

CCSE

Center for Computing
in Science Education



Overview of CCSE

Develop materials
and methods

Build educational
research group



Vision “an **international hub** for **research-based integration** of **computational methods** in education”

Build culture for
teaching and learning

Disseminate nationally
and internationally

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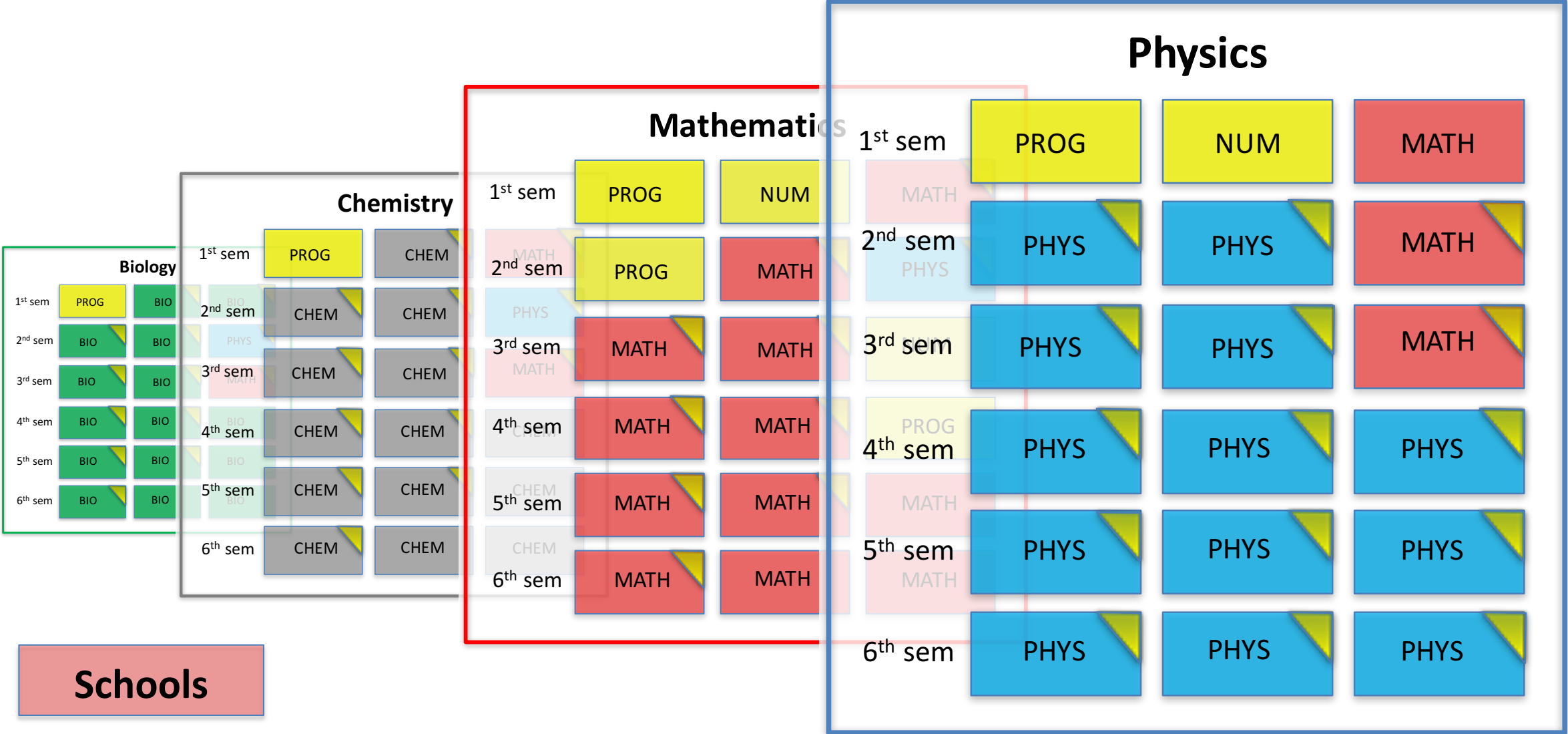


