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Fast forward digital

A new kind of university

Peter Vervest



Fast forward digital

A new kind of university

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Fast forward digital

A new kind of university

Address delivered at the occasion of the Valedictory of

Peter Vervest

on Friday, September 24, 2021 in the Aula of Erasmus University Rotterdam

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Abstract

The student is the centre of our universe, our only true asset, our *raison d'être*. Not research. Not the government. Not societal impact. The digital world has shown the devastating impact if we get this wrong. We can only succeed if we mobilise our students and alumni and reach out to all learners. We must reverse the dependency. Why not give students the money as Educoins in our educational blockchain? Let them decide. Make them co-creators in our research.

In his valedictory address, Professor Peter Vervest explores the disruptive effects of digitalisation on business and extrapolates what this will mean for university education and research. He argues in favour of digitally enabled, personalised learning paths and support for students combined with modularisation of the learning portfolio and challenge-based engagement of students in the research agenda. Education and research are two sides of the same coin. In the digital world, universities can succeed if they digitally reach out to students and alumni to engage in ongoing research and learning. This requires deep investments in digital technologies and a profound transformation of the university system and metrics.

Peter Vervest

Peter Vervest, Professor of Information Management and Networks Rotterdam School of Management Erasmus University



Photography: Elodie Burrillon | <http://hucopix.com>

Peter Vervest came to Rotterdam School of Management as a student in 1976. After graduating in law and management science, he joined Philips Telecommunications in the early days of connecting computers to telecommunication networks (1979). Peter specialised in open information systems ("Open Systems Interconnection") and graduated summa cum laude (1986) at Delft University of Technology. He was

appointed professor at Erasmus University Rotterdam in 1992. Peter combines academic and business life, was divisional director of Philips Electronics, UK (1987), co-founded a high-tech software and project firm (London, 1991), and is a partner at D-Age, a group of high-tech counsellors and investment managers (2000).

Since 2004 his research has focused on "smart business networks" with several key publications (e.g., Smart Business Networks, 2004 and The Network Experience, 2008). As chair of the Complexity programme of the Netherlands Organisation for Scientific Research (NWO) (2011-2018), he explored new ways to get a grip on complex business and societal challenges that result from our deeply connected world. He believes a digital transformation of education, universities specifically, is mandatory and unavoidable to empower our young generation to deal with the networked future.

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Life is becoming manufactured, just as the manufactured is becoming life
Kevin Kelly, *Out of Control*, 1994

Honourable rector, colleagues, students, alumni, friends, ladies, and gentlemen

Rotterdam School of Management celebrates 50 years of existence. In these 50 years, the world has changed beyond recognition. We have become digitised. We have become networked. This has given us unprecedented opportunities for global production chains.¹ Entirely new companies now rule the world of business.²

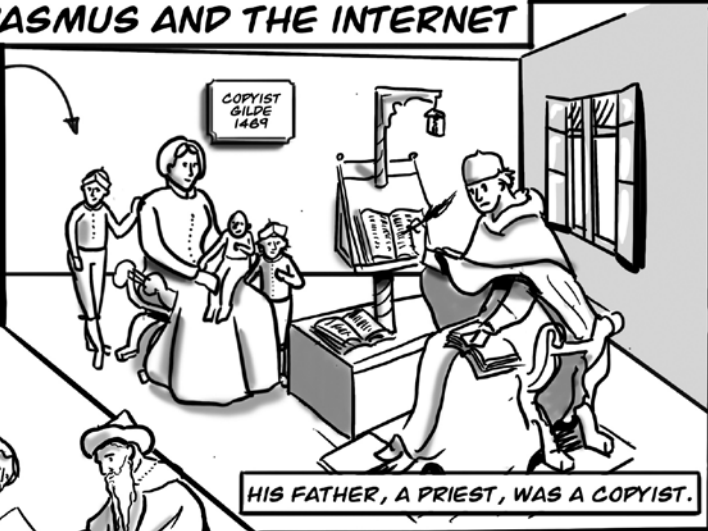
As a professor at this school, it strikes me how little the digital world has impacted university life. I cannot but admire the many things that have been done to use digital educational technologies but am concerned that the new generation expects something more, something different.^{3,4} A new generation has grown up with the digital tools that we once found so astounding, for whom social networks are normal to life, and online seems no different from on-campus. I dedicate my valedictory speech to these young people.

The key message in my speech today is **the student is the centre of our universe**, our only true asset, our *raison d'être*. Not research. Not the government. Not societal impact. The digital world has shown us the devastating impact if we get this wrong. We can only succeed if we mobilise our students and alumni and reach out to all learners. We must reverse the dependency. Why not give students the money as Educoins in our educational blockchain? Let them decide. Make them co-creators in our research.

Let me briefly go back to the history of our digital world. As a digital believer, I will then fast forward to a new world, present a view on education, and propose a new approach, a different kind of university, one with a focus on a networked world. But I will first start with history.

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- 1 Thomas Friedman, *The World is Flat: A Brief History of the Twenty-first Century*, publ. Farrar, Straus, and Giroux, 2005. Analysis why in our world of globalisation and digitisation ("steroids" in his words) work is outsourced to places in the world which have the lowest labour costs through what Friedman calls "workflow software".
 - 2 https://en.wikipedia.org/wiki/Big_Tech. There is increasing concern about Big Tech's power, and governments around the world are trying to reign it in.
 - 3 The Erasmus Education Lab and Erasmus Community for Learning and Innovation, opened in 2018, are clear focal points.
 - 4 For a perceptive view on education see "Digital Aristotle: Thoughts on the Future of Education" by G Gray on Youtube <https://www.youtube.com/watch?v=7vsCAM17O-M>

ERASMUS AND THE INTERNET



WHAT WAS REALLY DISRUPTIVE? THE TOOLS,
THE TEACHING OR ACCESS TO KNOWLEDGE?

1 Erasmus and the Internet

What would the name giver of our university, Erasmus Roterodamus (1469 - 1536), have made of the Internet? His father, a priest, was a copyist, at the time a goldsmith from Mainz, Johannes Gutenberg, came up with a printing machine.⁵ This machine revolutionised the business of book reproduction and democratised access to knowledge and opinions. This was at a time when the plague devastated Europe. Erasmus's mother died of the epidemic, and his father died of grief soon after.

Young Erasmus attended the Latin school in Deventer. A progressive German, Alexander Hegius, had recently been appointed rector. Hegius got his landlord, Pafraet, a local printer and a former apprentice of Gutenberg, to print original Latin texts so that his pupils would not have to learn by reciting old medieval poems or reading sloppy copies of old books.

It opened Erasmus's mind. He had access to the "real stuff", and it energised him. Erasmus would travel through Europe, search, and re-search source texts, carefully making comments and explanations, meeting humanists, priors, bishops and popes, dukes and kings, and printers such as Johan Froben in Basel who made a fortune from publishing Erasmus's *Adagia*, *Laus Stultitia*, and a particularly daring undertaking, the *Novum Instrumentarium*. This was the Erasmus version of the New Testament, based on the original writings. The impact was enormous. Roman Catholic dogma was challenged, and Luther turned this into his own dogma. The Age of Enlightenment had arrived.

There was no copyright in those days. Why would there be? Copying was cumbersome and expensive. Where would the market be, and who would read it? Erasmus became Europe's most famous writer, but he was not paid for his writings. He lived from benevolence, endowments, fees for occasionally educating young students, and begging. The printers made money. They owned those days' version of the Internet, but the inventor Gutenberg was bankrupted.⁶

The universities did not play a role. ***They commented and discussed, they invented nothing. They wore themselves out in subtleties, in fine distinctions, in quibbling*** according to Walter Rüegg.⁷ The university theologians did not particularly take to Erasmus.

5 Based on the impressive biography on Erasmus, *Erasmus Dwarsdenker*, A Biography, De Bezige Bij, 2021, by Sandra Langereis.

