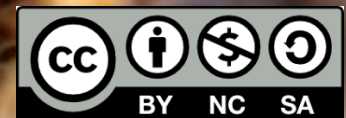


# FROM INFORMATION TO INSPIRATION

HOW STUDENT ANALYTICS HELPS THE VRIJE  
UNIVERSITEIT AMSTERDAM TO MAKE SENSE OF DATA

STRATEGY BEYOND BORDERS

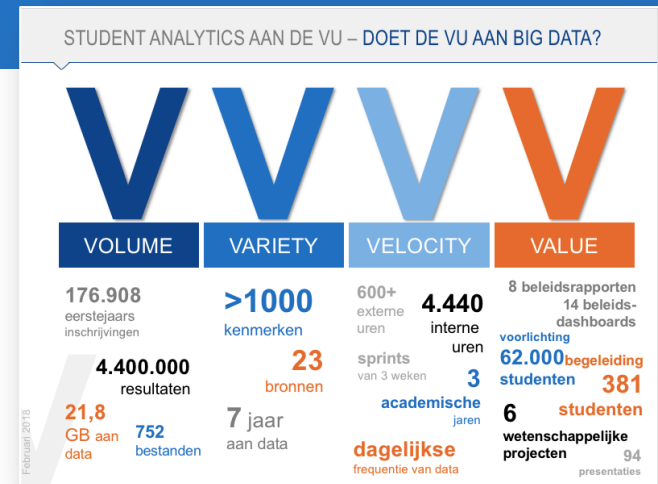
DECEMBER 09, 2019, V1



# I HOPE TO INSPIRE YOU WITH THREE STORIES



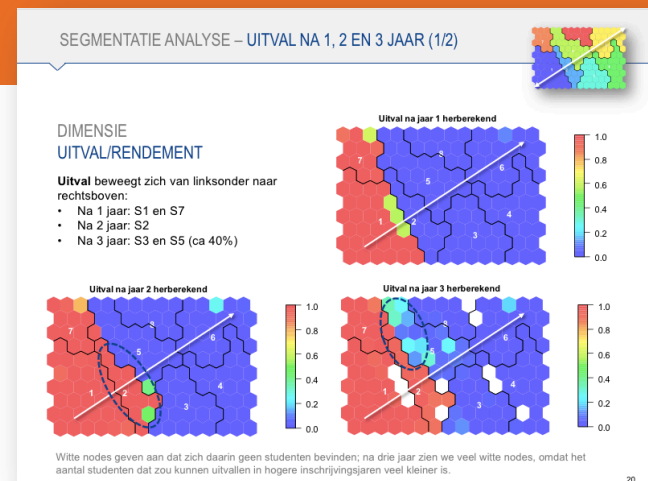
## How does Student Analytics add value to the VU?



# I HOPE TO INSPIRE YOU WITH THESE STORIES



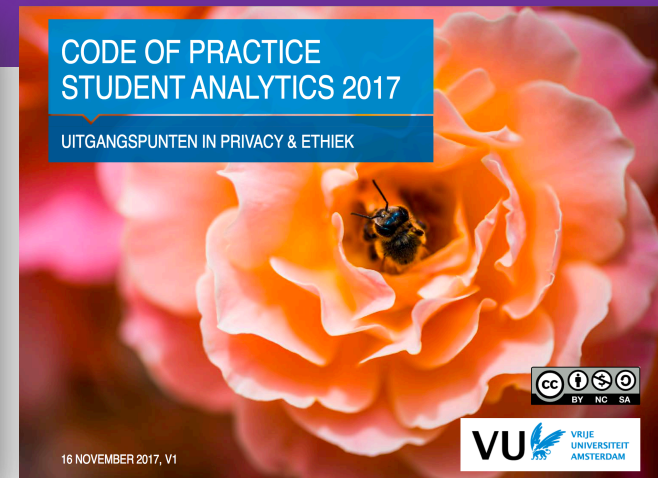
## What kind of analyses do we conduct?



# I HOPE TO INSPIRE YOU WITH THREE STORIES



## What is our Code of Practice regarding Privacy & Ethics?





# VU STUDENT ANALYTICS VU – IS IT BIG DATA?

# V

## VOLUME

**176.908**  
enrollments

**4.400.000**  
grades

**21,8**  
GB  
data

**752**  
files

# V

## VARIETY

**>1500**  
features

**39**  
sources

**7** year  
of data

# V

## VELOCITY

**600+**  
external  
hours

**5.768**  
internal  
hours

**sprints**  
every 3 weeks

**agile** **3**  
academic  
years

**daily**  
updates

# V

## VALUE

**10** policy reports  
**>30** policy  
dashboards

communication  
**62.000** counselling  
students **381**

**10** scientific  
projects **107**  
presentations

# GOALS – WHAT DOES THE VU WANT TO ACHIEVE WITH STUDENT ANALYTICS?

With Student Analytics the VU strives to **develop evidence based, actionable insights** to support student counselling, policy making and scientific research in order to **improve the student life cycle of all our students.**

