

# *Digital World – Digital Education*

## MOOCs as Cornerstone for a Digital University



**Prof. Dr. Christoph Meinel**

[christoph.meinel@uds.university](mailto:christoph.meinel@uds.university) & [meinel@hpi.de](mailto:meinel@hpi.de)

Former CEO | Hasso Plattner Institute | Germany

# And Digital Transformation isn't on its Way, ... It is Already Here and we are Not Well Prepared



- Higher education institutions have great potential to contribute through appropriate offerings and partnerships<sup>1</sup>

A different skill set than today will be needed for the digital future.

<sup>1</sup> „Leveraging Skills Adjacencies to Address Skills Gaps“, Gartner, 2021

<sup>2</sup> Future of Jobs Report 2020, World Economic Forum

# What Is the Impact of Digital Technologies?



- Contribution to solve global political and social challenges
- Enablement of new business models, products and services
- Knowledge creation is exploding

Organizations worldwide urgently need appropriately trained professionals.

# What Skills Do I Need Tomorrow?



- Number of skills needed for a job increases by 10% per year<sup>1</sup>
- One in three skills in an average job posting from 2017 in IT, finance or sales already outdated today<sup>1</sup>
- 40% of the workforce needs retraining<sup>2</sup>

A different skill set than today will be needed for the jobs of tomorrow.

<sup>1</sup> „Leveraging Skills Adjacencies to Address Skills Gaps“, Gartner, 2021

<sup>2</sup> Future of Jobs Report 2020, World Economic Forum

# Who Drives Digital Change in Organizations?



Digital  
Transformers

Tech  
Specialists

- Worldwide all-time shortage of skilled workers in digitalization hindering growth and innovation
- Digitalization is increasing the speed of production of new knowledge
- Demand for study programs and lifelong learning offers related to digitalization and digital technologies dramatically increased

It's only possible together:  
Tech specialists and digital transformers.

# How Can We Organize High-Quality Education of 'Digital Transformers' Worldwide?



- Goal 4 of the UN Sustainable Development Goals: Ensure inclusive, equitable, and quality education and promote lifelong learning opportunities for all
- Higher education institutions have great potential to contribute through appropriate offerings and partnerships<sup>1</sup>

Scalable higher education offerings are the only way to meet global demand.

<sup>1</sup> <https://link.springer.com/article/10.1007/s10734-020-00652-w#article-info>

Future Universities are Needed to Educate People that Are Able to Create and Settle the Digital World



# How Does Higher Education Need to Change?



- Development of new target groups
- Research, testing and use of new digital teaching formats
- Development of study programs and teaching content with the inclusion of 'future skills'
- Establishment of more flexible structures for research

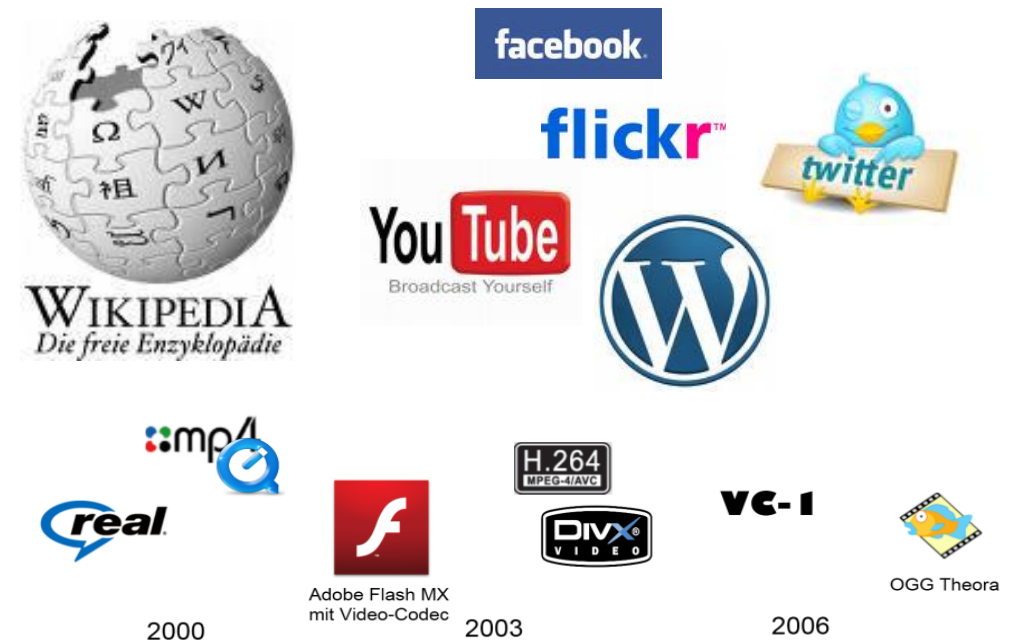
Digitization is differentiation.