6 https://en.wikipedia.org/wiki/Johannes_Gutenberg

7 Rüegg, W., de Ridder-Symoens, H., eds., *A History of the University in Europe*, Volumes I - IV, Cambridge University Press, 1992 - 2011

How Erasmus would have enjoyed the Internet! His writings could have been distributed to everyone, free of charge, no copyright, a worldwide audience of eyeballs, Twitter, WeChat, Facebook, Weibo, Instagram, Clubhouse, and so forth. They could have been sold via Amazon or Alibaba. He could have earned a living as the world's most influential influencer on Shopify. It begs the question - what was disruptive: Gutenberg's press, Erasmus's teachings, or the way it changed people's access to knowledge and the enlightened use of that knowledge?

2 One digital day

We live in equally exciting times. Our language is not Latin. It is not English. We speak a digital language, a programming language. Basic, Cobol, Pascal, Fortran, Java, Python. We need this to power the engines of our economy. Computers. Computers that communicate. Computers that form networks.

But how do computers form networks? In those early days, telecom networks were built for people, for human-to-human communications. They were a problem for computers. Computers are fast. They need the link only briefly. Traffic is not balanced. One computer sends a lot of data, the recipient sends few data. But the lines must be fast and robust as computers are not fault tolerant. In 1965 Donald Davies from the British National Physics Laboratory invented the term "packet switching". This was a revolutionary idea. You divide a message into packets which you drop onto a network that sends these via store-and-forward to the addressee. At the recipient end, you put the packets in the correct sequence to complete the message. This concept was the basis of what is the Internet. It resulted in the Transmission Control Protocol (TCP) by Vint Cerf and Robert Kahn in 1974 and the Internet Protocol (IP) in 1981.

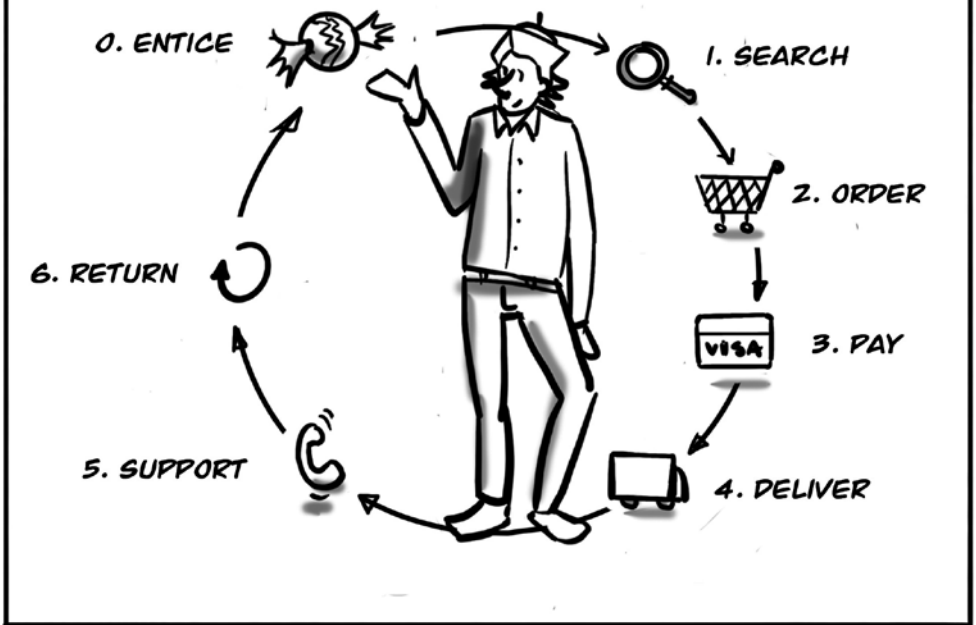
It would take to the 1990s before high-speed broadband packet switching networks were developed and widely available. Traditional telephone operators, the PTTs in Europe, had to divest their circuit-switched networks and invest in this new, uncharted technology leading up to the global Internet.

In 1990 British computer scientist Tim Berners-Lee came up with the idea to join the Internet Protocol and hypertext so that you could browse information that sits in different files and at different locations as if it were one document. The first commercial web browser was Netscape in 1995. It was distributed on the Internet for free, with 30 million downloads in its first month. Microsoft's founder Bill Gates understood the threat, quickly developed Explorer, and took the market.

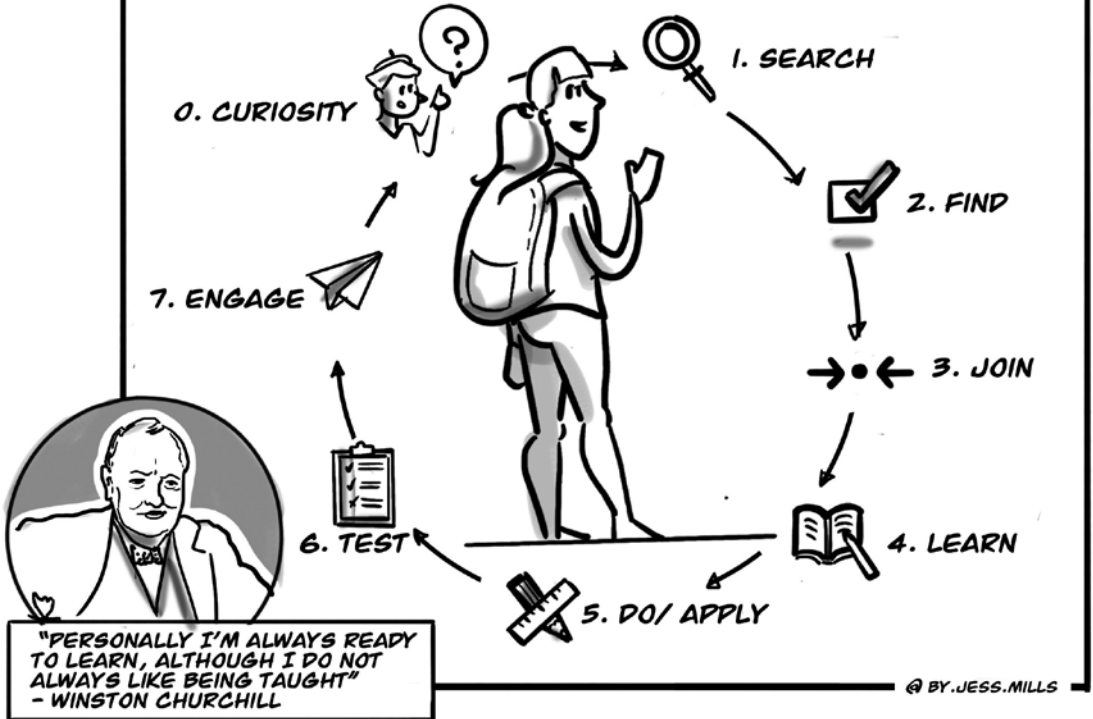
In that same period, a struggling electronics company established in 1865 as a pulp mill decided to put all its resources in the upcoming but unproven digital mobile phone market as a last resort. Nokia became a huge success until Apple Computers turned its iPod into a programmable mobile phone in 2007. The iPhone overtook the market, programmable telephones became the norm, and the market for apps matured at unprecedented speed.

This is our digital world. The once powerful post, telegraph and telephone companies were privatised. They were stripped of their monopolies and had to compete and reinvent themselves. Anyone could now hook a computer to a global network and send and receive messages. It has had an unmistakably major impact on every aspect of our lives.

CUSTOMER JOURNEY AT AMAZON



STUDENT JOURNEY AT ERASMUS UNIVERSITY



3 Incredible impacts

Initially, email was the main use of the Internet - but a graphical browser like the World Wide Web enabled a simple way to access computer content spread across the network. Now Internet could work like the Gutenberg press 500 years ago with one huge difference: **Erasmus could talk directly with the reader** and get a response!

