Tomsk

EPFL-MOOCs

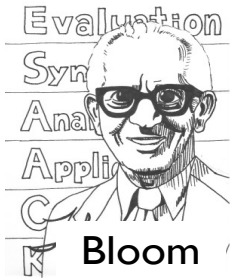
Patrick Jermann
Center for Digital Education

Summary

- What are MOOCs ?
  - Concept
  - Anatomy
- Facts and Figures
  - Registration geography
  - Retention rates
  - Integration on the campus
- Production
  - Production Process
  - Course Design
  - Studio and technical aspects

eLearning Waves

The Tsunami (2012)
Massive Open Online Courses (2008)
Technology-enhanced learning (2004)
Swiss Virtual Campus (2000)
Learning Management Systems (1999)
Virtual University (1999)
Open Learning (1995)
e-Learning (1993)
Online Education (1993)
Computer-Mediated Learning (1990)
Educational telematics (1988)
Computer-Assisted Learning (1985)
Computer-Based Learning (1980)
Computer-Assisted Instruction (1960)



Bloom

Vygotsky

Skinner

Piaget

There's a Tsunami coming [John Hennessy, President of Stanford]

"The Tsunami" (2012)
Massive Open Online Courses (2008)
Technology-enhanced learning (2004)
Swiss Virtual Campus (2000)
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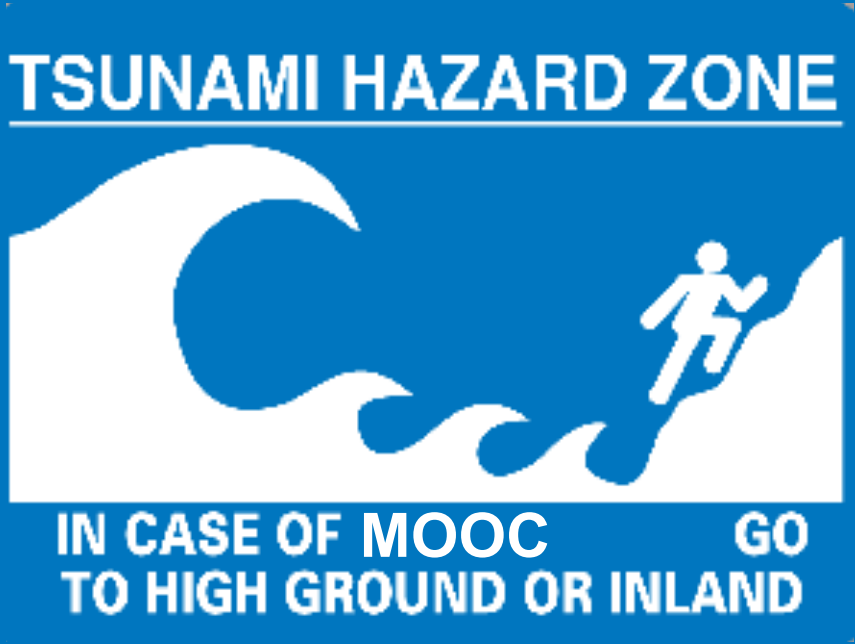
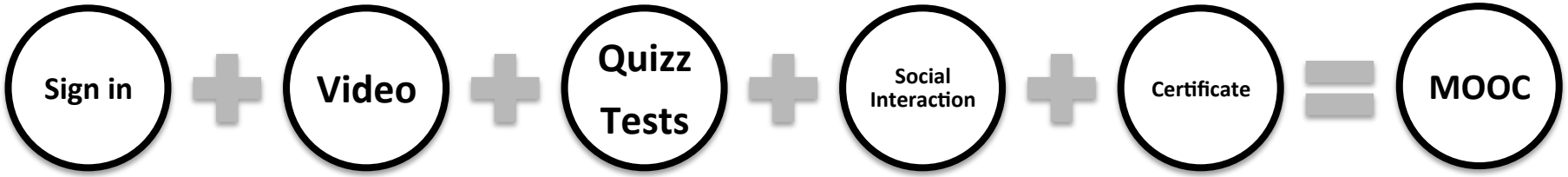


MOOCs = Massive Open Online Courses



xMOOCs

- Lectures + Assignments
- Strict Schedule
- Certification

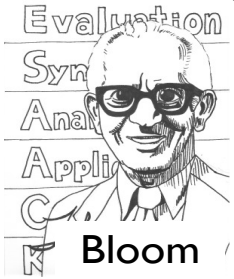
cMOOCs

- Social interaction, crowdsourcing
- YouTube, web2.0
- Free and open content

MOOCs = Massive Open Online Courses

- xMOOCs [2012]
  - The best lecturers
  - From the best universities
  - Focused on contents
  - High workload
  - A course is the unit
  - Classical pedagogy
  - Strict schedule
  - Certification

Skinner



Bloom

- cMOOCs [2008]
  - YouTube attention span
  - Free access to contents
  - Many small revenues
  - Anytime, anywhere
  - Social software
  - Community effects
  - Crowdsourcing
  - Learning analytics

Vygotsky

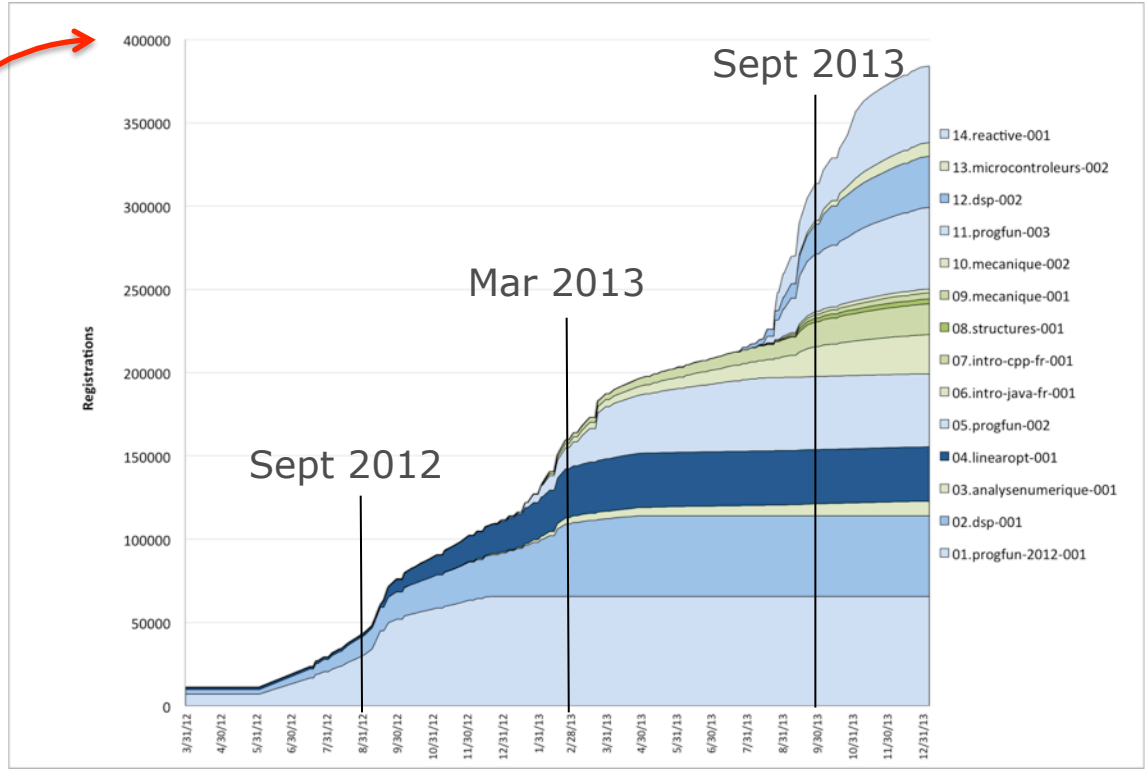
Piaget

MOOCs = Massive Open Online Courses

Ten EPFL professors

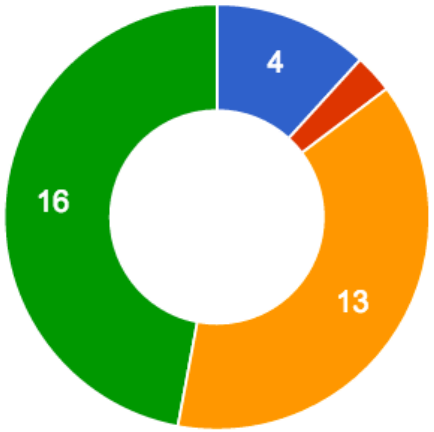
400’000

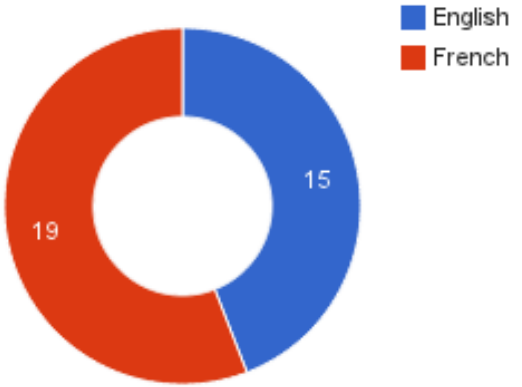
students in a year



What are EPFL's motivations to do MOOCs ?

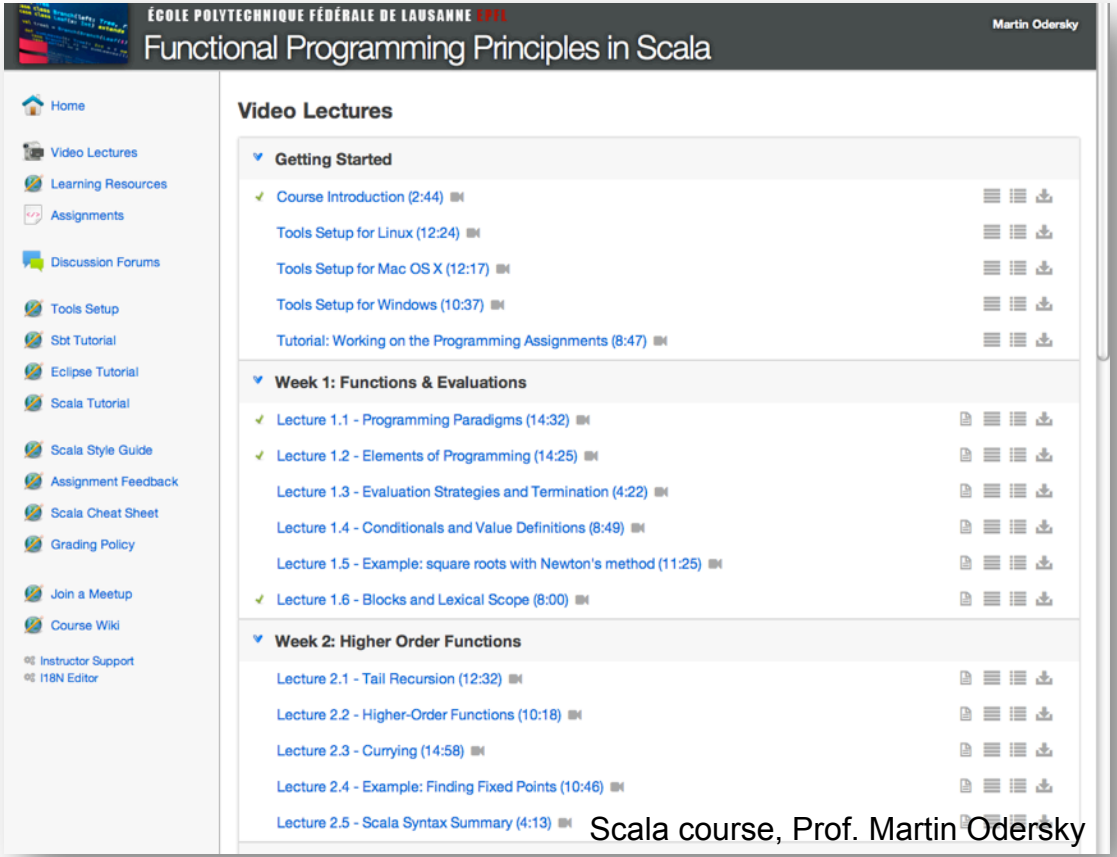
- Visibility and reputation
  Unique Selling Proposition
- Enhance teaching
  Internal & Africa
- Continued education
  Continued





