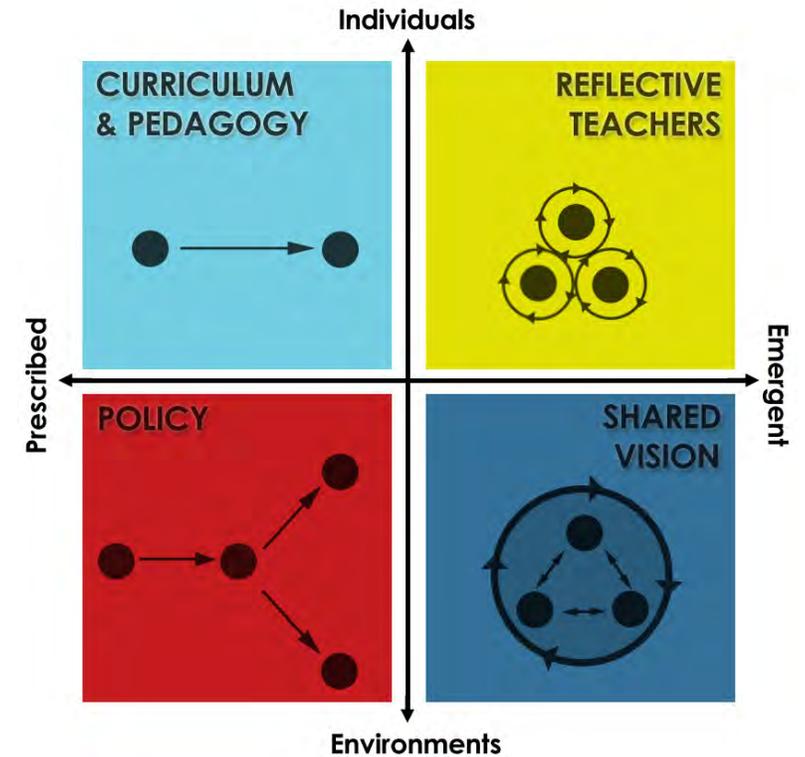


How to Effect Pedagogical Change at the Department Level



WESTERN MICHIGAN UNIVERSITY
Center for Research on Instructional Change
in Postsecondary Education

CRICPE

Charles Henderson

Western Michigan University

Physics Department Chairs Meeting

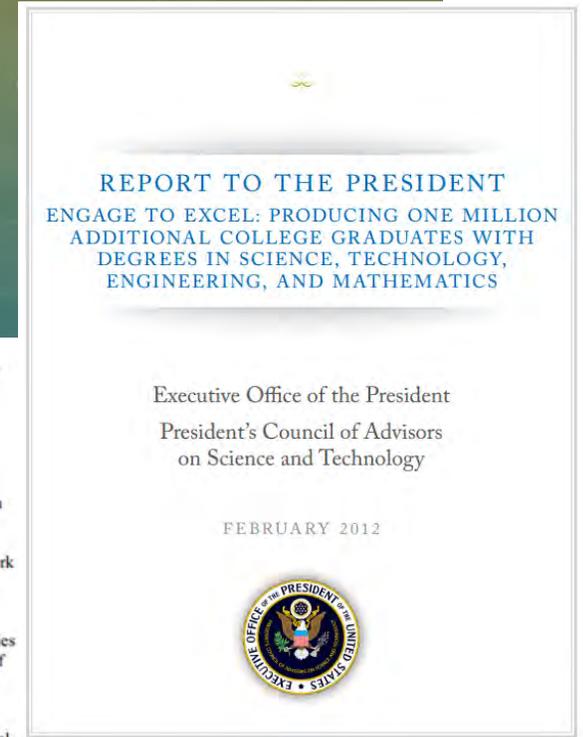
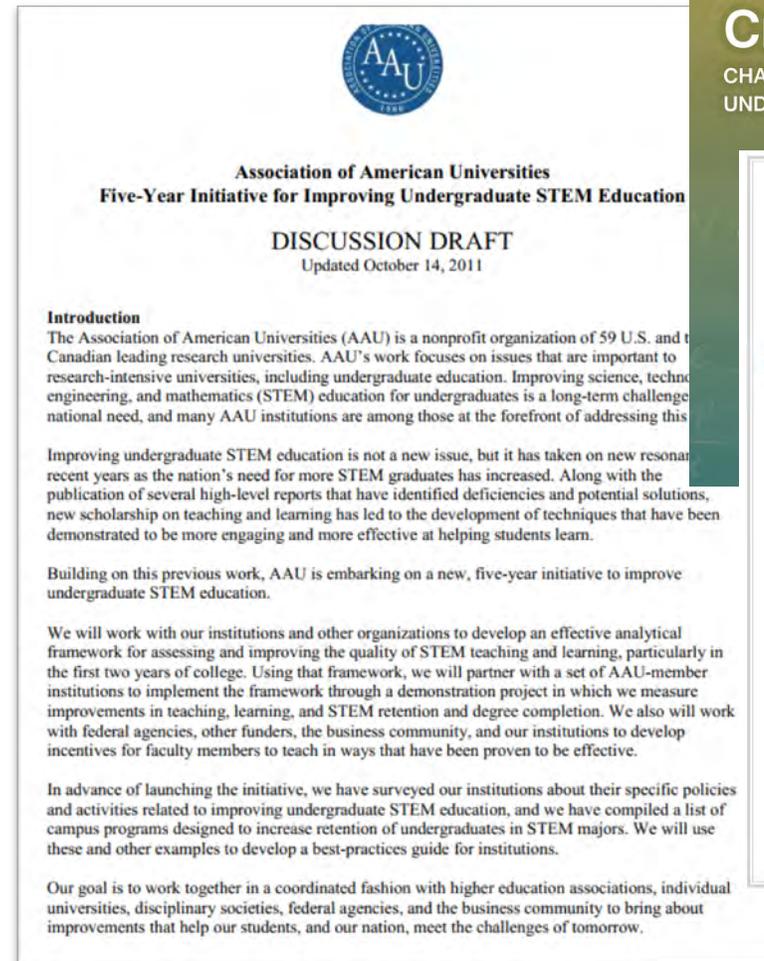
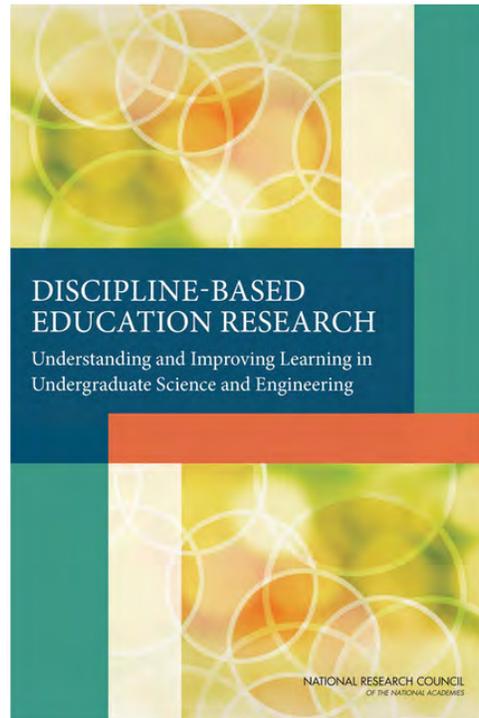
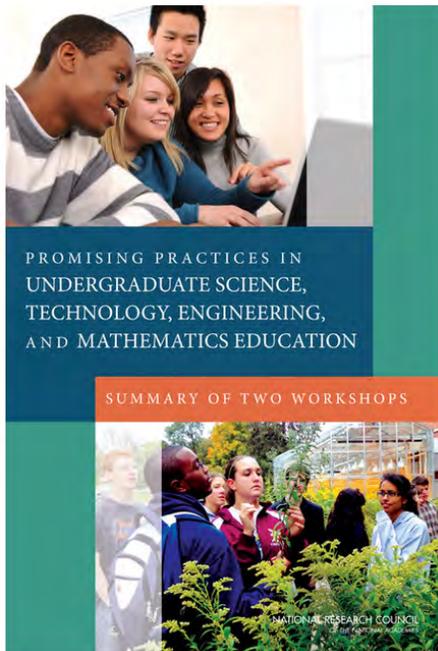
June 9, 2018

College Park Md

Materials available <https://goo.gl/NZkP7R>

Typical Undergraduate Physics Instruction is Problematic

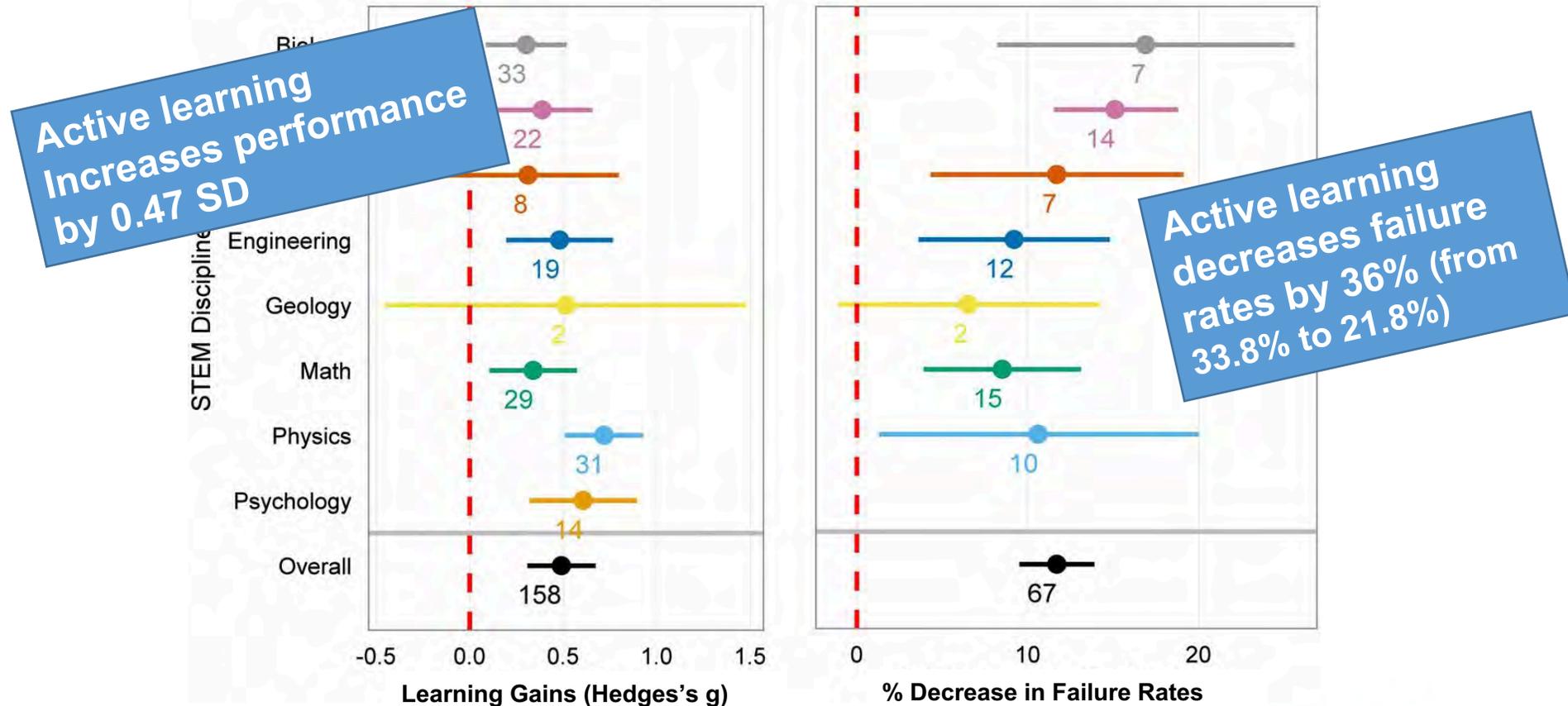
“Improving undergraduate teaching is integral to meeting the pressing national need for more STEM majors.” (AAU, 2011, p. 2)



Proven Solutions Exist

An important, highly replicable, result from DBER is that active learning instructional strategies increase student performance.

