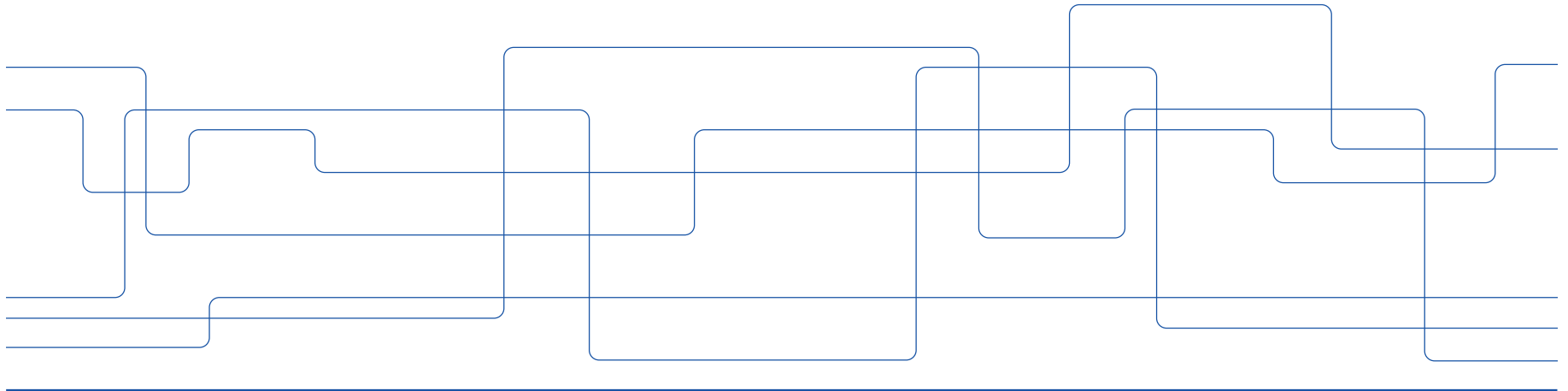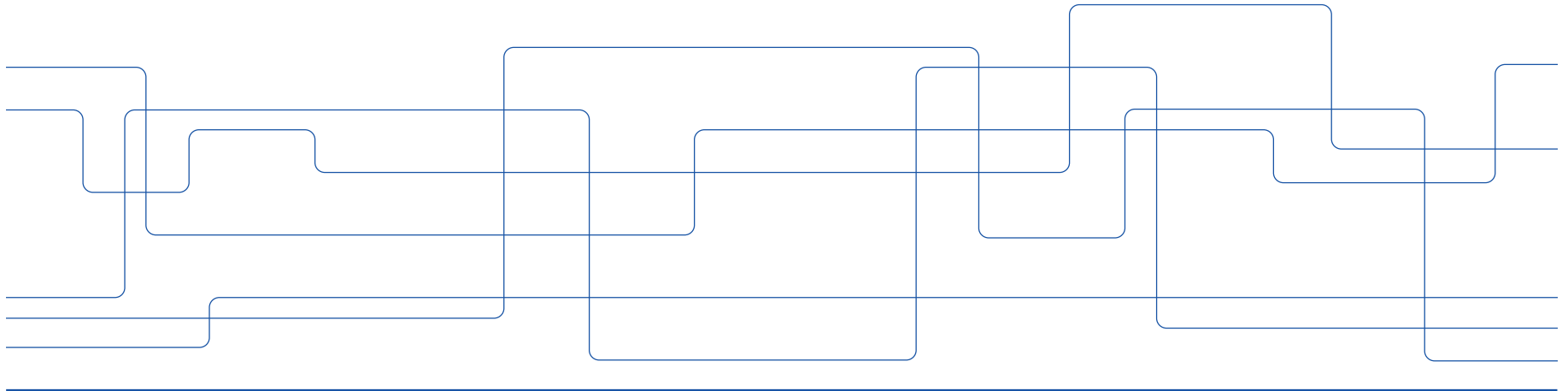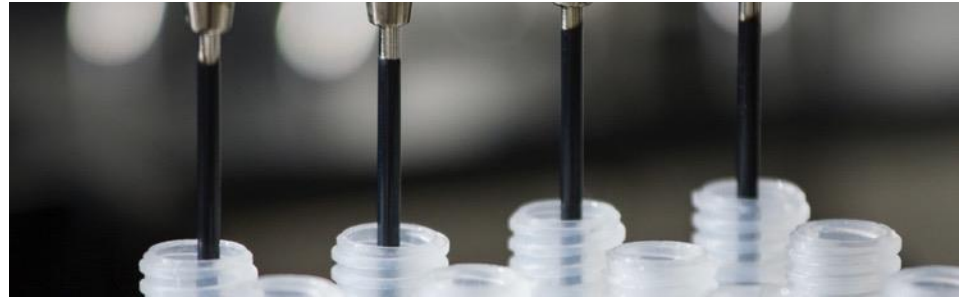# ICT tools and practices in learning: experience of KTH

Short about KTH

Research and education
for a brighter tomorrow

Sweden's largest technical university

17 500
students

4 000
staff (FTE)

