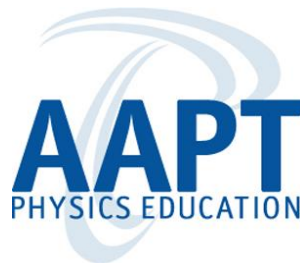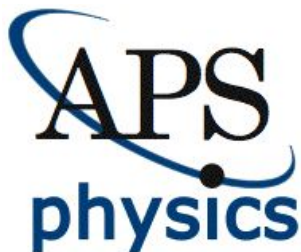# Improving and Supporting Physics Departments: Building a Comprehensive Guide of Effective Practices for Chairs

*Theodore Hodapp, Kathryne Woodle, Sean Costello*

*Project Development*

*28 July 2020*

# How many years have we been working on EP3?

# Brief Timeline

STB*:    Requests to APS to do what ACS does: Program Certification

2012:    APS leadership asks Committee on Education (COE) to investigate

2013:    Working group formed to investigate

2014:    Survey of physics chairs, report written

2015:    COE discusses, makes recommendation to APS Council; ABET announces intention to accredit all fields of natural science; APS Council charges COE to form task force (BPUPP: "Best Practices for Undergraduate Physics Programs")

2016:    APS COE begins process, drafts preliminary documents, recruits task force; Task force begins meeting

2017:    Applied for funding, beginning drafts & discussions on underlying issues, determination of content & structure of guide, development

2018:    NSF funding received, guide development commences

2019:    Guide development

2020:    Initial Rollout

2021:    Total release, train reviewers

2022+:    Update guide, new sections, evaluate review process

*Since Time Began

1. **Develop a guide for self-assessment of undergraduate physics programs founded on documented best practices linked to measurable outcomes**

   *The guide should provide a physics-community-based resource to assist programs in developing a culture of continuous self-improvement, in keeping with their individual mission, context, and institutional type. The guide should include considerations of curricula, pedagogy, advising, mentoring, recruitment and retention, research and internship opportunities, diversity, scientific skill development, career/workforce preparation, staffing, resources, and faculty professional development.*

2. **Recommend a plan for ongoing review and improvement of this guide under the oversight of the APS Committee on Education**

Passed by the APS Council, November 2015

**Co-Chair:** David Craig, Oregon State University

**Co-Chair:** Michael Jackson, Millersville University of Pennsylvania

- Noah Finkelstein, University of Colorado Boulder
- Courtney Lannert, Smith College and UMass Amherst
- Ramon Lopez, University of Texas at Arlington
- Willie Rockward, Morgan State University
- Gay Stewart, West Virginia University
- Gubbi Sudhakaran, University of Wisconsin-La Crosse
- Kathryn Svinarich, Kettering University
- Carl Wieman, Stanford University
- Lawrence Woolf, General Atomics Aeronautical Systems, Inc.

**Editorial Director:** Sam McKagan    **Project Manager:** Kathryne Woodle

**Staff Liaison:** Ted Hodapp    **Project Coordinator:** Sean Costillo

**AAPT Liaison:** Bob Hilborn    **External Evaluator:** Stephanie Chasteen

**Research:** C. Turpen, J. Corbo    **Community Engagement:** Joel Corbo

## Who is it for?

- Physics department chairs
- Program leaders
- Programs undergoing a self-study and being reviewed
- Program reviewers
- Departments & faculty facing program challenges or interested in improving their programs
- Anyone in physics involved with student learning assessment
- Administrative leaders

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**Effective Practices for Physics Programs**

## Help department chairs (& other program leaders)

- Bring together known literature on topics
- Collect practices recognized by the community as effective when there is insufficient evidence-based literature
- Collect information for departments to use in advocating for resources to improve their program
- Encourage discussions in departments on continuous improvement of physics programs using evidence
- External program assessment / departmental review
- Improve usefulness of assessment
- Engage PER community on departmental needs

## Chapters:

- **Introduction**: how to navigate and use the guide
- **How to be an effective Chair**
- **How to create and sustain effective changes in your department**
- **Effective practices** (~25 "sections")
- **Assessment of student learning**: developing a useful and efficient culture of assessment
- **Program review** and a Departmental Culture of Continuous Self-Improvement: Preparing for a self-study and program review as well as a Guide to reviewers
- **Strategic planning:** how to construct and use a strategic plan
- **Ancillary material**: Creating foundational documents; examples of student learning goals and program learning goals; assessment instruments; additional resources