In 1995 Amazon opened as an online bookseller. In our 1998 book "How to Win the Customer in the Digital World: Total Action or Fatal Inaction" my partner and good friend, the late Al Dunn, writes:⁸

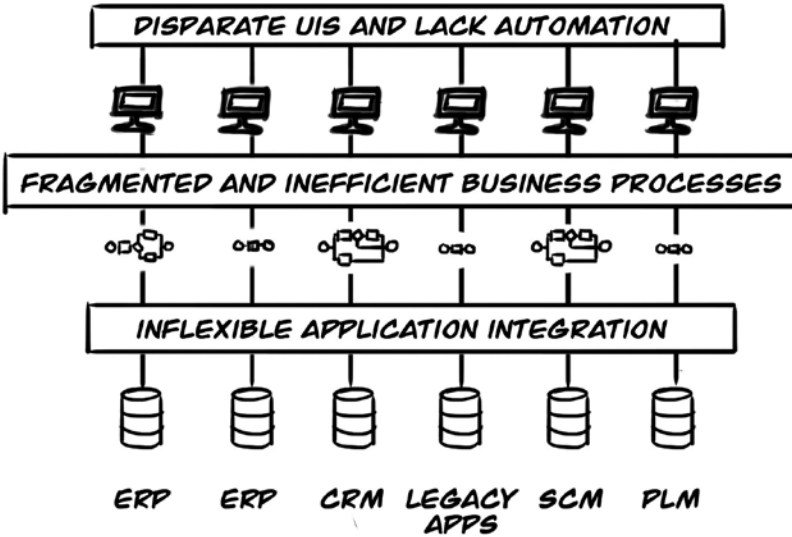
Amazon is the largest bookshop in the world. It is a digital shop on the Internet. Amazon's customer access is a website. When you visit the site, it remembers your previous visits and your interests. It welcomes you by name and suggests new books that might interest you based on your history. If you are seeking a particular book, you can type what you know about that book: author, title, or subject. The system checks its availability from a list of 3 million titles. The largest Barnes & Noble superstore can only hold 175,000 books....If you decide to order, an electronic order form helps you....payment is straightforward....when the book has been sent, Amazon tells you by email....if you wish Amazon lets you email the author or publisher....you never speak to a person, yet the website is more informative than a person....and of course Amazon learns more about you than if you bought the book in a normal bookshop, not only who you are but also what you bought, topics of interest, search behaviour, buying frequency....increasingly other sites around the Internet are providing a logical access to Amazon....

Compare this with the traditional bookshops such as Barnes & Noble or Donner of those days. Amazon made it easy to select from millions of items, books then, everything now, from CDs to washing machines, industrial equipment, food, and so on.⁹ Its warehousing technology and management practice is novel and the best in the world. It built high-quality digital systems and created a new business, Amazon Web Services, that has outpaced its retail business. Amazon Prime is now one of the largest consumer membership clubs. Today, there are many obvious ones such as Alibaba, Bol.com, Shopify, and less obvious ones, like She-in for fast fashion. What do these companies, these digital innovators, do so well? **What can universities learn from them?** Let me make a few observations.

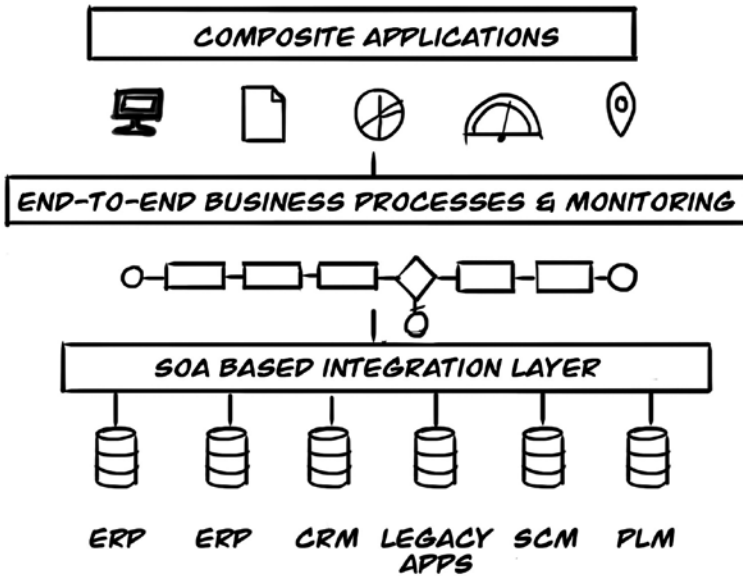
8 Peter Vervest, Al Dunn, "How to Win the Customer in the Digital World: Total Action or Fatal Inaction", Springer, 2000, p.28 etc.

9 Brad Stone, The Everything Store - Jeff Bezos and the Age of Amazon, Little, Brown & Company, 2013

CAPTURED IN FUNCTIONAL SILOS



BUSINESS OPERATIONS SYSTEM



These companies use digital technology smartly to put the customer first. Not just by being polite or explaining how the company works or what the customer should do. These companies understand what you want to do and organise accordingly. They put the customer process first: their systems adapt to what you want to do, not the other way around. Digital interaction machines make that possible. Not just the one time that you order - but in the full cycle of customer experiences: when they try to get you to buy something, when you order, pay, get it delivered, need support, or want to return it, and when they try to entice you to buy again. Every touchpoint should be a positive experience. Every touchpoint should be as relevant to you as it can be and should be for the company. This is what digital technologies allow you to do with increasing efficiency if used properly. Chatbots, interactions supported by artificial intelligence, augmented reality, etc. **Imagine what this means for how students want to learn.**

But we should be careful that the technology does not become a hard skin between you and the customer. If you have thousands of customer interactions, millions of customer touchpoints, and these happen in seconds, you need very advanced ways to manage this properly. Particularly as a touchpoint will include the customer's actual use of your product or service. With the advent of the Internet of Things, this is no longer theory. Gathering and organising these enormous amounts of data, analysing them, turning them into action, and doing this very quickly, is a new art. In our educational world, we call this learning analytics: **understanding how the student learns and adapt accordingly.**

The second important lesson from the digital innovators is their smart use of digital technology in every aspect of their operations. Back in the 1990s, Amazon introduced a new word: Fulfilment. How do you ensure that what the customer expects is fulfilled? No more, no less. Digital companies have an advantage. There is no history when they start. For most companies, this is where legacy comes in. Old IT systems. They are still around. These systems have been optimised for specific functions, like factory planning, inventory management, personnel, purchasing, sales, etc. They work on forecasting, that is, an expectation that something will happen, so you produce ahead of the event. Client order and production are decoupled and recoupled late in the supply process. The advantage is economy of scale: efficiency, minimum production lots, whether it is needed or not. The disadvantage is stock and obsolete stock that you must dump on the market. The answer has been "enterprise resource planning", software from companies such as SAP, Oracle, and Baan. ERP puts an artificial layer on top and between legacy systems. This layer instructs the functional systems and produces end-to-end processes e.g., making a customer delivery, managing a complaint, filling out an expense form, get the invoice paid. However, more often, ERP replaced legacy with enormous costs and organisational upheaval. Think of the **enormous expense of implementing SAP** at our university.

Reengineering the business process seemed easier: “don’t automate, obliterate”, said Hammer and Champy in 1993.¹⁰ We advocate a different approach: split products and processes into small, manageable modules, define proper interfaces and define some proper business logic or rules to combine these separate modules.^{11,12} Like Lego building blocks. Companies such as Volkswagen have adopted business modularity to balance greater variety in customer choice and cost-efficiency in production.¹³

A modular product portfolio has serious implications for planning and delivery. Today’s advanced warehouses are directly coupled to customer front-end operations. As you search and select products on a website, smart algorithms calculate the probability of you ordering, the availability of goods and transport, loading of capacity, possible alternative fulfilment ways, and, if needed, alternative offers to you as a customer while you are unaware of this.

This market-to-time demands accurate cooperation between an increasing number of partners in the supply chain. Companies now operate in a complicated web of partners, each linked in a temporary chain of actions to ensure delivery to the customer. This is what we call *smart business networks*:¹⁴ network-based fulfilment becomes a key differentiator of successful companies. **Should it not be the same for universities?**

10 Michael Hammer, Reengineering Work: Don’t Automate, Obliterate, Harvard Business Review, July-August 1990. Followed by James Champy and Michael Hammer, Reengineering the Corporation, HarperCollins, 1993.