100 000
alumni in 100 countries

1/3
women

2 100
international

313
professors

2 800
staff within research

1 600
doctoral students

19
international alumni associations

Where do KTH's Alumni work

5%
Consulting

9%
Information technology

7%
Program and project management

5%
Arts and design

3%
Product management

15%
Business development

21%
Engineering

5%
Research

10%
Operations

5%
Sales

3%
Finance

7%
Education

5%
Other
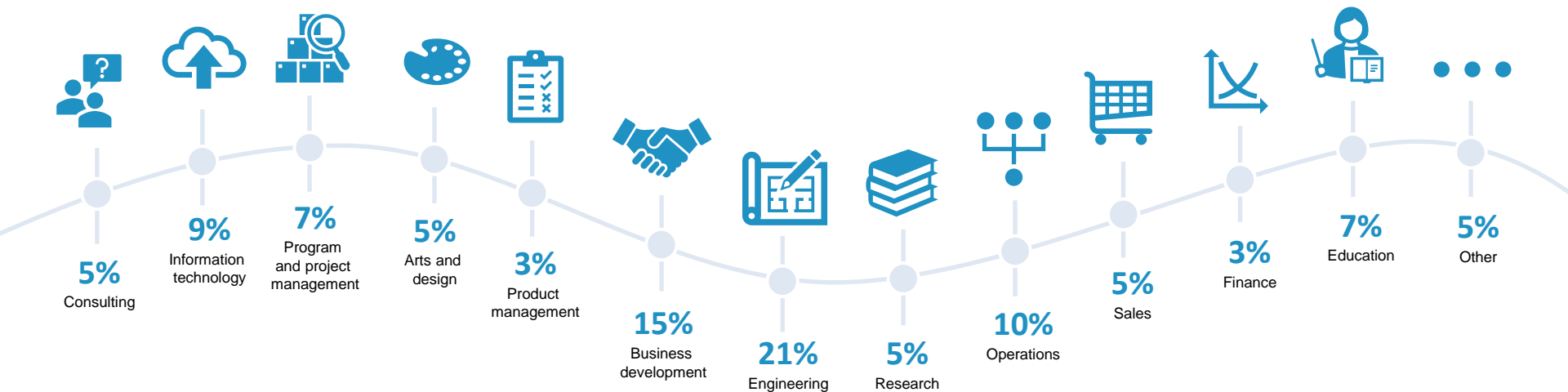
KTH's schools and departments

Architecture and the Built Environment

Architecture

Civil and Architectural Engineering

Philosophy and History

Real Estate and Construction Management

Sustainable Development, Environmental Science and Engineering

Urban Planning and Environment

Electrical Engineering and Computer Science

Computer Science

Electrical Engineering

Human Centered Technology

Intelligent Systems

Industrial Engineering and Management

Energy Technology

Industrial Economics and Management

Learning

Machine Design

Materials Science and Engineering

Production Engineering

Sustainable Production Development

Engineering Sciences in Chemistry, Biotechnology and Health

Biomedical Engineering and Health Systems

Chemistry

Chemical Engineering

Engineering Pedagogics

Fibre and Polymer Technology

Gene Technology

Industrial Biotechnology

Protein Science

Theoretical Chemistry and Biology

Engineering Sciences

Applied Physics

Engineering Mechanics

Mathematics

Physics

International ranking

QS WORLD UNIVERSITY RANKINGS

3

in the Nordic region

30

in Europe

89

in the world

2021

ACADEMIC RANKING OF WORLD UNIVERSITIES SINCE 2003

17

in Automation & Control

24

in Transport Science & Technology

26

in Mathematics

2020

THE WORLD UNIVERSITY RANKINGS

10

in the Nordic region

41

in THE Impact rankings

2020

KTH's four pillars

Sustainability

Equality

Digitalisation

Internationalisation
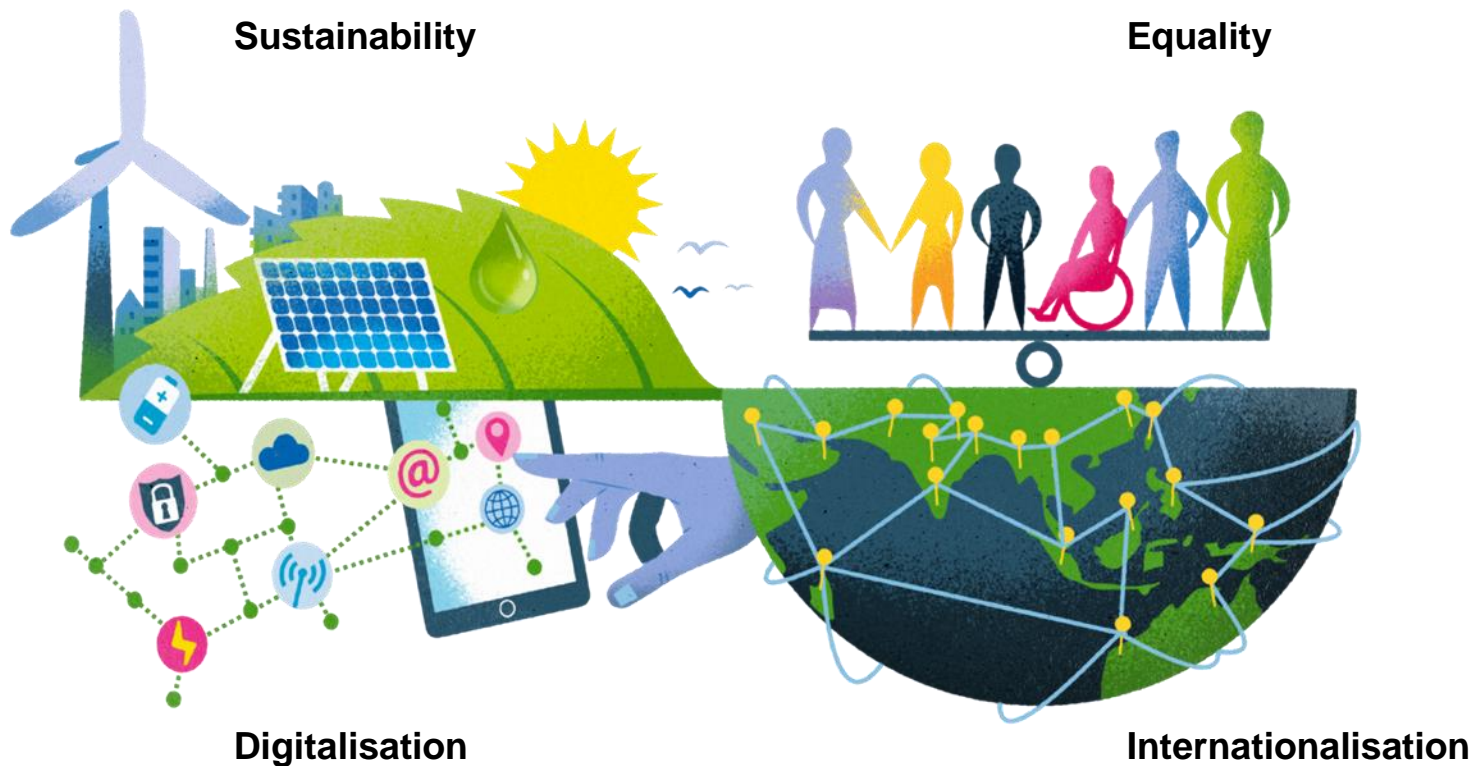
Meeting global challenges