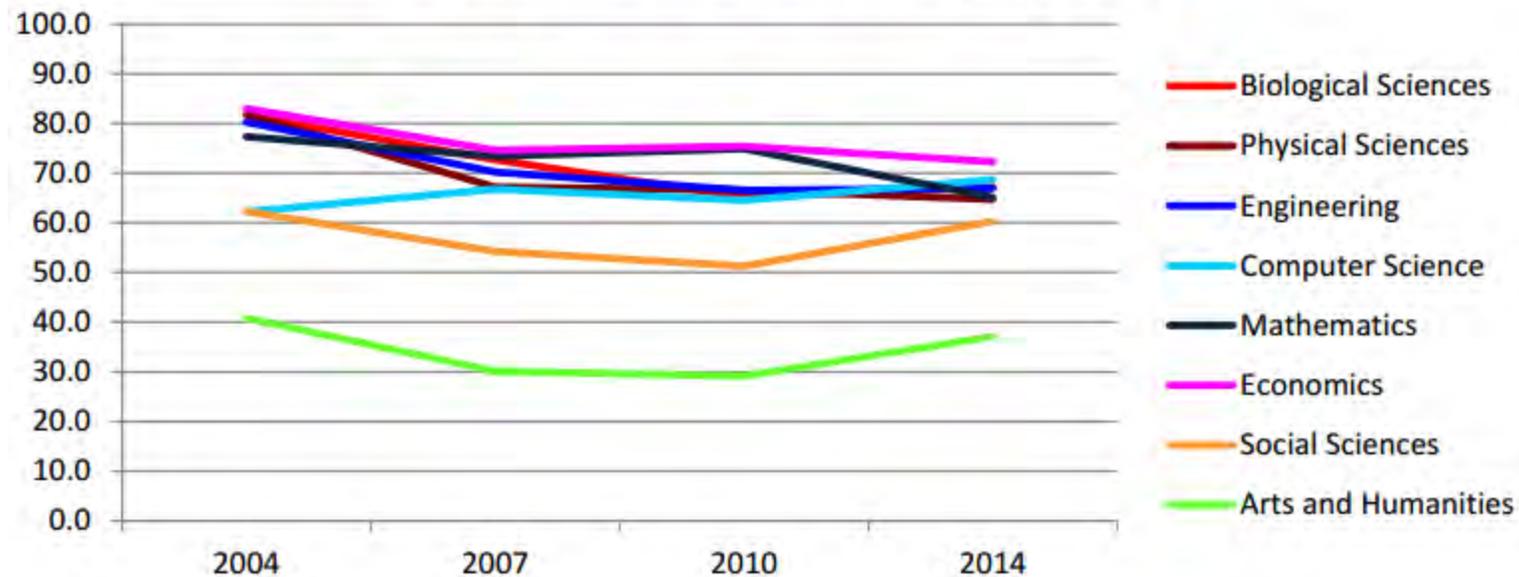
Effect sizes by discipline (from a metaanalysis of 225 studies – Freeman et al., 2014).



Solutions are not widely implemented

Most STEM faculty report using extensive lecturing

Figure 1. Trends in Use of Extensive Lecturing in "All" or "Most" Courses, by Field



Ten year data from Higher Education Research Institute's (HERI) Faculty Survey.

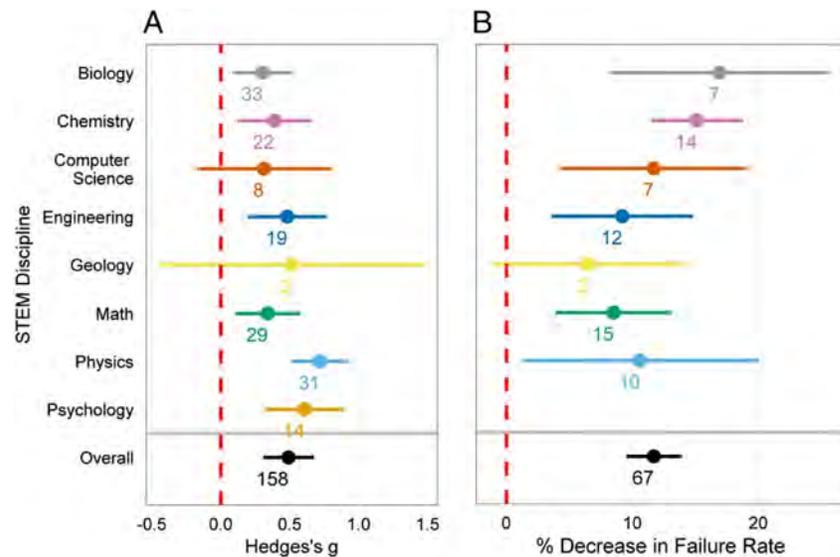
Report prepared by Kevin Eagan:

http://www.sloan.org/fileadmin/media/files/STEM_Higher_Ed/STEM_Faculty_Teaching_Practices.pdf

What do Change Agents Do?

Persuade individual instructors that they should change

- Often using data



Provide information and materials to instructors

- e.g., PhysPort

PhysPort
Supporting physics teaching with research-based resources

Home | Expert Recommendations | Teaching Methods | Assessments | Workshops

Teaching Methods and Materials

Tell us about your course to find methods relevant to you.

Any Subject | Any Level | Any Setting | Submit

Student Skills Developed ?
Any

- Conceptual understanding
- Problem-solving skills
- Lab skills
- Making real-world connections
- Using multiple representations
- Designing experiments
- Building models
- Metacognition

Instructor Effort Required ?
Any

- Low
- Medium
- High

Research Validation ?

- Gold star validation
- Silver validation
- Bronze validation
- Research-based

57 Research-Based Methods

Sort by: Popularity

Peer Instruction
Small group discussion of conceptual questions interspersed with lectures, increasing engagement and providing formative feedback on student thinking

Subject: [MS] [HS] [IC] [IM] [UL] [GS] [O] [J] [X] [B]

Level: [MS] [HS] [IC] [IM] [UL] [GS] [O] [J] [X] [B]

Setting: [1] [2]

PhET Interactive Simulations
Open-ended game-like simulations that include expert visual models, enabling scientist-like exploration and real-world connections

Subject: [MS] [HS] [IC] [IM] [UL] [GS] [O] [J] [X] [B]

Level: [MS] [HS] [IC] [IM] [UL] [GS] [O] [J] [X] [B]

Setting: [1] [2]

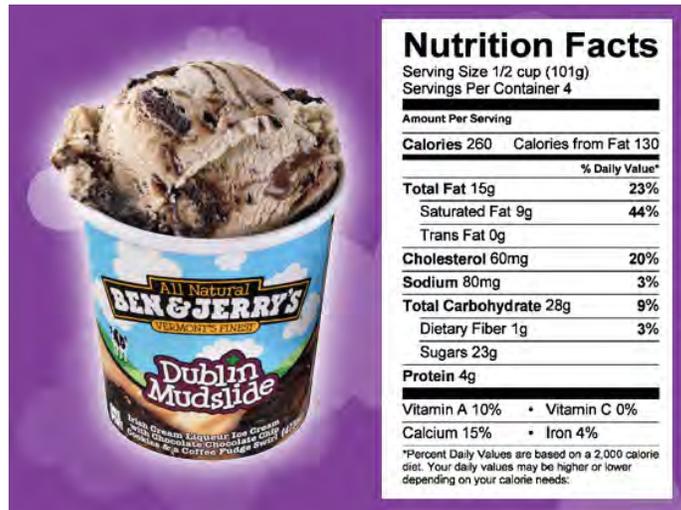
Teaching with Clickers
Students use electronic devices to answer questions and instructors collect and display responses, facilitating student engagement and collaboration

Change agents need to work smarter not harder

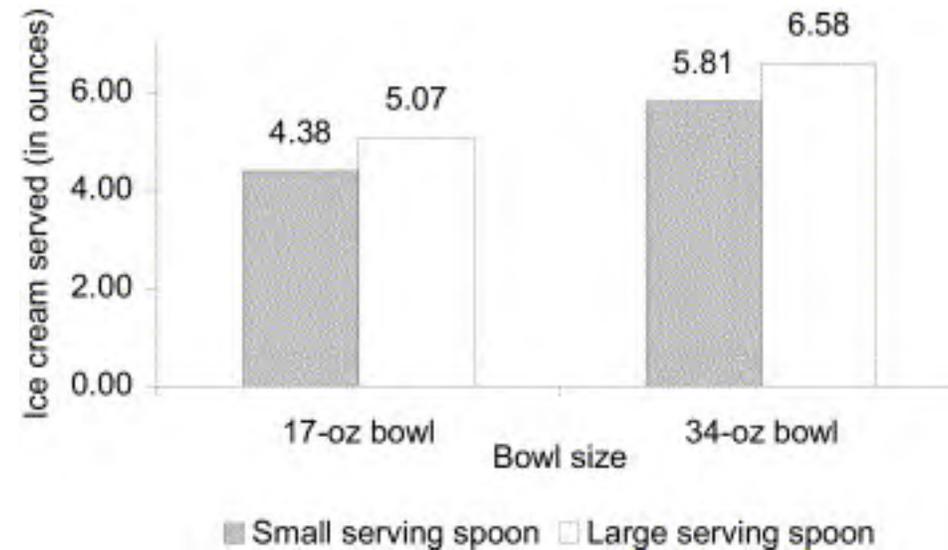


Changing the environment is often more effective than providing more information.

Provide Information



Change Environment



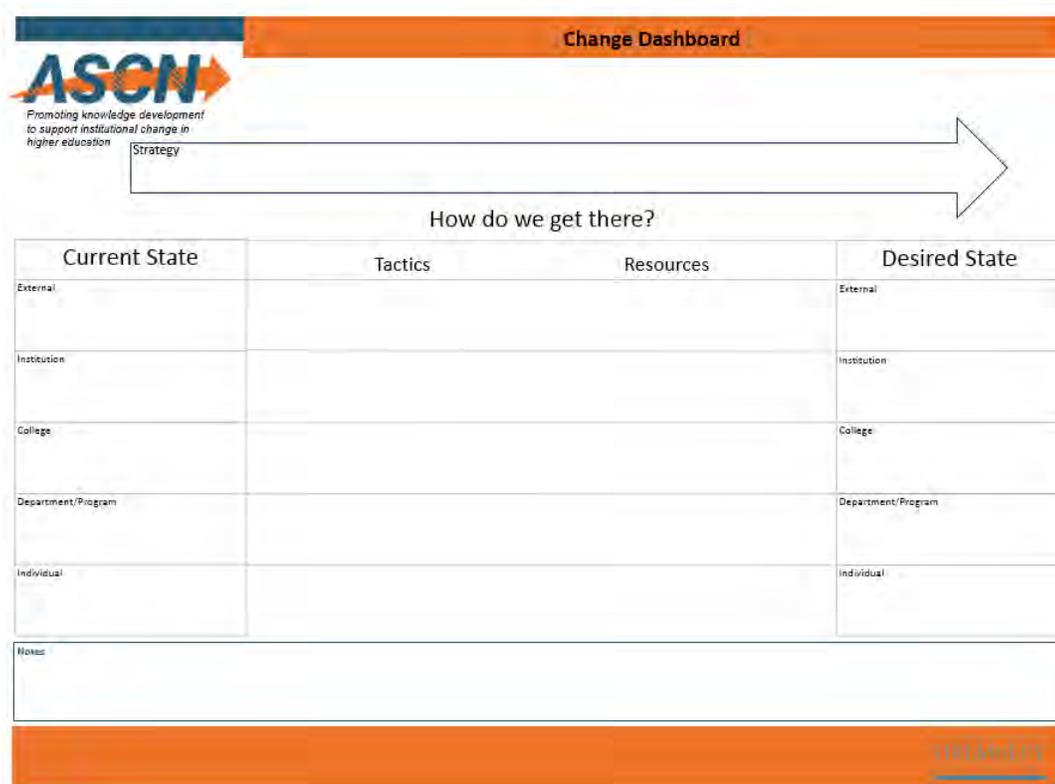
Brian Wansink, Koert van Ittersum, James E. Painter, **Ice Cream Illusions: Bowls, Spoons, and Self-Served Portion Sizes**, American Journal of Preventive Medicine, Volume 31, Issue 3, 2006, 240–243, <http://dx.doi.org/10.1016/j.amepre.2006.04.003>

You are a change agent. You can change the environment. It is important to work smarter!



Two tools that college/university–based change agents can use to plan successful environmental change

Change Dashboard

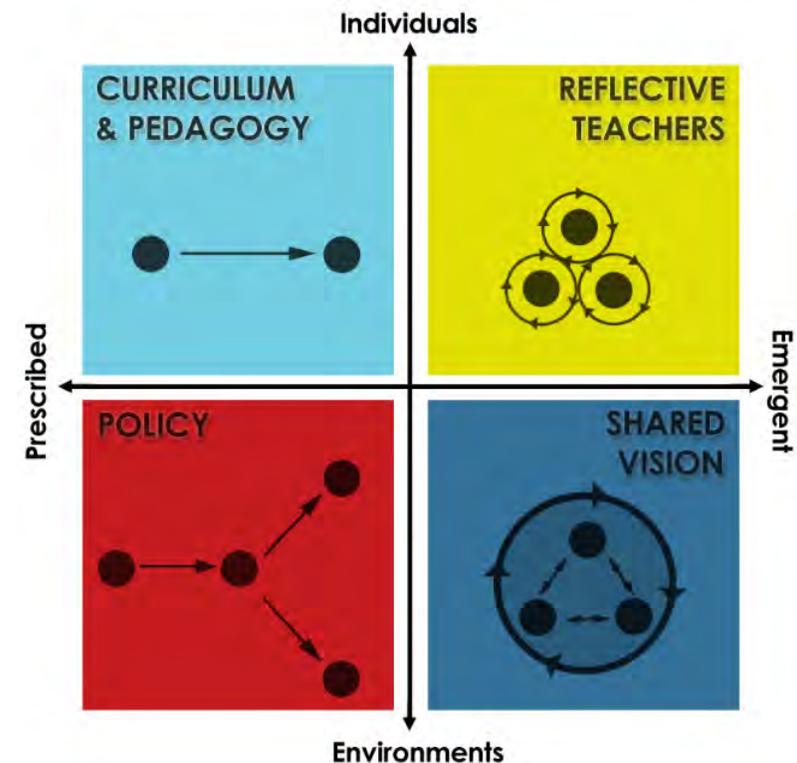


The Change Dashboard form features the ASCN logo (Promoting knowledge development to support institutional change in higher education) and a 'Strategy' arrow pointing right. Below it is the question 'How do we get there?' followed by a table with columns for Current State, Tactics, Resources, and Desired State. The table has rows for External, Institution, College, Department/Program, and Individual. A 'Notes' section is at the bottom.