11 Martijn Hoogeweegen, Modular Network Design - Assessing the Impact of EDI, PhD Thesis, Erasmus University Rotterdam, 1997.

12 Matthijs Wolters, The Business of Modularity and the Modularity of Business, ERIM PhD Series Research in Management, 2002, <https://repub.eur.nl/pub/920>. Also see Otto Koppius, Information Architecture and Electronic Market Performance, ERIM PhD Series Research in Management, 2002 and Dominique Delporte, Improving the Flexibility and Profitability of ICT-enabled Business Networks, ERIM PhD Series Research in Management, 2003.

13 Modular Querbaukasten, or: Modular Transversal Toolkit. https://en.wikipedia.org/wiki/Volkswagen_Group_MQB_platform

14 Peter Vervest, Eric van Heck, Kenneth Preiss, Louis-François Pau, Smart Business Networks, Springer, 2005.

4 The great transition

Why is this so difficult? Every organisation has a compelling inner logic, a pattern of values, beliefs, and behaviour developed over time, “the way we do things around here”. The logic is clear in a start-up company. A new idea, we need to find customers, we need to be careful with the money. Are we doing things that people want, and can we do them better than anyone else? It gets blurred in a large company where the link between internal effort and the result with the customer is no longer there. An internal market develops, leadership is disconnected from floor realities, performance metrics become unrelated to the customer, and information systems are disjointed. As the internal organisation becomes isolated from the real world and wrong metrics define internal behaviour, the outside world faces this autistic organisation.¹⁵

So many companies have missed the great opportunities of the digital networked world. As an example, take the great labels of the music record business.¹⁶ Warner, Sony, Universal, Polygram were powerful players in 1999 when the market was 3 billion CDs. Then a group of hackers led by a student, Shawn Fanning, created Napster that allowed users to download and share music without paying the rights holders. Napster was sued and forced to close, but others followed, such as Kazaa, The Pirate Bay, etc. The music industry used every legal and technical method to fight, but by 2013 the sales of physically recorded music were down to the level of the early 1970s.

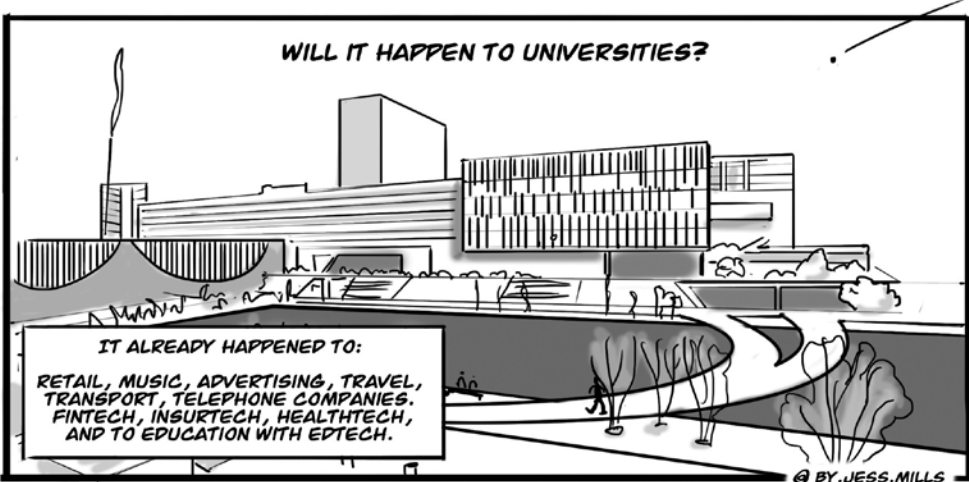
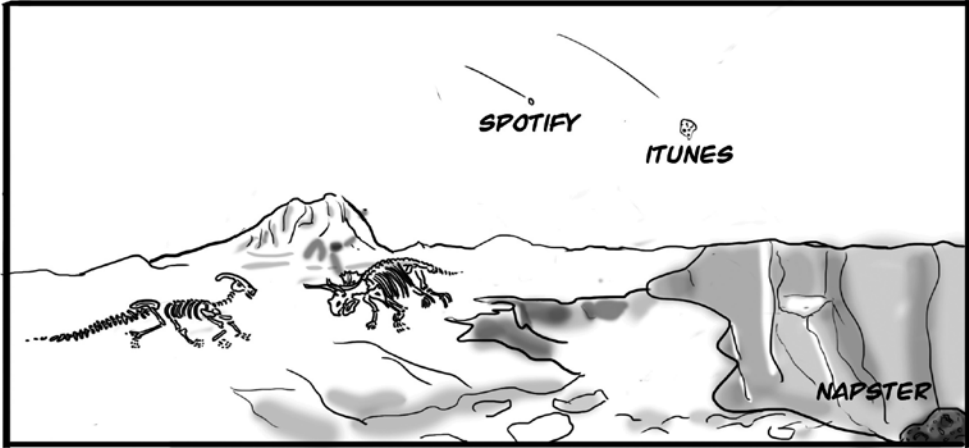
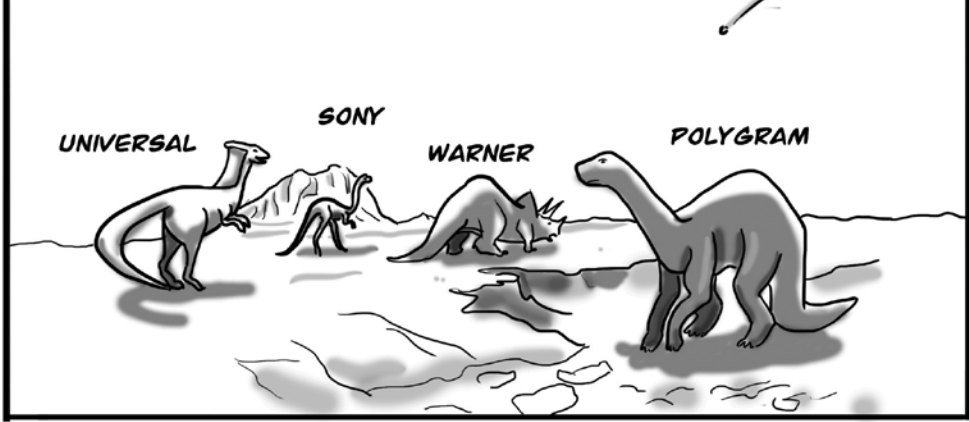
The first company to create a successful online service for legal music was Apple in 2003: the iTunes music store with the iPod. It allowed consumers to unbundle the music album and only buy the songs that they liked. The iTunes store with its new pricing model – 30% for Apple and no bypass – has been an enormous success to this day. In 2008, after years of negotiations with the record labels, Spotify created the first legal access-based subscription music service. Did the music industry change? Where were the days when their key competence was finding the right talent, putting them under an onerous contract, making them stars, having strict control over sales and distribution, and making extravagant money? The Internet allows anyone with or without talent to try their luck, become a star or an influencer. Or fail. They arrange their own distribution and promotion via YouTube, Instagram, Facebook, and others.

15 See also: Peter Vervest, Al Dunn, *Erfolgreich beim Kunden in der digitalen Welt*, Springer, 2002.

16 <https://www.bbvaopenmind.com/en/articles/the-music-industry-in-an-age-of-digital-distribution/>

THE GREAT TRANSITION

(OF THE MUSIC INDUSTRY)



Search is another business. With their enormous databases of telephone directories, white and yellow pages, the telephone companies have been absent in this new business of search engines. New names have appeared, Yahoo! and Ilse in the Netherlands, and Google with their PageRank. The reverse of search is advertising, said the venture capitalists of Google, and AdWords turned the world of advertising upside down. Eyeball marketing. Make it free for users. "If you're not paying for the product, you are the product" is the Internet marketeers' slogan.