# Development of Internet and Devices Enabling Tele-Teaching and E-Learning on Large Scale

Technique allows tele-teaching and e-learning at a completely new level

- Free Exchange of Knowledge over the Internet
- Efficient apps are available to communicate and collaborate
- Easy to use interactive devices
- Easy to generate and distribute multimedia content
- Social networks for social interaction



IT-technologies provide completely new possibilities to set up future universities.

# Historical Development of Universities – From University 1.0 to University 3.0 ...

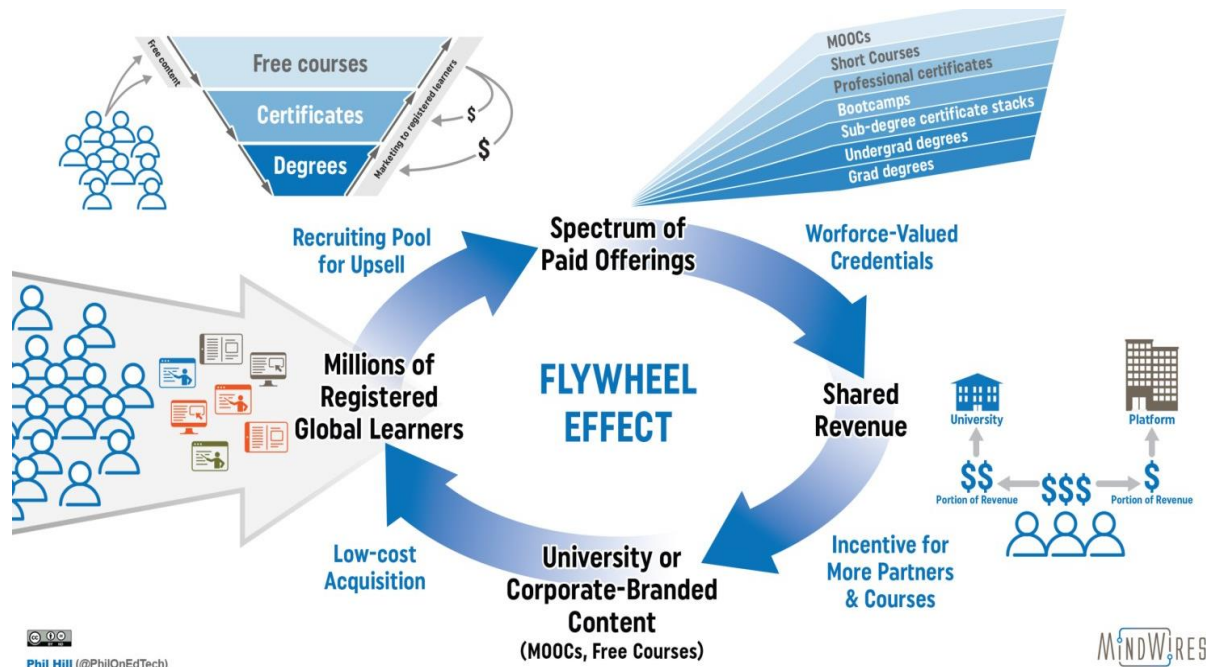
- **University 1.0:** Ancient Universities
  - Very personalized and organized around mahatmas
  - Students became followers of philosophers
- **University 2.0:** Recent Universities
  - Genesis with the upcoming book printing technology
  - Build around the university's library
  - Students are physically present, attend lectures, seminars, ...
- **University 3.0** or the future of universities: Web-universities
  - Genesis with upcoming IT technologies and emerging digital world
  - Organized around Internet portals and platforms
  - ...

# First structures of the University "3.0"

## MOOCs – Massive Open Online Courses



# MOOCs - Disrupting Innovation in E-Learning



- MOOCs provide the missing social dimension in online learning and are an 'easy entry' for more comprehensive learning offers
- Relevant, scaling educational format for both individuals and organizations for upskilling and reskilling
- Effective contribution to addressing the shortage of skilled workers

MOOCs are part of the response to the changes brought about by digitization.