**EP3**
Effective
Practices
for Physics
Programs

**Students**

- *Recruiting (in 1st release)*
- *Retention*
- *Advising and Mentoring of Students*
- Internships (to be included in 2nd release)
- *Undergraduate research*
- *Career preparation*

**Curriculum**

- *Implementing research-based instructional practices in your program*
- *Introductory courses for physical science and engineering majors*
- Introductory courses for life sciences majors
- *Upper-level physics courses*
- Introductory courses for Non-STEM majors
- Communication skills
- *Laboratory / experimental skills*

- *Computational skills*
- Capstone experiences
- Online education

**EP3** — Effective Practices for Physics Programs

(8)  (8)  (3)  (2)  (1)

To date: approx. 80 contributors submitted materials with another approx. 15 pending

Other contributors → Your contribution → Synthesis → You provide feedback → Review → Finalized draft → Task force approval

Other contributors →

For each section there will be several individuals (including yourself) contributing content

The task force and editorial director will then synthesize into one cohesive document.

We may have some additional questions for you. After internal vetting you will have a chance to see and comment on the synthesized section.
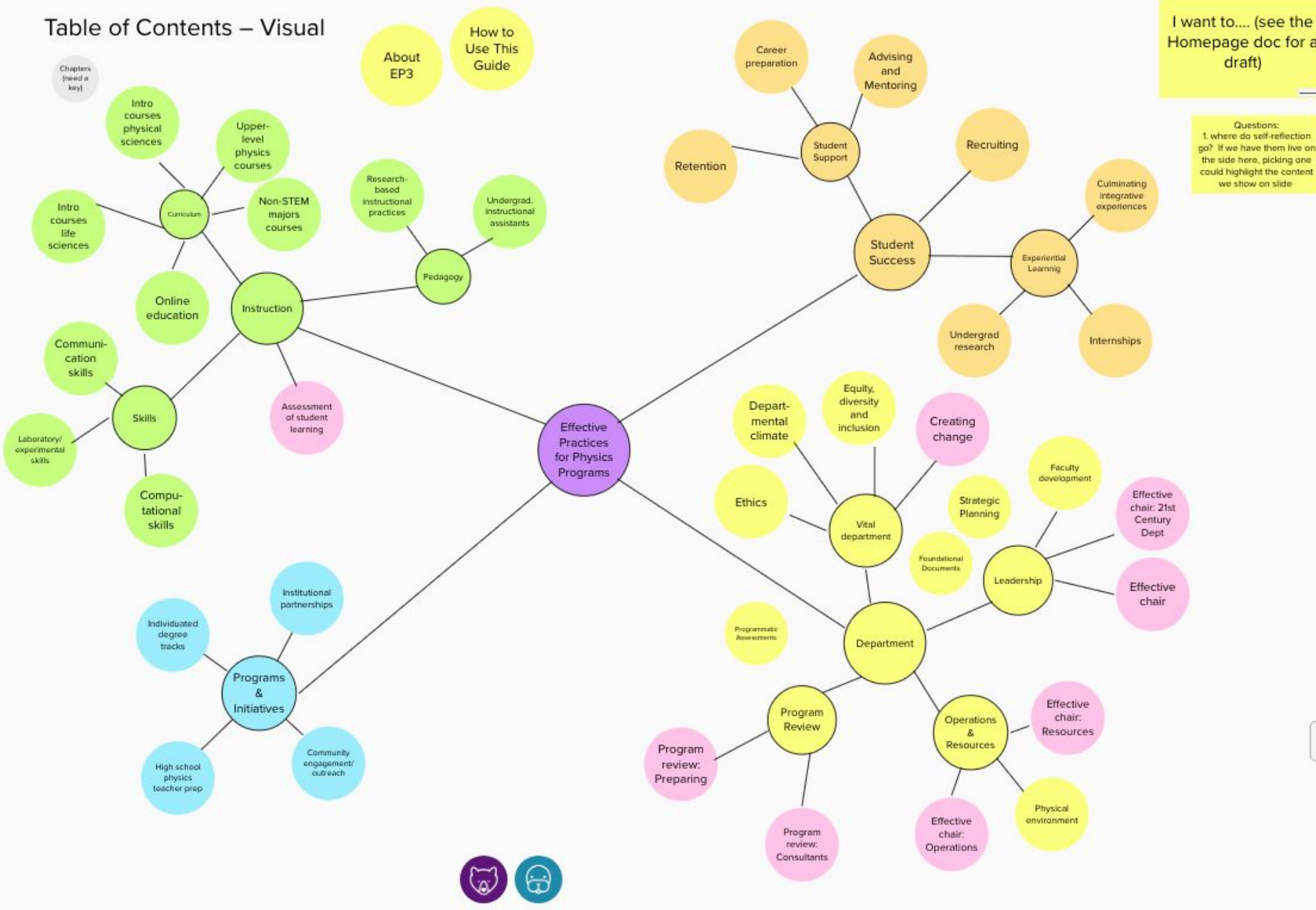
Each section will be sent for expert review to at least 4 individuals.

