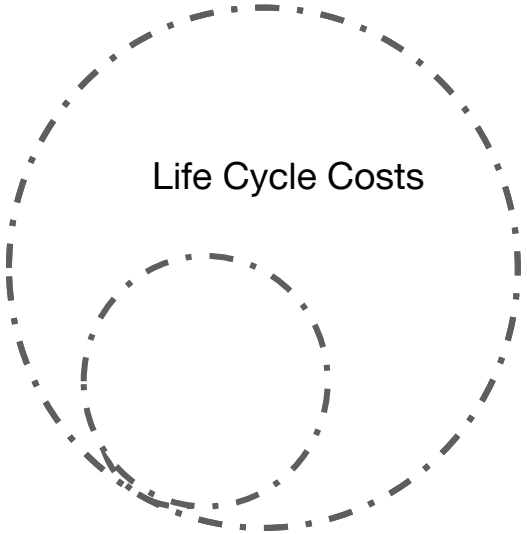
CM@Risk, Design Build,
(maybe) IPD-ish (if nothing goes wrong)

Integrated Project Delivery (IPD)

Renée Cheng adapted from
Howard Ashcraft, 2019

Proportional way to consider the value proposition in the built environment

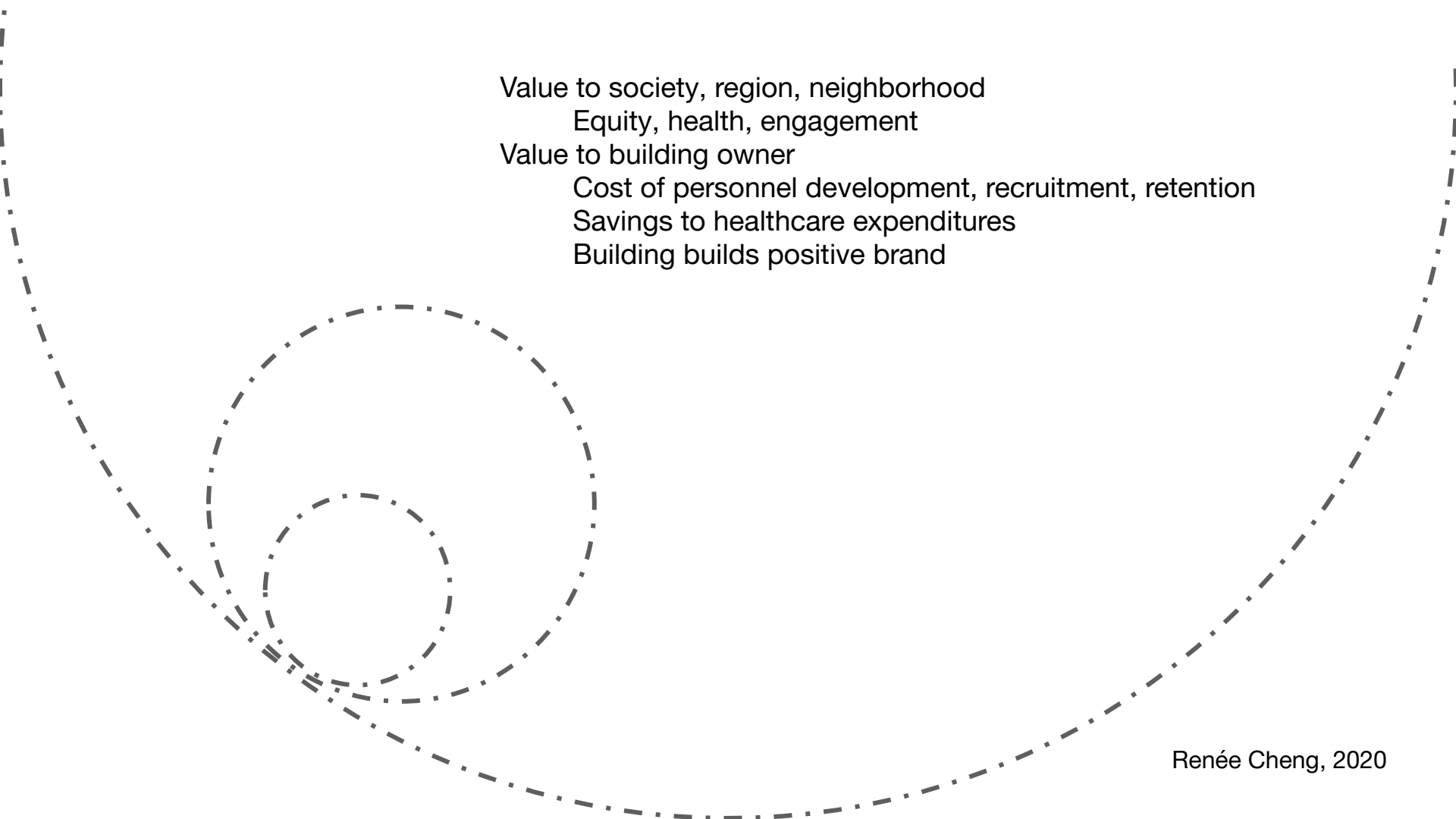
Renée Cheng, 2020



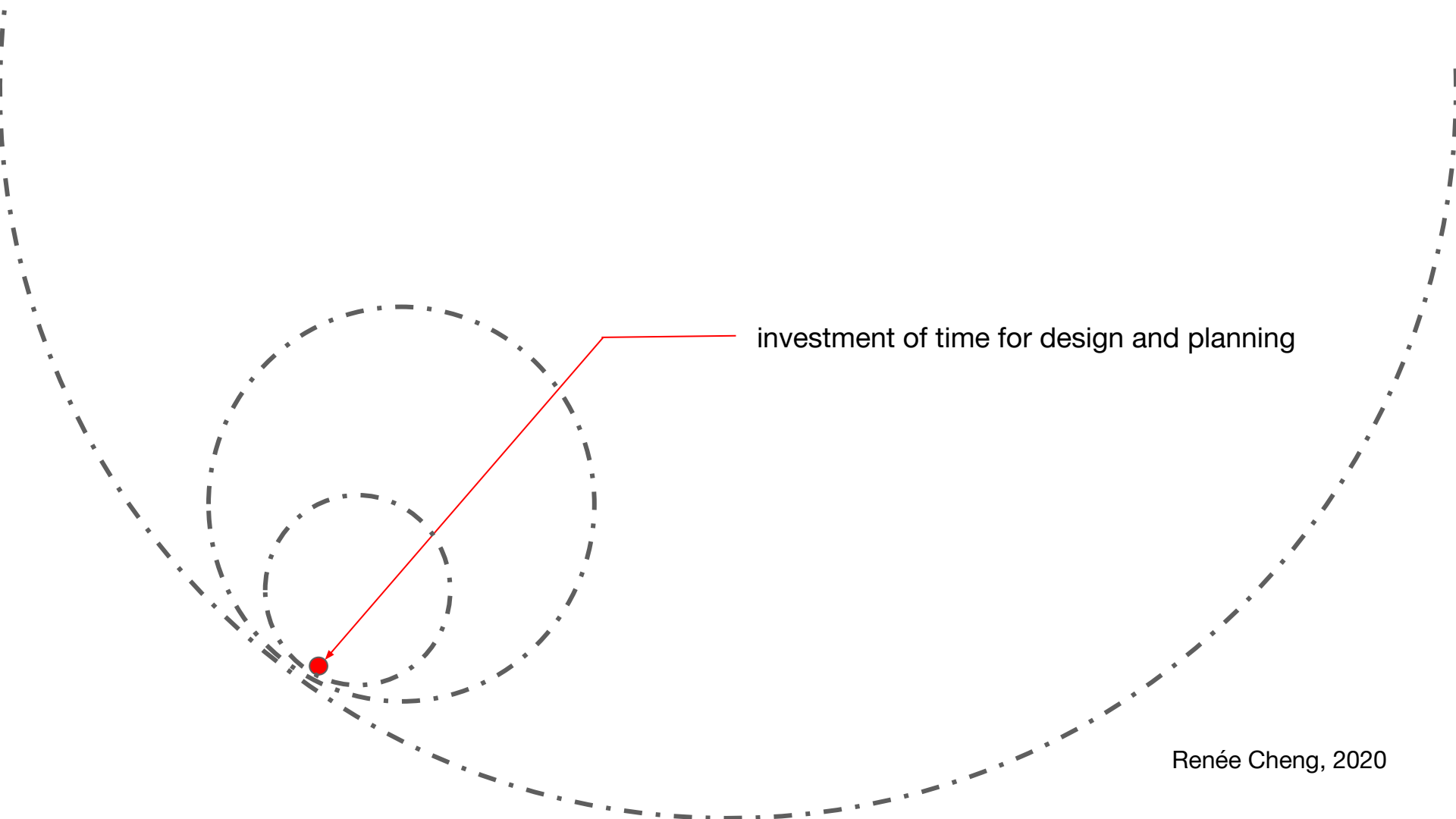
Renée Cheng, 2020

Value to society, region, neighborhood
- Equity, health, engagement

Value to building owner
- Cost of personnel development, recruitment, retention
- Savings to healthcare expenditures
- Building builds positive brand



Renée Cheng, 2020



Renée Cheng, 2020

Tree cover may improve academic performance. This study of 624 Illinois public high schools showed that tree cover density within a 1-mile radius of schools was positively associated with better ACT scores and...