The global sustainability goals are integrated in KTH's education, research and collaboration.

Education at KTH

"

A lot provided a background understanding and setting... It really is a rewarding way of studying with a lot of practical experiments. A lot of workshops with professional designers and companies as well.

Anonymous

Firoze Khutaisu Koroma
Sierra Leone
Bangladesh
Studied from Aug/18 to Jun/18

Martin Sandberg
Director of Conversion - Spotify
Anonymous
Studied from May/18 to May/19

Education for the future

- Over 100 degree programmes from qualifying courses to lifelong learning

- Innovation and entrepreneurship

- Challenge driven education

- Gender equality and diversity

- Sustainability/global goals for sustainable development

- Education abroad

- Attractive degree

Education at first cycle and advanced level

Circa 30 programmes at first cycle and circa 60 master's programmes within:

- Architecture and Built Environment

- Engineering Sciences in Chemistry, Biotechnology and Health

- Energy and Environment

- Industrial Engineering and Management

- Electrical Engineering and Computer Science

- Engineering Sciences, Mechanical and Vehicle Engineering

- Engineering Physics and Applied and Computational Mathematics

- Design and Product Realisation, Engineering Materials Science

- Technology and Learning

- Open Entrance and Qualifying Educations

Total number of students per previous education country
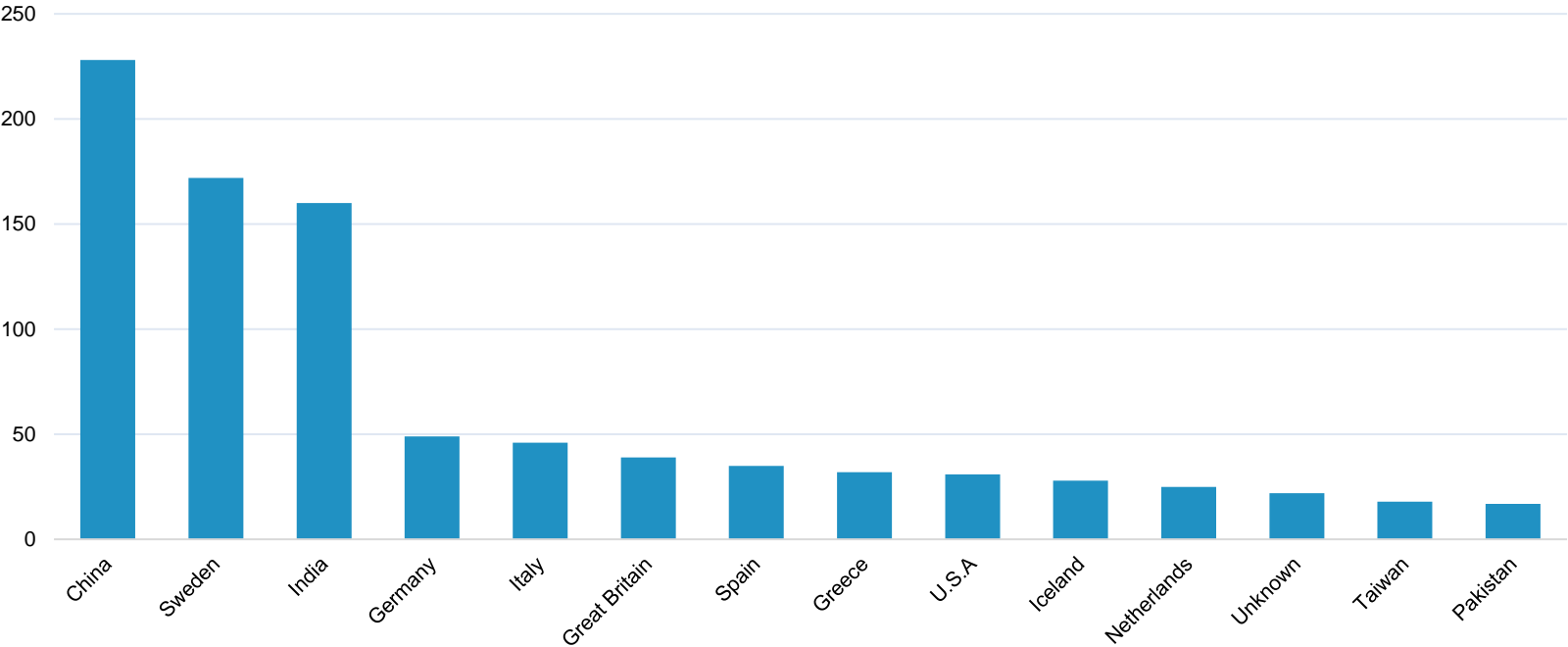
An international university

- All Master programs tought in English for all students
- International recruitment of students
- Worldwide recruitment of staff
- International campus

An international university

- CDIO - Modern engineering pedagogy (www.cdio.org)