Auction companies did not invent eBay or Match.com. Campus networks did not come from universities. Facebook started at a university, notably Harvard, as FaceMash, where students could vote on which of two randomly selected female students was more attractive. It had nothing to do with Harvard other than that Zuckerberg hacked into its security network to copy student IDs to populate his website. News and advertising companies did not grasp what social networks such as Friendster, Myspace, Twitter, LinkedIn, and Facebook would become.¹⁷

The incumbents - as companies in the old market are regularly called - did not understand the winner-takes-all rule of the game. At a certain point in time, the winner's total cost of adding and serving another user is lower than the competitor's incremental cost. This is when natural monopolies arise. There is another advantage on the Internet: each additional user creates disproportional added value for the complete user base, the network effect, which makes Big Tech stronger and stronger.

These transformational changes have happened to retail, music, advertising, travel, transport, and telephone companies. It is happening to banks with fintech, insurance companies with insurtech, health companies with healthtech, to education with edtech. **Will it happen to universities?**

17 <https://www.digitaltrends.com/features/the-history-of-social-networking/>

5 This new kind of university

I would like to share a few quotes with you. The first is from Andrew Ng, one of the founders of Coursera:¹⁸

We started....to democratize access to high-quality education....The old model of education, where you go to college for four years and then coast for the next 40, does not work in today's changing world....For organizations, education enables scalable workforce development so that they can adapt to rapidly changing environments. Every person - and every organization - has to be a lifelong learner....We've seen billions struggle during the pandemic. At school, many learners and instructors were ill-prepared to move to learning online. At work, digital acceleration is threatening many jobs as skills rapidly become obsolete. The staggering scale of disruption has underscored the need to modernize the global education system. Leaders tasked with creating a level playing field now recognize that learning online will be a powerful means of providing individuals with the skills they need and promoting social equity....If we can unlock the full potential in every person, we will move humanity forward.

When Daphne Koller and I teamed up to found Coursera, our mission was to transform lives through learning....When my machine learning MOOC launched out of Stanford in 2011, neither of us expected that over 100,000 learners would enrol within weeks. I was teaching 400 on-campus students a year at the time and realized that to reach a similar audience, I would have had to teach for 250 years....The learners came from around the world, spanning many age groups and walks of life, and included people that otherwise did not have access to a great education....We started Coursera to democratize access to high-quality education.

The second quote is from prof. Ed Brinksma, our Erasmus University president:¹⁹
Our students are ahead of us....the notion of student changes....everyone is a possible client....we are all students, a potential learner.

And this quote is from Frank Slootman, chairman and CEO of Snowflake, and alumnus of Erasmus School of Economics:²⁰

What Erasmus University should do?....When I left the economic school, alone on the street, I found out that companies need really different things....you

18 Founder Andrew Ng on his IPO, pp. 103-105. Coursera Prospectus, SEC, 31 March 2021. https://sec.report/Document/0001193125-21-102478/d65490d424b4.htm#toc65490_13

19 Prof. Ed Brinksma, president, Erasmus University Rotterdam, during Erasmus Centre for Data Analytics, Summit, 15 July 2021

20 Frank Slootman, Chairman & CEO, Snowflake, alumnus of Erasmus School of Economics, during Erasmus Centre for Data Analytics, Summit, 15 July 2021, <https://www.snowflake.com/podcast/interview-with-frank-slootman/>

must tweak the curriculum to what companies need, what societies need.... and now it is data, the technical ability to work with data, without always knowing what you must do with the data.

When I look at the Coursera site, it gives the same impression as when I first looked at the Amazon site sometime in 1995.²¹ Not very good. I miss the smell of a good bookshop. Strolling around. Snooping in books. What is on the shelf, sells, and if it does not sell, it is not on the shelf. Old logic. The Coursera site is a compilation of mainly data science courses, which are easy to teach online. Poor students. They miss the interaction, the social glue, the feedback from a live teacher, a live environment, the smell of the lecture hall, the sweat. We learn what the teacher teaches; what we do not learn is not taught. Old logic?

Coursera quoted 77 million learners at the end of 2020,²² of which 3.2 million paid ca. US\$60 each.²³ Coursera has nearly 12,000 degree-students paying US\$2,500 or €2,200 per year on average. By comparison, Erasmus University has 32,000 students paying €67 million on tuition fees, i.e., €2,200 each, and the government contributes €326 million, or €11,000 each.²⁴

The raw figures do not tell the story. The challenge of early digital companies was to attract customers, give them an experience they want, then give them an experience they can no longer miss.²⁵ You can only do that if your every encounter with the user provides something extra, something that is relevant and desirable. Think of Coursera as 77 million pairs of eyeballs. Assume they spend an average of ten hours on your site in a full year. This is 770 million contact hours. You can add value at least 770 million times. In 2020 Coursera spent €65 million on R&D - to find out how to do this. They know about their learner base, what they learn, when, where, where they struggle. They are fully data driven - data about their learners, their enterprise and college customers, pulling data from cookies and likes, linking to Facebook and other social media, and analysing search behaviour via Google and other search engines. There is a large unknown world of data acquirers and resellers. The privacy purists hate this. But learners give consent.

21 Coursera's IPO was on 5 April 2021 and was valued at ca. US\$5bn in July 2021 <https://finance.yahoo.com/quote/COUR/>

22 <https://blog.coursera.org/>. Many "on-line" learning providers such as Coursera, EdX, Kahn Academy, Udacity, experienced rapid growth in the 2020 Covid-19 year. EdX grew to a 110 million enrollments, 29 million more than in 2019. <https://press.edx.org/edx-passes-110-million-total-global-enrollments-up-29-million-year-over-year>

23 <https://www.classcentral.com/report/coursera-s1-analysis/>

24 Erasmus Jaarverslag 2020.

25 Kashmir Hill, "I Cut the Big Five Tech Giants from my Life: It Was Hell", Gizmodo, July 2019 <https://gizmodo.com/i-cut-the-big-five-tech-giants-from-my-life-it-was-hel-1831304194>

THIS NEW KIND OF UNIVERSITY



IT IS WHY I SHOULD UNDERSTAND HOW PEOPLE LEARN.

NOT ONLY WHAT PEOPLE LEARN.

"...OUR STUDENTS ARE AHEAD OF US...
...THE NOTION OF STUDENT CHANGES...
...EVERYONE IS A POSSIBLE CLIENT.
... WE ARE ALL STUDENTS, A POTENTIAL LEARNER."

- PROF. ED BRINKSMA
ERASMUS UNIVERSITY PRESIDENT



" WHAT ERASMUS UNIVERSITY SHOULD DO?.....WHEN I LEFT THE ECONOMIC SCHOOL, ALONE ON THE STREET, I FOUND OUT THAT COMPANIES NEED REALLY DIFFERENT THINGS.....YOU MUST TWEAK THE CURRICULUM TO WHAT COMPANIES NEED, WHAT SOCIETIES NEED..... :.... AND NOW IT IS DATA, THE TECHNICAL ABILITY TO WORK WITH DATA, WITHOUT ALWAYS KNOWING WHAT YOU MUST DO WITH THE DATA..... "

- FRANK SLOOTMAN
CHAIRMAN AND CEO OF SNOWFLAKE, AND
ALUMNUS OF ERASMUS SCHOOL OF ECONOMICS



" WHEN DAPHNE KOLLER AND I TEAMED UP TO FOUND COURSERA, OUR MISSION WAS TO TRANSFORM LIVES THROUGH LEARNING..... WHEN MY MACHINE LEARNING MOOC LAUNCHED OUT OF STANFORD IN 2011, NEITHER OF US EXPECTED THAT OVER 100,000 LEARNERS WOULD ENROL WITHIN WEEKS. I WAS TEACHING 400 ON-CAMPUS STUDENTS A YEAR AT THE TIME AND REALIZED THAT TO REACH A SIMILAR AUDIENCE, I WOULD HAVE HAD TO TEACH FOR 250 YEARS.....THE LEARNERS CAME FROM AROUND THE WORLD, SPANNING MANY AGE GROUPS AND WALKS OF LIFE, AND INCLUDED PEOPLE THAT OTHERWISE DID NOT HAVE ACCESS TO A GREAT EDUCATION.....WE STARTED COURSERA TO DEMOCRATIZE ACCESS TO HIGH-QUALITY EDUCATION. "

- ANDREW NG
CO-FOUNDER OF COURSERA



Assume our students spend a real 40 hours a week studying, 50 weeks a year, call these 64 million contact hours. That is, if we count staring at a book, discussing with student friends, travelling to and from the campus, sorting out curricula and exam rules and regulations as real study. The question is, do we know? Do we have accurate, just, reliable, interpretable, instant, data, all the time, all over the organisation? Our Learning Management Systems are part of what we need to know. Does Canvas tell us?²⁶

Coursera intrigues. It has been on the market for ten years, has 200 employees, offers 4,600 courses, grows 60% annually, had 82 million registered learners during the first quarter, serves 2,000 businesses, 130 universities and colleges, 100 government agencies, made a loss of ca. €55 million in 2020, more this year, raised ca. €500 million before it went public in April, is valued at ca. €4.5 billion, has access to the financial market for growth, ca. €250 million in cash; no buildings on the balance sheet, and very low housing expense.²⁷ What stands out is the scalability of online learning, and what data can do: full focus on the learning experience, data on learners, fairly accurate data on teachers, what sells, what does well, what does not, what skills current and future employers demand.