Li, Dongying, Yen-Cheng Chiang, Huiyan Sang, and William C. Sullivan. "Beyond the School Grounds: Links between Density of Tree Cover in School Surroundings and High School Academic Performance." Urban Forestry & Urban Greening 38 (2019): 42–53. https://doi.org/10.1016/j.ufug.2018.11.001

TOPICS

EDUCATIONAL VALUE, TREES, LEARNING LANDSCAPES

SHARE THIS

Researchers studying a Toronto pilot project found that installing a bike lane and removing 136 on-street parking spaces improved the business environment for establishments along the corridor. The number of...

Arancibia, Daniel, Steven Farber, Beth Savan, Yvonne Verlinden, Nancy Smith Lea, Jeff Allen, and Lee Vernich. "Measuring the Local Economic Impacts of Replacing On-Street Parking With Bike Lanes." *Journal of the American Planning Association* 85, no. 4 (2019): 463–81. https://doi.org/10.1080/01944363.2019.1638816

https://www.landscapeperformance.org

A scoping review of the impact on children of the built environment design characteristics of healing spaces

2020 ◦

HERD: Health Environments Research & Design Journal ◦ Journal Article

Pages in press

Author(s): Gaminiesfahani, H., Lozanovska, M., Tucker, R.

SOURCE LINK SAVE

Effects of birthing room design on maternal and neonate outcomes: A systematic review

2020 ◦

HERD: Health Environments Research & Design Journal ◦ Journal Article

Pages in press

Author(s): Nilsson, C., Wijk, H., Höglund, L., Sjöblom, H., Hessman, E., Berg, M.

SOURCE LINK SAVE

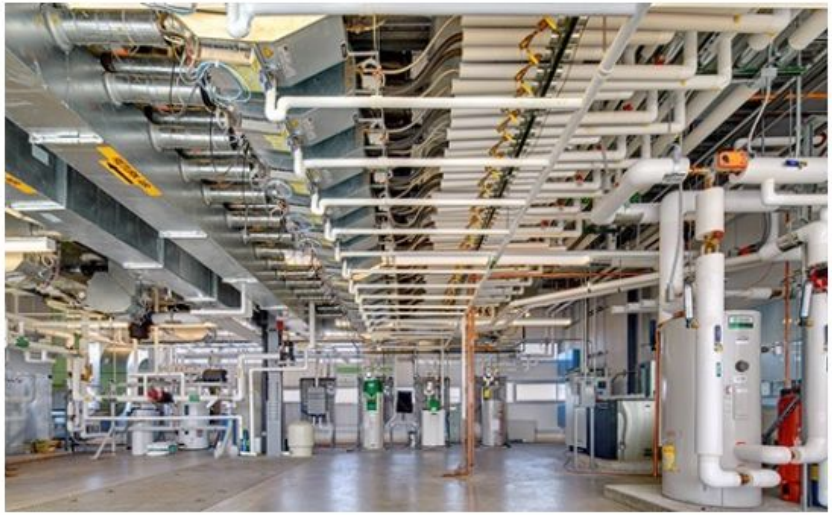
https://www.healthdesign.org/research-services/pebble-project