Anatomy of a MOOC

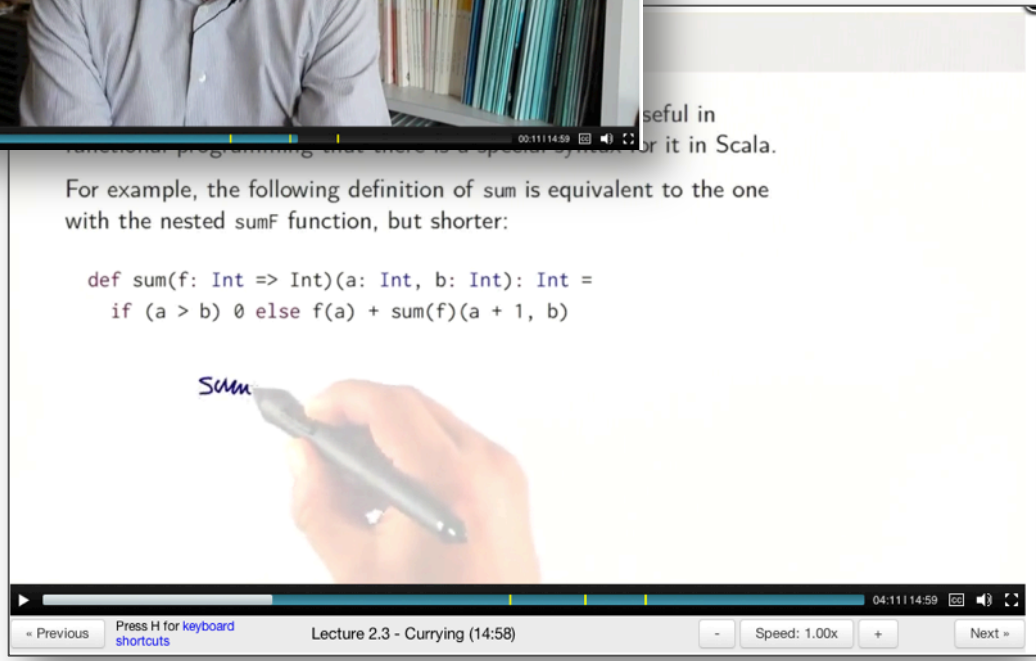
- A course segmented into weeks



Scala course, Prof. Martin Odersky

Anatomy of a MOOC

- A course segmented into weeks
- Short Videos (5 x 7-12 minutes)



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- A course segmented into weeks
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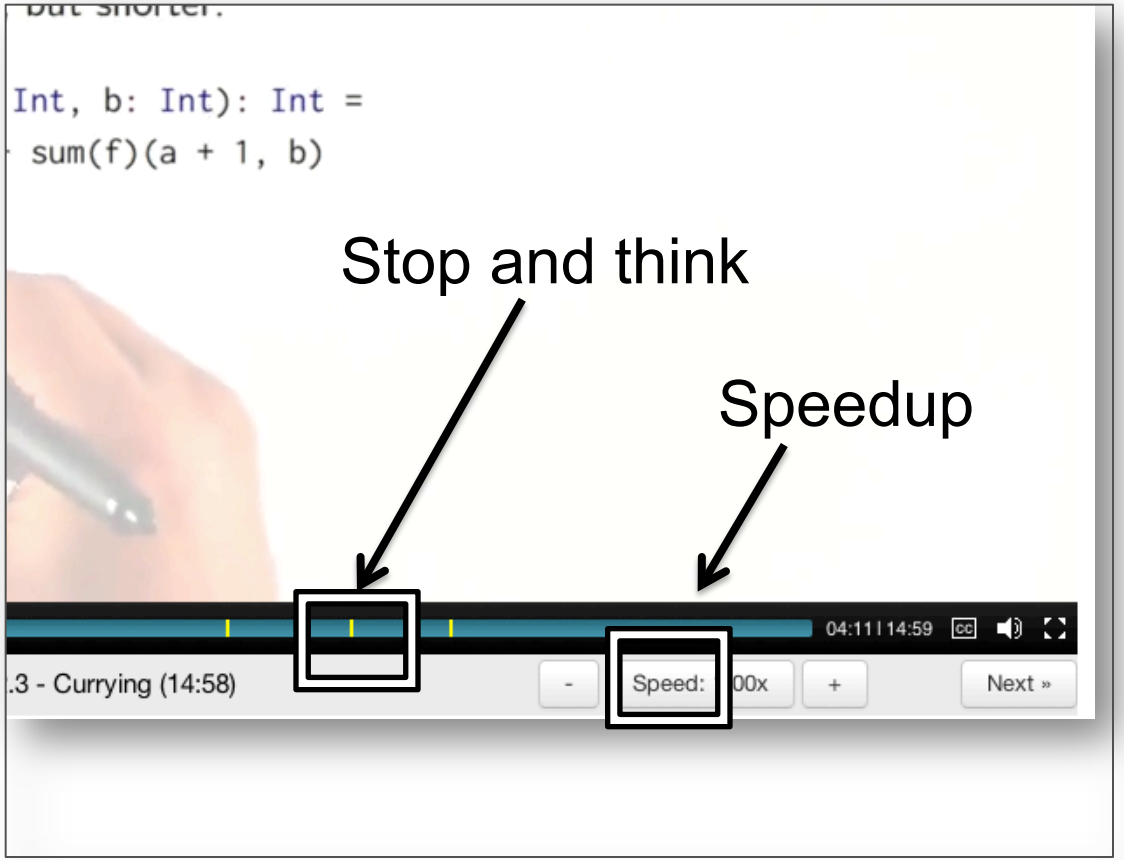
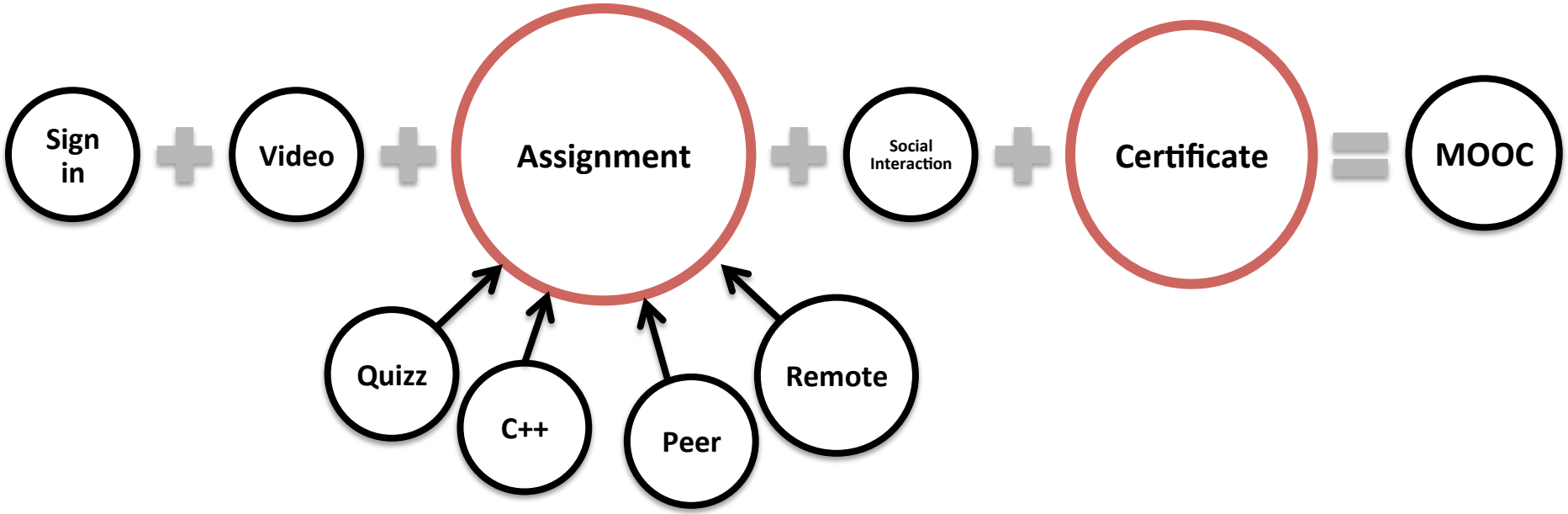
- Speed control and inline quizzes



Evaluation & Certification

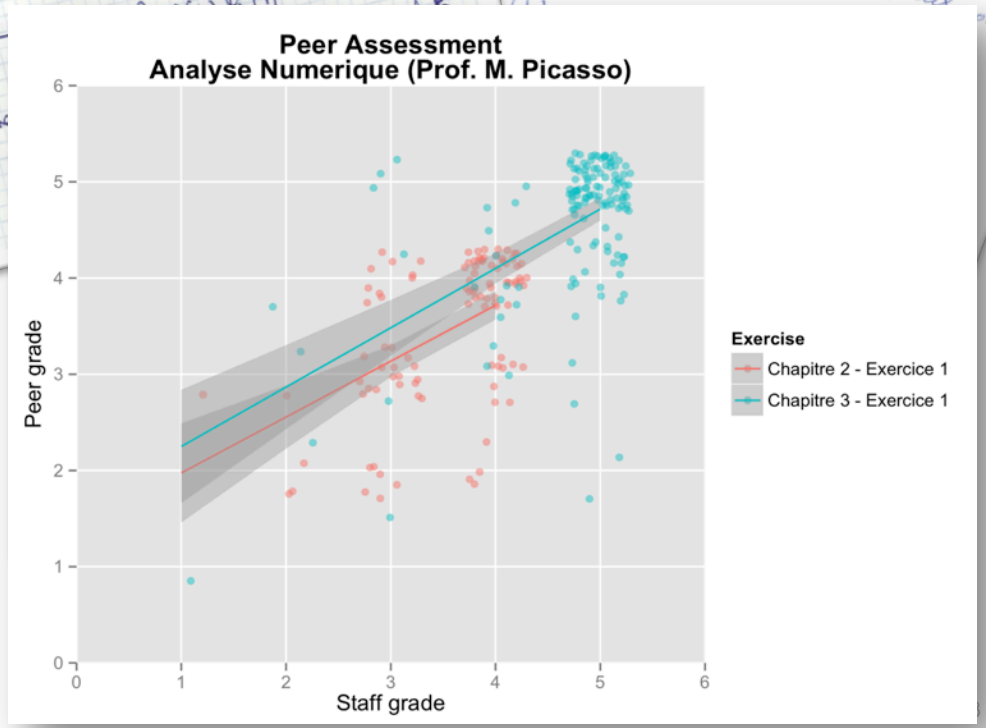


Peer Asessment

- Address complex skills
- Assessing = Learning

- Possible to use external tools
  e.g. www.bibsonomy.org

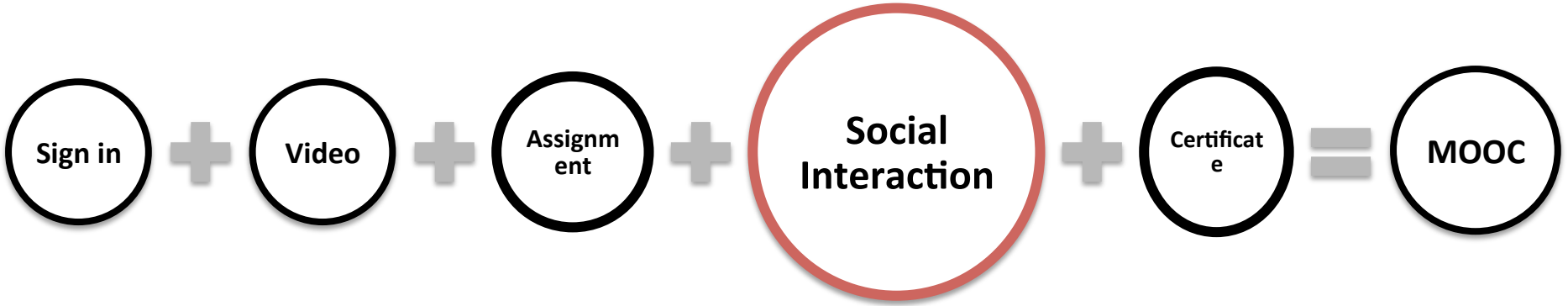
- Too much peer assessment
  kills peer assessment