# MOOCs – Core Values?

## **Learner-centeredness**

- The learner, not the technology, is the focus
- Features and course formats are designed from the learner's perspective

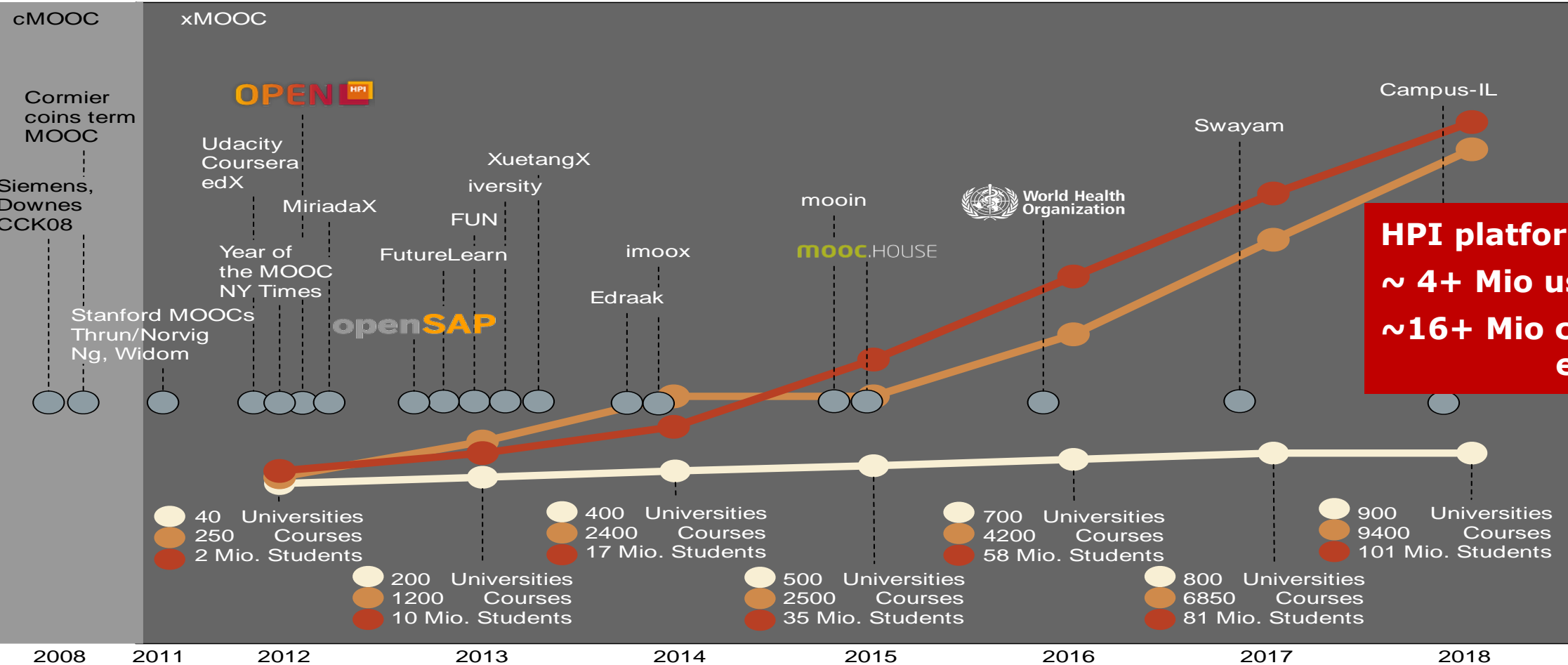
## **Social Learning**

- Collaborative learning instead of excessive adaptively
- Fostering the course community

## **Research Driven Development**

- Measurement and continuous optimization of success/failure of features and course formats
- Courage to take risks: leaving well-known paths in order to continuously improve the learner experience

# Timescale and Figures: MOOC Offers Around the World



**HPI platforms total:**  
 ~ 4+ Mio users  
 ~16+ Mio course enrollments

# openHPI – Our Approach to Design and Operate the First European MOOC-Plattform

The screenshot shows the openHPI website homepage. At the top, there is a navigation bar with the logo 'OPEN HPI' (where 'HPI' is in a red box) and 'Hasso Plattner Institut' to its right. Further right in the navigation bar are links for 'About openHPI', 'FAQ', and 'Register'. The main content area features a large graphic on the right showing a student with a laptop and a backpack, surrounded by a hand-drawn diagram of educational concepts like 'ICT', 'NETWORK', 'CAREER', 'UNIVERSITY', and 'Course'. To the left of this graphic, the text reads: 'openHPI: Interactive Online Information Technology Courses starting September 3<sup>rd</sup> 2012'. Below this text is a yellow 'register now' button. Underneath the main graphic is a video player titled 'Welcome to openHPI' with a play button icon. The video player shows a man in a suit speaking in front of a bookshelf. Below the video player, there is a short paragraph of text.