Green office environments linked with higher cognitive function scores

For immediate release: October 26, 2015

Boston, MA – People who work in well-ventilated offices with below-average levels of indoor pollutants and carbon dioxide (CO_2) have significantly higher cognitive functioning scores—in crucial areas such as responding to a crisis or developing strategy—than those who work in offices with typical levels, according to a new study from the Harvard T.H. Chan School of Public Health's Center for Health and the Global Environment, SUNY Upstate Medical University, and Syracuse University.

The researchers looked at people's experiences in "green" vs. "non-green" buildings in a double-blind study, in which both the participants and the analysts were blinded to test conditions to avoid biased results.



Researchers controlled indoor environmental quality from a space underneath the testing environment to simulate conventional and green building conditions.

https://www.hsph.harvard.edu/news/press-releases/green-office-environments-linked-with-higher-cognitive-function-scores/

KieranTimberlake

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5 Citations

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52 References

See all ›
4 Figures

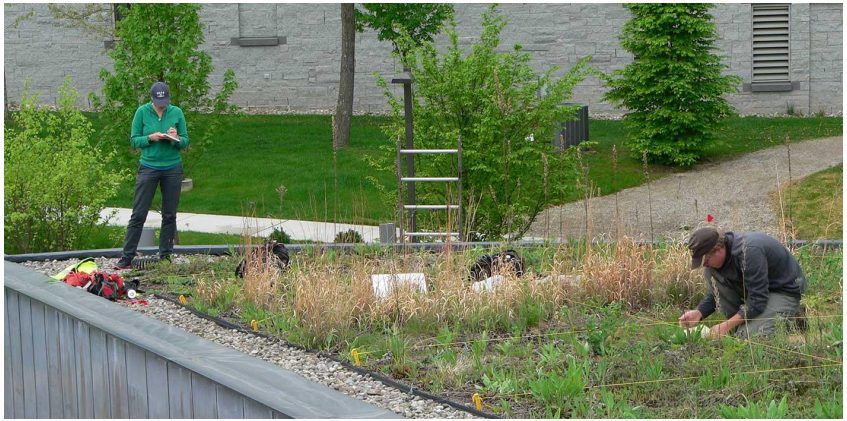
Green Roofs Over Time: A Spatially Explicit Method for Studying Green Roof Vegetative Dynamics and Performance

Article (PDF Available) · August 2014 *with* 391 Reads

Cite this publication

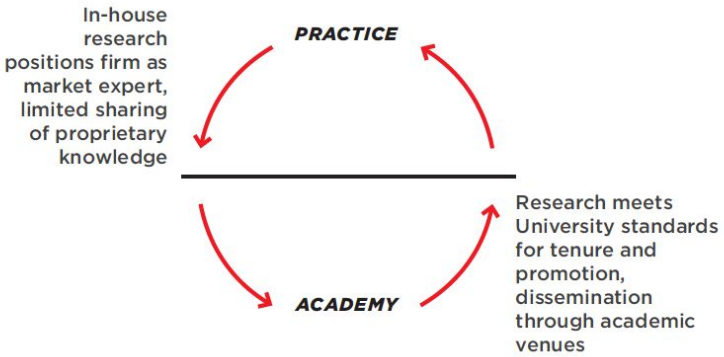
Max R. Piana
8.02 · University of Massachusetts Amherst/U.S. Forest S…