- Department of Learning in Engineering Sciences

- Retraining of staff – selection of courses

- 15 ECTS credits – requirement for career development

- Recommendations from SUHF – Association of Swedish Universities

- Enhancing Higher Education

Academic development of teachers

General learning outcomes for teaher education

- Basic Communication and Teaching - 3 credits, English

- Teaching and Learning in Higher Education - 7,5 credits, English

- Doctoral Supervision - 3 credits, English

- Digital Learning in Higher Education - 4,5 credits, English

- Teaching and Learning for Challenge Driven Education in a Global Context - 3 credits, English

- Global Competence for Teachers in Higher Education - 3 credits, English

- Gender Theory and Gender Equality in Technical Higher Education - 4,5 credits, English

- Supervision and Assessment of Degree Project Work in First and Second Cycle - 3 credits, English

- Learning for Sustainable Development - 4,5 credits, English

Capacity building in learning for students

- **Autumn semester**:

Focus on study technique, source criticism, reference management, support for students with disabilities, career development, language learning ...

Spring semester:

Focus on thesis projects (bachelor and master): seminars on information management, academic writing (structure, writing process, academic style…), presentation technique ...

Tutorials on information management (information retrieval, search strategies, databases, reference management, Open Access ...)

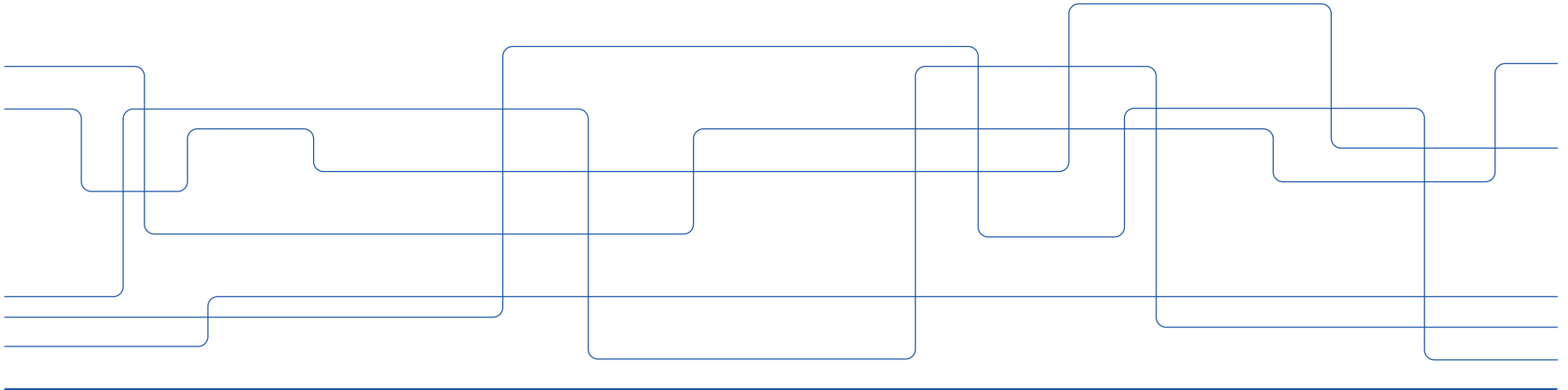**Study technique: Seminars** / workshop in order to improve students study skills.

How academic development of teachers organized at your university?
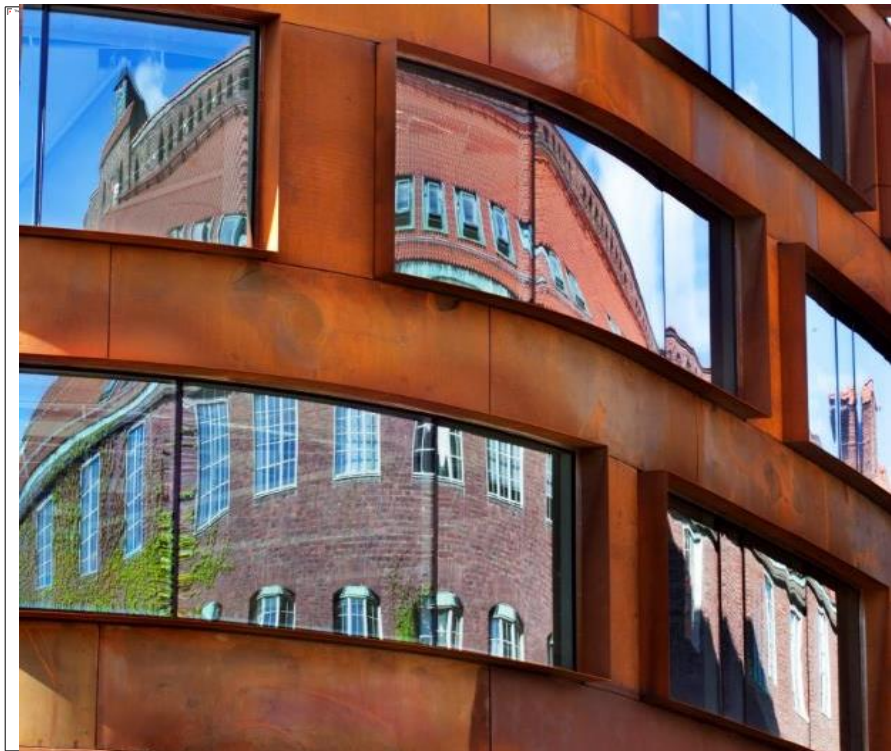**How do you ensure learning skills of the students?**

IT in education

Digital education at KTH

- KTH – a modern campus university
- Digital tools and services all over the campus
- E-learning complements and inreaches campus learning
- Teachers, students and IT services work together to improve quality of education

Digital education at KTH: teacher perspective and pedagogy

- Concepts in digital education

- Pedagogical methods

- Accessibility of the courses

- Organization and student involvement

- Tools available

- Service and support

Concepts and methods of digital education

Central concepts

- Learning activities

- Assessment activities

- Synchronous learning and assessment activities

- Asynchronous learning and assessment activities.