Current State	Tactics	Resources	Desired State
External			External
Institution			Institution
College			College
Department/Program			Department/Program
Individual			Individual

Notes

Four Categories of Change Strategies



Change Dashboard

An action plan that helps you get from where you are now to where you want to be.

Four key parts:

- Current state
- Desired state
- Change strategies
- Change tactics



The form is titled "Change Dashboard" and features the ASCN logo with the tagline "Promoting knowledge development to support institutional change in higher education". A large arrow labeled "Strategy" points from left to right across the top. Below it, the question "How do we get there?" is centered. The main part of the form is a table with four columns: "Current State", "Tactics", "Resources", and "Desired State". The rows represent different levels of the organization: "External", "Institution", "College", "Department/Program", and "Individual". A "Notes" section is located at the bottom of the table. The form is framed by an orange border.

Current State	Tactics	Resources	Desired State
External			External
Institution			Institution
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Department/Program			Department/Program
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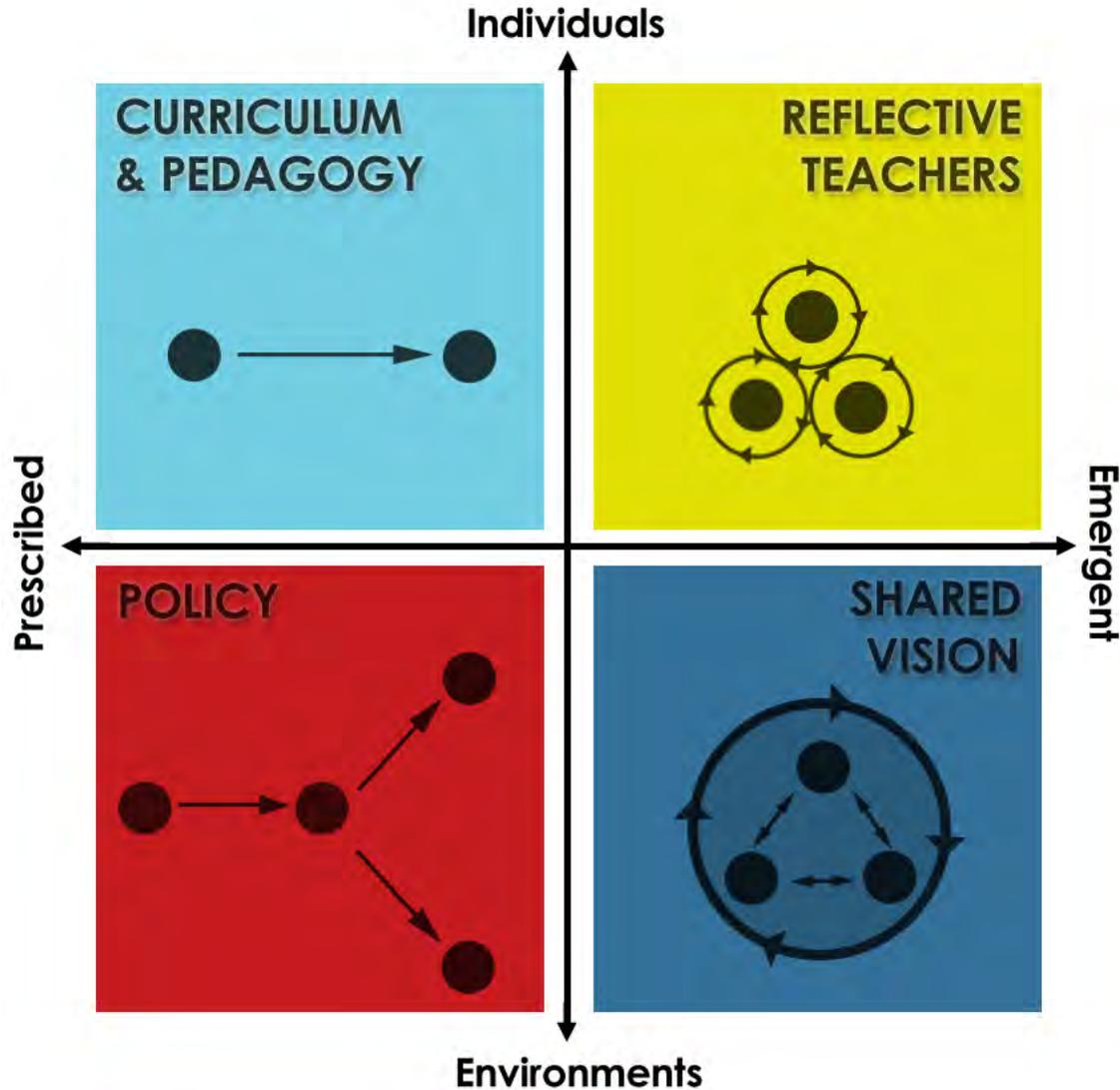
Notes

The Dashboard was developed to support team planning and communication at the Systemic Change Institute



Four Categories of Change Strategies

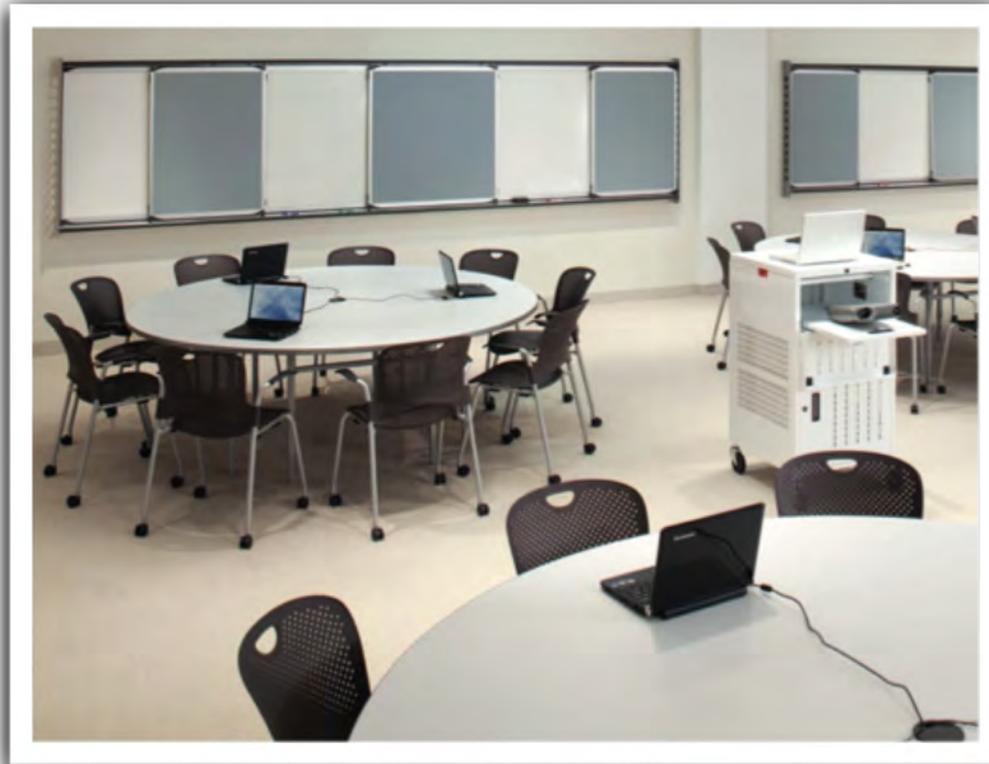
A **conceptual picture** of change strategies and tactics. Helps to identify possible strategies and tactics and ensure alignment between strategies and tactics.



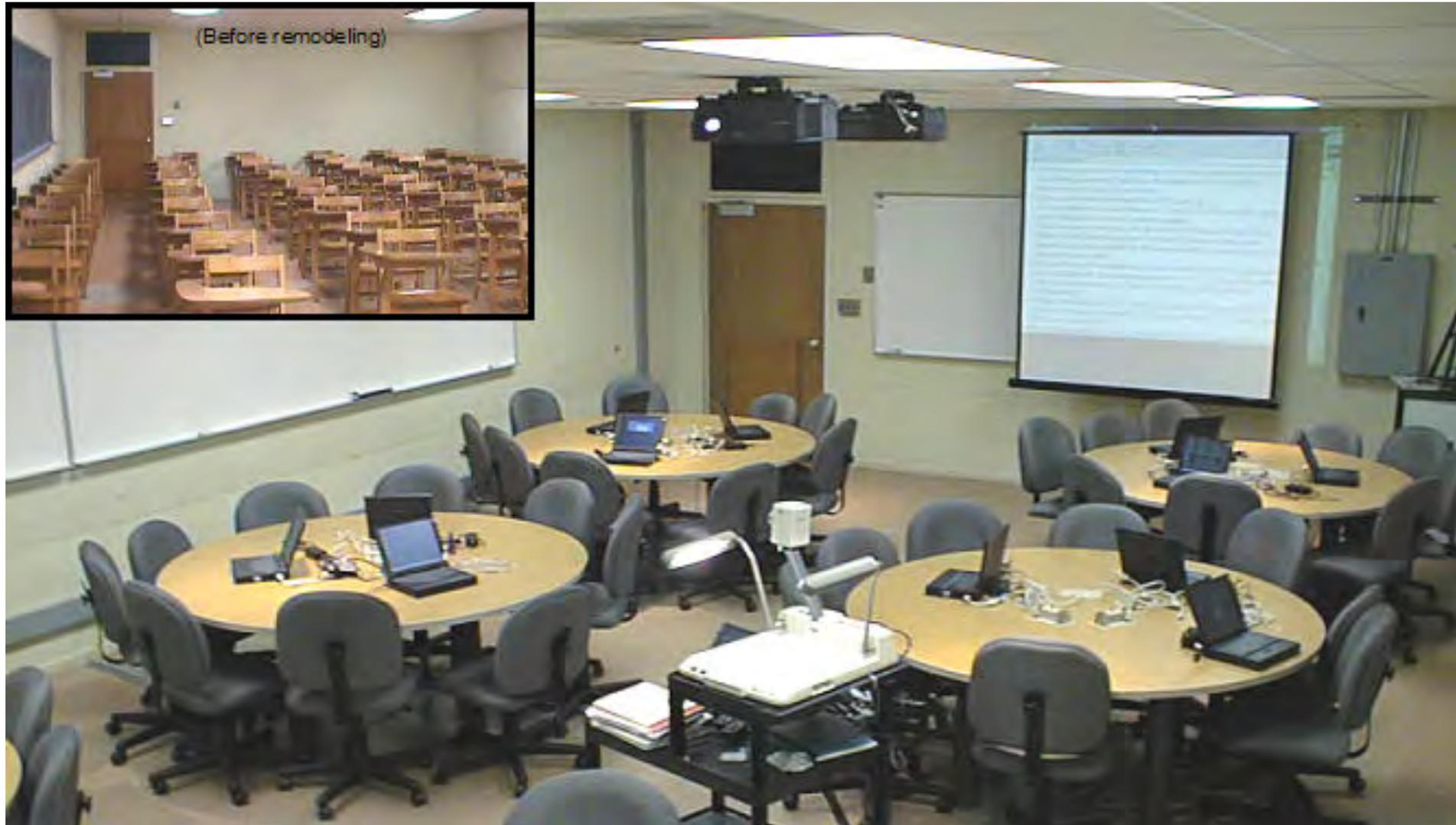
*C. Henderson, A. Beach, and N. Finkelstein, "Facilitating change in undergraduate STEM instructional practices: An analytic review of the literature. *Journal of Research in Science Teaching*, 48(8), 952-984 (2011).

For example, you want to implement SCALE-UP

SCALE-UP Involves redesigning the **classroom** and **pedagogy**



What would you do to increase the likelihood of a successful transition?



Many change initiatives fail because the strategy and tactics are never explicitly articulated.

- ***Change strategy***: Coherent plan of action that guides a change agent's choice of tactics (e.g., provide tested, ready-to-use materials for teaching a specific course).
- ***Change tactics***: The specific activities that change agents use to promote instructional change (e.g., dissemination of textbooks or other materials, or the specific nature, duration, and content of workshops, etc.).

Developing an explicit change strategy

Step 1: Understand the Gap

Current State
External
Institution
Department
Individuals



Desired State
External
Institution
Department
Individual

What do you want to change at each level?

Structures

- curriculum (e.g., types of knowledge presented through the curriculum, organization of the curriculum)
- pedagogies (e.g., use of particular teaching methods or new technologies)
- student learning and assessment practices
- policies (key institutional policies such as those regarding scheduling)
- budgets
- non-financial resources (e.g., allocation of space or equipment towards particular projects)
- departments and institutional structures (e.g., organizational hierarchy, relevant centers)
- decision-making structures (e.g., formal governance processes, ad hoc structures such as task forces)

Cultures

- ways groups or individuals interact with one another
- the language the campus used to talk about itself
- the types of conversations (e.g., topics and priorities discussed at formal and informal conversations)
- relationships with stakeholders

(Structural and cultural changes adapted from Eckel and Kezar (2003). *Taking the Reins: Institutional Transformation in Higher Education*. Westport, CT: Praeger Publishers.)