Our students pay as much as an online learner provider like Coursera charges for a complete university degree program. Our government contributes on average an extra €11,000 per student, based on the number of students. This gives an annual student budget of, say, €13,000 to deliver research-based high-level, university-degree, quality education. What do students get? How is the budget spent?

What do we really know about our students? Why are they here? To get a diploma, escape home, enjoy a new social life, find a job, learn something new, or be challenged? In a digital world, you do not ask, you find out. In 2013 researchers at Cambridge University concluded that surprisingly accurate estimates of Facebook users' race, age, IQ, sexuality, personality, substance use, and political views can be inferred from automated analyses of only their Facebook likes - information publicly available by default.²⁸ One of the authors, Michal Kosinski, remarked, "similar predictions could be made from all manner of digital data with this kind of secondary inference with remarkable accuracy".²⁹

26 Canvas is the learning management system in use at Erasmus University.
<https://www.instructure.com/en-gb/product/canvas/higher-ed>

27 <https://sec.report/Document/0000950170-21-000180/>. By comparison: Erasmus University spends €77m on housing and depreciation; the balance sheet carries €255m housing and equipment. R&D is not specified. Erasmus Jaarverslag 2020.

28 Michal Kosinski, David Stillwell, Thore Graepel, Private traits and attributes are predictable from digital records of human behavior, PNAS, April 9, 2013 (15) 5802-5805, <https://www.pnas.org/content/110/15/5802>

29 <https://www.cam.ac.uk/research/news/digital-records-could-expose-intimate-details-and-personality-traits-of-millions>

OLD / CURRENT SYSTEM

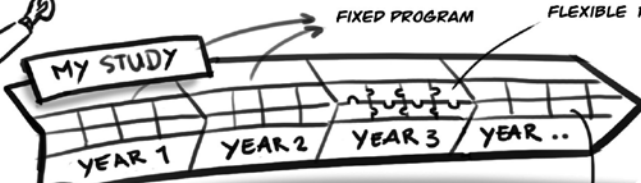


COOKIE CUTTER SYSTEM IS OPTIMISED FOR SILO'S



THIS IS THE ONLY WAY...

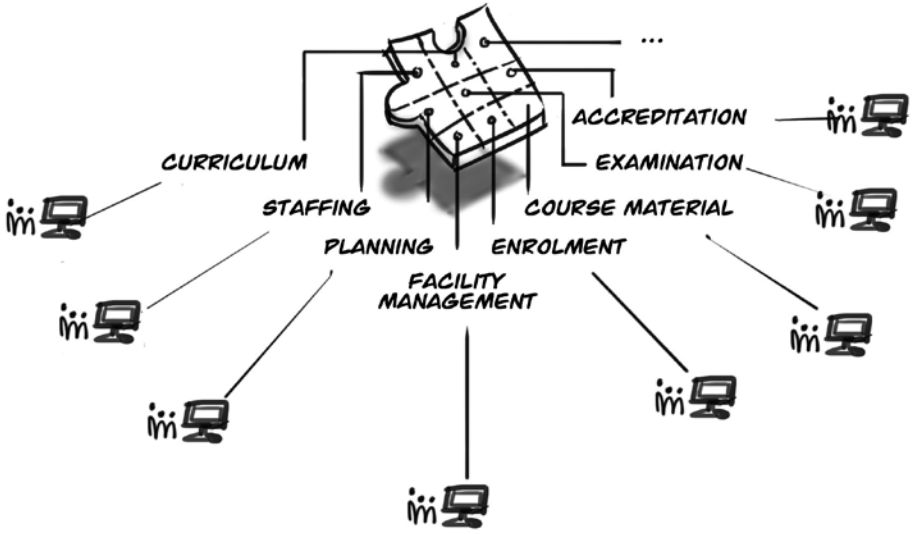
ERASMUS
ORG.



STUDENT

I WANT TO BECOME
AN ACCOUNTANT...

INFRASTRUCTURE NEEDED
FOR ONE COURSE:



ALL WITH AN OWN DEPARTMENT
OPTIMIZING FOR THEIR OWN SYSTEMS

This may have inspired Alexander Nix, chief executive of Cambridge Analytica to muck and mess around in American politics. It is the spectre of privacy officers.³⁰

Once registered, what choice do students have? How is the learning experience delivered? It feels uneasy to step into the domain of education experts, but I will suggest a few appreciations from the digital world.

One: **digital technology enables a personalised learning path.** By introducing a modular approach of the education portfolio, the curriculum is unbundled in separate, self-contained learning modules, with clear interfaces and a set of rules that define how the modules fit together. Modules can be home-produced or from outside partners, other universities, and learning providers such as EdX or Coursera. Like business partner networks, this requires agreements on standards, quality, pricing, and scheduling. Surf, the collaborative ICT network of our Dutch universities, has been working on “Leren-op-Maat” for many years, developing a codebook and addressing the financial settlement between participating institutes.³¹ But developing an educational ecosystem requires more.

Two: **digital technology gives a personal interface.** Continuous support from a smart learning management system, understanding individual student requirements, as a trusted personal agent, assisted by chatbots, various layers of support, an online call centre, embedded knowledge of personal learning issues, smart escalation from chatbot to a fellow student and a tutor. Every touchpoint, question, bit of information, tool, self-test, code, or simulation is relevant and adds value. All data points are registered in a personal vault, shared for analysis as and when needed through an all-powerful app on the phone of every Erasmian.

A personal interface and a modular, personalised learning path will empower students to make their own, real choices. Now comes **the hard part: where does the engagement come from?** Why do 1.8 billion people log into Facebook every day? How does this stickiness develop? What drives our students, what motivates them, and what is unique about the university experience?

30 See the impressive Netflix docu, The Great Hack, <https://www.netflix.com/ch-en/title/80117542> and the NY Times revelation <https://www.nytimes.com/2018/04/04/us/politics/cambridge-analytica-scandal-fallout.html>

31 This may be an understatement of what is being achieved – see e.g.: <https://versnellingsplan.nl/publicatie/one-pager-pilot-studentmobiliteit/> & <https://www.surf.nl/files/2019-03/whitepaper-onderwijs-op-maat-2016-def.pdf>

My PhD advisor, Hans Wissema, is studying the history and transformation of today's university system in our modern world.³² His view: our universities date back to 1810 when Wilhelm von Humboldt founded the University of Berlin to stimulate the idea of science in students' minds and to encourage them to take account of the fundamental laws of science in all their thinking. However, a modern university should commercialise and exploit the knowledge it creates, and this has a great impact on how the university operates and must be organised. Our university has taken this on board in its mission to make a positive societal impact.

Therefore, modern university education is special because of its potential application as well as its scientific basis. Digitalising learning helps to mobilise the knowledge and skills required to acquire and apply scientific knowledge. The application leads to new science questions and research funding. **There is no hard line between research and education** as reflected in annual performance appraisals, tenure tracks, appreciation of research grants, awards, and P-star publications, etc. In a way, all our students are researchers. Potentially 32,000 students can engage in research provided the appropriate challenge and a digital environment to mobilise the learning experience is present.