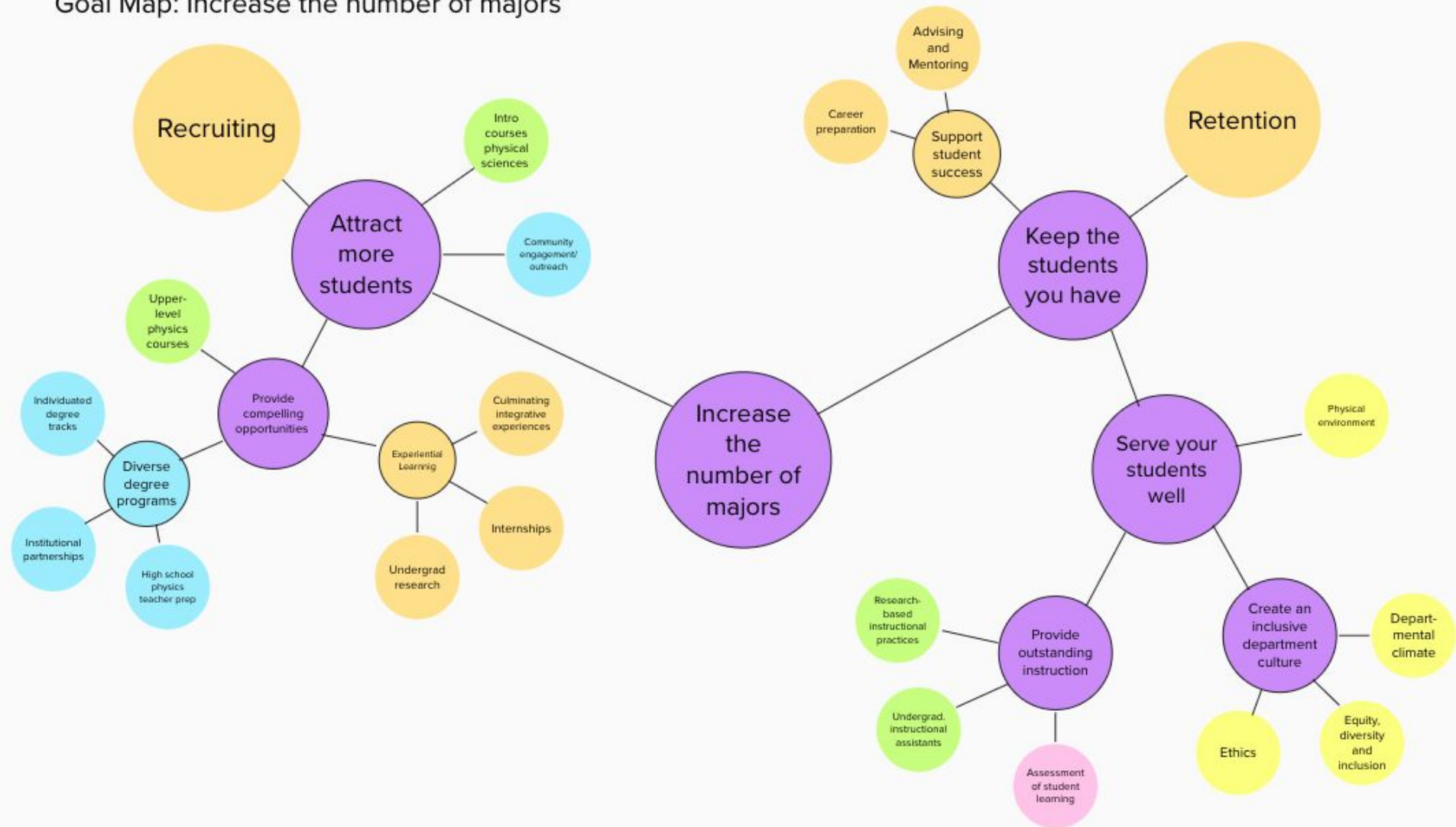To see an example of a final section the Teacher Preparation can be found here: http://apps3.aps.org/bpupp/