Stephanie Carlisle
7.81 · University of Pennsylvania

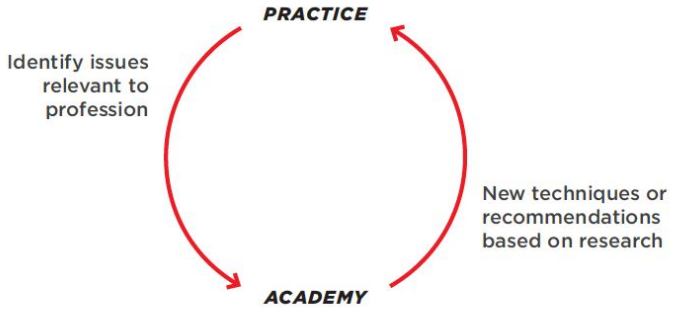


KNOWLEDGE LOOP

BROKEN KNOWLEDGE LOOP



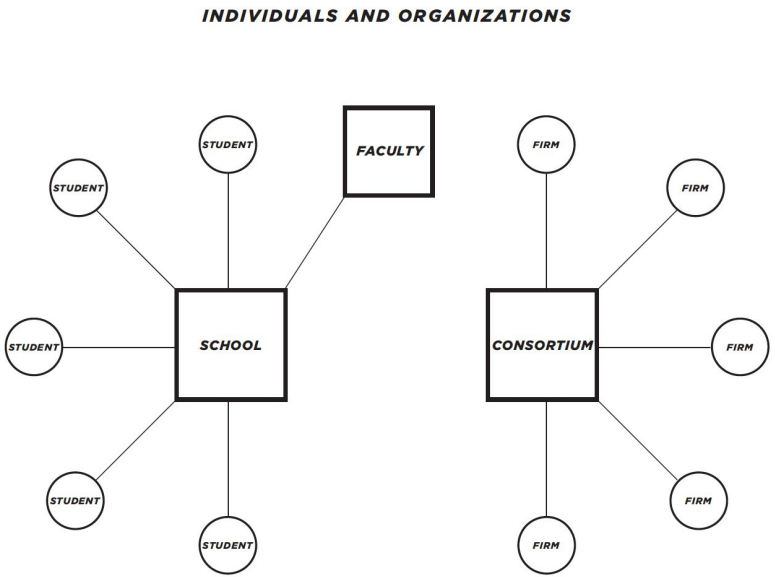
COMPLETED KNOWLEDGE LOOP

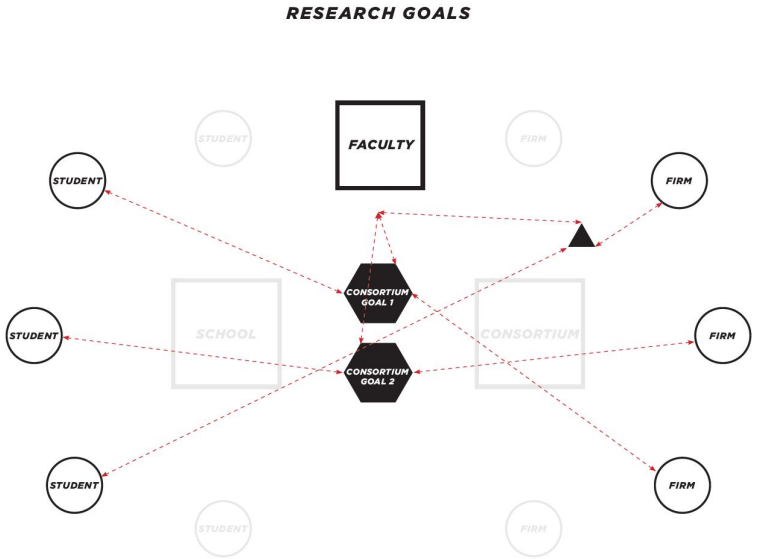


drawn by Kai Samela based on conversations between Tom Fisher and Renée Cheng

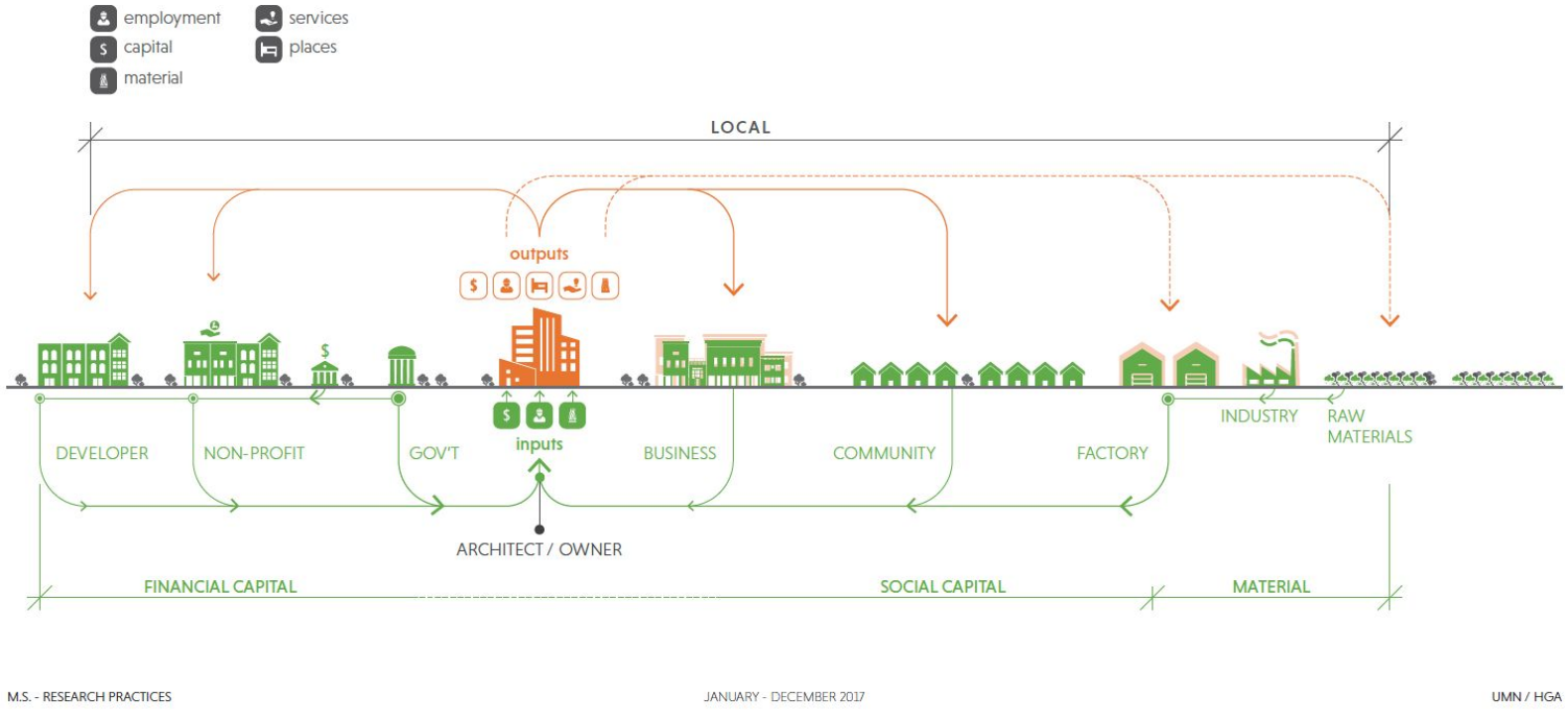
Model of Applied Research Consortium under development at UW CBE

multi-disciplinary expansion of architecture research program originally developed by Renee Cheng at University of Minnesota





LOCAL ECONOMY MODEL



Alejandra Cervantes, final project for Master of Science in Research Practice, University of Minnesota and HGA Architects, 2017