Certification ["Pay to get Out"]

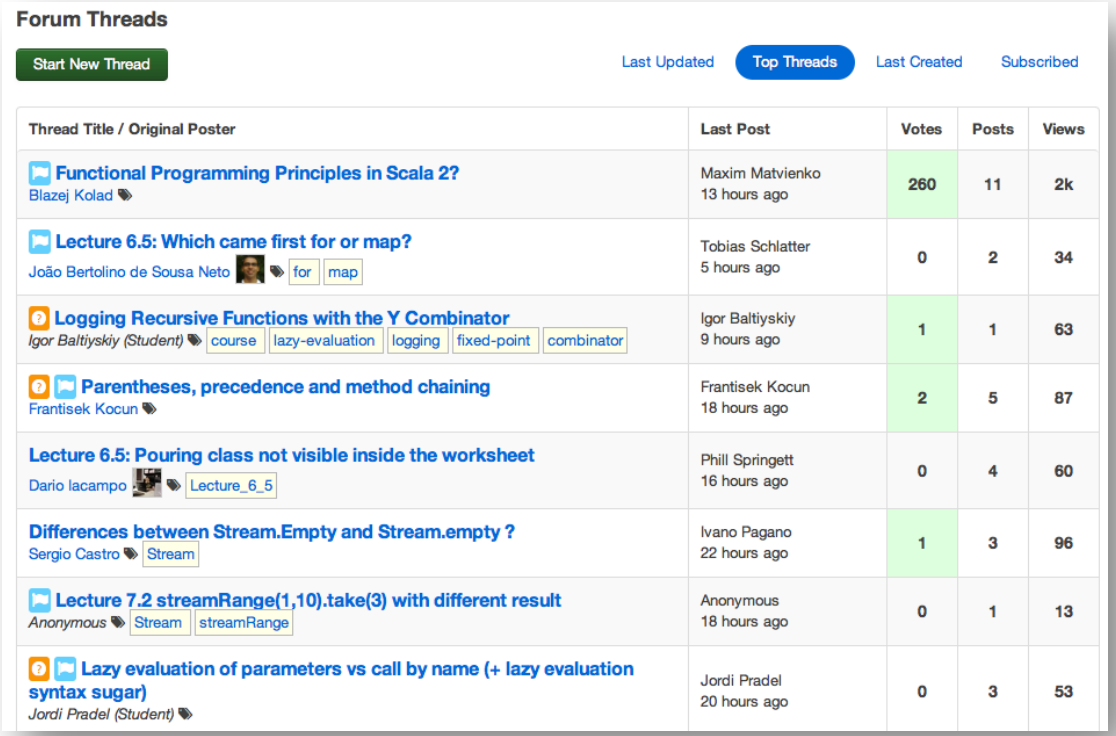
- Better certificate = More expensive
  - Statement of accomplishment
  - Signature track
  - American Council on Education (ACE)
  - University Degree

Learning together



Anatomy of a MOOC

- A course segmented into weeks
- Short Videos (5 x 7-12 minutes)
- Speed control and inline quizzes
- Assignments and hard work
- Peer Assessment
- Online Forums



Anatomy of a MOOC

- A course segmented into weeks
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- Online Forums
- Study Groups

A propos des Meetups Everywhere Coursera

13 086 COURSERIANS 1 449 VILLES

Learning for life.
Education for everyone.

Coursera Meetups are a great way to meet your fellow Courserians, swap stories, share ideas, form study groups, and have a great time.

Find a meetup near you, or start a new one. These events are for you, by you, so meet wherever you like. You choose the topic, the time and the venue.

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FÉDÉRALE DE LAUSANNE

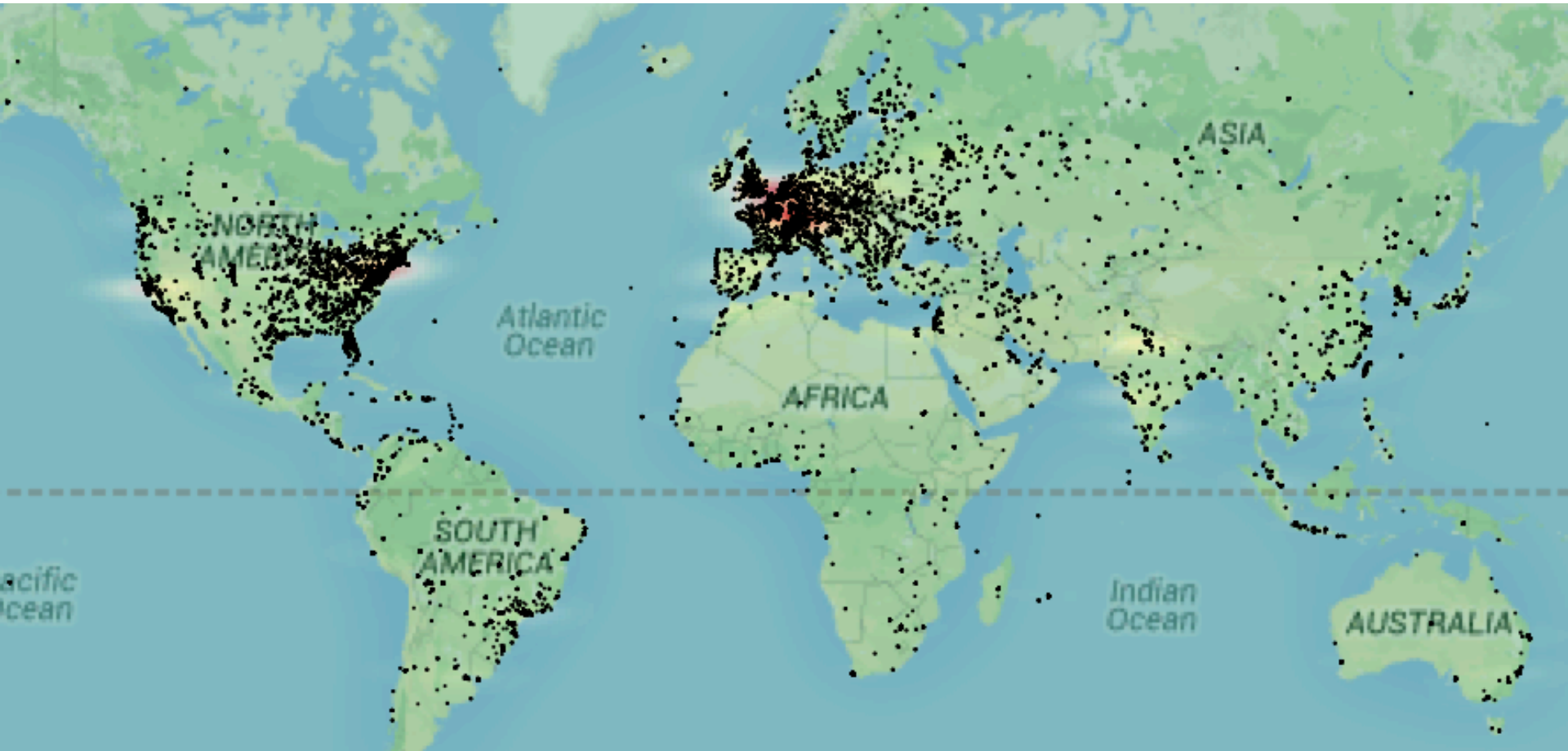
Current State of MOOCs at EPFL

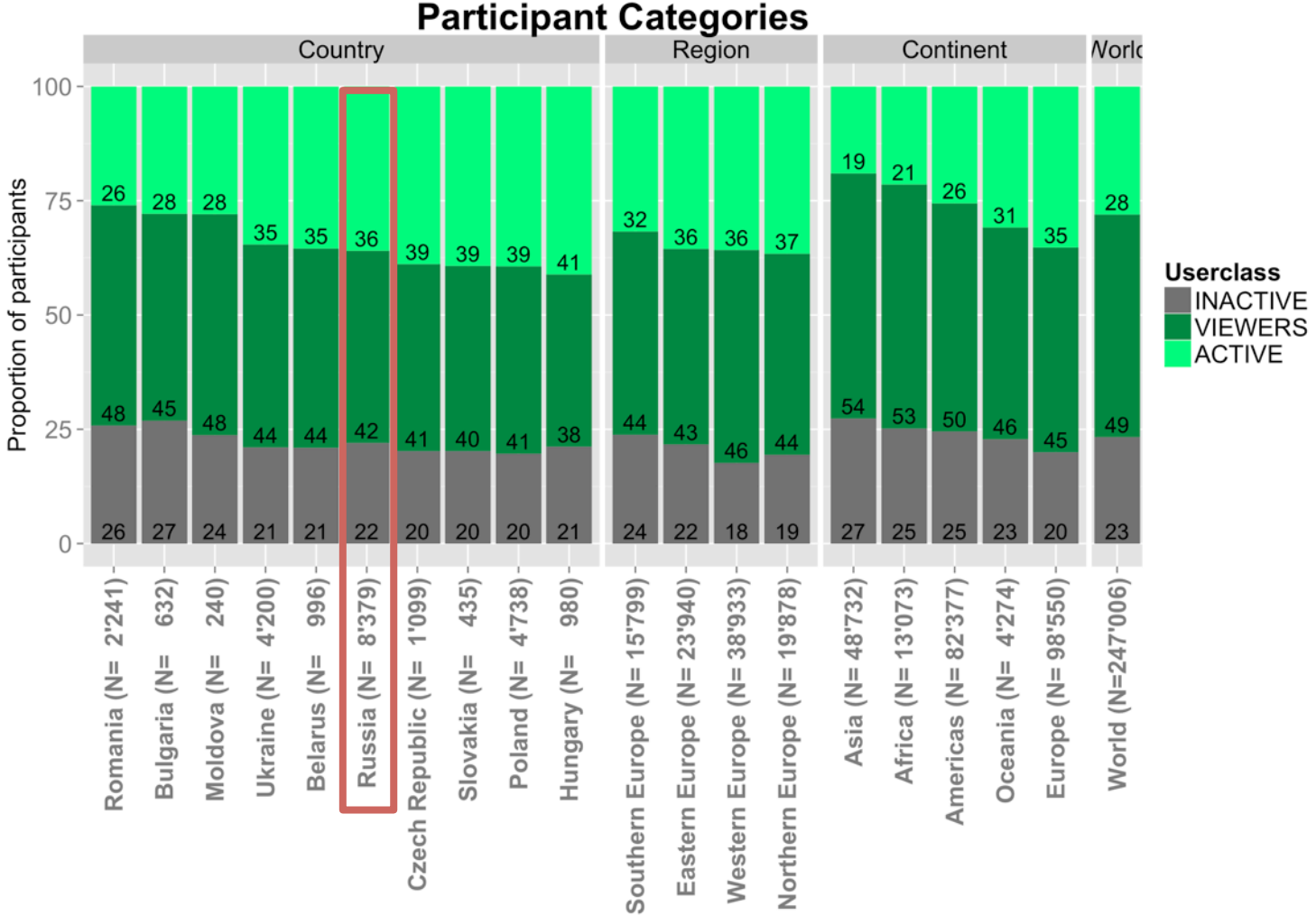
Platforms

coursera | Explore Courses
Categories Partners About | Patrick Jermann
École Polytechnique Fédérale de Lausanne
Initiation à la programmation (en Java)
Sep 17th 2013
Initiation à la programmation (en C++)
Sep 17th 2013
Introduction à la programmation orientée objet (en C++)
Feb 17th 2014
Introduction à la programmation orientée objet (en Java)
Feb 17th 2014
coursera