Step 1: Understand the Gap – SCALE-UP

Current State (partial)

External

Institution

- Classrooms not conducive to use of SCALE-UP
- Teaching is judged only by student evaluations

Department

- Department has culture of individual course ownership

Individual

- Faculty not knowledgeable about SCALE-UP
- Dean is ambivalent about SCALE-UP use



Desired State (partial)

External

Institution

- Classrooms support the use of SCALE-UP
- Teaching effectiveness is judged by multiple methods

Department

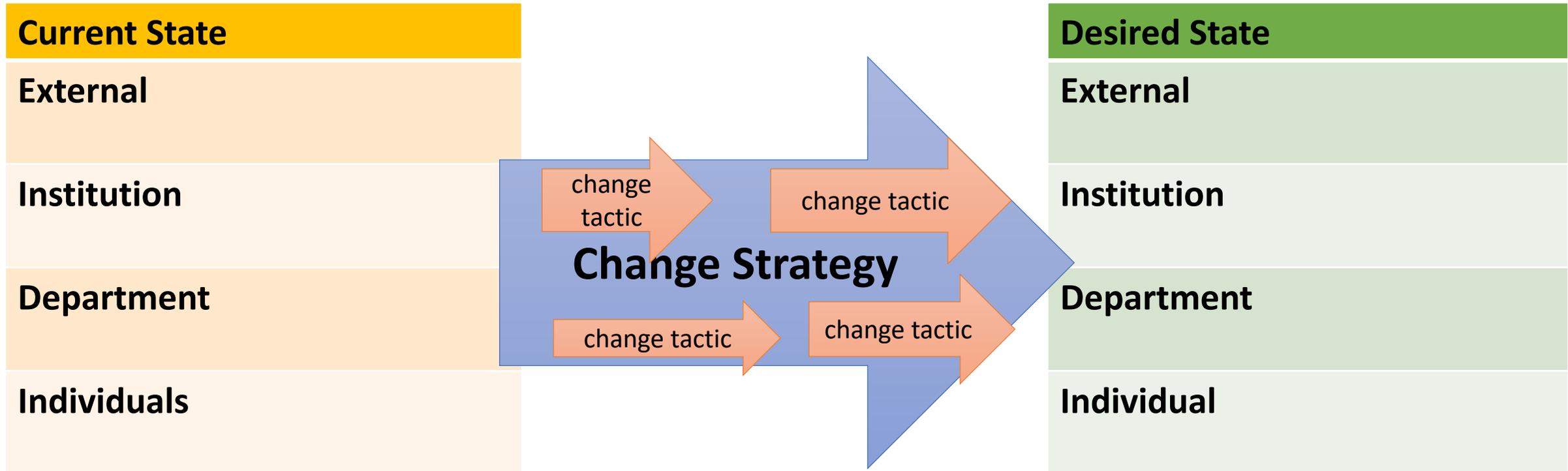
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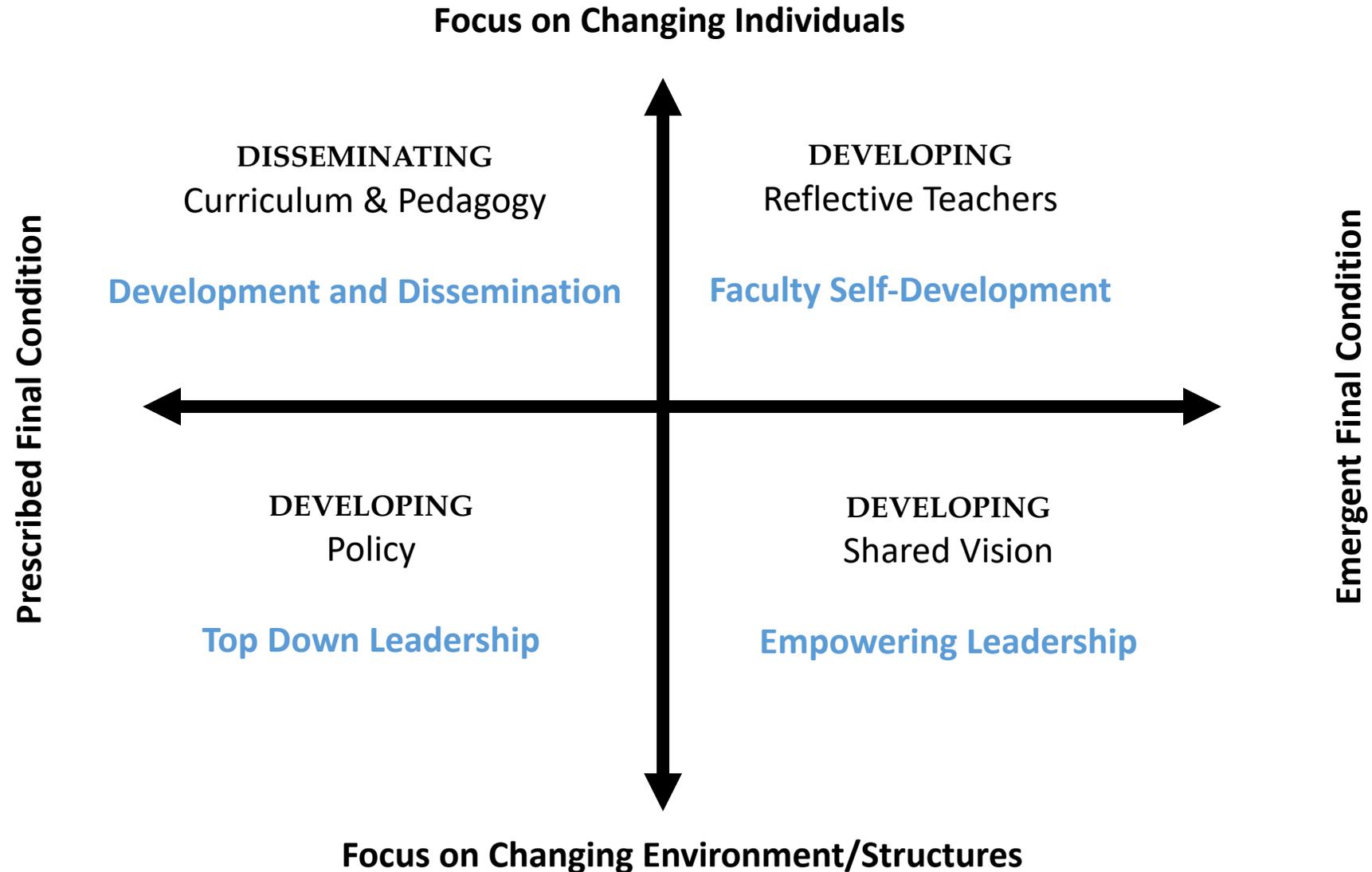
- Faculty know how to implement SCALE-UP
- Dean supports SCALE-UP use

Developing an explicit change strategy

Step 2: Identify a strategy and tactics to bridge the Gap



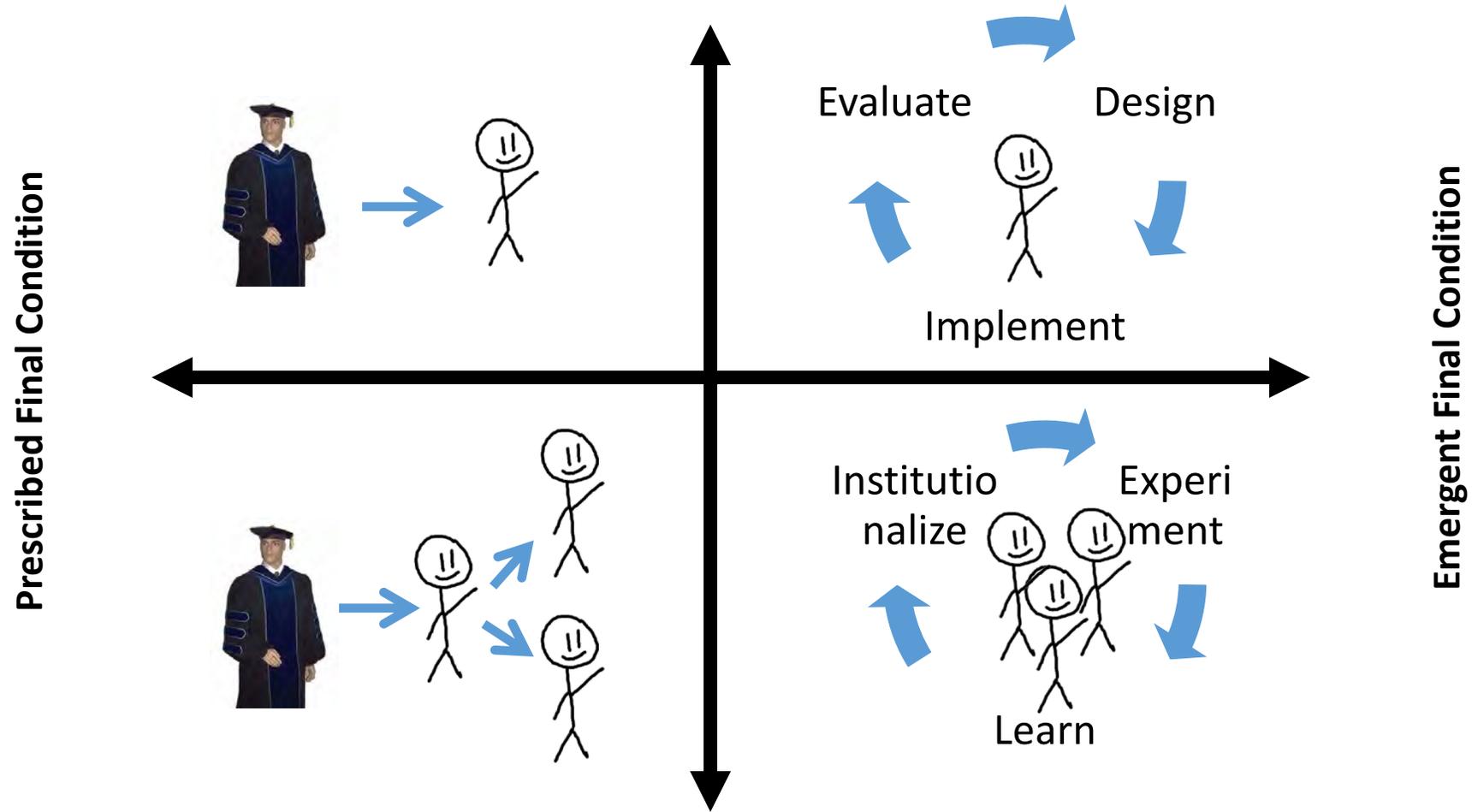
Four Categories of Change Strategies



*C. Henderson, A. Beach, and N. Finkelstein, "Facilitating change in undergraduate STEM instructional practices: An analytic review of the literature. *Journal of Research in Science Teaching*, 48(8), 952-984 (2011).

How they Work

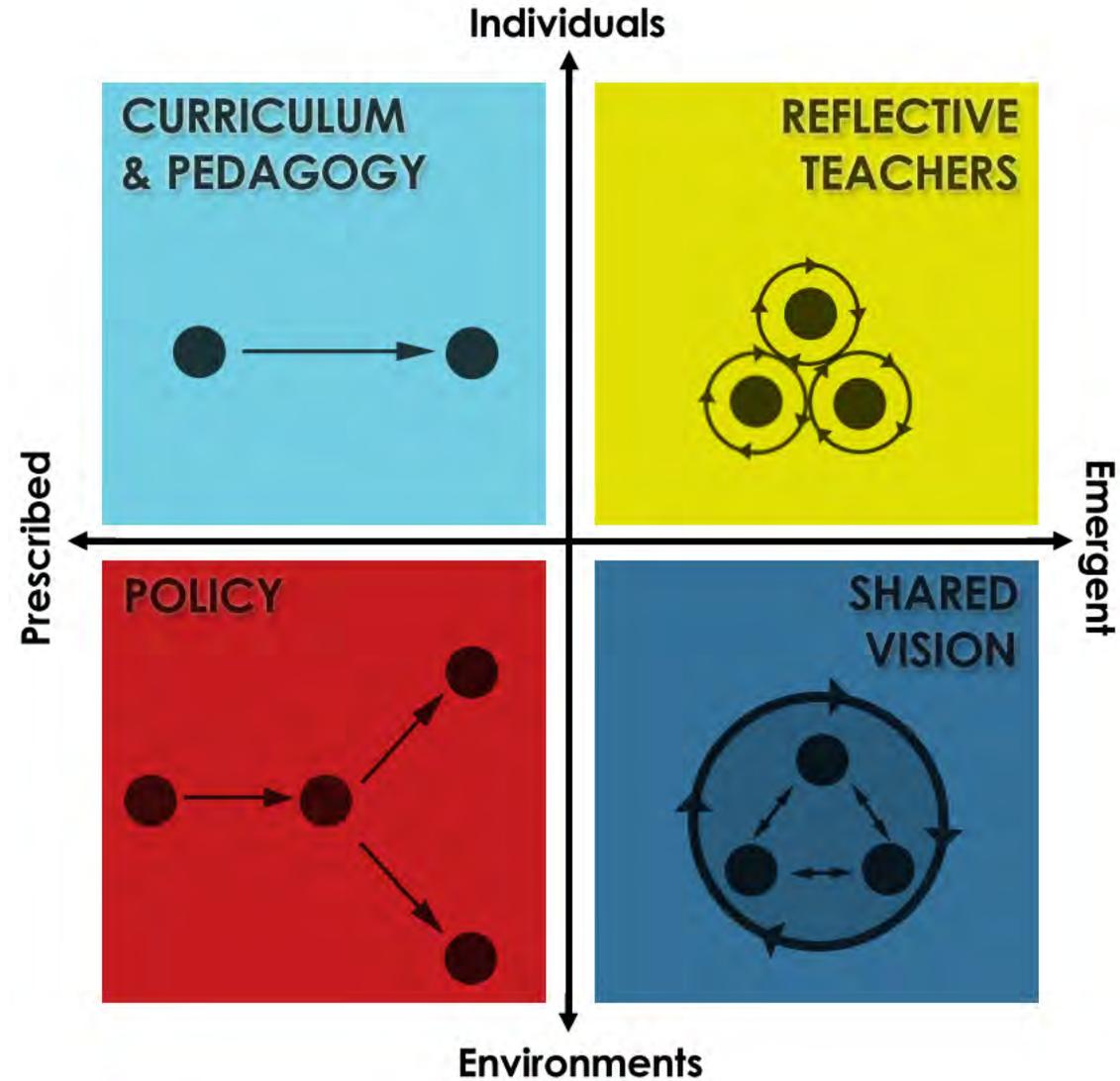
Focus on Changing Individuals



Focus on Changing Environment/Structures

*C. Henderson, A. Beach, and N. Finkelstein, "Facilitating change in undergraduate STEM instructional practices: An analytic review of the literature. *Journal of Research in Science Teaching*, 48(8), 952-984 (2011).