Common methods in digital education

- Blended learning

- Flipped Classroom

- Hybrid teaching - in a lecture hall and with web conferencing

Accessability of the courses

The law about accessible digital public service

- **perceivable**, regardless of, for example, vision impairment

- **operable**, i.e. possible to interact with

- **understandable** and

- **robust**, meaning it can be interpreted by a wide variety of user agents, including assistive technologies

Accessibility in practice – supporting teachers

- Accessibility tips

- Accessibility FAQ

- "Learn the basics" – step-by-step online guide

Organization and student involvement

The IT platform for education

KTH has a platform to support the use of IT in education. The platform is a cross-functional decision-making group consisting of a steering group responsible for coordinating the different projects of e-learning and study administration.

The platform coordinates and is responsible for digitalisation initiatives and management of the IT support to the first and second cycle education at KTH. The training platform is part of the portfolio management developed at KTH.

Organization and student involvement

The IT platform for education

Vision

- The IT platform for education gives teachers and administrators the conditions to create world class programme education.

- The platform offers teachers a way of work which is effective, pedagogical and legal certainty.

- The platform is perceived to be uniform and is continuously improved to automate work and offer new quality-enhancing possibilities for education.

Organization and student involvement

The IT platform for education

Chairman of the steering group and operation representatives

- Joakim Lilliesköld (EECS) - Chairman of the steering group

- Hans Wolfarth - Head of IT

- Joakim Pettersson - Object owner IT for e-learning and StudAdm

- Arnold Pears (ITM) - Head of Department, institution for learning

- Stefan Stenbom (ITM) - object owner e-learning

- Kattis Jonsson Berglund (EDO) - object owner StudAdm

- Tilda Byrstedt (THS) - student representative, THS Head of Educational Affairs

Organization and student involvement

The IT platform for education

The platform's project office

- **e-learning** administrative object (IT at GVS + digital learning)

- **study administration** administrative object (IT + EDO at GVS)

- **digital examination** project

- **web meeting, video and streaming** synchronisation team

- **education administration** synchronisation team

- **local support** synchronisation team

Organization and student involvement

The IT platform for education

Ongoing projects and initiatives

- digital examination and continuous examination

- digital course production

- course information

- **Interoperability with other universities internationally**

Working Group for the digitalisation of education

The Working Group for the digitalisation of education (AG) is a temporary organisation which was formed in March 2020 due to the corona pandemic.

Objectives

- Teachers, as far as possible, have access to personal guidance, training activities and training materials in order to continue to develop their use of digital education and examination, both for online and campus-based activities.

- Ensure that continuous and systematic evaluation is made of the digital transition of education in order to utilize the experiences of the digital transformation of education and formulate future needs.

- Ensure that the experiences from the digital transition are translated into pedagogical, technical and administrative recommendations and support.

Local support for the digitalisation of education

Mission

- Continuously report the team's operations and status as well as coordinate the implementation of tasks and deliveries with AG-staff and others teams under AG.

- Lead and coordinate the school's support and guidance on digital tools and systems for implementing digital education.

- Report educational needs regarding digital training of other teams.

- Form a link between the school's teachers and administrations and the central support within AG.

- Contribute to knowledge formation within AG about teachers' and administrators' educational position and educational needs.

- Take preparatory measures to once again be able to concentrate KTH's resources if the governments' or other authorities' guidelines change so that the teaching on campus cannot be carried out.

Questions?

How is your system organized?
What challenges do you have at your
institutions?

Digitalisation of education at KTH: tools

Learning Management System

Canvas is KTH's learning management system. Here a teacher will find guides, instructions, pedagogical tips and inspiration for work with the courses in digital environment.

Recognisable and unified structure is important for students

- It is easier for the students if the structure is recognisable and they know where they can find the course material. A clear structure in the course room is something that both students and student representatives at KTH often presents when it comes to factors that benefit learning and studies.

- A recommendation is that a teacher use the existing templates for KTH Canvas rooms. They have a unified structure for where and how teachers publish course content.

Digitalisation of education at KTH: tools

Canvas: broad support for the teachers

Checklists for course design in Canvas

- Create course room in Canvas
- Before the start of the course in Canvas
- Before examination in Canvas
- General checklist

Guides to functions

- Home, Announcements, Modules, Pages, Syllabus, Assignments, Quiz, Grades, People, Discussions and Settings.

Administration

- How Canvas rooms are created, how users are added to canvas, roles and permissions, user terms.

Digitalisation of education at KTH: tools

Canvas: Self-study course

All KTH-employees has access to an introductory course in Canvas to give you the basic knowledge you need to get started with Canvas quickly and easily. The course will give you:

- an **introduction** to the basic functions in Canvas

- possibility to test knowledge in short **quizzes**

Digitalisation of education at KTH: tools

Canvas: External Applications

- **Mentimeter:** a web-based presentation tool and digital system for interactive polls, quizzes and more. Participants can vote in real time, through an automatically generated code, for different alternatives or write their own answers.

- **Möbius:** an advanced quiz tool that is recommended when you want to create assignments where numerical calculations are an important factor.

- **Ouriginal:** an external tool used for plagiarism control on assignments in Canvas and should be used by teachers and examiners when students submit text files in Canvas.