edX
HOW IT WORKS COURSES SCHOOLS
dashboard
ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE
EPFLx
Back to schools
EPFL is the Swiss Federal Institute of Technology in Lausanne. The past decade has seen EPFL ascend to the very top of European institutions of science and technology: it is ranked #1 in Europe in the field of engineering by the Times Higher Education (based on publications and citations), Leiden Rankings, and the Academic Ranking of World Universities.
EPFL's main campus brings together 12,600 students, faculty, researchers, and staff in a high-energy, dynamic learning and research environment. It directs the Human Brain Project, an undertaking to simulate the entire human brain using supercomputers, in order to gain new insights into how it operates and to better diagnose brain disorders. The university is building Solar Impulse, a long-range solar-powered plane that aims to be the first piloted fixed-wing aircraft to circumnavigate the Earth using only solar power. EPFL was part of the Alinghi project, developing advanced racing boats that won the America's Cup multiple times. The university operates, for education and research purposes, a Tokamak nuclear fusion reactor. EPFL also houses the Musée Bolo museum and hosts several music festivals, including Balelec, that draws over 15,000 guests every year.
EPFL is a major force in entrepreneurship, with 2012 bringing in $100M in funding for ten EPFL startups. Both young spin-offs (like Typesafe and Pix4D) and companies that have long grown past the startup stage (like Logitech) actively transfer the results of EPFL's scientific innovation to industry.
COURSES (0) all | new | current | past
There are no courses currently available from this sch... check back soon!
About Us Jobs
edX

Worldwide MOOC participation




Participant Categories
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Bulgaria (N= 632)
Moldova (N= 240)
Ukraine (N= 4'200)
Belarus (N= 996)
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Czech Republic (N= 1'099)
Slovakia (N= 435)
Poland (N= 4'738)
Hungary (N= 980)
Southern Europe (N= 15'799)
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Western Europe (N= 38'933)
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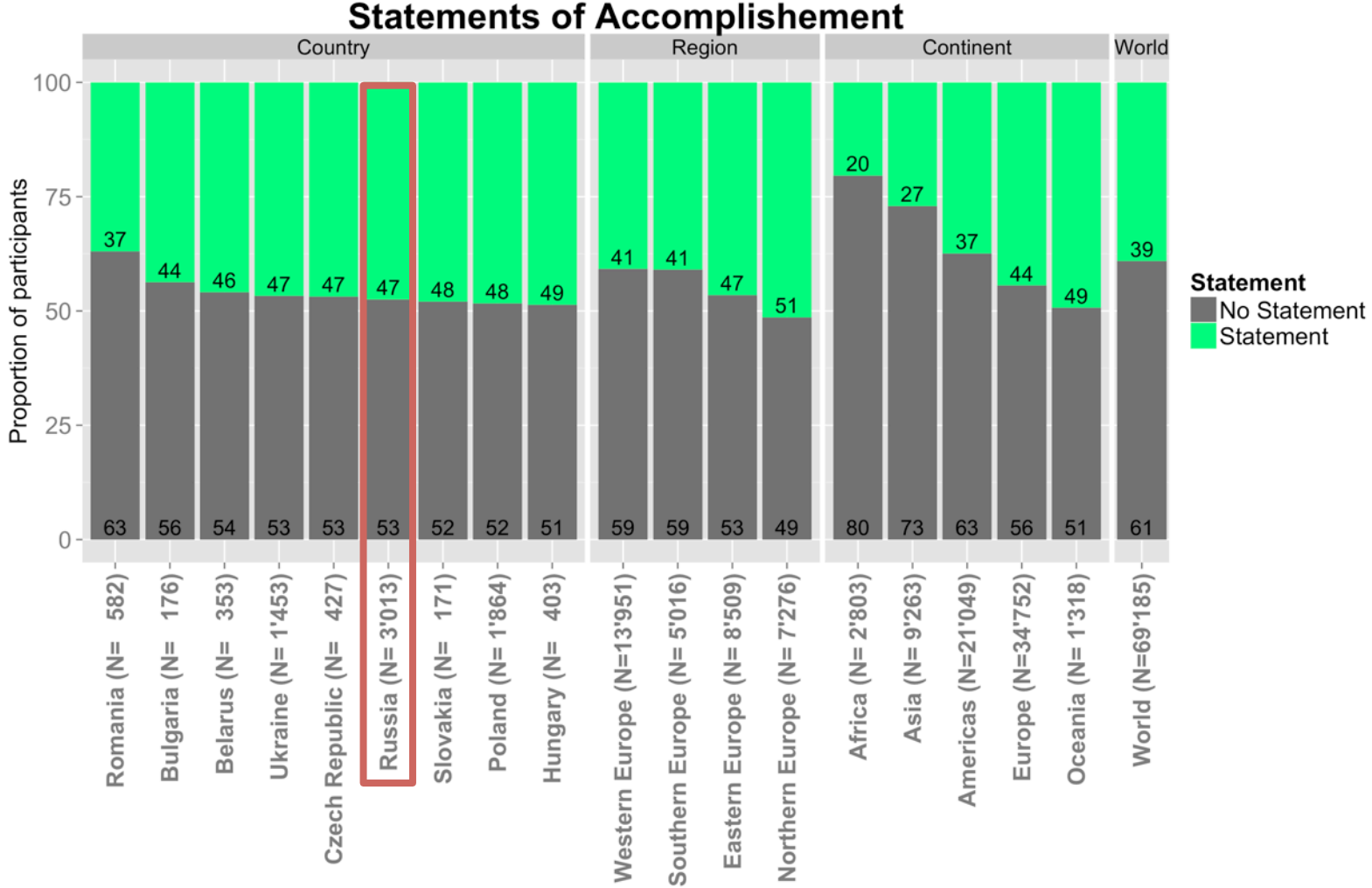
Americas (N= 82'377)
Oceania (N= 4'274)
Europe (N= 98'550)
World (N=247'006)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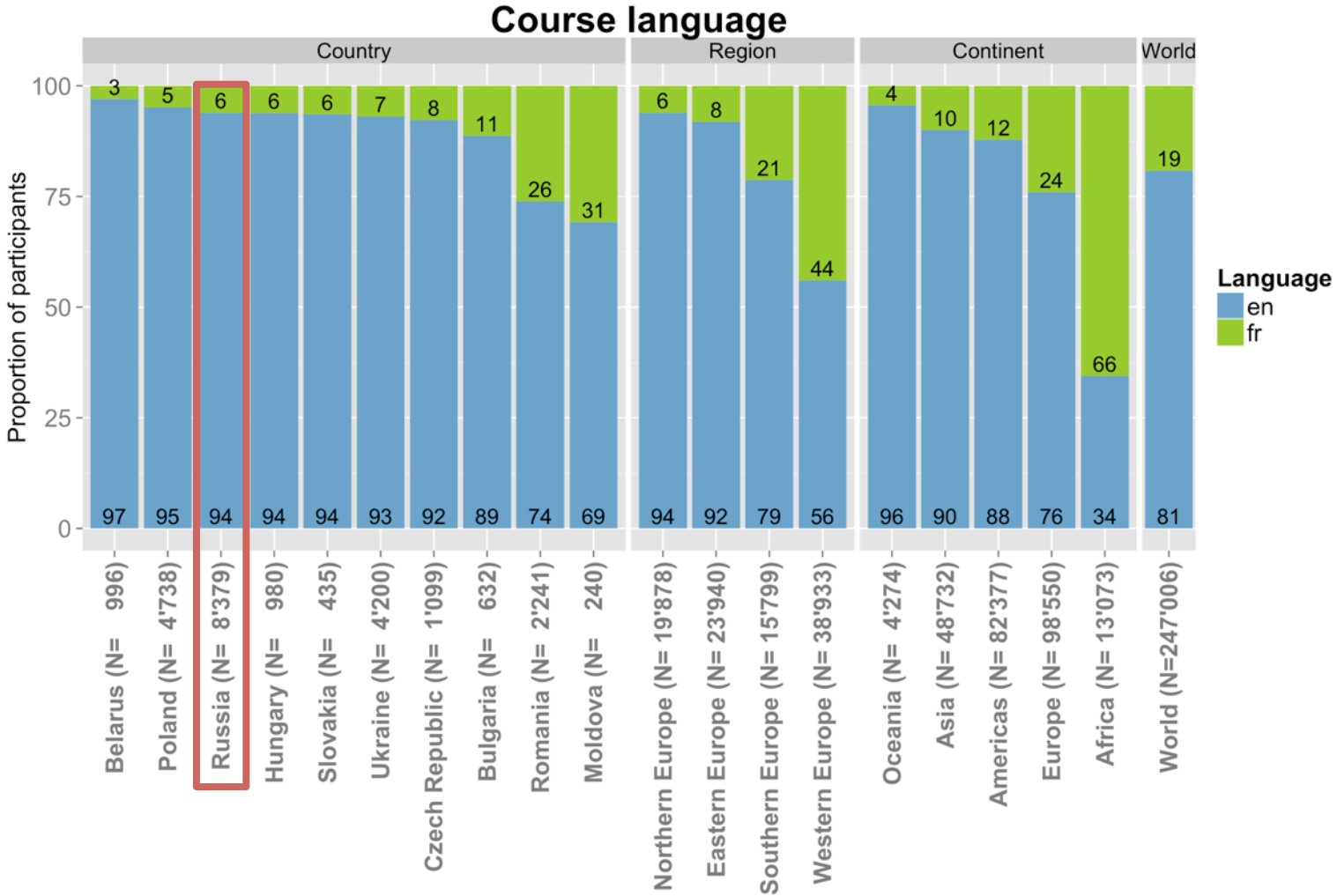
Poland (N= 1'864)
Hungary (N= 403)
Western Europe (N=13'951)
Southern Europe (N= 5'016)
Eastern Europe (N= 8'509)
Northern Europe (N= 7'276)
Africa (N= 2'803)
Asia (N= 9'263)
Americas (N=21'049)
Europe (N=34'752)
Oceania (N= 1'318)
World (N=69'185)
Statement
No Statement
Statement


Course language
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World (N=247'006)
Language
en
fr