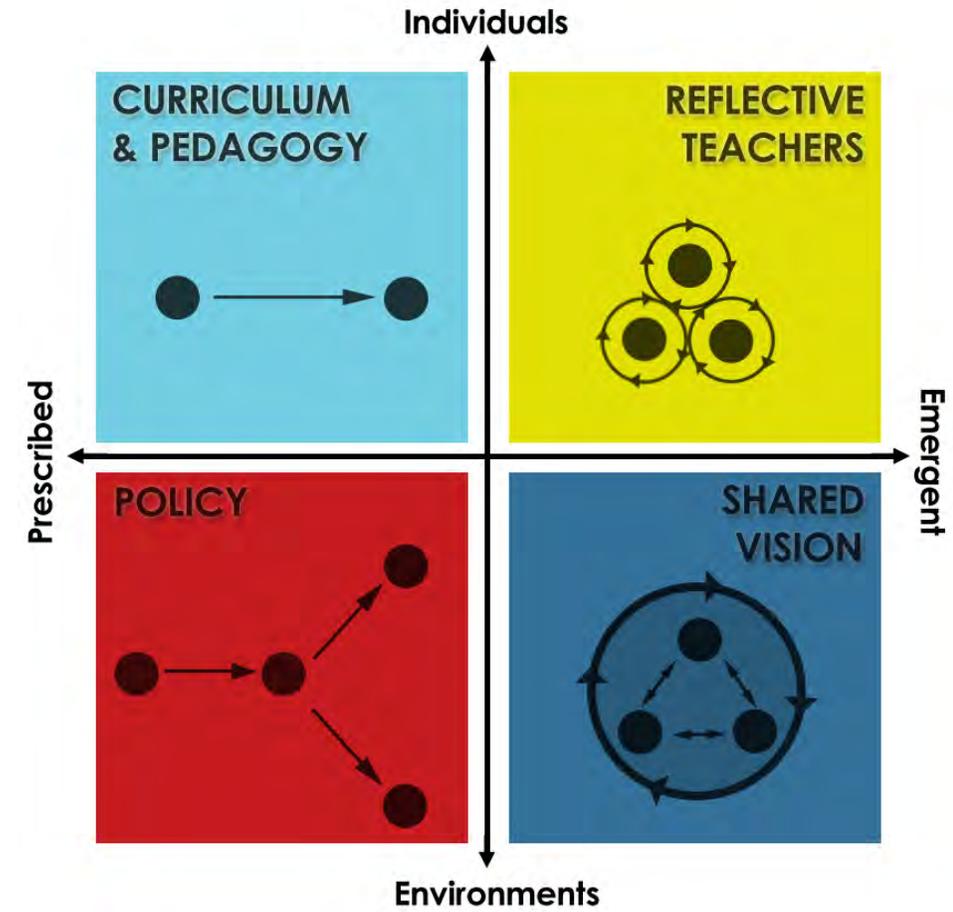
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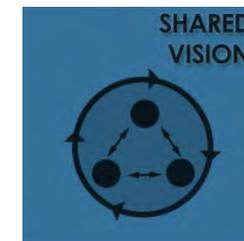
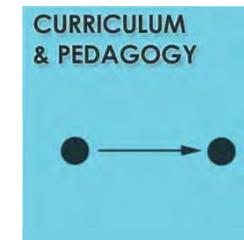
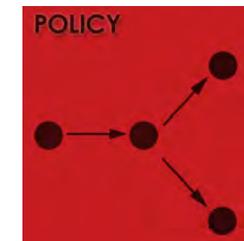
How Would You Categorize these Change Tactics?

- A. Provide opportunities within your department for faculty to share good ideas and strategies related to teaching
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- C. Promote the success of your department's curricular improvements to the Dean
- D. Create a departmental task force to make improvements to the introductory sequence

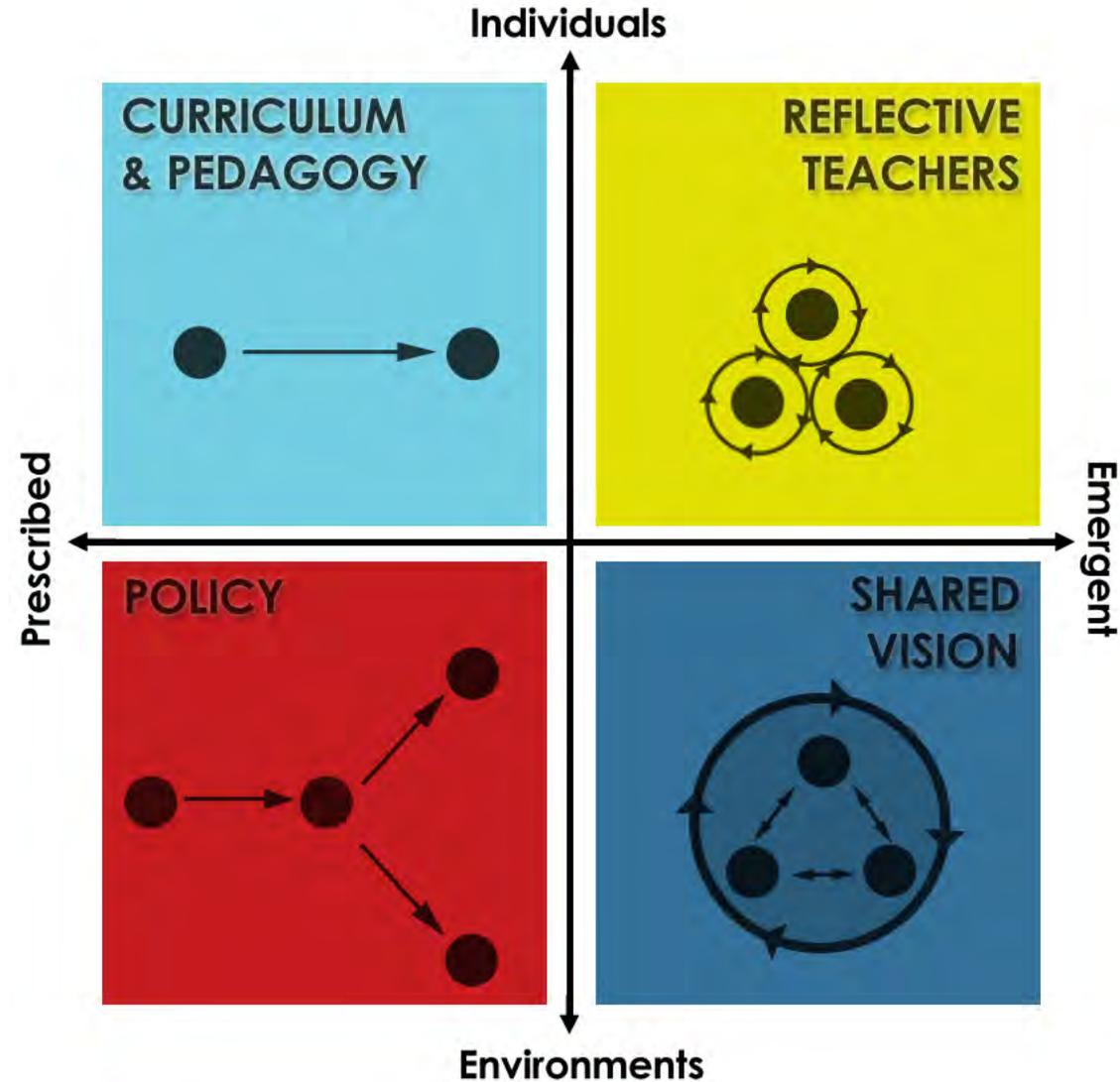


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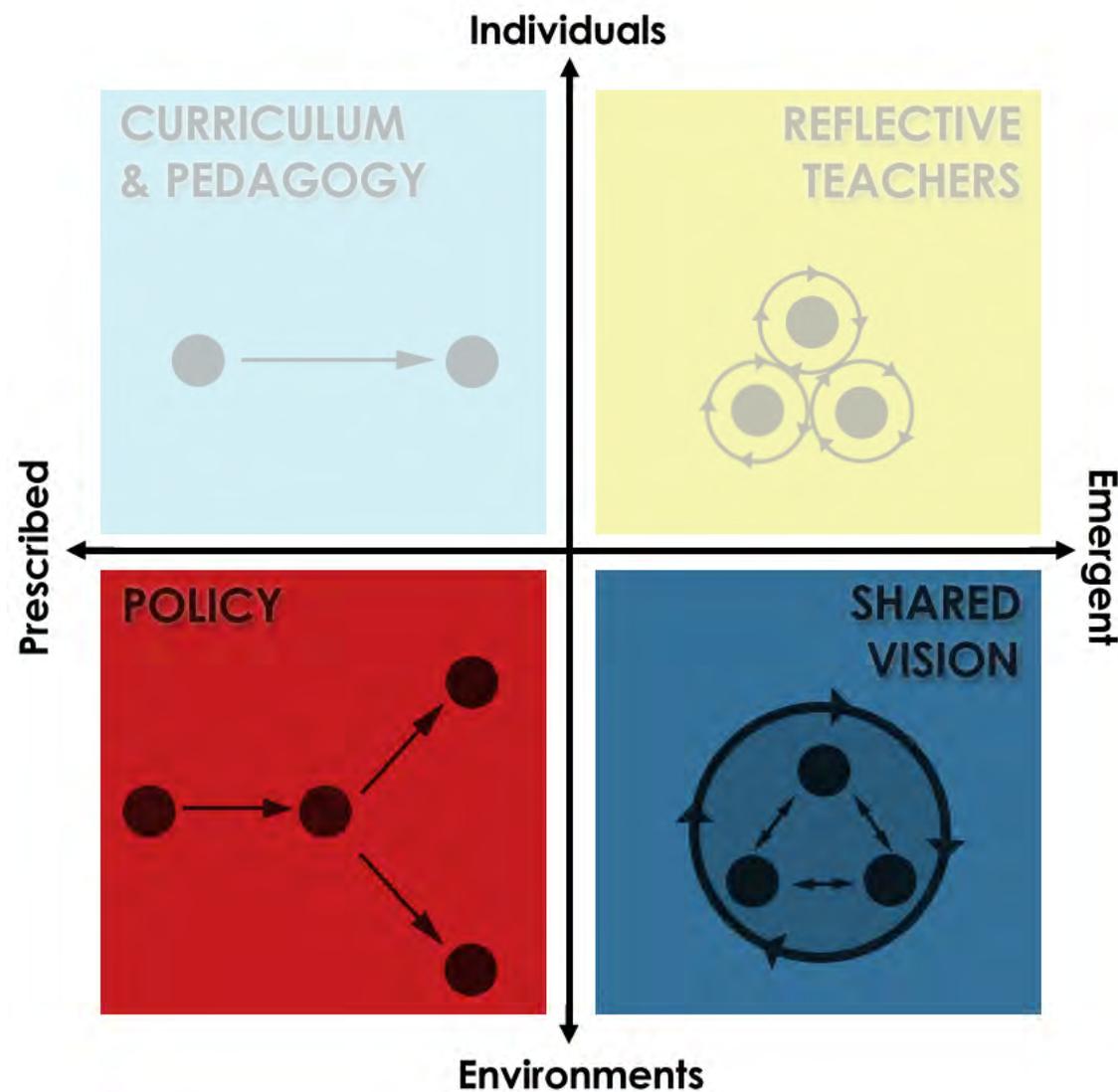