OPEN HPI Hasso Plattner Institut

About openHPI

FAQ

Register

openHPI: Interactive Online Information Technology Courses starting

September 3<sup>rd</sup> 2012

register now

Welcome to openHPI



Sign up now for openHPI, the educational Internet platform of the Gern Potsdam. Starting in September you will be able to take part in a world on interactive online courses covering different subjects in Information (ICT).

Enter a fascinating world of knowledge with our free open online course around the world and familiarize yourself with fundamental and current and IT systems engineering.

The openHPI platform is an ideal basis for the further development of online education.

# What Does the openHPI Platform Designed in 2012 Deliver?

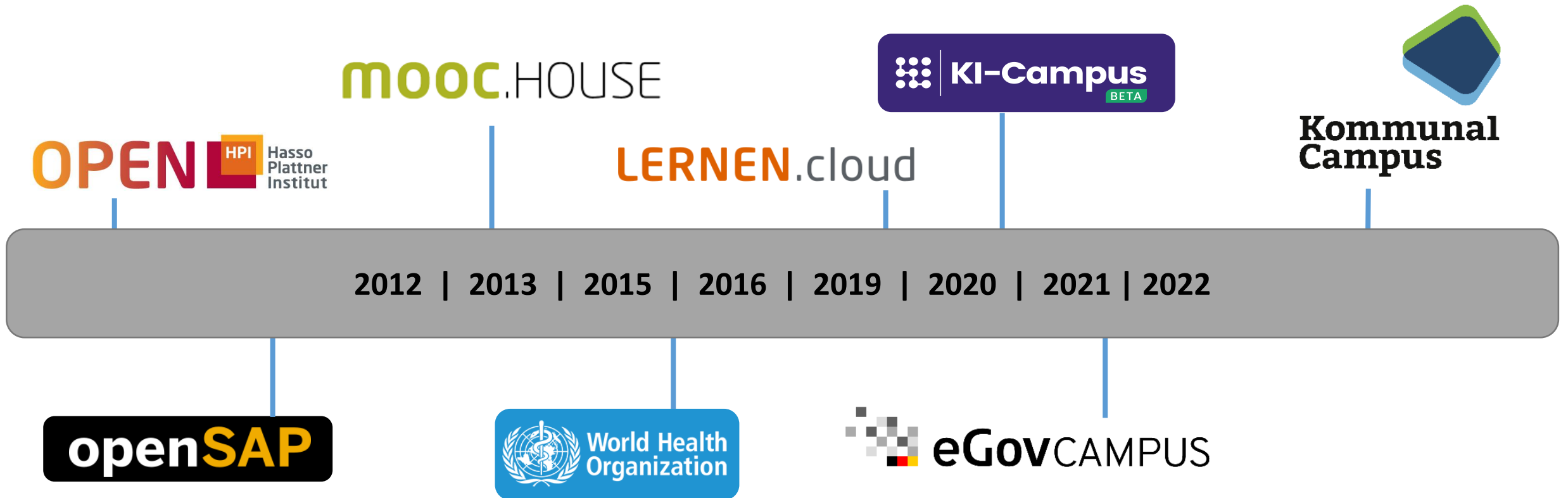


- More than 10 years didactically structured with learning videos, collab spaces, discussion forums, peer (group) assessment, gamification elements, ...
- Certificates at university level
- Internationally recognized research on MOOCs, digital education and knowledge engineering

The openHPI platform is an ideal basis for the further development of online education.



# The openHPI Platform Family: Altogether 16+ Mio. Enrolled Learners

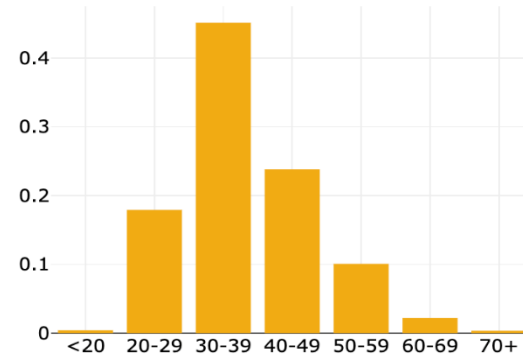


The openHPI platform is an ideal basis for the further development of online education.