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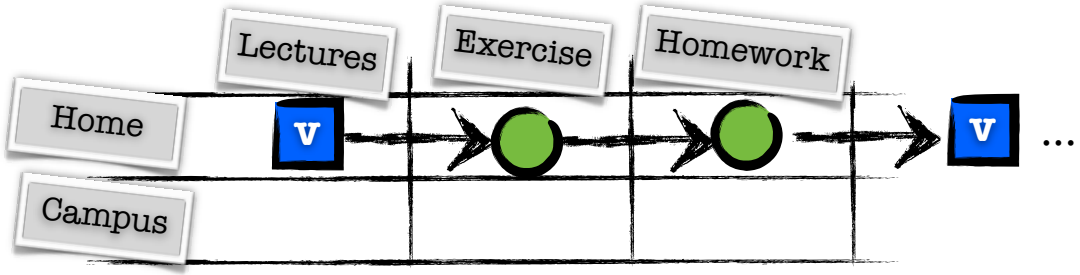
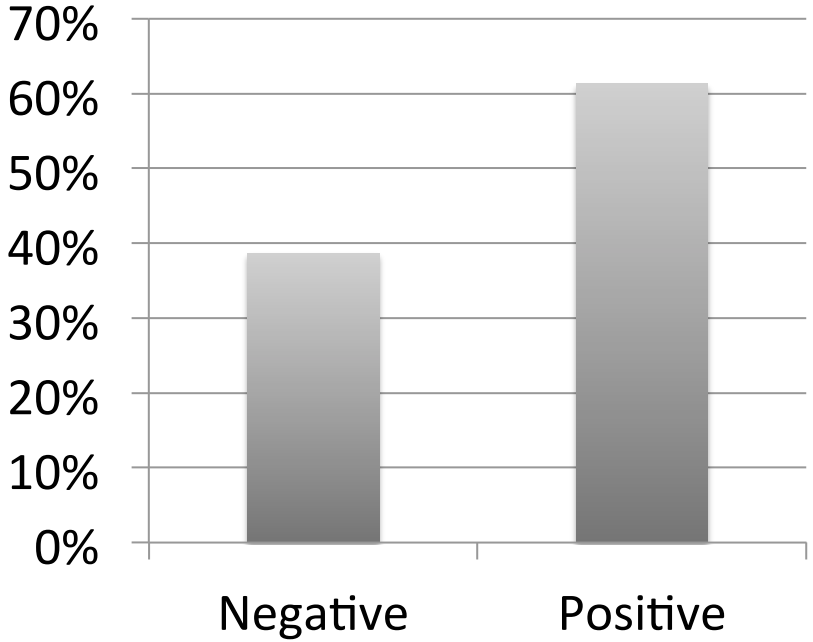
Integration

MOOC 100% on line



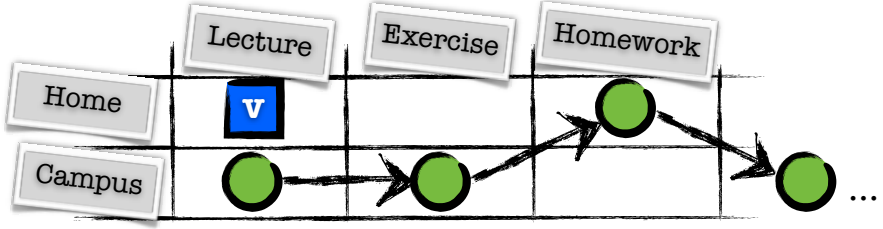
On campus course evaluations

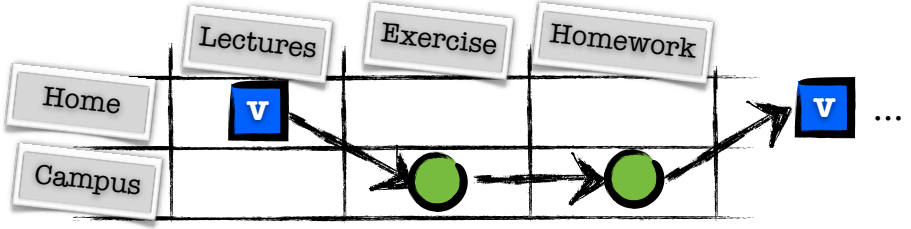
[N=6 courses, 287 ratings, 316 comments]



- Overall positive ratings (61%)
  - Good quality
  - Useful for learning
  - Complement to lecture
  - Replay
  - Flexible schedule
- But there are issues (39%)
  - Need social interaction
  - Recitation section design
  - Quality
  - Match between video and exercice

Course formats … After the tsunami





- Status quo (bachelor ?)
  - Have a ex cathedra lecture
  - Propose the video as an optional complement
  - Students use the video as an open resource

  \+ does not require self-directed students

  \- decouples the online and on campus moocs

- Flipped classroom
  - Mandatorily watch video before the class
  - Organize sessions to deepen knowledge
  - Best format has to be optimized
  - Students are better prepared for exercises

  \+ More effective learning

  \- Costly in human coaching and logistics

Online teaching

Onsite training – ENSP Yaoundé

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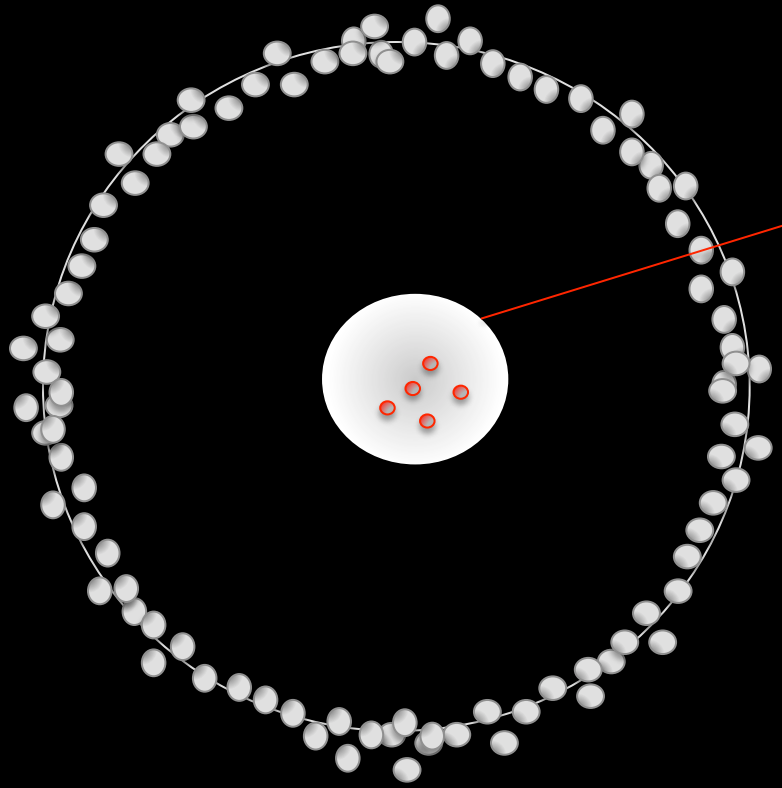
The MOOC Factory

Center for Digital Education

http://cede.epfl.ch



The MOOC Factory

- Producing MOOCs
- Flipped classroom
- Operating platforms
- Data Analytics
- Operating Moodle
- Tools & Services

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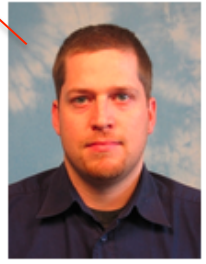

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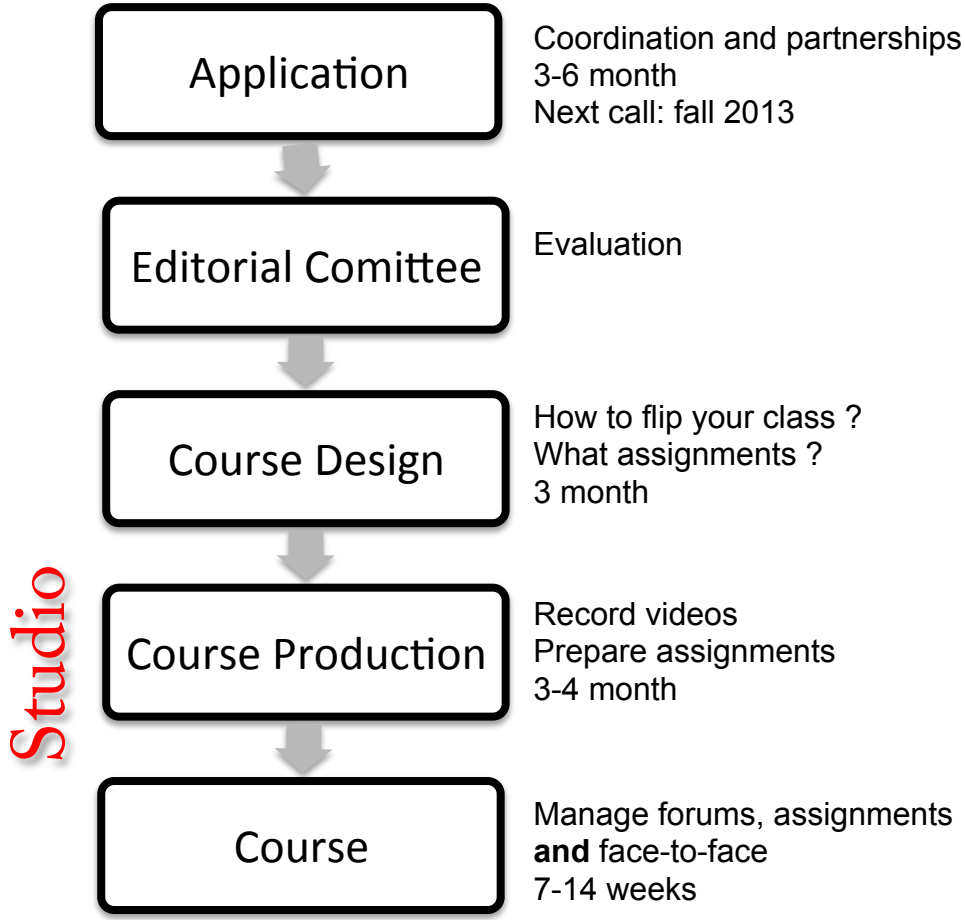
The MOOC

Studio



Rationale

- The teachers are the drivers
  - We provide a **template** and teachers prepare their slides
  - We **coordinate** the production
  - We setup the studio and teachers record alone
- Supporting “Presence”
  - Teachers’ image on the slides at the beginning and at the end
  - Pointer and Invisible Hand Effect during explanations
- Inform design with research

First of all, a human adventure

Three (complementary) design philosphies

- Instructional design
  1. Start from course objectives
  2. Define learning outcomes
  3. Design learning activities
- Content based
  - Start from list of chapters and sections
  - Cut the material into small pieces
- Product based BESTSELLER
  - Start from the elements of the MOOC
  - 7 times 5 videos of 12 minutes
  - 7 assignments & 7 quizzes
  - 1 mid-term exam and 1 final exam

- Questions I ask teachers …
  - What is special about your course ?
  - What kind of assignments do you do ?
  - Are you using simulations ? Demonstrations ?
  - Do you want to grade exercises ?
  - How will the MOOC be used on campus ?
  - Who is the course for ?
  - What language ?

- Things I give them
  - Production schedule
  - Powerpoint & Latex template

Assignments and knowledge control

- Every week
  - 1 Assignment = Homework = Grades
  - N Exercises = Learning = No grades
- Exams
  - Mid-term (in week 4-5)
  - Final exam (in week 8)
- Grading policy
  - Determine early on what weight is given to Assignments and Exams in the final grade, e.g. 1/3 for assignements + 1/3 mid-term + 1/3 final
- Multiple Choice Questions

  ⇒ invite teachers to seminar about designing MCQ
- Programming Assignments

  ⇒ automatic correction needs to be developed by the prof's team

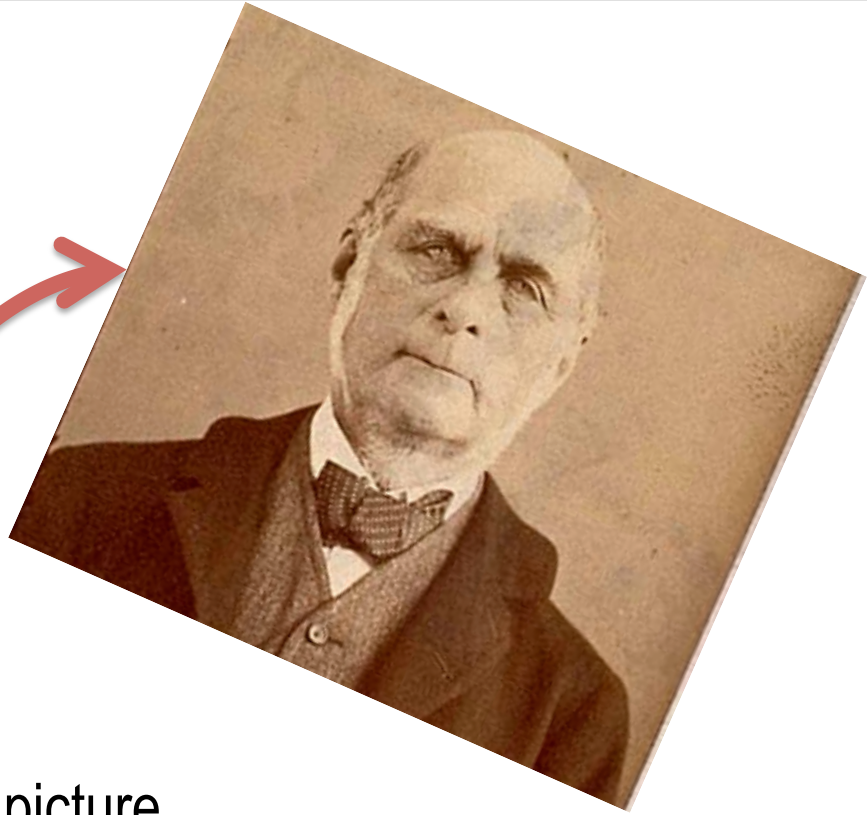
  ⇒ Coordinate with the platform engineers early on
- Peer-Assessments

  ⇒ Rubric design is requires careful design

  ⇒ Settings are tricky (malus for not participating, how many corrections are required by student ?)