Vision “an **international hub** for **research-**
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Programming is integrated in all science study programs and adapted to the disciplinary context



Research-based materials and methods

Teaching teams: Course development strategies

Computing and data science: Professional competence for PhD

LA program: Learning assistants as agents of change

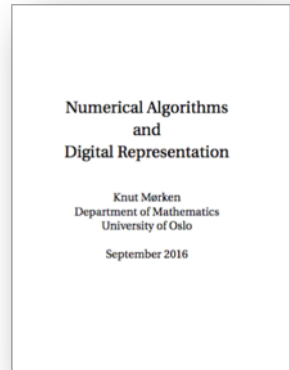
ProFag: Programming in context Courses for teachers and faculty

Computational essays: Creative programming

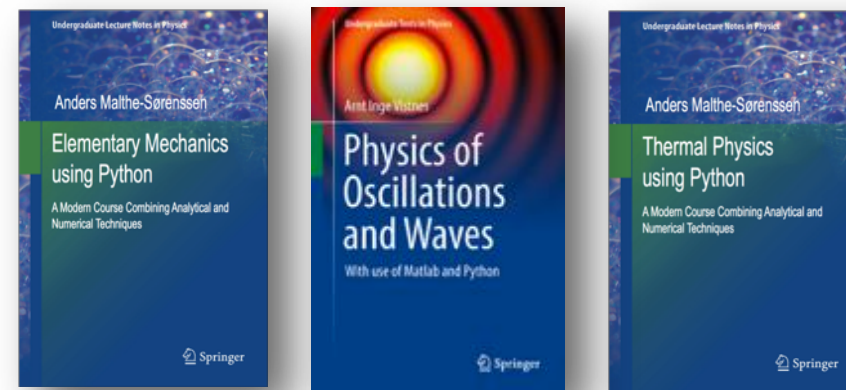
Computational science



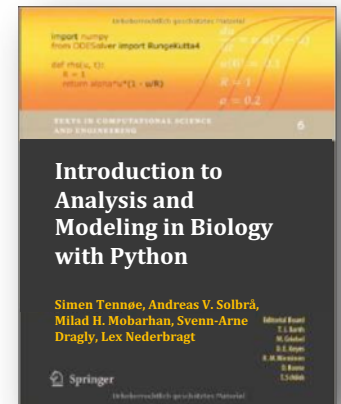
Mathematics



Physics



Bioscience

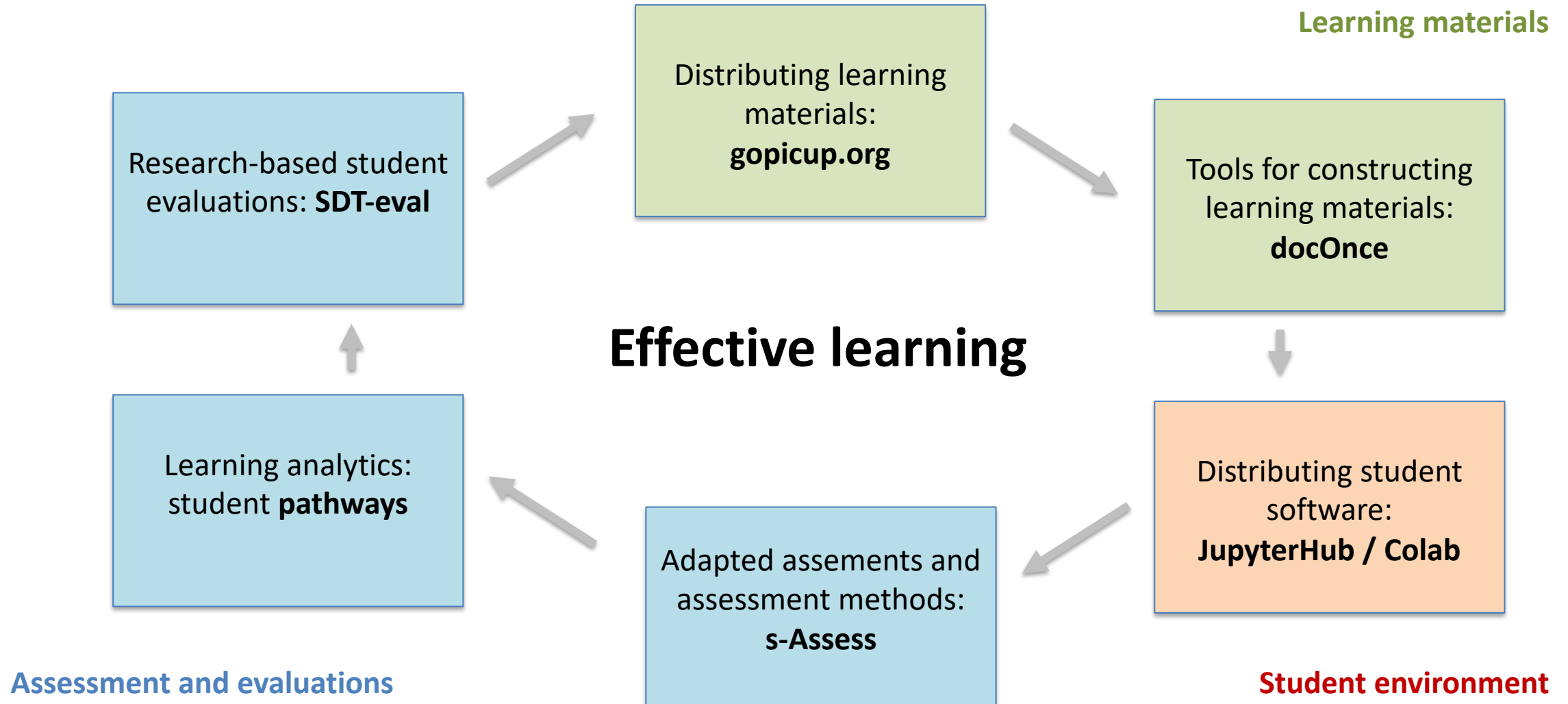


NEW

NEW

NEW

Developing the underlying tools for change



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Research forms the base for curricular change

We study the effect of computing on disciplinary understanding, motivation and creativity



Danny Caballero



Top international education researcher are partners – and come to study our education



Elise Lockwood



We have unique competence in studying effects of computing – *across disciplines* and *levels* (from school through university)



Tor Ole Odden

Developing a discipline-based education research activity

Resources

UiO resources:

- Education research
- Didactic research

International partners

- Discipline based education research
- Connection to international projects

External funding

Projects

Foundation project:

- Computing and its effect on student understanding, transfer and problem solving abilities

Computational literacy:

- Computing and its effect on student problem solving abilities, creativity and disciplinary expression

Assessment project:

- Developing assessment methods, analyzing student results, intervention studies

External funding

Pathways project:

- Data science and machine learning to address student assessments, learning and pathways

School project:

- How to teach programming in schools, and how to organize teacher professional development programs

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Summer institutes

Events • FDW2019

2019 PICUP Summer Faculty Development Workshop at UW River Falls



Energize Your Undergraduate Physics Courses with Computation!

In this week-long workshop, participants, with the guidance of the workshop coordinators, will develop a viable, personalized plan for integrating computation into their undergraduate physics course(s) to be implemented in the upcoming academic term(s), and interact with other enthusiastic faculty committed to improving the physics curriculum across the fruited plain, all in a stimulating and engaging, but not too geeky, environment. And the food and snacks are fantastic!