Digitalisation of education at KTH: tools

IT Tools for teachers

Programme, course and study planning

- Student admissions and course choices (NyA)

- Course and programme planning (course & programme syllabus, course offerings, etc.) (Kopps)

- About course and course memo

- Handle individual study plans for doctoral students (ISP)

Schedule

- Schedule planning (Kopps + TimeEdit)

- Viewing schedules through My schedule (Social) and Schedule search (TimeEdit)

Digitalisation of education at KTH: tools

IT Tools for teachers

Teaching and video

- Digital meetings and lectures

- Zoom and hybrid teaching

- Technical equipment in rooms

- Video for teaching

- Create and manage video

Digitalisation of education at KTH: tools

IT Tools for teachers

Before examination

- Examination

- Checklist before examination (including Quiz)

- KTH's exam room template in Canvas

- Settings for examining assignments (including Ouriginal)

- Create a quiz (Canvas Quizzes and Möbius)

After examination

- Assess documents in SpeedGrader in Canvas

- Export results from Canvas (KTH Transfer to Ladok)

- Report grades in Ladok

Digitalisation of education at KTH: tools

IT Tools for teachers: Video for teaching

- Guidance in presentation design and video production

- Rooms with recording capability

- Webinar about video recording: "Make your course more digital - How to record in your home environment" (KTH Play)"

Digitalisation of education at KTH: tools

IT Tools for teachers: Video for teaching

KTH Play: Features of KTH Play

- Recording can be done with Kaltura Capture or Kaltura Express.

- Easier video editing with the editing tool.

- Automatic subtitling on uploaded media via the Reach module.

- Different sharing options:
  - Direct link to KTH Play.
  - Embedding code for web pages.
  - Canvas-linked embedding.
  - Publishing in channels in KTH Play.

No file size restrictions

Questions?
How is your video production organized?
Do you have facilities and support for video media preparation? How do they work?
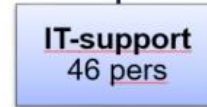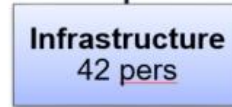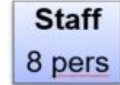
IT service at KTH

IT org

Hans Wohlfarth

IT

138 employees
25 consultants

Staff
8 pers

IT-development 28 pers	Infrastructure 42 pers	IT-support 46 pers	Archive & Registries 14 pers
Joakim Petersson	Katti Wall Stenberg	Zlatko Mitrovic	Jessika Persson

Campus

KTH Entre

Drottning Kristinasväg 48

Campus Valhallavägen

Teknik & Hälsa Flemingsberg

SciLifeLab Solna

KTH Kista

Campus Telge (ITM) Södertälje

KTH facts

- **People**
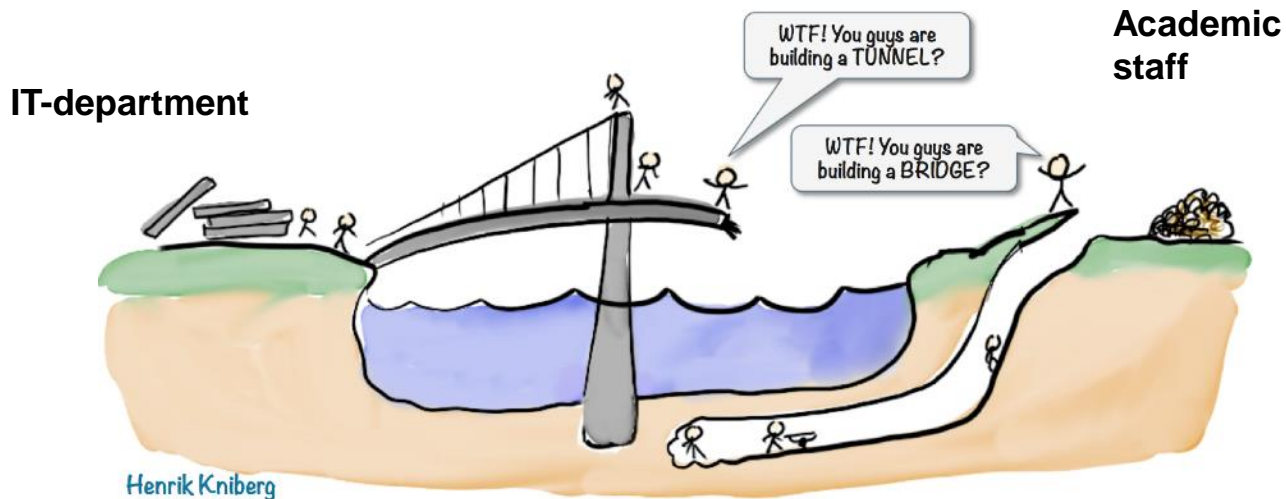- 3,628 employees,
- 13,633 Students

- **IT-cost**
- IT department:
-    17 500 000 euro

- KTH:s total IT-cost (2018)
- 35 000 000 euro
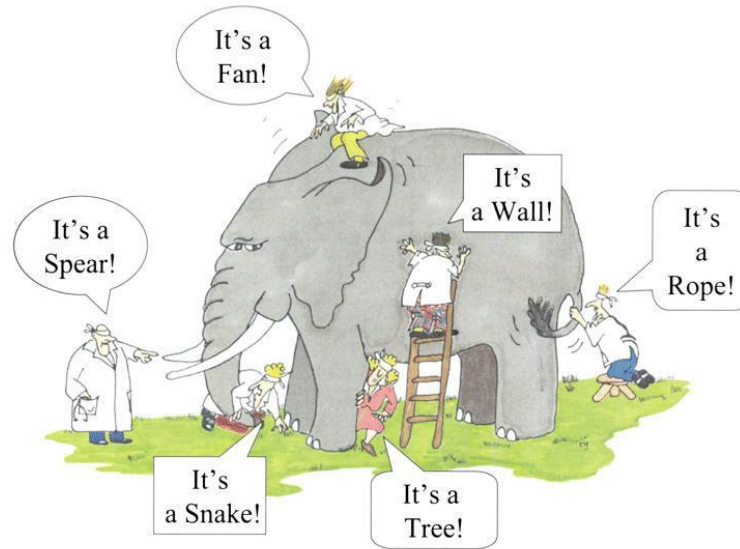- Including HPC center cost: 3 000 000 euro

- **Computers and users**
- 12 644 workstations
- 40 000 Users (employees, students and others)