# Learning Offers at openHPI: Age Distribution

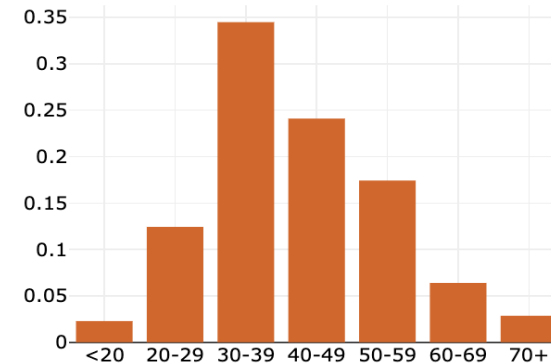
openSAP

Age Distribution



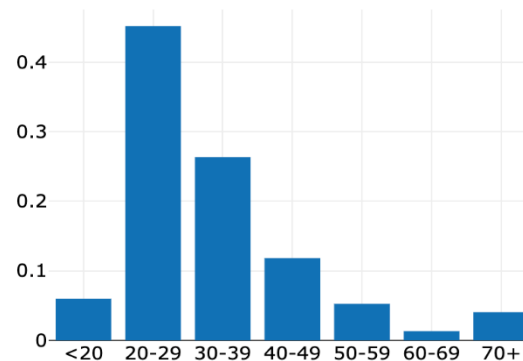
openHPI

Age Distribution



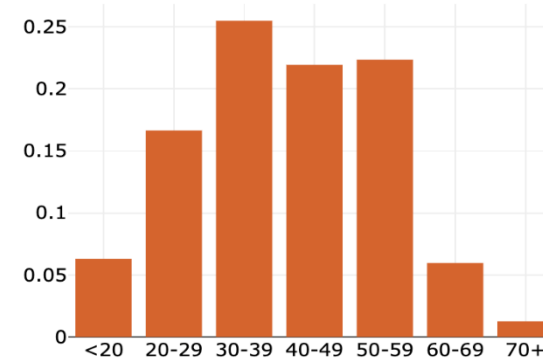
OpenWHO

Age Distribution

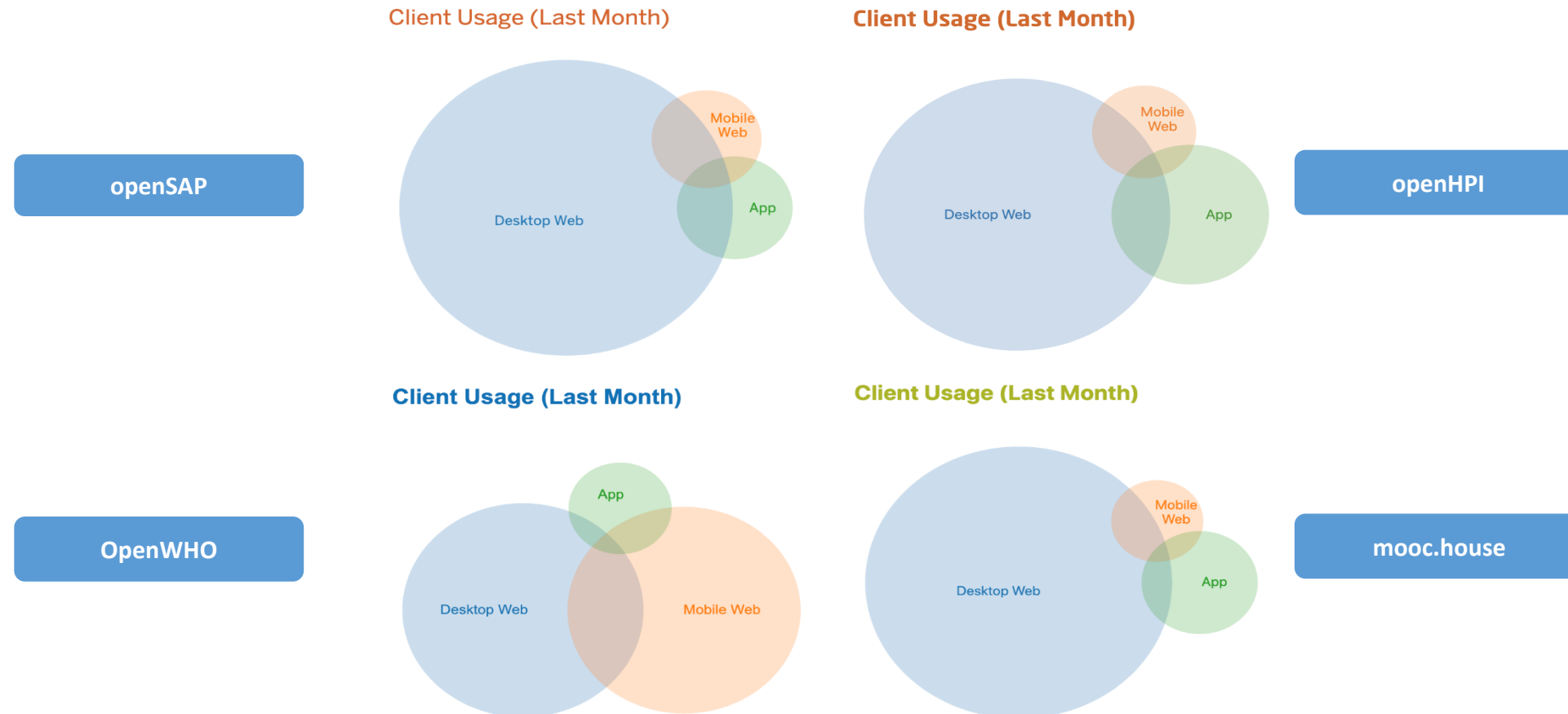


mooc.house

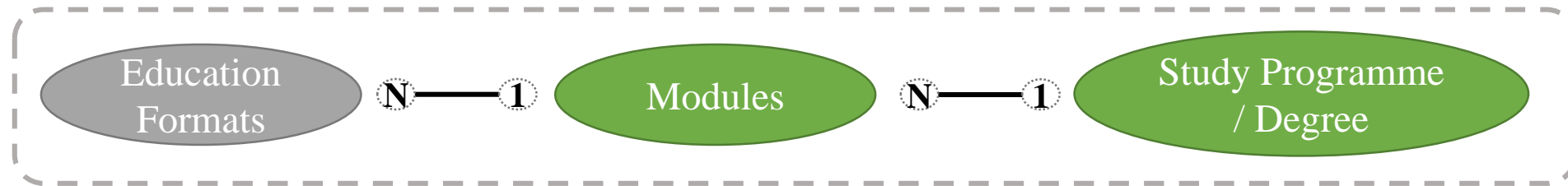
Age Distribution



# Learning Offers at openHPI: Usage: Web – Mobile – App



# Learning Offers at openHPI: Innovative Online Educational Formats



On the basis of own experience, discussion with other MOOC providers and literature review: we use four types of **online educational formats**:

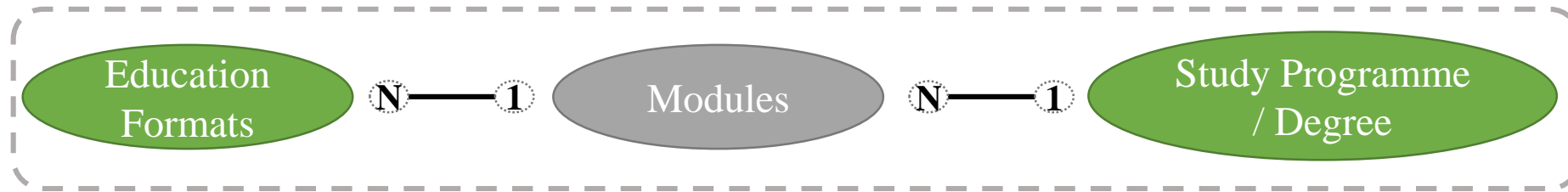
- **Knowledge Nuggets**
- **Demonstrations**
- **Discussions**
- **(Extreme) Programming**

All formats have been tested in various MOOCs with thousands of learners

# Learning Offers at openHPI: Innovative Online Educational Formats

	Knowledge Nugget	Demonstration	Discussion	(Extreme) Programming
Explanation	Short explanation Videos	Secondary content to reinforce learning or motivate by presenting examples	Allows students to reiterate on and better understand certain topics	Disruptive education formats particularly for programming education