Michigan State University
(since 2015)

Kompetanseheving
universitet

- INTPART
- LA-programmet ved MN
- REAL undervisning
- Summer Institute

MN's Summer Institute

In close collaboration with Michigan State University, we are happy to give faculty from UiO, NMBU, UiA, USN and UiB the opportunity to attend a four days intensive workshop in state-of-the-art scientific teaching in context. In 2019 we focus on integrating computation in undergraduate physics.



Facts about this course

When

17th - 20th of June 2019

Where

The Physics building,
University of Oslo

Contact Us

realfagsundervisning@mn.uio.no

In collaboration with



Comment by a previous attendee

"The basic philosophies promoted and explored in the SI are nothing short of

University of Oslo
(since 2018)



ProFag – Realfaglig Programmering

ProFag er etterutdanning for lærere i PROgrammering for FAGenes skyld. Tittelen signaliserer at vi setter faget i sentrum. Programmeringen skal bidra til styrking og utvikling av realfagene.

- Programmering i Python – basisopplæring
- Algoritmisk tenkning
- Didaktiske utfordringer
- Programmering for fagets skyld
- Programmering endrer fagene



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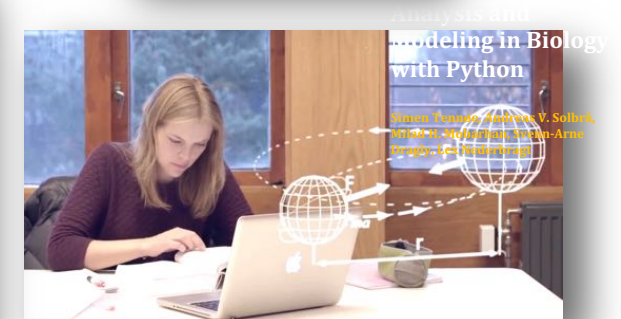
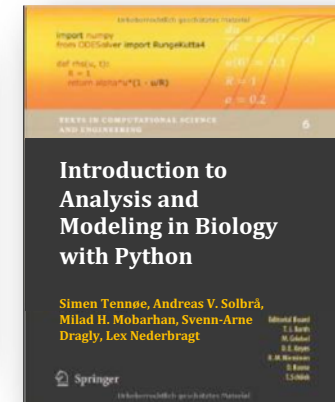
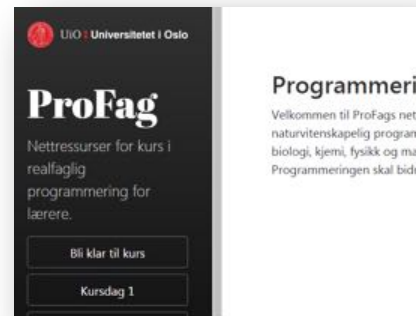
Build culture for
teaching and learning

Disseminate nationally
and internationally

Research-based dissemination strategy

Research shows: Dissemination must be based on the same principles as student-active teaching

- Flexible material
- Workshops and instruction
- Partner with teachers
- Adapt to situation
- Monitor and improve!
- Students play active role!



Adaptive strategies for dissemination

Target groups

Science educations

Humanities, social sciences, etc

Schools and teacher education

Government and industry

Local, national, and international

Methods

Professional development

Summer institutes

Student transformation teams

Learning material

Coupling to research

Partnerships

Strategic partnerships

National:

- Teacher education
- Universities
- Engineering/colleges

International

- European networks
- US (Intpart x 4)
- China

Dissemination: Playbook

Initialization

- Presentations and site visits
- Demonstrate material
- Map research alignment



Early adaptation

- Finance student taskforces
- Identify key personnel
- Examples and exercises
- Develop faculty competence