Convert IT department from infrastructure to User driven IT
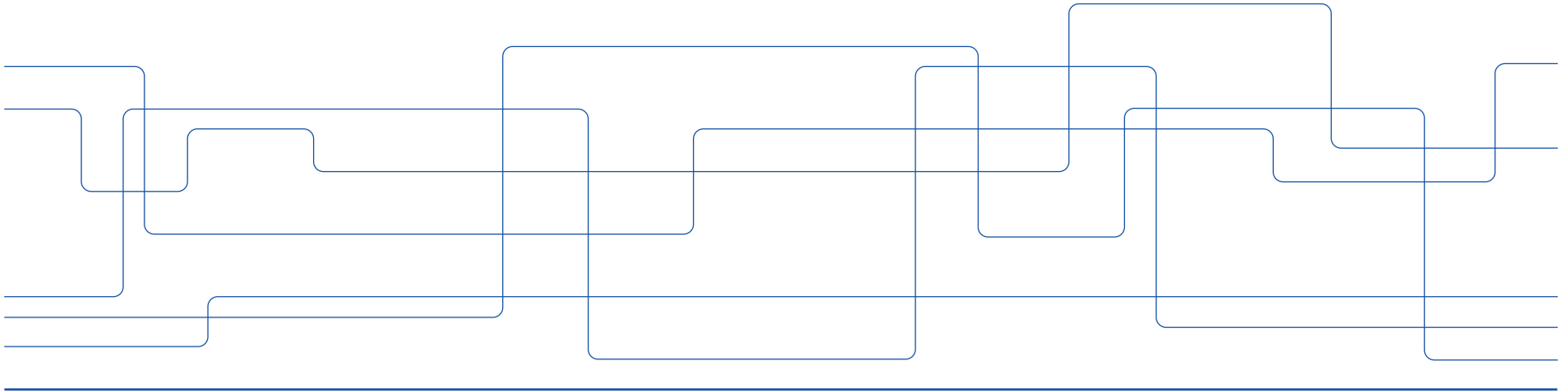
Digitalization Challenge

Questions?

IT services and support at KTH

IT services at KTH

- IT-workplace: KTH Windows, KTH Mac, KTH Ubuntu

- E-mail: MS Exchange, on premise (employees & students)

- Access to home directory and shared files – on premise

- Printing: KTH Print (FMP = FollowMePrint)

- KTH OneDrive – cloud storage

- Backup – Code 42

- Network (via Sunet)

- IT Security

IT services at KTH

- Wireless Network: Eduroam and Conference

- Work remote: VPN, RDP and Citrix with KTH desktop

- IT-Support for education: over 60 computer rooms

- AV-support for meetings and education

- Video conference: Zoom, PexIP, Cisco

- Telephony: Mobile and fixed

- Procurement: IT-, Tele- and AV products

- One account (@kth.se) - for all services

IT services at KTH – internal systems

- UG (Users & Groups): User database

- Confluence: information, documentation

- Slack: Chat

- Trello: Trello board, collaborating

- Efecte Edge: ITSM (ticket management)

- IT processes: Incident (& Service Request), Problem and Release

SPOC (Single Point of Contact)

- Five Campus areas – one process/interface

- E-mail: it-support@kth.se

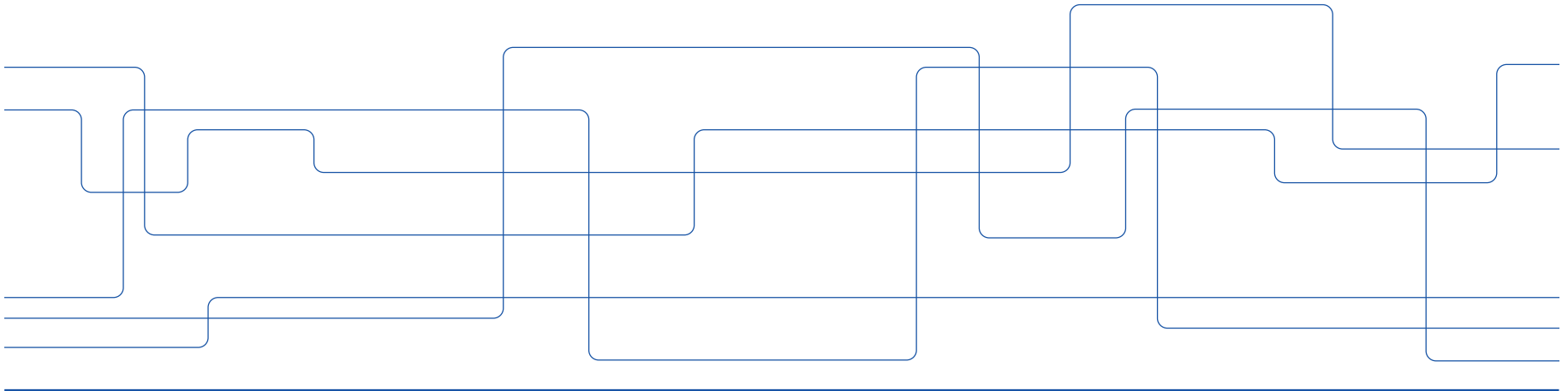- Telephone: 08-790 6600

- Main ServiceDesk: Kristinas Väg 4)

Questions?

E-lrearning at KTH

KTH definition of e-learning

- "E-learning is defined as teaching with the support of technology. This includes using the Internet for *learning activities* and systems used for *educational administration* used by teachers".

  Quote from KTH vision for e-learning

What is a Learning Management System?