³² This may be an understatement of what is being achieved – see e.g.: <https://versnellingsplan.nl/publicatie/one-pager-pilot-studentmobiliteit/> & <https://www.surf.nl/files/2019-03/whitepaper-onderwijs-op-maat-2016-def.pdf>

6 Our way forward

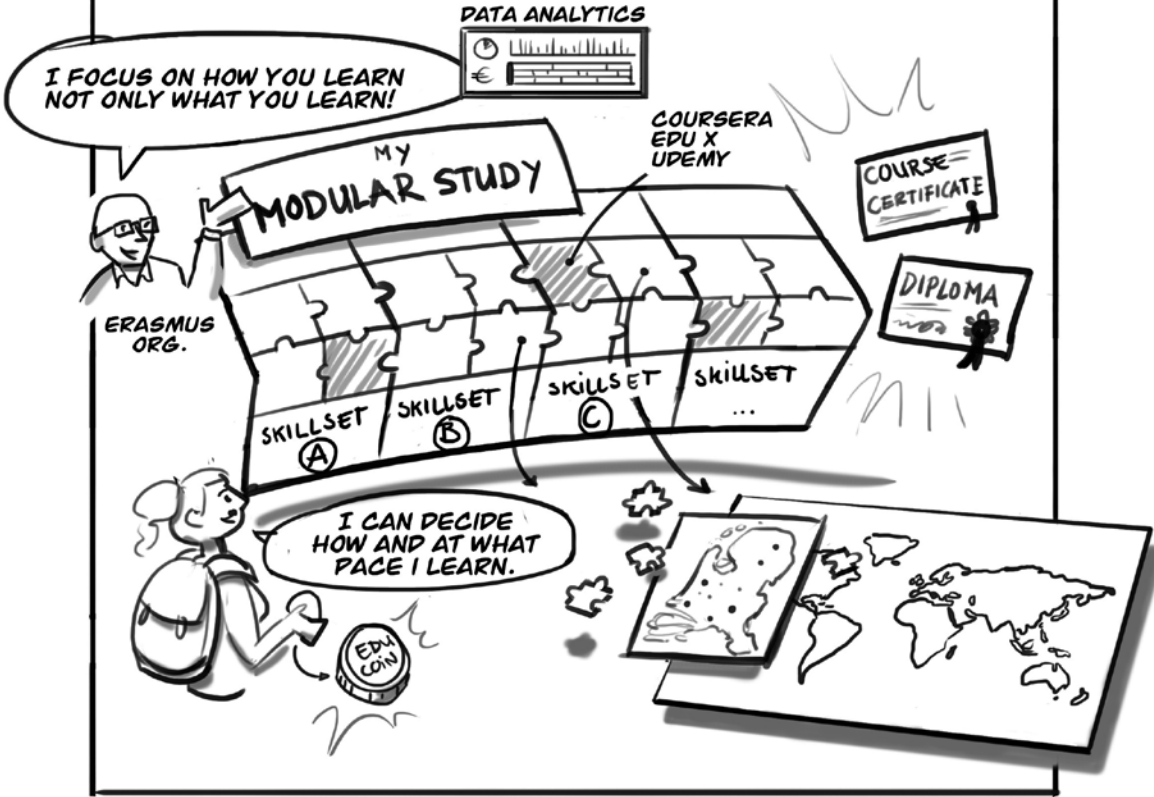
What would Erasmus have said? What do students want? A new kind of university, a “challenger”? An example. Not surprisingly, in these digital times, our master programme Business Information Management has become most popular with an explosion in the number of applicants. There was no option but limiting the number of admissions to 250. The complications and logistics of managing a rapid growth in students will be enigmatic to an outsider. Research staff had not increased with the number of students, and even with an adequate budget, it was difficult to recruit quality staff. We developed our own course materials, asked for help from outside teachers, and tried to give students a personal, positive experience. This was especially difficult during the last part of the programme when students choose a research topic and have four months to complete their proof of scientific mastery with a coach and co-reader. To manage the quantity, we developed a **Thesis-Online-Platform (TOP)**. A simple idea. The TOP system guides the student through the master thesis process from start to end with several standard steps and procedures, as if you were booking a trip on Booking.com or finding a new date on Match.com.

The “minimum viable product” has been in use since 2005. It has helped us to manage large numbers of students with fewer staff. The vision was ambitious. Companies would list their topics of interest and available internships on the TOP website, students fill in their areas of interest, followed by schema matching with the research agenda of our staff. A thesis would become a hypertext research paper with deep links to source literature. Every thesis is part of a smart knowledge repository for future students, research, and a revenue source. Researchers expand the literature and manage their own knowledge base online, and companies pose new research challenges. A system to link worldwide data repositories. Students can access via Canvas and TOP online learning modules to acquire the skills they need.

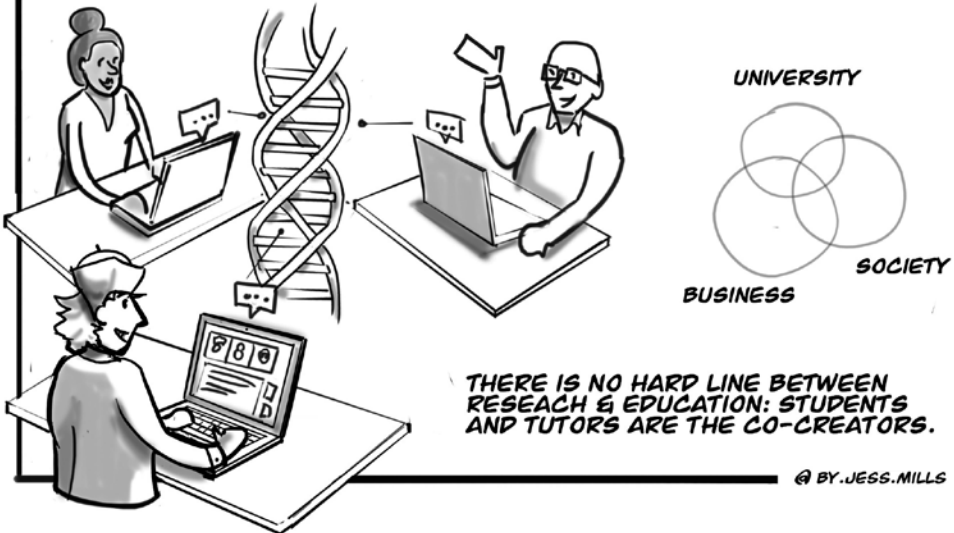
It is developing - but the online world is faster. I will suggest a few ideas to speed up developments. Students come up with a challenge, something that is important for them, they organise their own group, make it concrete, and argue the relevance and the feasibility. We provide the coaches. The students recruit support from business and society. We provide an app and the cockpit of online learning through Canvas and others. This is not new. The issue is accreditation and quality management. Can students be co-responsible for this? Will they take their responsibility of co-creators? Students could receive Educoins based on the annual tuition fees and the government contribution that they can spend with us, other universities, online course providers, such as Khan Academy, Coursera, edX, and other tutors according to the agreed playing rules. Educoin transactions could be registered in a special educational blockchain managed by the university. This blockchain is an immutable record

FUTURE EDUCATION SYSTEM

TAILORED TO STUDENT'S NEEDS BY UTILISING EXISTING PLATFORMS



THE CHALLENGER UNIVERSITY



of the students' learning experiences. The university ensures that Educoins are a tradable and respectable currency of capability. It is a student's passport to lifelong learning.³³

Erasmus wonders what is in it for the tutors and professors if they were to do this? We are scientists. We are driven by curiosity, the want-to-find-out, the need to know, our obsession with the "why" question. The metrics of the university system do not help. The peer pressure to score high on the list of publications that matter, the so-called P-star list. The task to get prestigious research grants, the proposals to be written, the conferences and papers, the review boards, and the editorial tasks. Interacting with students is fun but time-consuming, exhausting, and you really do not know much about the students, what they learn, what you do best. If we are to be coaches, we need help. We need a good dashboard to manage what we do, give insight into students' progress, and help us design a modular course and develop teaching material. Could students really be co-creators of our research? Is this realistic? Are students capable? They still need to learn.