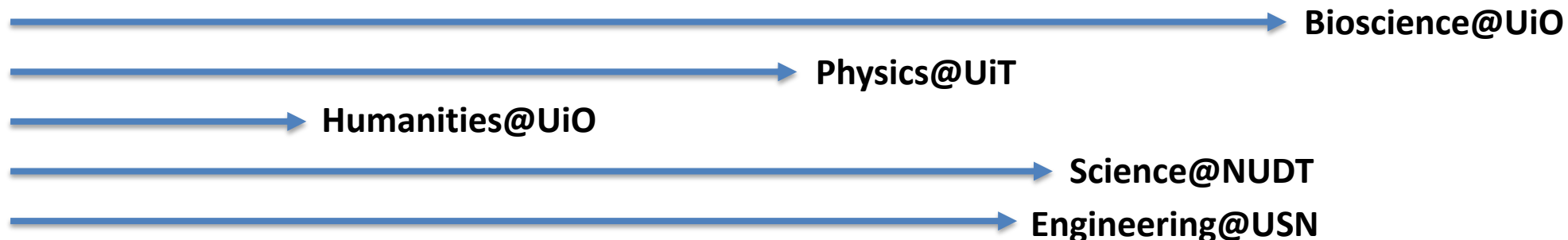
Adaptation

- Cross-curriculum
- Faculty initiatives
- Integration of research activity
- Part of learning outcomes
- Admin & leader support