MOOC Media Template

- Two shots (mise en slide ~ mise en scène)
  1. Full Shot (with and without title)
  2. Split Shot
- Components
  - Video of the professor
  - Handwriting
  - Figures, images and formulas
  - Additional videos
- 16:9 format !

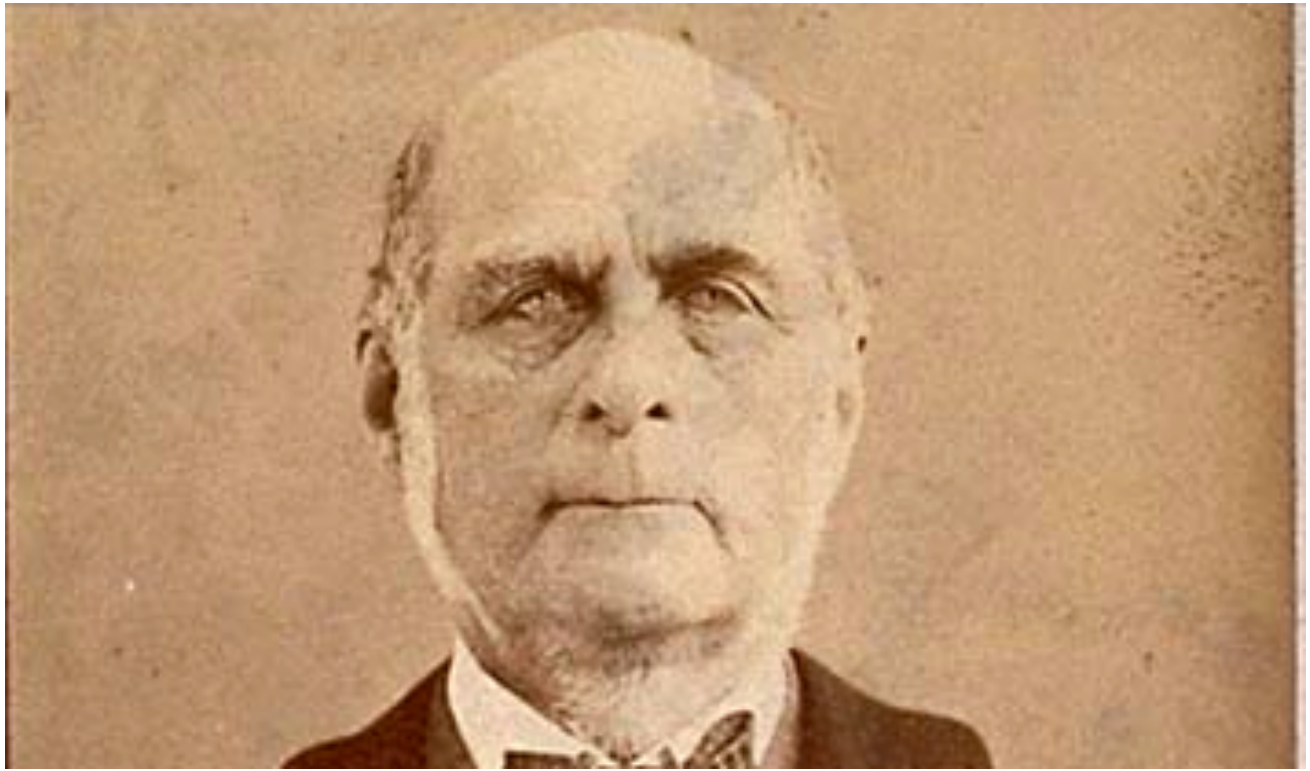


This is the professor's picture

Typical Video Scenario (7-12 minutes)

1. Welcome (Full shot with professor, Split shot with TOC)
   - Explain what the lesson is about
2. Development / Example (1/2 or full shot of content)
   - Develop explanations => Explain by handwriting
   - Illustrate theory with examples => Include videos
   - Use contrasting cases => Side by side examples
3. Add interactivity
   - Ask questions before giving answers => Quizzes
   - Give a short task to do => Stop the video and resume
4. Conclusion / Goodbye (Full Shot)
   - Summary
   - Introduction to exercises

Sample => Welcome (Full Shot)



Sample => Introduction / Summary (Split shot)

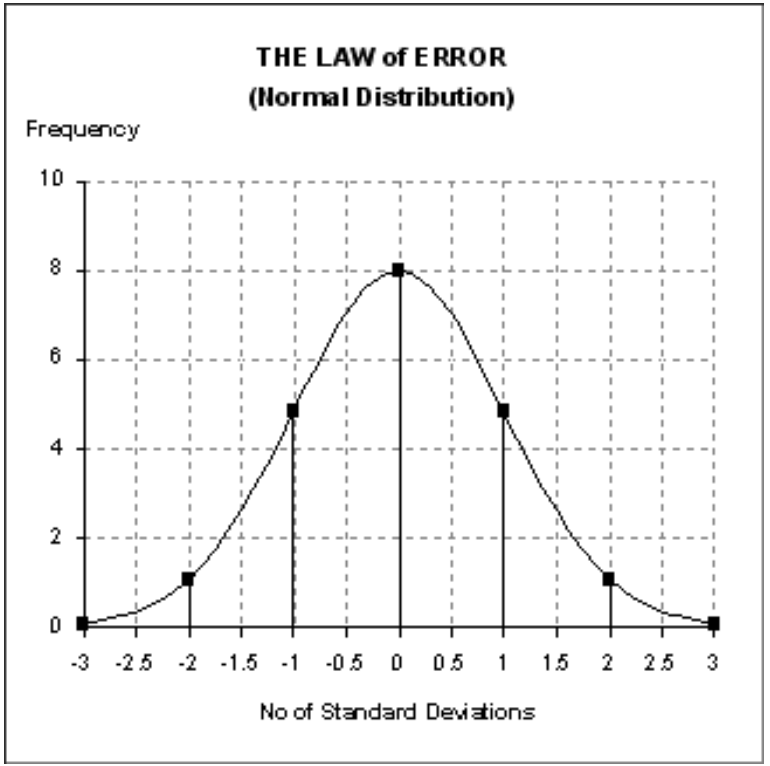
- Salutation and Goodbye
- Split Shot with professor + content
  - Look straight into the camera
  - Use this shot when you address the audience directly. For example when you salute, or when you say goodbye.
  - You have to know your text by heart.
- Use it also to encourage, or for transitions, to conclude an explanation.

Sample => Explanations (Split shot)

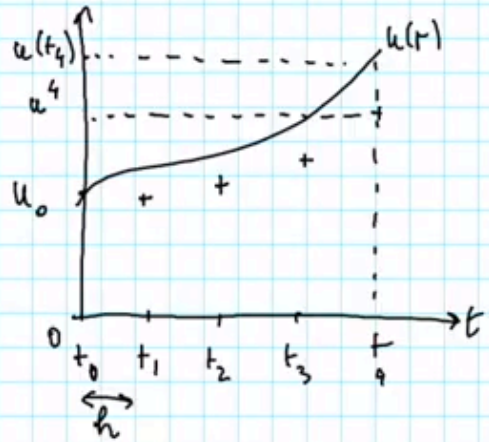
- Referring and explaining
- Split Shot with professor profile
  - Look at the iMac (screen placed on the side of the camera)
  - This will result in a 2/3 shot that gives the impression that the teacher is looking at the content.
- For Bullets and Video
  - Use this shot when commenting static content (an image, graphics, a schema) or a video

Sample => Complementary representations

Notation	$\mathcal{N}(\boldsymbol{\mu}, \boldsymbol{\Sigma})$
Parameters	$\boldsymbol{\mu} \in \mathbf{R}^k$ — location $\boldsymbol{\Sigma} \in \mathbf{R}^{k \times k}$ — covariance (nonnegative-definite matrix)
Support	$\boldsymbol{x} \in \boldsymbol{\mu}+\mathrm{span}(\boldsymbol{\Sigma}) \subseteq \mathbf{R}^k$
PDF	$\left\vert 2\pi\boldsymbol{\Sigma}\right\vert^{-\frac{1}{2}} e^{-\frac{1}{2}(\mathbf{x}-\boldsymbol{\mu})'\boldsymbol{\Sigma}^{-1}(\mathbf{x}-\boldsymbol{\mu})}$, exists only when $\boldsymbol{\Sigma}$ is positive-definite
CDF	(no analytic expression)
Mean	$\boldsymbol{\mu}$
Mode	$\boldsymbol{\mu}$
Variance	$\boldsymbol{\Sigma}$
Entropy	$\frac{1}{2}\ln\left\vert 2\pi e\boldsymbol{\Sigma}\right\vert$
MGF	$\exp\left(\boldsymbol{\mu}'\mathbf{t} + \frac{1}{2}\mathbf{t}'\boldsymbol{\Sigma}\mathbf{t}\right)$
CF	$\exp\left(i\boldsymbol{\mu}'\mathbf{t} - \frac{1}{2}\mathbf{t}'\boldsymbol{\Sigma}\mathbf{t}\right)$



Sample => Handwritten Content (Full shot)



$t_n = nh \quad n = 0, 1, 2, \ldots$ Calculer u^n de $u(t_n)$

A partir de $u^0 = u_0$ on va calculer u^1
u^1 - - - - u^2
$\vdots$
u^n - - - - u^{n+1}

méthode de marche en temps.