Environment strategies are most appropriate for institutional change



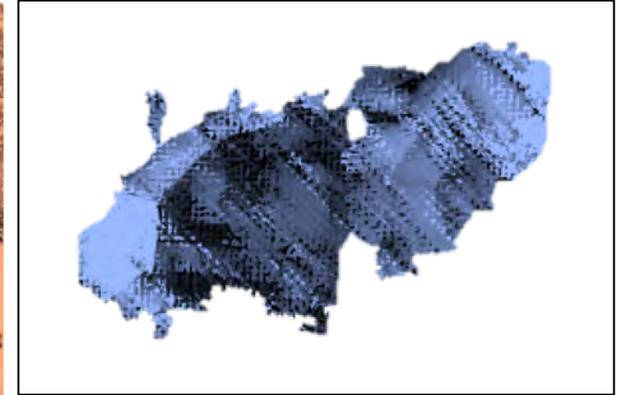
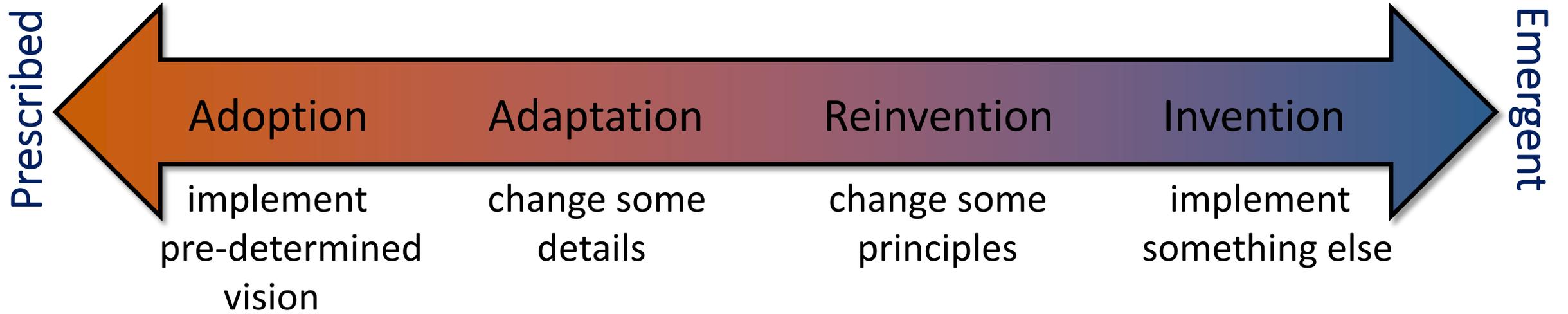
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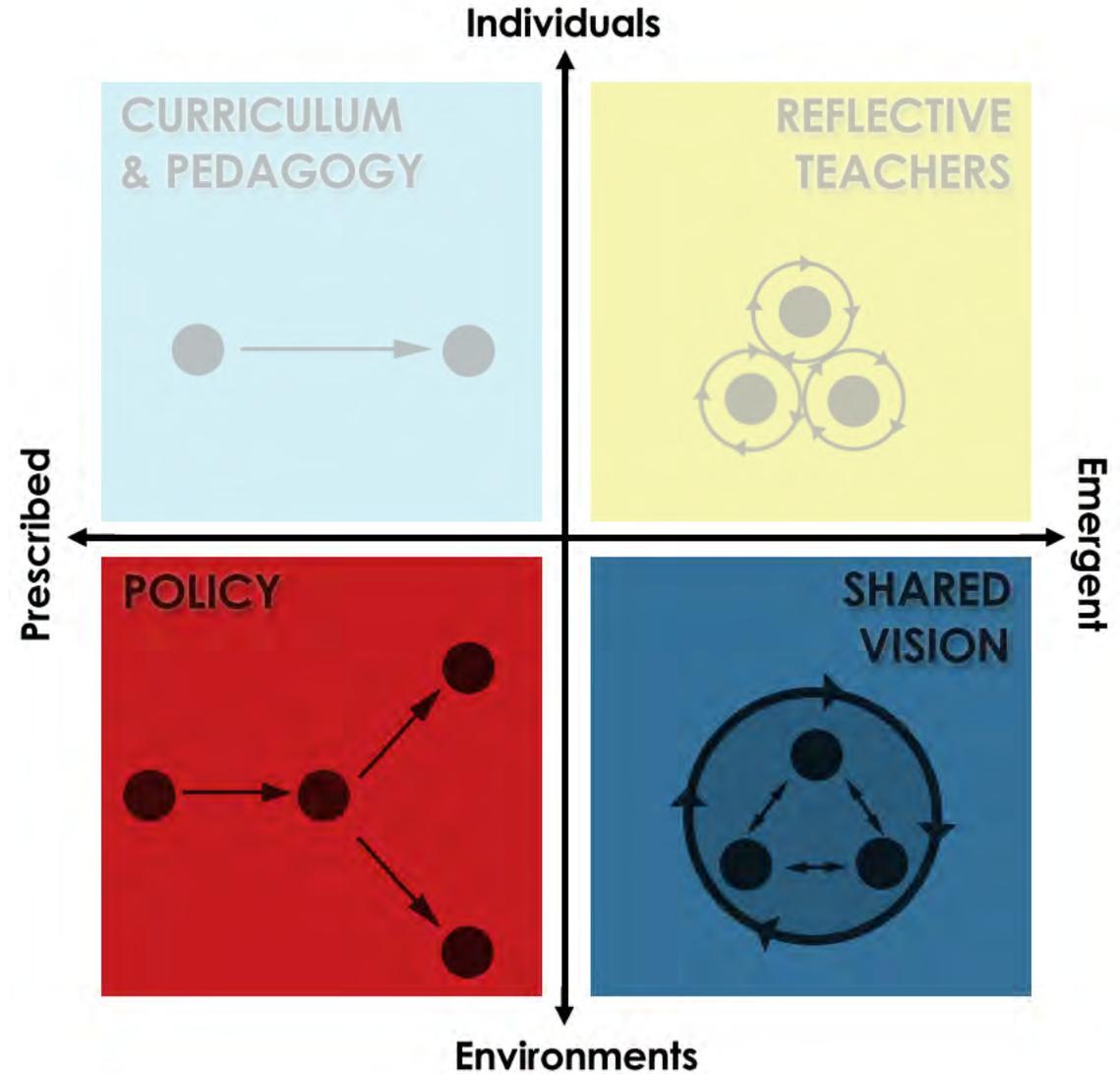
Prescribed vs. emergent strategies depends on how pre-determined your final vision is



Henderson & Dancy 2008; Henderson *et al.* 2012

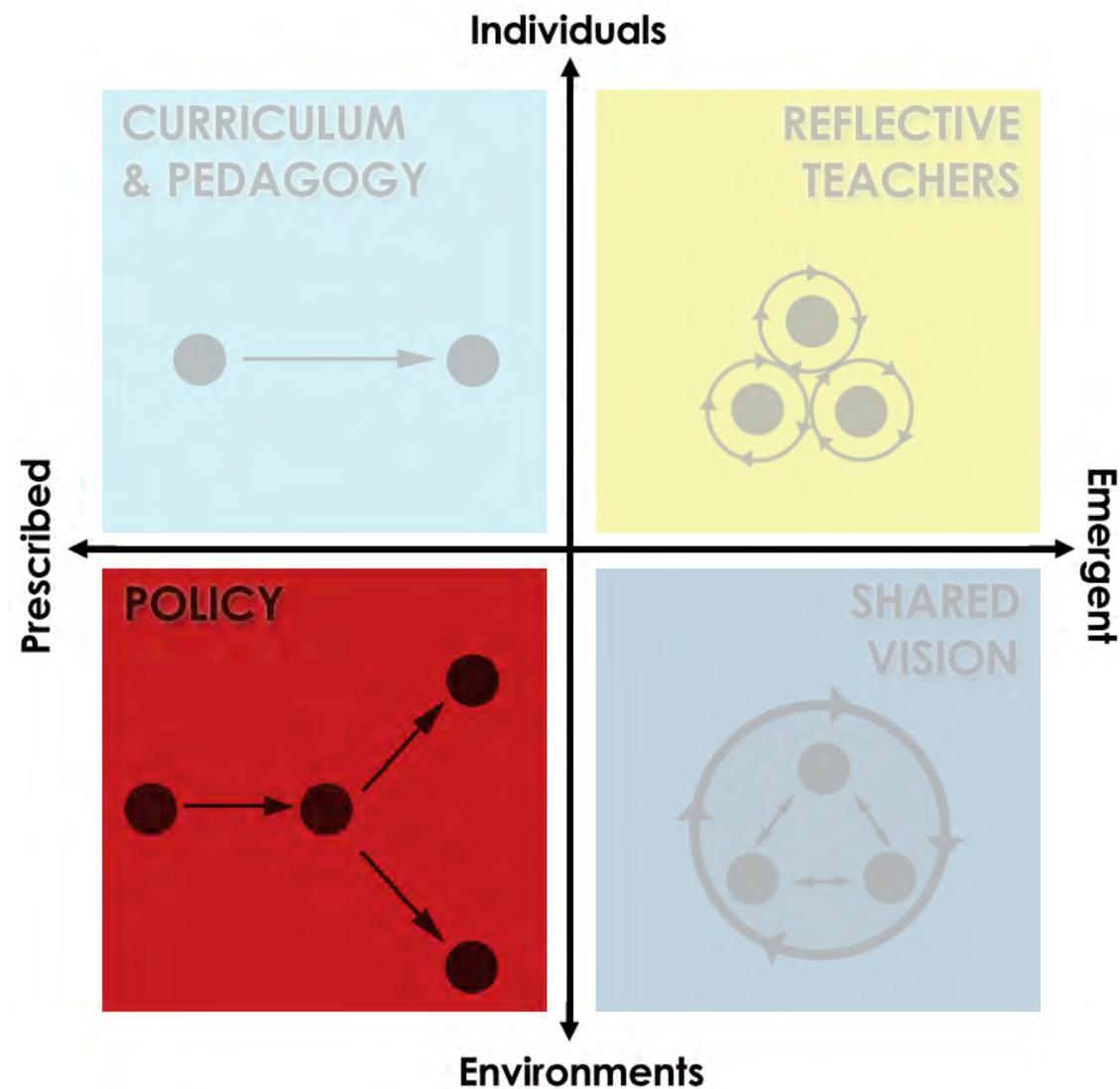
Turpen, Henderson & Dancy 2016; Dancy, Henderson & Turpen 2016

Environment strategies are most appropriate for institutional change



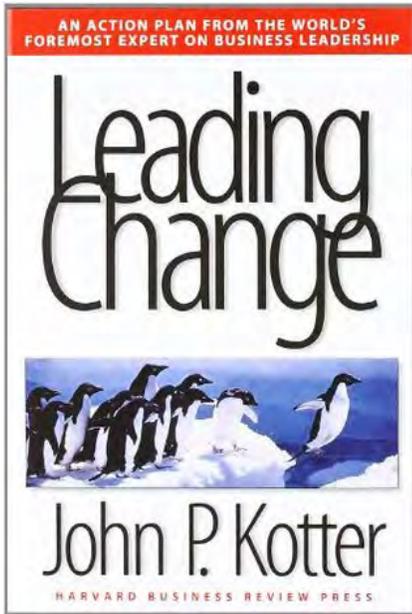
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Prescribed - Environment strategies



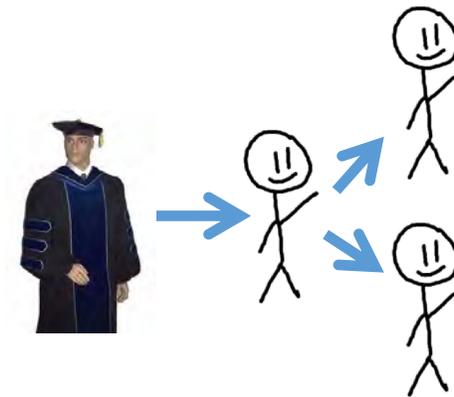
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Eight-Stage Leadership Process

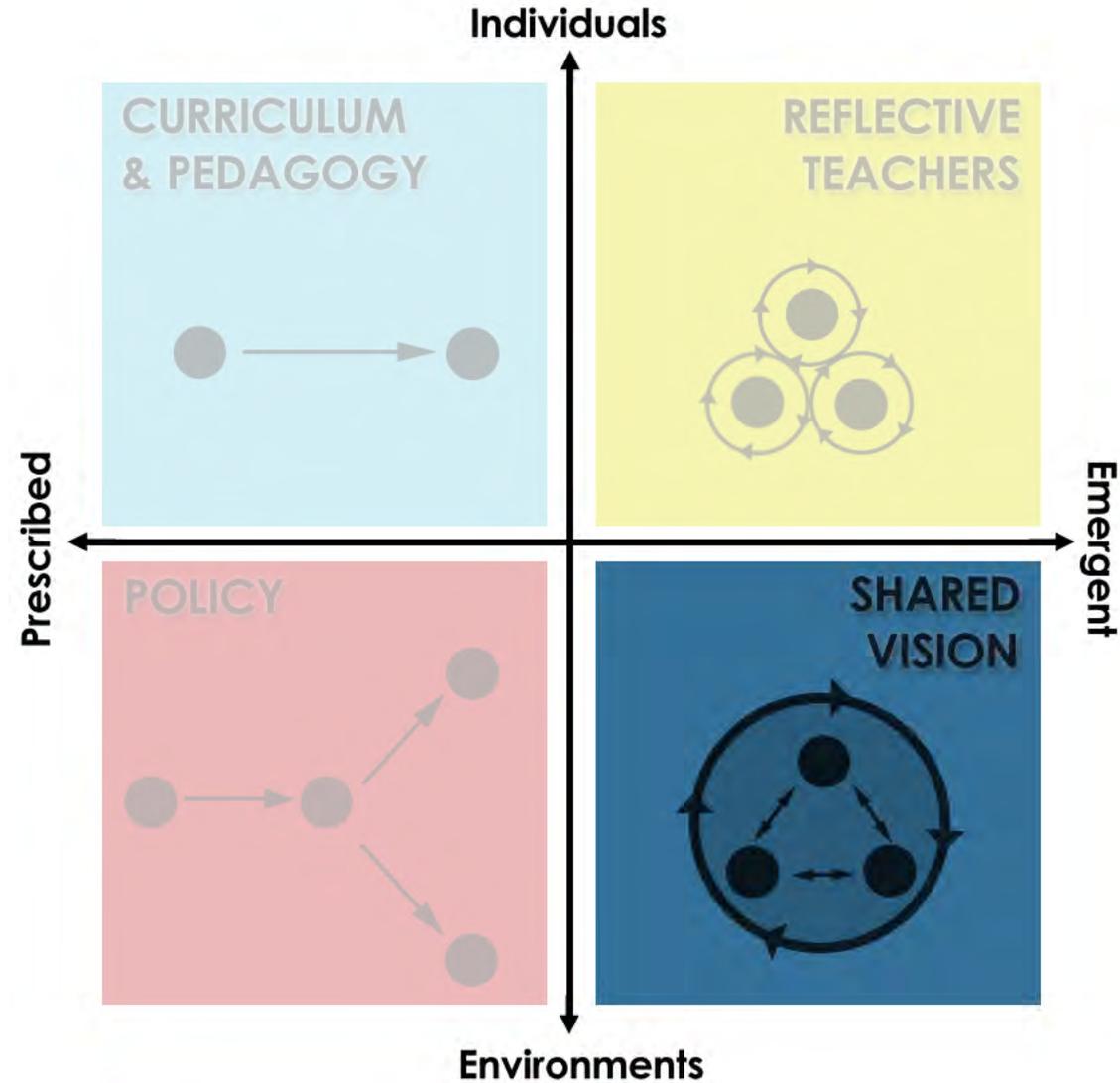


Eight-Stage Leadership Process (Kotter, 1996)