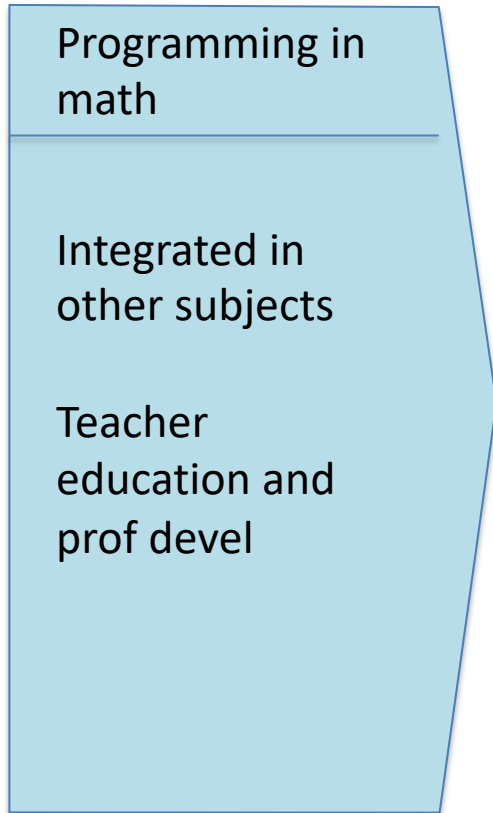
Integration

- Develop own material
- Educate own faculty
- Partner in dissemination

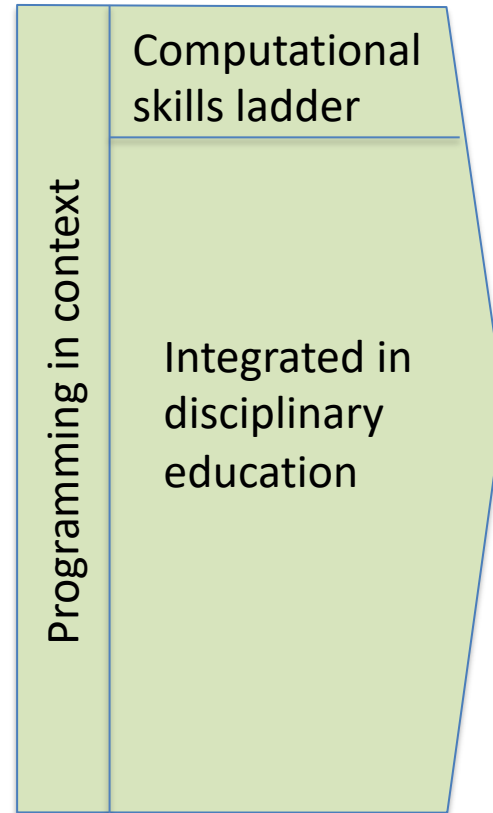


Integration across the educational timeline

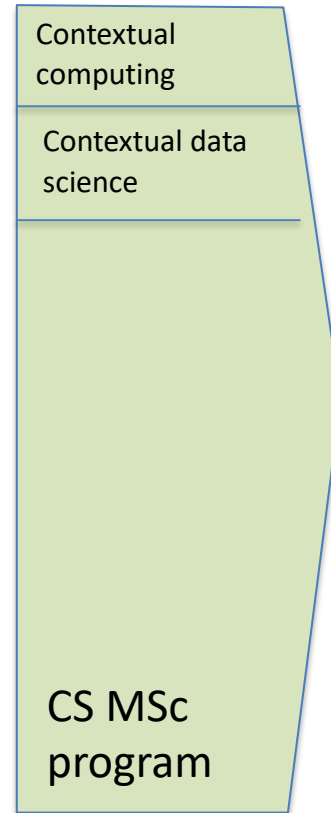
1-13