Examples	<ul style="list-style-type: none"> <li>- Videos</li> <li>- Flipped Classroom</li> </ul>	<ul style="list-style-type: none"> <li>- ■ Live examples</li> <li>- ▽ Media analysis</li> <li>- ▽ Reactionary content</li> </ul>	<ul style="list-style-type: none"> <li>- ■ Panel discussion</li> <li>- ■ Fish bowl</li> <li>- ▽ Forum discussions</li> </ul>	<ul style="list-style-type: none"> <li>- ▽ Programming Tasks</li> <li>- ■ Pair programming</li> <li>- ■ Mob Coding</li> </ul>
Asynchronous?	Yes	Yes (▽) / No (■)	Yes (▽) / No (■)	Yes (▽) / No (■)
Scalable?	Yes	Yes	Yes	Yes
Exemplary Resources & Literature	<ul style="list-style-type: none"> <li>• Renz et al. 2015</li> <li>• Glance, Forsey, and Riley 2013</li> <li>• Bishop and Verleger 2013</li> <li>• Tucker 2012</li> </ul>	<ul style="list-style-type: none"> <li>• Lewis 2020; Macnamara n.d</li> </ul>	<ul style="list-style-type: none"> <li>• Dutt 1997</li> <li>• Miller and Benz 2008</li> </ul>	<ul style="list-style-type: none"> <li>• Umaphy and Ritzhaupt 2017</li> <li>• Harrer, Huber, and Christ 2019</li> </ul>