1. Establishing a sense of urgency
2. Creating the guiding coalition
3. Developing a vision and strategy
4. Communicating the change vision
5. Empowering broad-based action
6. Generating short-term wins
7. Consolidating gains and producing still more change
8. Anchoring new approaches in the culture



Emergent - Environment strategies

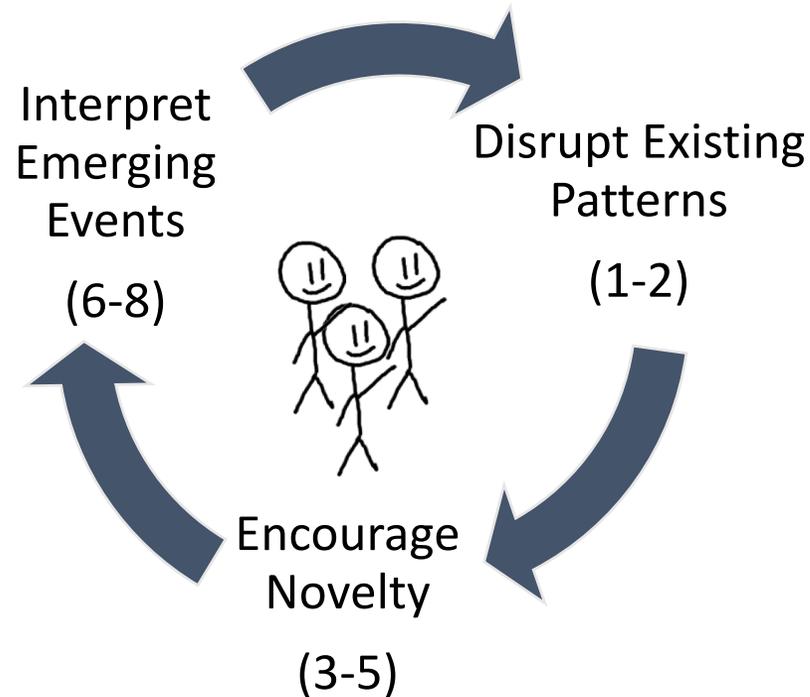


*C. Henderson, A. Beach, and N. Finkelstein, "Facilitating change in undergraduate STEM instructional practices: An analytic review of the literature. *Journal of Research in Science Teaching*, 48(8), 952-984 (2011).

Complexity Leadership Theory

Complexity Leadership Theory's Enabling Leadership (Uhl-Bien et al., 2007)

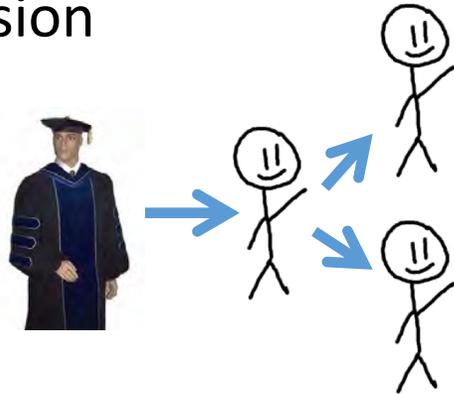
1. **Disrupting patterns to encourage interactions between individuals**
2. **Developing rules that create interdependency to encourage teamwork**
3. **Encouraging dissenting opinions to increase tension**
4. **Avoiding stifling regulations**
5. **Articulating the vision**
6. **Identifying emerging knowledge from interactions**
7. **Communicating emerging knowledge to formal leadership**
8. **Implementing knowledge**



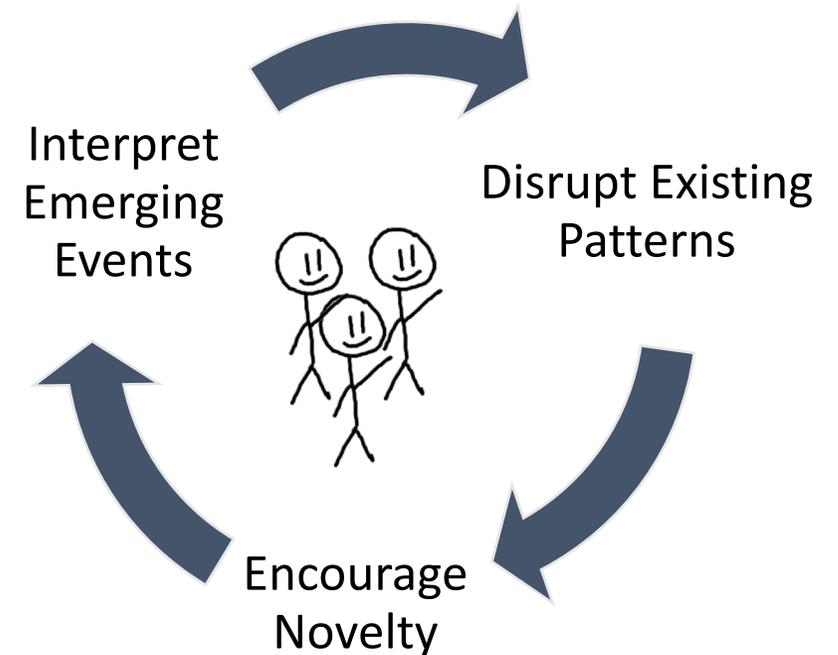
Borrego, M., & Henderson, C. (2014). Increasing the Use of Evidence-Based Teaching in STEM Higher Education: A Comparison of Eight Change Strategies. *Journal of Engineering Education*, 103(2), 220–252. doi:10.1002/jee.20040

Comparison of Eight-Stage Leadership Process and Complexity Leadership Theory

Eight Stage (prescribed) – start with a vision



Complexity Leadership (emergent) – start with disruption



Create Vision

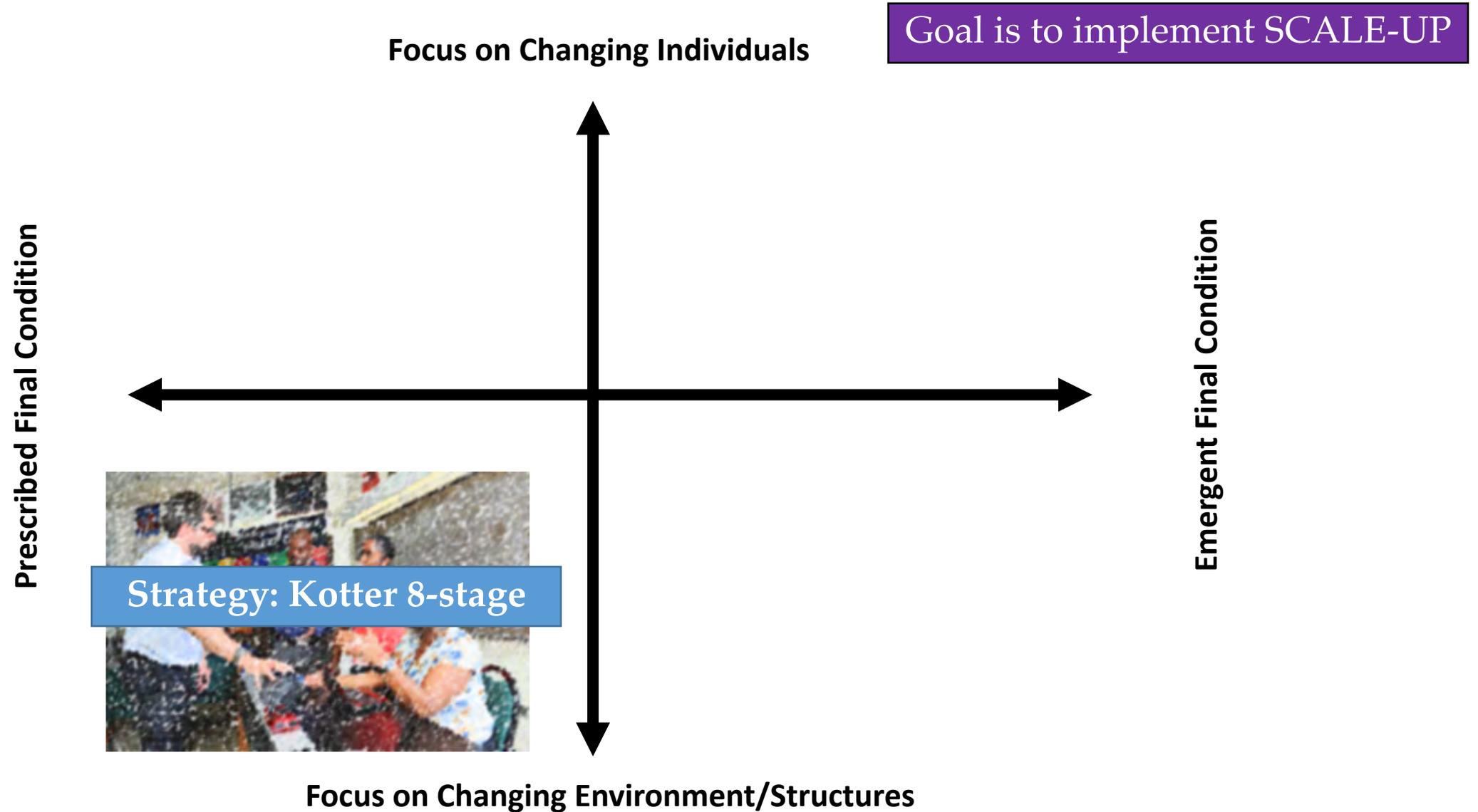
Implement Change

Institutionalize Change

There are many other change strategies

Change Strategy	Summary
Diffusion (Curriculum & Pedagogy)	Innovations are created in one location, then adopted or adapted by others. Multi-stage adoption process.
Implementation (Curriculum & Pedagogy)	A set of purposeful activities are designed to put proven innovations into practice in a new setting.
Scholarly Teaching (Reflective Teachers)	Individual faculty reflect critically on their teaching in an effort to improve.
Faculty Learning Communities (Reflective Teachers)	A group of faculty supports each other in improving teaching.
Quality Assurance (Policy)	Measurable target outcomes are identified and progress towards them is assessed and tracked.
Organizational Development (Policy)	Leader develops new vision and plans a strategy for aligning employee attitudes and behaviors with this vision.
Learning Organizations (Shared Vision)	Leader works to develop an organizational culture that supports knowledge creation.
Complexity Leadership (Shared Vision)	In a complex system, results are not easily predicted. Change agents can create conditions that increase the likelihood of productive change.