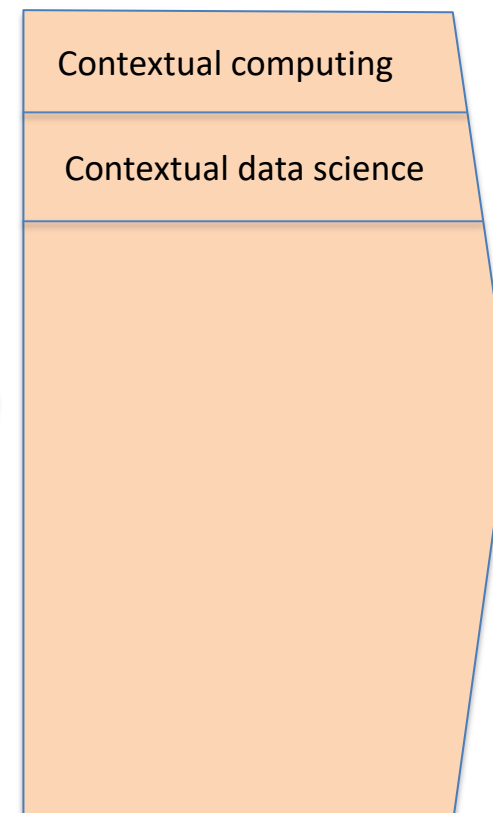
Bachelor



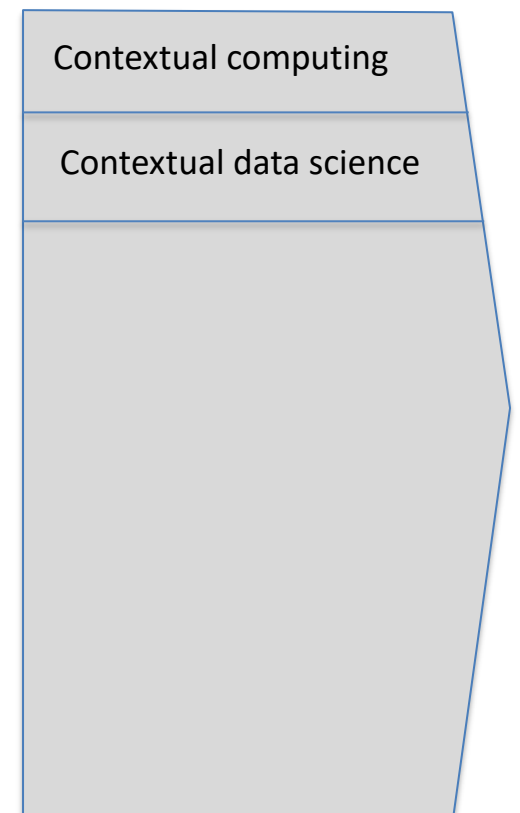
Master



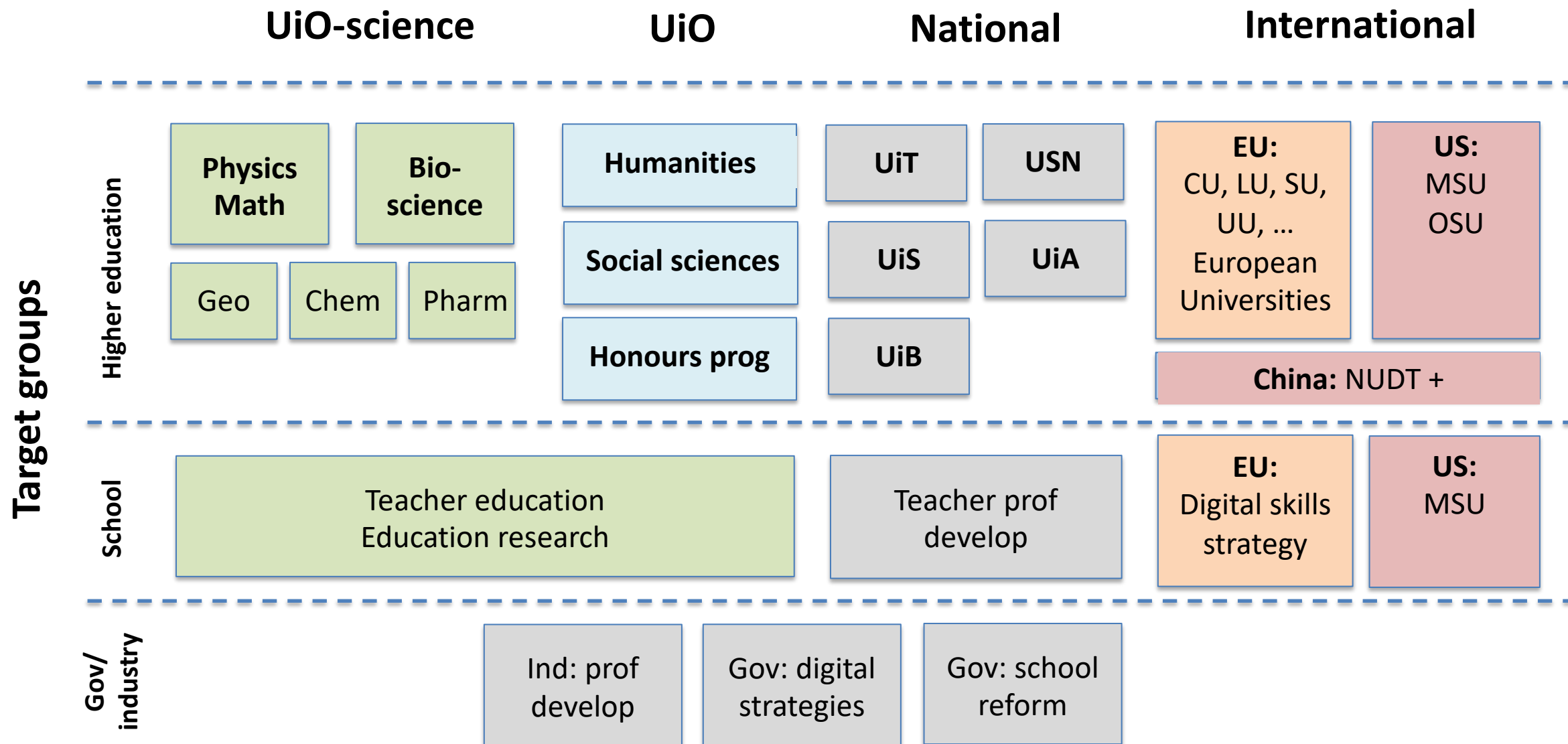
PhD



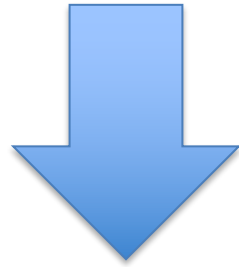
Post-grad



Dissemination: Partners and collaborators



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