- LMS is a system is used to handle:

- Courses

- Users (teachers, students)

- The relationship between these different entities

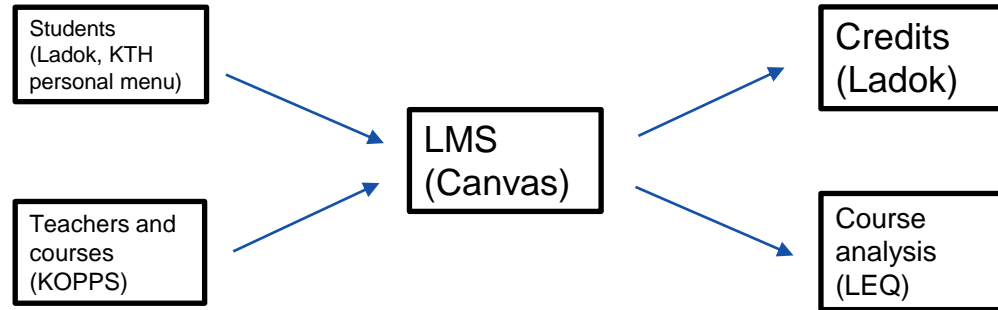- Links to source data systems (Kopps, Ladok, etc.)
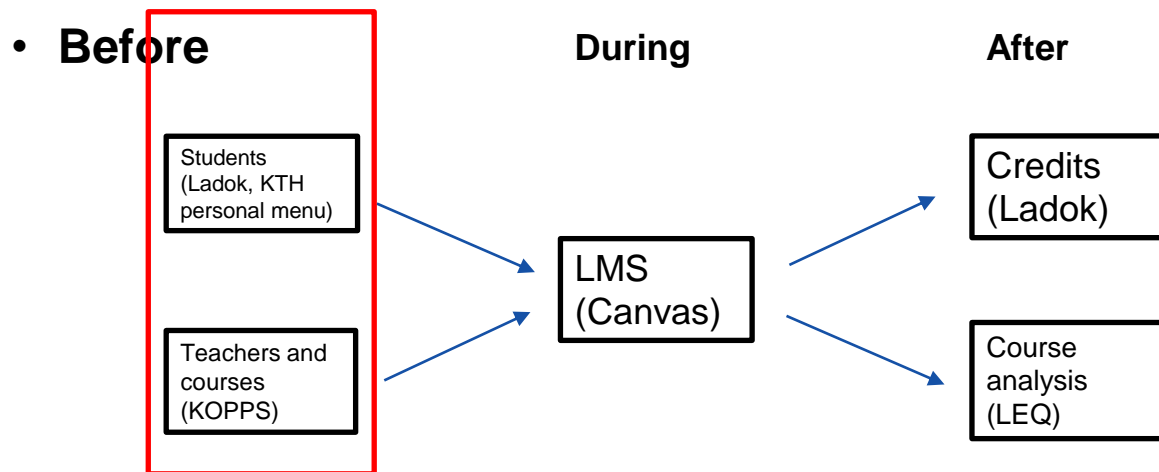
A digital course life cycle at KTH

- **Before**   **During**   **After**

Students (Ladok, KTH personal menu)

Teachers and courses (KOPPS)

LMS (Canvas)

Credits (Ladok)

Course analysis (LEQ)

A digital course life cycle at KTH

- **Before**   **During**   **After**

Students (Ladok, KTH personal menu)

Teachers and courses (KOPPS)

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Credits (Ladok)

Course analysis (LEQ)

A digital course life cycle at KTH

- **Before**

During

After

```
Students
(Ladok, KTH
personal menu)
```

```
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A digital course life cycle at KTH

- **Before**   **During**   **After**

| Students (Ladok, KTH personal menu) | → | LMS (Canvas) | → | Credits (Ladok) |
| Teachers and courses (KOPPS) | → | | → | Course analysis (LEQ) |
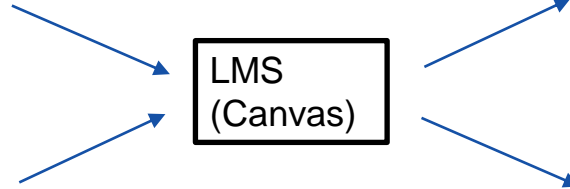
Before the course starts

- Course rooms are created automatically through KOPPS

- Teachers are enrolled some time before so they can arrange new or import a previously created course content, also through KOPPS

- Student registers through Ladok (Swedish national credit system), starting in the KTH personal menu

- (add somewhere that we are working in an agile environment)

During the course

- In Canvas students can submit assignments, download files shared by the teacher, collaborate using project groups including document sharing, and conduct online meetings (built in, as well as LTI)

- Course appearance can be customized, and content can be arranged by the teacher into topics using Modules

- Canvas includes Teacher–Student communication tools (webmail, discussions, announcements), as well as booking features

- Canvas has built in quiz engine, which can be used for assignments

- Assignments can be graded online using SpeedGrader, with option for anonymizing graded student names

After the course ends

- Results are reported to Canvas gradebook and can be exported further to the Ladok credit system

- LEQ – Learning Experience Questionnaire. A course evaluation method closely connected to each course at KTH and also including a course analysis tool

How it can be improved? – Use of LTI

- Canvas supports very easy implementation for extension plugins using LTI protocol (**L**earning **T**ools **I**nteroperability).

- Those are procured separately, with different license types.

- Examples of LTI's:
  - Advanced Quiz Engine – Möbius Courseware
  - Peer Review Tool – Peergrade
  - Video Conference Tool – Zoom.us
  - Video Sharing Platform – Kaltura

How it can be improved? – Use of LTI

- LTI's integrate seamlessly into Canvas. No need for login or separate student registration as data is passed directly from LMS

- Several different tools are possible to find on *eduappcenter.com*

- We validate each LTI that is connected to our Canvas instance.

- In this process we investigate:

- Data handling practices, including affiliates and sub-processors

- Stability of the developer

- Release schedule

These services and integrations are maintained by an agile team of developers

How it can be improved? – Use of LTI

- **There is no silver-bullet**

- **There is no one-size-feets-all**

- **Make it using available resources and scale it up!**

Questions?