Schéma d'Euler progressif: $\dfrac{u^{n+1} - u^n}{h} = f(u^n, t_n)$

origine ? on écrit l'éq. diff. temps t_n : $\dot{u}(t_n) = f(u(t_n), t_n)$ on utilise une formule de diff. finies progressive pour approcher $\dot{u}(t_n)$ chap 2

$$\frac{u(t_{n+1}) - u(t_n)}{h} = f(u(t_n), t_n) + O(h)$$ on remplace $u(t_n)$ par u^n

avantage : schéma explicite : $u^{n+1} = u^n + h\, f(u^n, t_n)$ facile à programmer

inconvéni

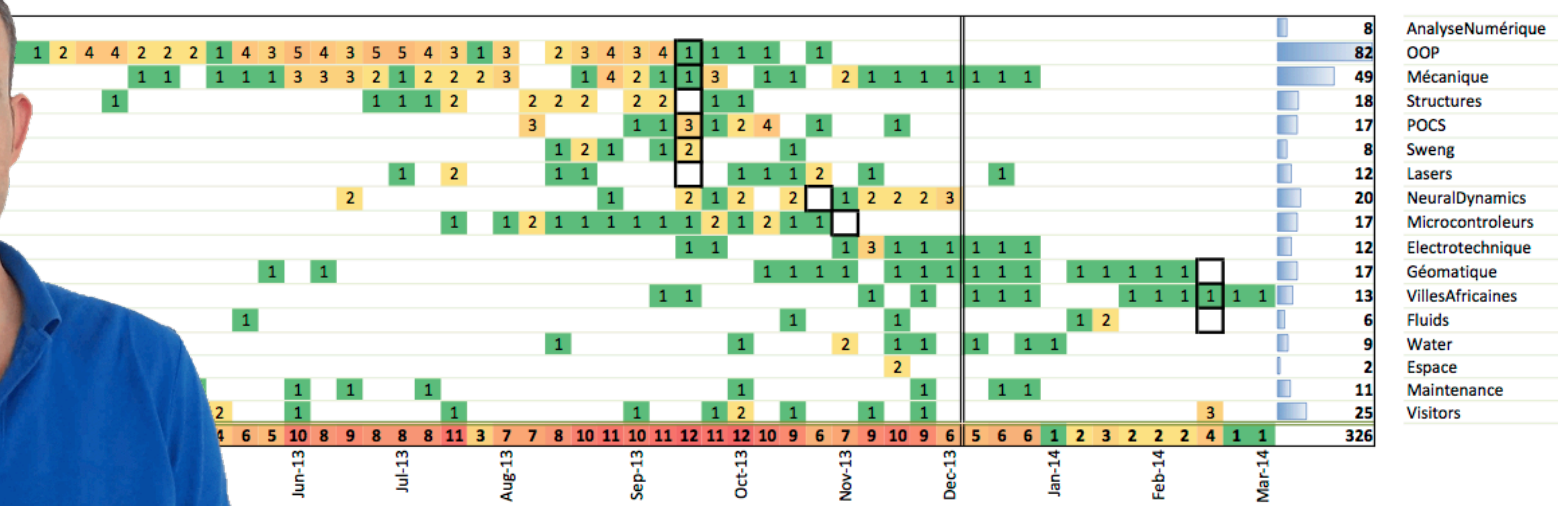
Studio Design

[Gilles Raimond]

Production Coordination

[Gwenaël Bocquet]

Number of studio sessions



The Invisible Hand effect

[Jeremy Rieder]

http://www.youtube.com/watch?v=agbe9B5l_VI

SYSTÈMES TRIPHASÉS SYMÉTRIQUES

Tension Simple : $\underline{U}_{RN}$, $\underline{U}_{SN}$, $\underline{U}_{TN}$

Tension Composée : $\underline{U}_{RS}$, $\underline{U}_{ST}$, $\underline{U}_{TR}$

$$\underline{U}_{RS} = \underline{U}_{RN} - \underline{U}_{SN}$$

$$\underline{U}_{ST} = \underline{U}_{SN} - \underline{U}_{TN}$$

$$\underline{U}_{TR} = \underline{U}_{TN} - \underline{U}_{RN}$$

$$\underline{U}_{RN} = U e^{j\alpha} \qquad \underline{U}_{SN} = U e^{j\left(\alpha - \frac{2\pi}{3}\right)}$$

SYSTÈMES TRIPHASÉS SYMÉTRIQUES

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$$\underline{U}_{RN} = U e^{j\alpha} \qquad \underline{U}_{SN} = U e^{j\left(\alpha - \frac{2\pi}{3}\right)}$$

$$\underline{U}_{RS} = U e^{j\alpha} \left(1 - e^{j}\right.$$

Câble avec charges uniformément réparties

Schéma structural

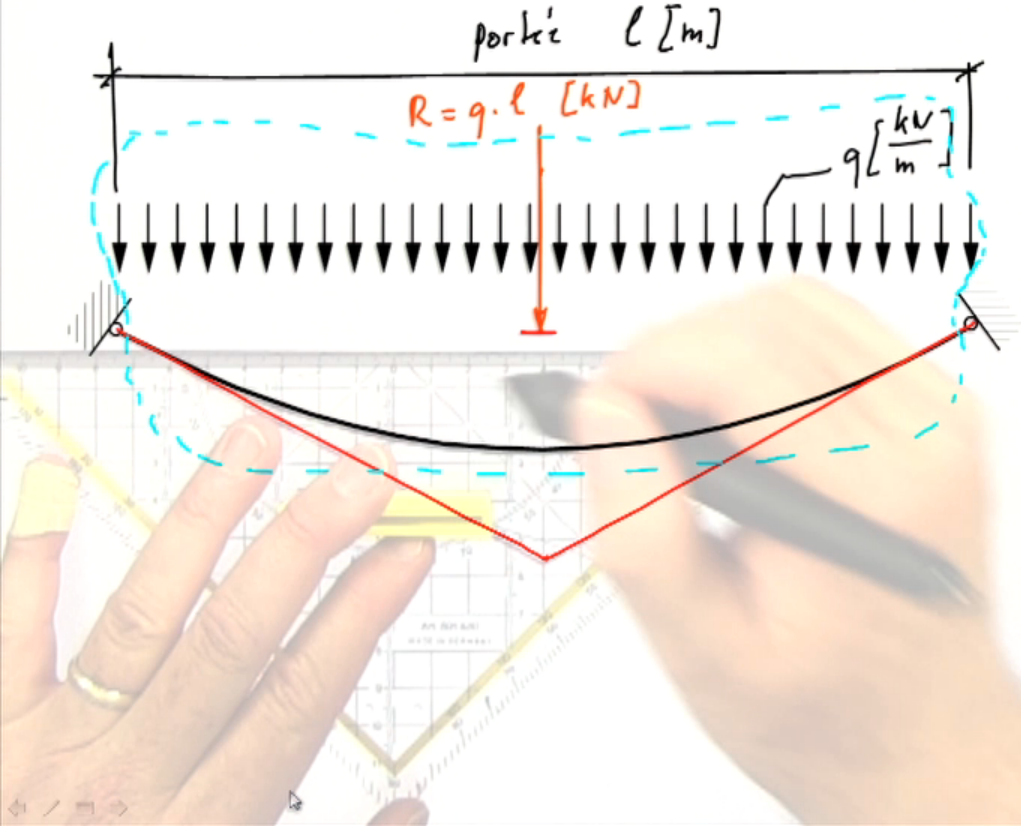
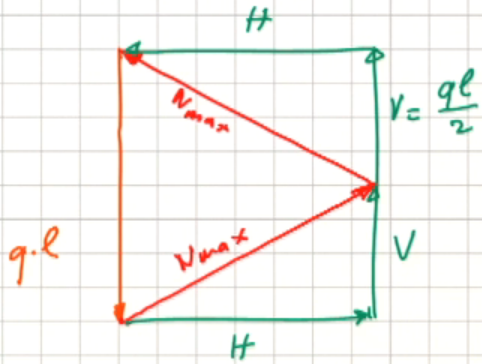


Diagramme de Cremona



Câble avec charges uniformément réparties

Schéma structural

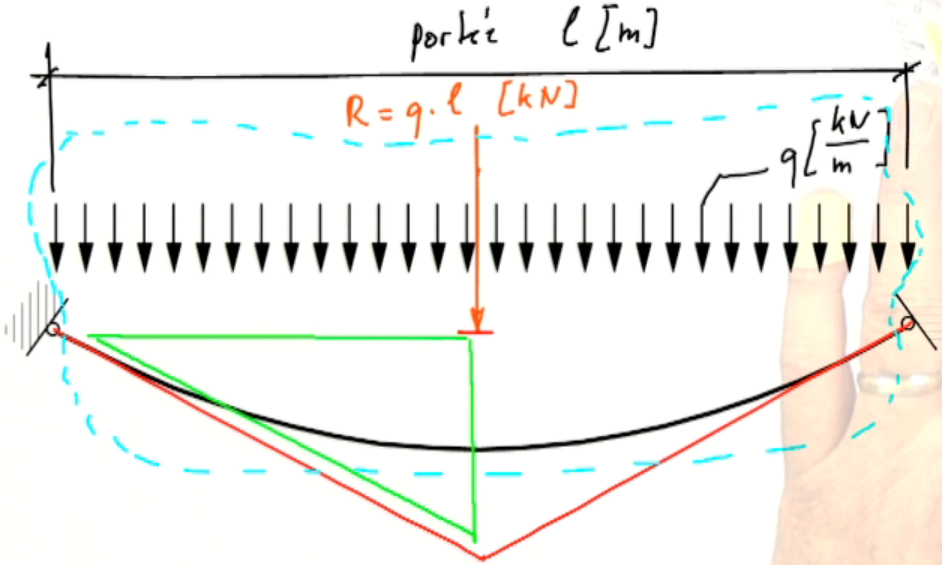
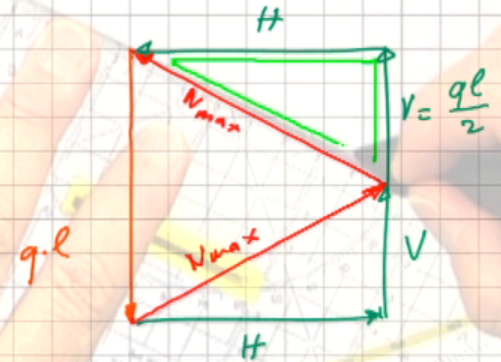