# Example Content: Recruitment

1. Create and review a comprehensive and collaborative recruiting plan
    A. Involve all members of your department and administration in the plan
        i. Collaboratively engage and involve as many members of your program as possible to participate in recruiting activities, including full- and part-time faculty at all ranks, staff, and students.
        ii. Partner with administration and campus offices who can contribute to and support the plan.
        iii. Identify and recruit champions who can be strong advocates for, and drivers of, the plan.
        iv. Incentivize participation in recruitment efforts, for example with a service award for students and with officially recognizing faculty time as service.
        v. Support members of your program to participate in the plan in ways that most effectively use their strengths and interests.
    B. Explicitly include strategies for recruiting and supporting students from groups that are underrepresented in your program
        i. See the **Equity, Diversity, and Inclusion** section for suggestions on how to do this effectively.
        ii. Recognize that if your efforts are successful at recruiting students who have not previously succeeded in your program, your faculty may face additional challenges, and plan to support faculty with those challenges.

## 6 Themes, 19 Effective Practices, 72 Implementation Strategies

# Table of Contents – Visual



Chapters (need a key)

About EP3

How to Use This Guide

**Instruction**
- Curriculum
  - Intro courses physical sciences
  - Upper-level physics courses
  - Non-STEM majors courses
  - Intro courses life sciences
- Pedagogy
  - Research-based instructional practices
  - Undergrad. instructional assistants
- Online education
- Assessment of student learning

**Skills**
- Communication skills
- Laboratory/ experimental skills
- Computational skills

**Effective Practices for Physics Programs**

**Student Success**
- Student Support
  - Career preparation
  - Advising and Mentoring
  - Retention
  - Recruiting
- Experiential Learning
  - Culminating integrative experiences
  - Undergrad research
  - Internships

**Vital department**
- Departmental climate
- Equity, diversity and inclusion
- Creating change
- Ethics
- Strategic Planning
- Foundational Documents
- Programmatic Assessments

**Leadership**
- Faculty development
- Effective chair: 21st Century Dept
- Effective chair

**Department**
- Program Review
  - Program review: Preparing
  - Program review: Consultants
- Operations & Resources
  - Effective chair: Resources
  - Effective chair: Operations
  - Physical environment

**Programs & Initiatives**
- Institutional partnerships
- Individuated degree tracks
- High school physics teacher prep
- Community engagement/ outreach

I want to…. (see the Homepage doc for a draft)

Questions:
1. where do self-reflection go? If we have them live on the side here, picking one could highlight the content we show on slide

# Goal Map: Increase the number of majors

## Is:

- Collection of community knowledge and evidence-based practices
- Authored, reviewed, approved by physics community **(>200!)**
- *Living* document (not static), with stewardship by an Editorial Board
- Primarily online
- Ethics and diversity included throughout
- Effort to encourage evidence-based pedagogy
- Transform mandatory assessment into useful exercise
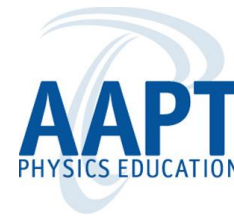- Suggestions on how to improve all aspects of a program
- Opportunity to extend reach of education research

**Effective Practices for Physics Programs**

## Is:

- **Key:** flexible, not prescriptive; mindful of local contexts
- **Tool to help departments understand who they are and what they want to be, and then provide community-based knowledge and information to help them achieve this**

## Is NOT:

- Accreditation or program certification
- Mandate to conform
- A checklist of required actions
- Every possible idea for what to do (e.g., the 'kitchen sink')
- At the smallest level of detail to assist with implementation
- **Finished (yet)…**

1. Finish the Guide
2. Build website
3. Rollout to departments
4. Train reviewers
5. Develop integrated way for COE to update the guide