Example: SCALE-UP



Aligning tactics with strategy



Tactics for implementing SCALE-UP

Current State (partial)

External

Institution

- Classrooms not conducive to use of SCALE-UP
- Teaching is judged only by student evaluations

Department

- Department has culture of individual course ownership

Individual

- Faculty not knowledgeable about SCALE-UP
- Dean is ambivalent about SCALE-UP use



Desired State (partial)

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- Classrooms support the use of SCALE-UP
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Questions that arise:

- Who do you need to get on board? (Dean, faculty)
- What structural changes are necessary? (classroom, assessment of teaching effectiveness)
- What cultural changes are necessary? (joint course ownership)

Desired State (partial)

External

Institution

- Classrooms support the use of SCALE-UP
- Teaching effectiveness is judged by multiple methods

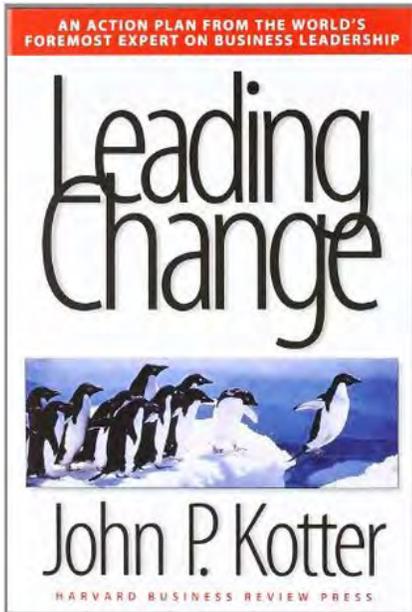
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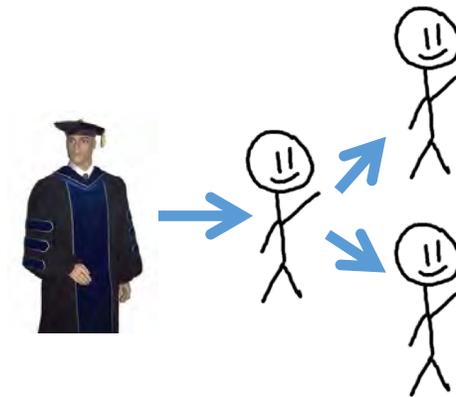
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Individual

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Tactics

Create Vision

- Urgency: our DFW rates are too high
- Create a task force to implement and test feasibility of SCALE-UP and develop teaching resources
- Bring in speakers about SCALE-UP and visit nearby SCALE-UP sites
- Secure support from Dean

Desired State (partial)

External

Institution

- Classrooms support the use of SCALE-UP
- Teaching effectiveness is judged by multiple methods

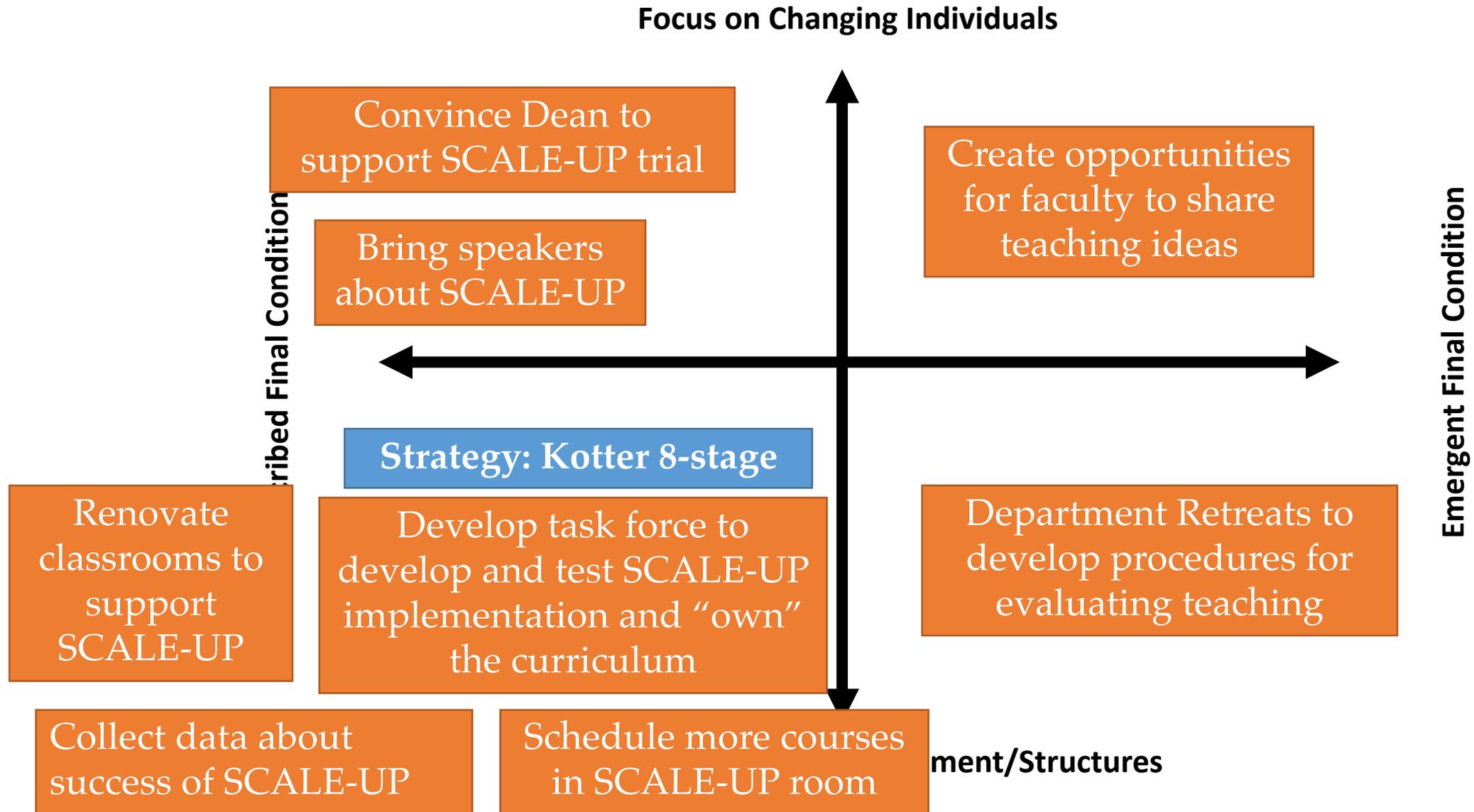
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Example: SCALE-UP

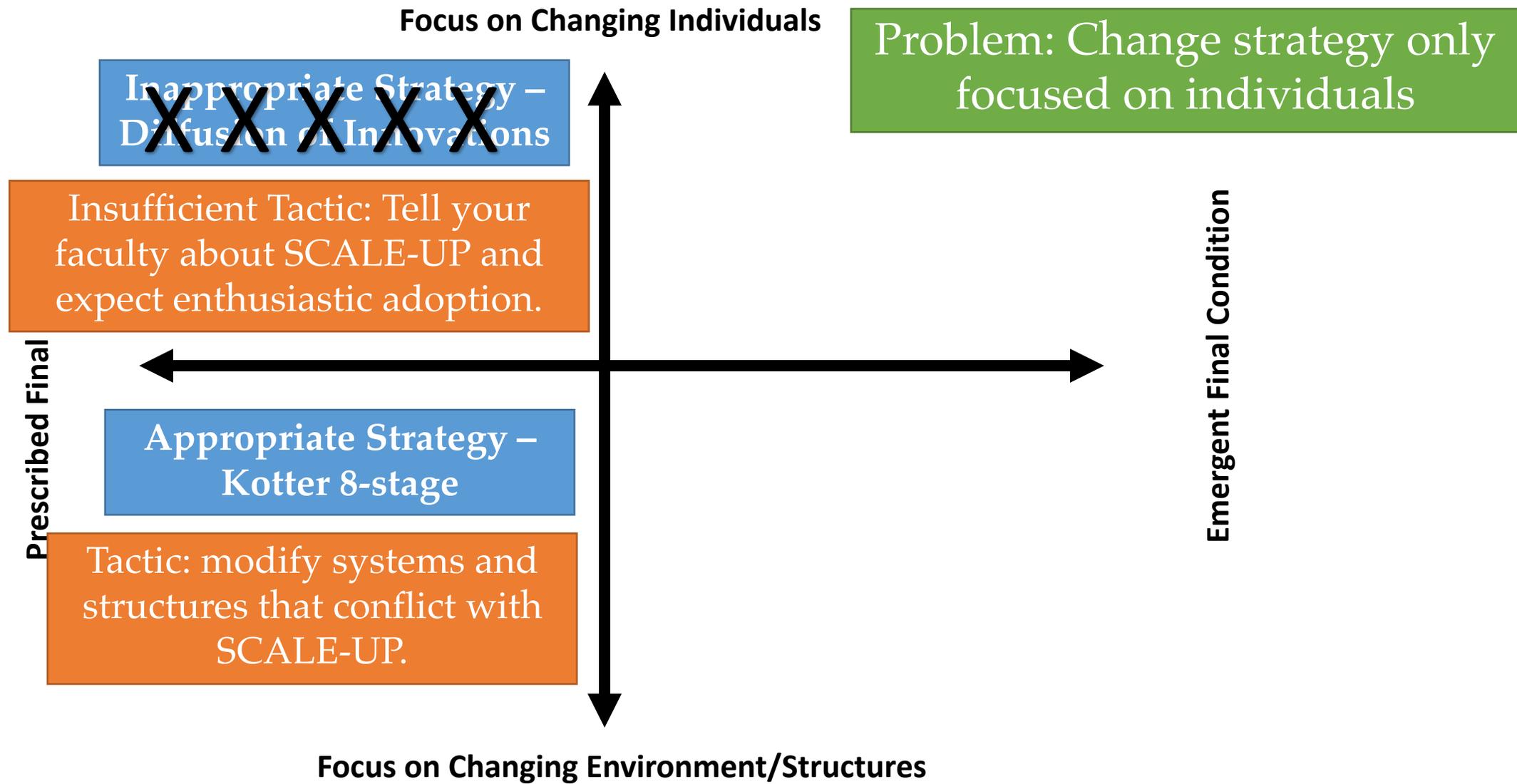




RESISTANCE

Assumption: People and systems always resist change

Reality: Resistance is a symptom of 1) lack of alignment between strategies and tactic, 2) inappropriate change strategy, or 3) attempting to bridge too large of a gap.



Tactic: Recognize accomplishments the team.

Prescribed Final Condition

Tactic: Offer workshops related to your initiative.

Strategy: Kotter 8-stage

Tactic: Set constraints on teams by articulating required project components.

Tactic: Develop metrics to track progress towards project goals.

Focus on Changing Individuals



Environment/Structures

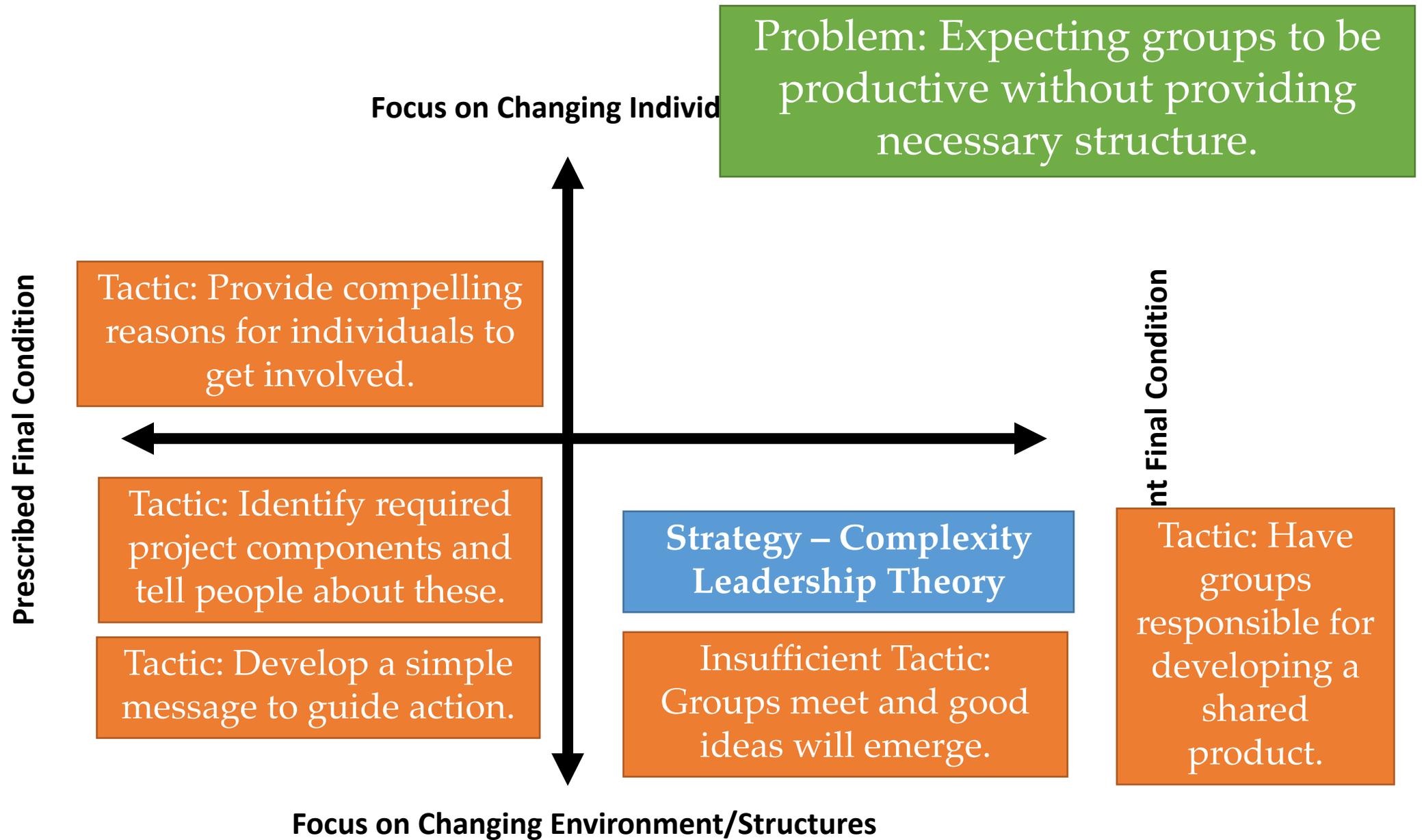
Tactic: Provide opportunities for individuals to share ideas with others

Inappropriate Strategy – Complexity Leadership Theory

Tactic: Create project teams that meet and develop good ideas.

Emergent Final Condition

Problem: Pretending to value emergent outcomes when you really do not



Materials available <https://goo.gl/NZkP7R>

Summary – The Dashboard and Four Categories can help change agents identify and articulate change strategy and tactics that:

- *Engage both individuals and environments*
 - Focus on individuals as people who are shaped by and can shape environments and structures.
- *Align environments and structures with the desired change*
 - Seek to align policies and cultures within units and between levels of the system.
- *Balance emergent and prescribed processes*
 - The right balance will depend on the context and the type of change sought.
- *Reduce the likelihood of resistance*
 - Resistance usually results from a lack of alignment.