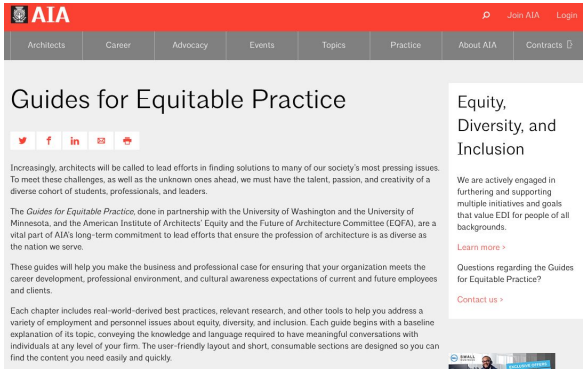
Guides for Equitable Practice

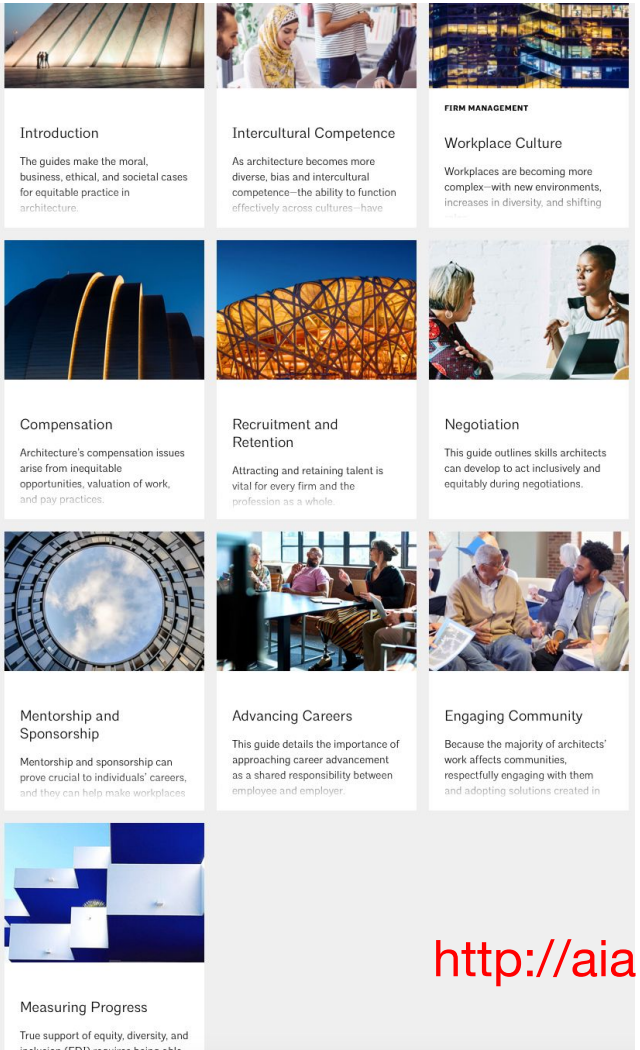
Guides for understanding and building equity in the architecture profession

FIRST EDITION
PART I – RELEASED NOVEMBER, 2018
PART II – RELEASED JUNE, 2019

AIA

The University of Washington for the American Institute of Architects Equity and the Future of Architecture Committee





http://aia.org/equityguides

Office: Gould Hall
Research Website
Curriculum Vitae [pdf]

Renée Cheng

Dean

be.washington.edu/people/renee-cheng/

Renée Cheng joined the College of Built Environments as dean on January 1, 2019. Dean Cheng comes from the University of Minnesota where she was a professor, associate dean of research, head of the school of architecture, and directed an innovative graduate program linking research with practice and licensure. Prior to UMN, she taught at the University of Michigan and the University of Arizona. She is a graduate of Harvard's Graduate School of Design and Harvard College.

A licensed architect, her professional experience includes work for Pei, Cobb, Freed and Partners and Richard Meier and Partners before founding Cheng-Olson Design. Dean Cheng has been honored twice as one of the top 25 most admired design educators in the United States by DesignIntelligence. She has received numerous honors and awards including the 2017 Lean Construction Institute Faculty Award and was named to the American Institute of Architecture's College of Fellows in 2017.

Cheng is a leader in the American Institute of Architects (AIA) and advocates for equity in the field of architecture and in the practices related to the built environment. Recently, Cheng led the research effort for the AIA guides for equitable practice in the workplace. Cheng has pioneered research surrounding the intersection of design and emerging technologies, including work on industry adoption of Integrated Project Delivery, Building Information Modeling and Lean.

CONTACT THE DEAN

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FROM THE DEAN'S DESK


Archinect Deans List: Renée Cheng on How Comprehensive Design Can Engender Inclusivity

AIA releases new chapters of "Guides for Equitable Practice"


Building equity: A talk with Renée Cheng, new dean of the UW College of Built Environments