Erasmus knows that this challenger university is a formidable task for university governors. The dependency is reversed. Students must want to spend their Educoins with us, not with other institutes, and they have a choice. The monopoly of awarding a diploma, their passport to a career is no longer straightforward. And we are responsible for the quality, certification, and standards of education as well as of research. The budgeting and cost allocation system must be overhauled. The ecosystem in which the university operates will change radically. Digital technology is expensive and not easy. On the other hand, the perspective of mobilising 32,000 students as co-creators is enticing and compulsive. It presents vast opportunities to impact society and develop life-long relations with alumni and businesses at large - admittedly at the possible risk of stripping the house.

I am not fast-forwarding to 2030 for a new kind of university. The university will adapt to different times ahead, slowly. Few companies have adapted to the digital era with verve. New companies without a history have taken their place.

Erasmus may want to prioritise: 1. an excellent, innovative, digital interface with our students; 2. modularisation of the learning portfolio; 3. challenge-based engagement of students at large in our research agenda.

Erasmus University has the tools to deliver. Today the Erasmus Data Collaboratory has been inaugurated. Erasmus Centre for Data Analytics, their Leadership challenger programmes, the Education Lab & Studio, the Community for Learning and Innovation are potent ingredients to deliver the challenger university. Examples of student-own initiatives in the Erasmus Tech Community and Turing University demonstrate that we can successfully engage our students.

33 Students prepared an impression "A Day for an Erasmus student in 2024" <https://vimeo.com/417950801>, 2020.

7 A complex society

The importance of a new kind of university should not be understated. When the Internet grew in the 1990s, there was a general belief that the Internet would be “democratic”, the number of links per node or person would have a normal average. In 1999 László Barabási and Réka Albert showed this was not the case: a few nodes dominate the number of links, the Internet is “scale-free”, and therefore a few nodes can have a disproportional influence on the traffic that flows on the net.³⁴ Network science has matured over the past 20 years. As networks become dense and the degree of interactive communications increases, the collective behaviour exhibits something that we call emergence: collective properties that we did not expect from studying the components. It becomes “complex”. Getting a grip on complex phenomena is one of the greatest challenges of science.³⁵ The societal issues of today, such as the climate crisis, intertwined global economies, Covid, cyber vulnerabilities, and global mobility require a new approach.^{36, 37} New scientists must deliver.^{38, 39, 40, 41.}
⁴² The study of complexity is pre-eminently trans-disciplinary and requires a new approach of early-on engagement of our students as co-researchers. A challenger university and the Erasmus Data Collaboratory should help!

34 László Barabási and Réka Albert, Emergence of Scaling in Random Networks, *Science* 286, 509 (1999), DOI: 10.1126/science.286.5439.509

35 Netherlands Organisation for Scientific Research. https://nwo.h5mag.com/nwo/edit-jaaroverzicht_2016_preview02/complexiteit_wiskunde_ict_en_industrie_toekenningen/8238/Paper_Grip_on_Complexity.pdf

36 Ball, Ph., *Why Society is a Complex Matter – Meeting Twenty-First Century Challenges with a New Kind of Science*, Springer, 2012.

37 Perspectives on a Hyperconnected World – Insights from the Science of Complexity, World Economic Forum’s Global Agenda Council on Complex Systems, January 2013.

38 Diederik van Liere, *Network Horizon and the Dynamics of Network Positions*, ERIM PhD. Series Research in Management, 2007, <https://repub.eur.nl/pub/10181>

39 Ting Li, *Informedness and Customer-Centric Revenue Management*, ERIM PhD. Series Research in Management, 2009, <https://repub.eur.nl/pub/14525>

40 Wouter Vermeer, *Propagation in Networks: the impact of information-processing at the actor level on system-wide propagation dynamics*, ERIM PhD. Series Research in Management, <https://repub.eur.nl/pub/79325>

41 Evelien van der Hurk, *Passengers, Information, and Disruptions*, ERIM PhD. Series Research in Management, 2015, <https://repub.eur.nl/pub/78275>

42 Paul Bouman, *Passengers, Crowding and Complexity: Models for passenger oriented public transport*, ERIM PhD. Series Research in Management, 2017, <https://repub.eur.nl/pub/100767>



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8 Thank you

I am grateful to my many colleagues at our university. Over the many years, you always made me feel welcome and important. Thank you, Eric van Heck and the BIM group, thank you, Department One and all RSM, thank you, ERIM, thank you, Erasmus! Many thanks to my students and my PhD students. It has always been an intriguing time. Thank you, Hans Wissema for our long and continued friendship. Thank you, Henk Boddendijk, group director at Philips, for such subtle mentoring. Without Philips, this would not have been possible. Thank you to so many colleagues at other national and international universities for your guidance and comradeship. Many thanks to Ming Yu and Li Zheng of Tsinghua University. We did great things with smart business networks. Also, many thanks to friends from the NWO complexity programme and NPCS.⁴³ We had a great time together.

Is it part of getting older when you lose good friends to the unknown? Thank you, Al Dunn, you were the incredibly intelligent, inimitably creative, a most humorous person, and it was an honour to have been your business partner and friend. I miss Jo van Nunen, my operations research teacher when I was a student, who enthusiastically joined my PhD committee and glued me to this university - always a laugh and a cry!

I am grateful to my parents, my sister, and my brothers. My three sons, aged 3, 6, and 8 at my inauguration as professor years ago, have now grown up. You make us proud and confident that the world will be better. Kathelijne, my wife, at my inauguration, I called you the beginning and the end of my value chain. I now know better. You are always at the centre of all networks!

To everyone here I would say: We are Erasmus. He lived with the precursor of the Internet, in plague-infested times, and inspired with a free mind, with humour and facts, not fabrications. Erasmus, a free mind. **We are Erasmus.**

Peter Vervest, 24 September 2021

43 Netherlands Platform for Complex Systems <https://npcs.nl/>

The student is the centre of our universe, our only true asset, our raison d'être. In his valedictory address, Professor Peter Vervest explores the disruptive effects of digitalisation on business and extrapolates what this will mean for university education and research. He argues in favour of digitally enabled, personalised learning paths and support for students combined with modularisation of the learning portfolio. Challenge-based engagement of students in the research agenda is critical as education and research are two sides of the same coin. In the digital world, universities can succeed if they digitally reach out to students and alumni to engage in ongoing research and learning. This requires deep investments in digital technologies and a profound transformation of the university system and metrics.

About the author

Peter Vervest came to Rotterdam School of Management as a student in 1976. After graduating in law and management science, he joined Philips Telecommunications in the early days of connecting computers to telecommunication networks (1979). Peter specialised in open information systems ("Open Systems Interconnection") and graduated summa cum laude (1986) at Delft University of Technology. He was appointed professor at Erasmus University Rotterdam in 1992. Peter combines academic and business life, was divisional director of Philips Electronics, UK (1987), co-founded a high-tech software and project firm (London, 1991), and is a partner at D-Age, a group of high-tech counsellors and investment managers (2000). His current research focuses on complex networks and the impacts on business and society.

ERiM

The Erasmus Research Institute of Management (ERIM) is the joint research institute of Rotterdam School of Management, Erasmus University (RSM) and the Erasmus School of Economics (ESE). The research undertaken by ERIM is focused on management of the firm in its environment, its intra- and interfirm relations, business processes, strategies, finances, consumers, markets and their interdependent connections.

Since its founding in 1999, the objective of ERIM is to carry out first-rate research in management and to offer an advanced doctoral programme in Business and Management. Within ERIM, over 300 senior researchers and PhD candidates are active in five research programmes, spanning all areas of management research. From a variety of academic backgrounds and expertise, the ERIM Community is united in striving for excellence and working at the forefront of creating new business knowledge.

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