Diagramme de Cremona



Design

Record

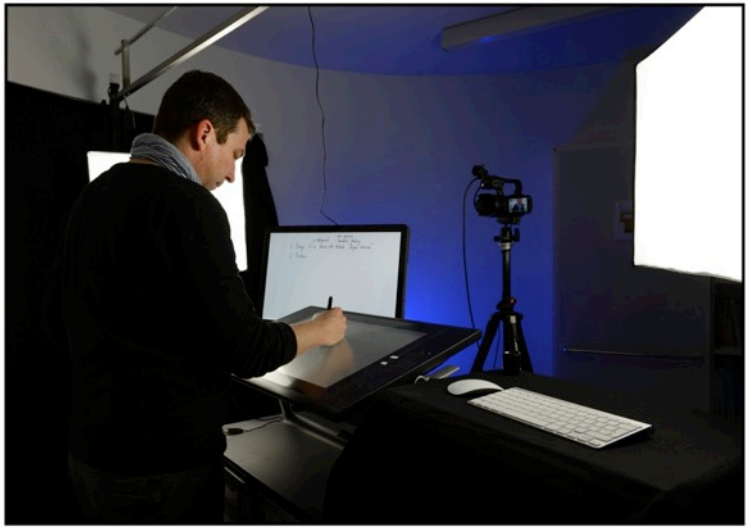
Review

Edit

Check

Publish

Video production



Thierry Parel

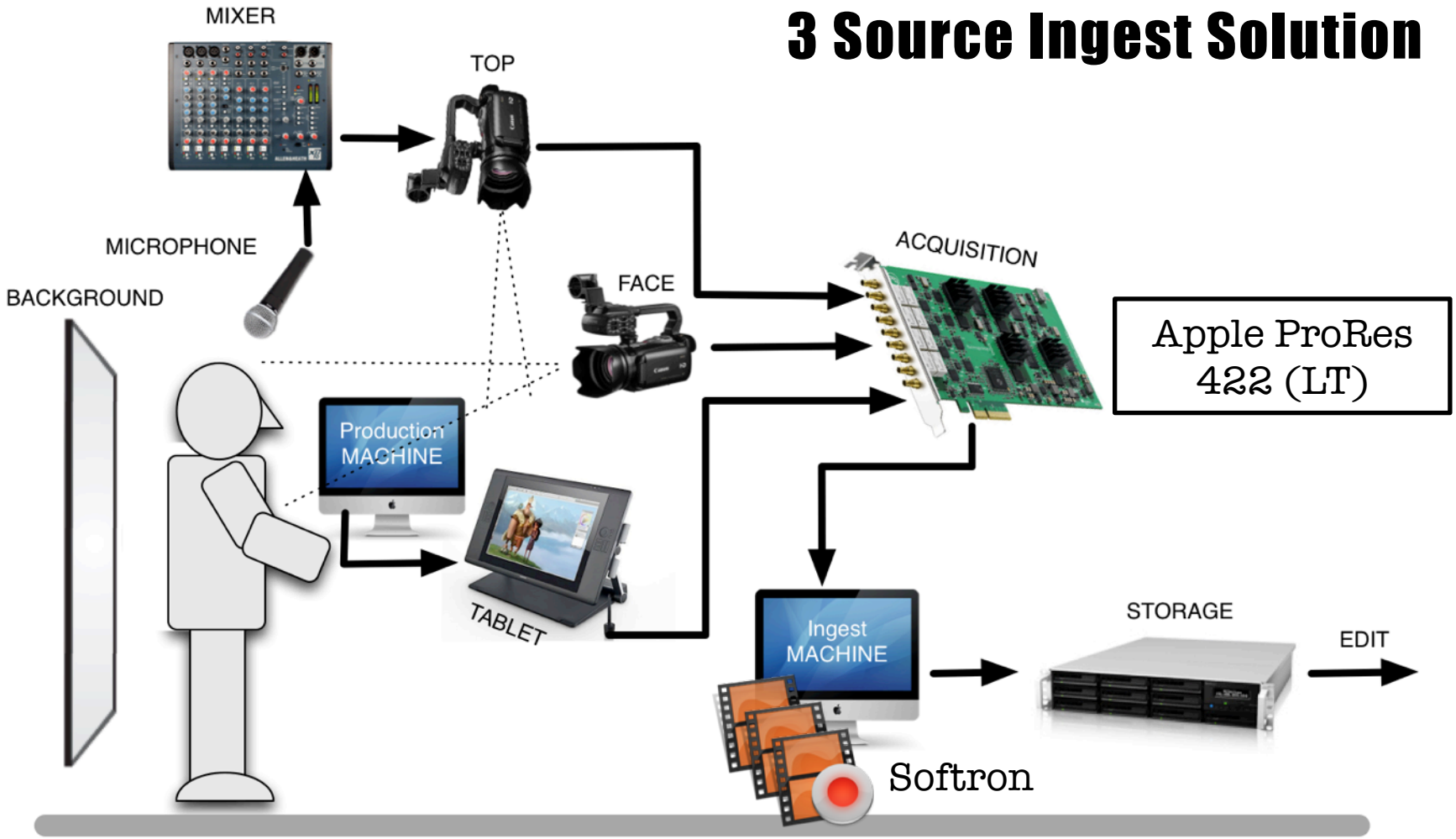
10 MOOCs to produce in 3 month

10 man/months editing =>

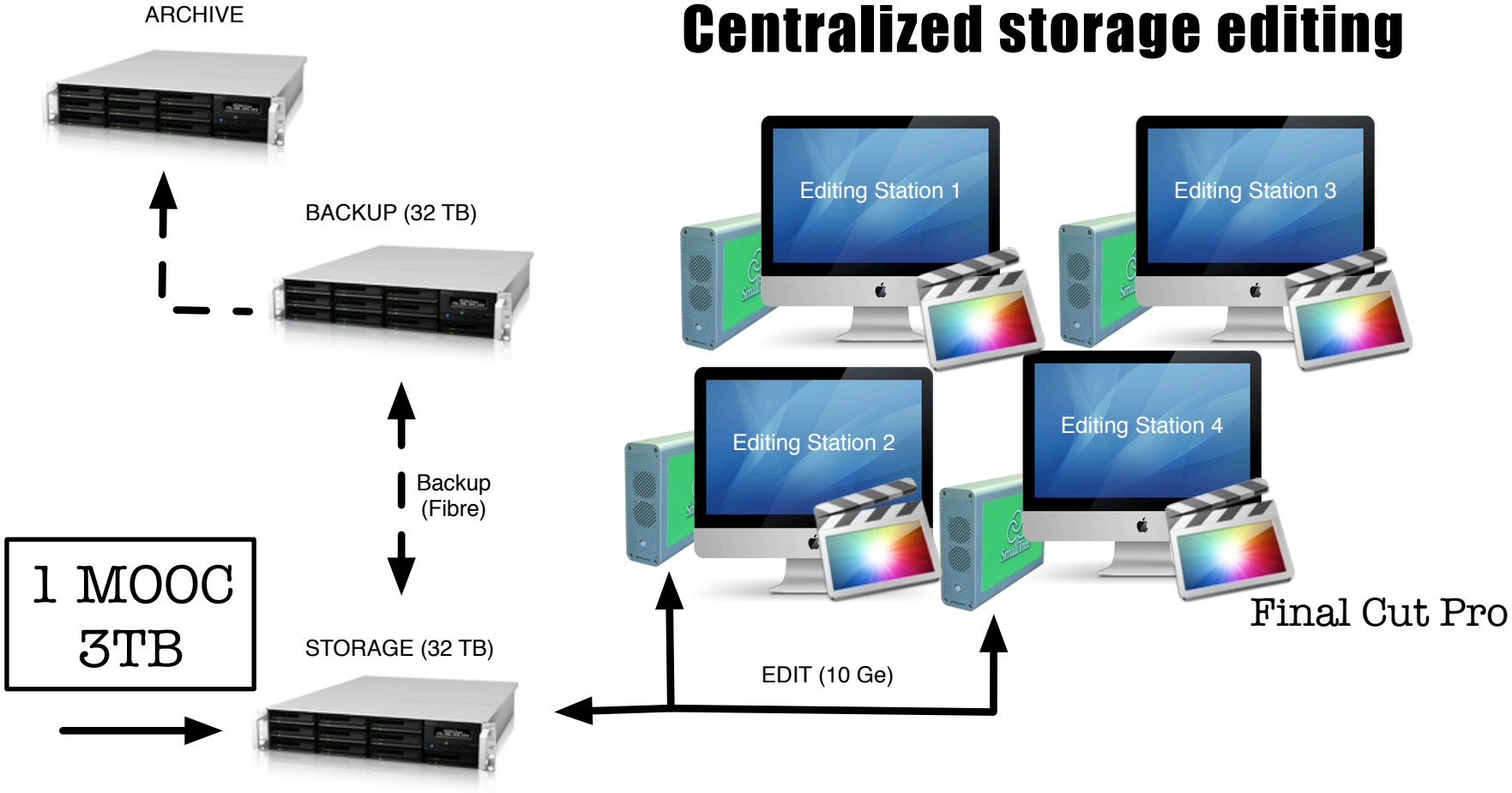
300% editor FTE for three month

- 1 unit = 7-15 minutes
  - 1 unit => 1 hour studio
  - 1 unit => 4 hours editing
- 1 MOOC week = 5 units
  - 1 week = 5 hours studio
  - 1 week = 20 hours editing
- 1 MOOC = 7 weeks
  - 1 MOOC = 35 hours studio
  - 1 MOOC = 4 weeks editing

3 Source Ingest Solution



Centralized storage editing



http://cede.epfl.ch/production

METTLE STUDIOSET

(2250 Watt Daylight Set)

Lighting is key !

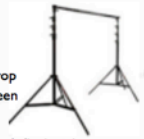
Two Mettle Dynamic 2000 studiosets give decent lighting of the professor's face and of the

Indicative price:
400 CHF

BACKDROP

Photoflex background

- DP-SHDBGSPKT - Pro Duty Backdrop
- DP-MCK007A - Chroma Green screen
- DP-MCK003A - Grey Solid Muslin



Indicative price:
550 CHF

SONIC ISOLATION

Flexolan Acoustics

The ester noise insulation foam allows to reduce echo and sound reverberation in the the studio.We use it in addition to a curtain to achieve clean sound.

Indicative price:
50 CHF / 2m²

SOFTWARE

These are the basics used in MOOC production

OPEN SANKORE

Presentation software

Open-Sankoré

To annotate the pdf slides used during the capture..

http://open-sankore.org/en

Indicative price (Open Source):
0 CHF

SCREENFLOW

Telestream

To capture the screen, the voice and the head of the presenter..

http://www.telestream.com/screenflow

Indicative price:
100 CHF

FINAL CUT PRO

Apple

In addition to screenflow when special effects are needed (e.g. transparent overlays, etc.)

http://www.apple.com/finalcutpro/

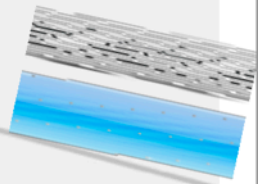
Indicative price:
300 CHF

INFOS

List of reseller's URL available upon request. (cede@epfl.ch)

- Digitec
- Heiniger AG
- Apple Store
- House of Sound
- Visuals
- Decibel
- Flexolan

MOOC STUDIO



Material for setting up a MOOC studio

Hardware needed

WACOM CINTIQ 24HD

24" (1920x1080 pixel)

This allow to draw and annotate in super quality your slides using a stylus like on real paper!

Indicative price:
2350 CHF

IMAC 27"

- 2.6 GHz Quad-Core Intel Core i7
- 16GB 1600MHz DDR3 SDRAM
- 1TB Fusion Drive
- Apple Wireless Keyboard
- Apple Magic Mouse

Indicative price:
2'800 CHF

CANON XA 10

Polyvalent Professional Camcoder

The Canon XA 10 produces a crisp picture and outputs in HD quality to a HDMI capture device. It also records to an internal memory for out of studio shots.

Indicative price:
1700 CHF

BLACKMAGIC INTENSITY EXREME

HDMI to Thunderbolt Acquisition card

Connect the Canon XA 10 to the iMac via the blackmagic acquisition card.

Indicative price:
350 CHF

ALLEN & HEATH XB10

Compact Broadcast Mixer

This mixer features an USB output, compressor, limiter and equalizer which allows to get a clear and clean sound out of our two microphones.

Indicative price:
920 CHF

AUDIO TECHNICA AT2031

Two microphones setup

- AT2031 Condenser cardioïd microphones:
- AT8410A Microphone Suspension
- SAMSON MB1 Mini Boom Stand
- Cables

Indicative price:
600 CHF

The MOOC

	Time	Milestone	Duration (est.)	Work to be completed
1	D-8 month	Application		
1	D-6 month	Editorial Comittee		
2	D-5 month	Course Design	1-2 weeks	• Define the structure of one week of instruction **=> Video Lecture Scenario** • Cut the course into 7/14 weeks, each week consists of 5-6 small units of 7-12 minutes which each cover 1 concept. • Identify Existing Material to be integrated and • Define assignments (MCQ, peer assessment, programming assignments)
2	D-5 month	Media Training	2 hours	• Slide Design (what happens on the screen) **=> MOOC Media Template**
3	D-4 month	Prototype Week	1 week (Prof) 1 week (CEDE)	• Design slides according to the Video Lecture Scenario • Record and edit the video • Hire video assistant
3	D-4 month	Review Meeting	2 hours (Prof) 2 days (CEDE)	• Reflect on quality of video / feedback • Define rules for video editors
4	D-3 month	Teaser	2 days (Prof) 1 week (CEDE)	• Prepare scenario (text + illustrations) • Record in studio and edit
4	D-3 month	Landing page	2 days	• Describe course on platform (text + teaser) • Create professor(s) pages
4	D-2 month	Course Description Agreemment		• For coursera courses, defines the content, copyright and period of delivery
5	D-3 month	Productions weeks 2-7	3 month	• Studio work, video editing • 1 hour video = 2-4 hours studio = 20-40 hours editing
6	D-Day	Course Opening		
6		Delivery	7-14 weeks	• post weekly announcement • monitor forum & supervise assignments

http://cede.epfl.ch

EPFL – CEDE

Center for Digital Education

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