# Learning Offers at openHPI: Innovative Online Educational Formats



- Modules build on a combination of different education formats, traditional University examples could be *Seminars* or *Lectures*
- They differ in the primary way that new knowledge is retrieved by students, which could be e.g. through presentations, own research, or own development
- We propose five different module types, that we already tested on our online-learning platform openHPI:

# Learning Offers at openHPI: Innovative Online Educational Formats

## **(1) Knowledge Essential:**

- Primarily asynchronous presentations by the lecturer
- Introduction into new topics
- Rather little amounts of deflection and discussion by students
- Strictly structured
- Easily scalable

## **(2) Experiences:**

- Strengthen previous knowledge
- Less presentations by lecturer
- Small (Group-based) research / reflection tasks

# Learning Offers at openHPI: Innovative Online Educational Formats

## **(3) Deep Dives:**

- In-depth work of students on (own) topics
- Framework for project work of various kinds
- Lecturer primarily observation and guidance role

## **(4) Mastery: Coding**

- Module to teach programming
- Few content input sessions by lecturer
- Many practical (group-based) programming exercises

## **(5) Mastery: Social & Future Skills**

- Teaches soft-skills such as *presentation* or *project management*
- Hugely depends on synchronous group-assignments



# Learning Offers at openHPI: Innovative Online Educational Formats

	Traditional Equivalent	Primary Education	Scalability	Potential Examination
<b>Knowledge Essential</b>	Lecture	Knowledge Nuggets	Yes	Exam
<b>Experience</b>	Seminar	Discussions	Yes	Presentation / Exam
<b>DeepDive</b>	Project	Projects & Seminar Work	Partly	Presentation
<b>Mastery: Coding</b>	Programming Seminar	Programming Exercises	Yes	Coding Challenge
<b>Mastery: Socials</b>	Soft-Skill Seminar	Practical Group-Tasks	Party	Presentation / Group Challenge

***German University of Digital Science –  
A Founding Initiative for a University “3.0”***



# ***German University of Digital Science – Educating to Master the Digital Transform***



- Innovative teaching formats like MOOCs, ....
- Online degree programs (MBA, M.Sc., B.Sc.) in Digital Transformation, Leadership, Entrepreneurship, ...
- Research Center in Digital Engineering, Digital Health, Digital Energy, Digital Education, ...
- Global, interdisciplinary research redefined

**Pioneers the future of university on latest and upcoming IT technologies.**

# ***German University of Digital Science –*** A Completely Online Operating University



- Building all activities on latest and upcoming IT-technologies, e.g.,
  - Blockchain
  - 3D full body avatars for the Metaverse / Gloomins NFT
  - Artificial intelligence and dealing with big data
  - Virtual classroom technologies
- Complementing the existing higher education system

A contribution to successfully shaping digital change worldwide.

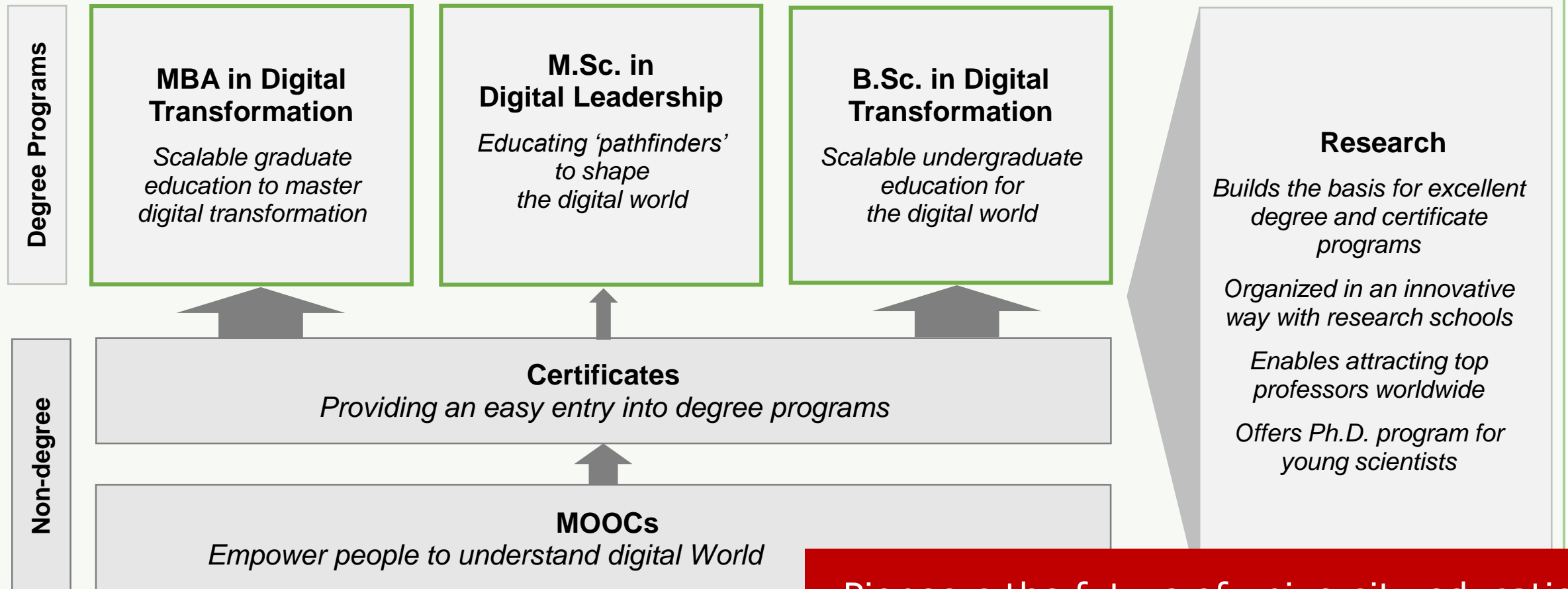
# ***German University of Digital Science – Teaching Knowledge to Master Digital Transform***



- Redesign education through the use of digital technology
- High-quality university education on digitization - accessible anywhere, anytime, and at scale
- Student-centered, challenge-based learning using innovative digital formats

A contribution to successfully shaping digital change worldwide.

# German University of Digital Science – Teaching Knowledge to Master Digital Transform



Pioneers the future of university education on latest and upcoming IT technologies.

# ***German University of Digital Science –*** Research Organized in Highly Flexible Research Centers



- Research focus on topics of digital transformation, e.g. learning analytics and digital education, artificial intelligence, digital entrepreneurship, digital health, digital energy, ...
- Professors and scientists are distributed worldwide and cooperate in highly flexible Research Centers
- Research Centers are organized around by Research Schools

Pioneers the future of university research on latest and upcoming IT technologies.

# ***German University of Digital Science – Degree Programs Cover Future Professional Skills***



- Degree programs at all qualification levels: MBA, B.Sc., M.Sc., PhD
- Fundamentals of digital technologies and their application in various areas of society including programming
- Professional/Future Skills: Design Thinking, Entrepreneurial Thinking, Business management

**Graduates leave the university as 'Digital Transformers'.**



# ***German University of Digital Science –*** **Learning Through Mentored Self-Directed Learning**



- Knowledge acquisition primarily through self-directed, asynchronous learning via videos combined with self-tests, (interactive) exercises or assignments
- Combination with innovative synchronous course formats and assignments (challenges)
- Mentoring program and student services to support globally distributed students

**Student-centered, challenge-based learning oriented to the principles of design thinking.**

# ***German University of Digital Science – Main Building and Labs are Home in the Metaverse***



- Further development and increased use of VR/AR technologies in education
- Combination of asynchronous, synchronous, online, and on-site formats
- Trend toward immersive learning experiences in virtual space to teach a variety of skills<sup>1</sup>

**Making the best out of the virtual and the physical world.**

<sup>1</sup> <https://www.pwc.com/us/en/tech-effect/emerging-tech/virtual-reality-study.html>

# MOOCs as Cornerstone for a Digital University

Thank You for Your Interest!



**Prof. Dr. Christoph Meinel**

[christoph.meinel@uds.university](mailto:christoph.meinel@uds.university) & [meinel@hpi.de](mailto:meinel@hpi.de)

Co-Founder of the German University of Digital Science