## Business intelligence

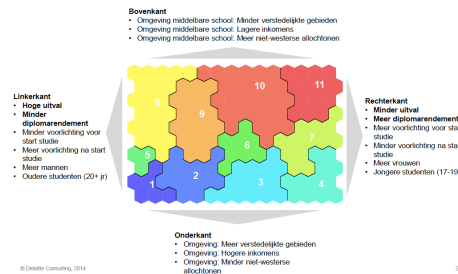
Understand facts on past and present performance

## Student Analytics

Explore and discover, predict, actionable insights



Management information



**Voorspelling** Ons model schat op basis van een logische en evenwichtige keuze uit variabelen de kans op uitval of switch op zeven meetmomenten



The following kind of features were collected, combined and analyzed:



Gender  
Age on October 1  
Country of education before college  
Family background

## Demographics

## Pre-education / Secondary education

High school study profile  
Pre-education and high school  
Gap-years / Years since degree  
Years present in higher education  
Orientation and introduction program  
Matching



Former degrees  
Geographic distribution (GIS)  
High school quality and background  
Date of enrollment

## Enrollment

## Student success and satisfaction

Examination grades  
Dutch proficiency test  
Study results  
Honours and Cum Laude  
Student satisfaction  
Student retention and degrees  
Alumni

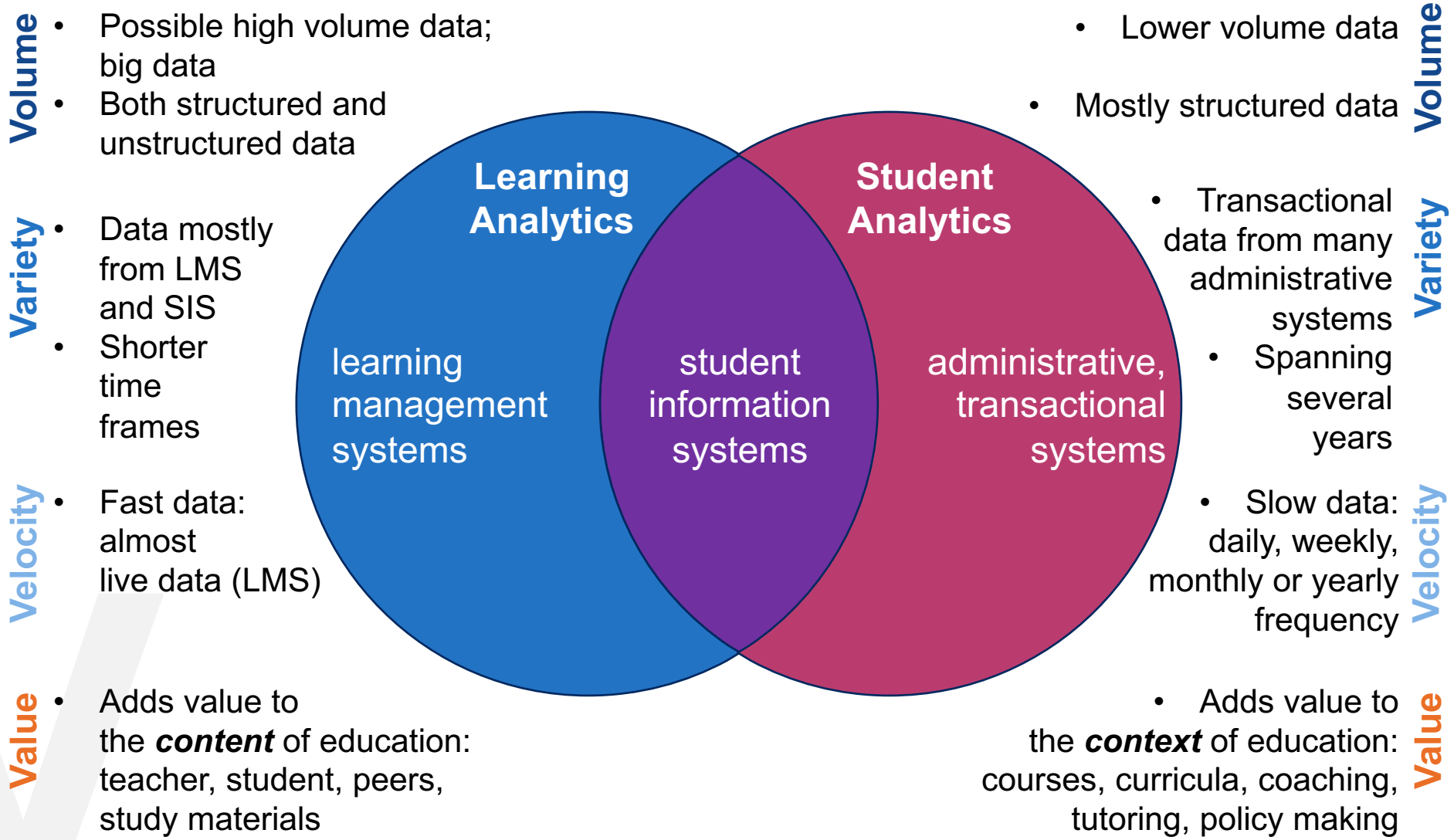


### ***Special personal data***

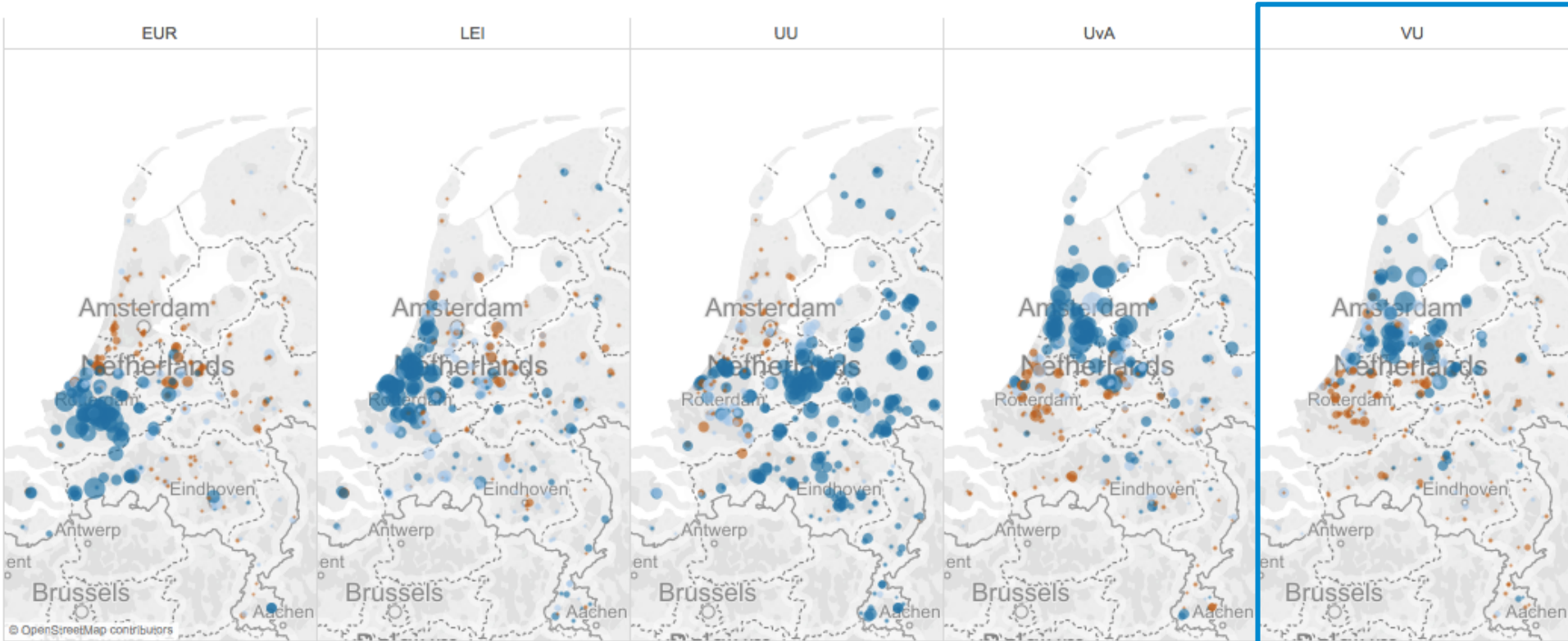
Part of the data set for scientific purpose, but not used in prediction models or policy making:

- Ethnicity, first generation students, nationality
- Information on disabilities and academic accommodations

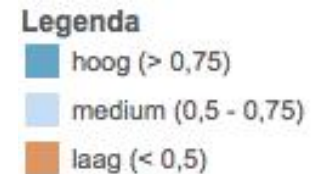
# LEARNING & STUDENT ANALYTICS – KEY DIFFERENCES AND SIMILARITIES



# ENROLLMENT ANALYSIS – BROAD UNIVERSITIES RANDSTAD (2014)



**The visualisation of the geographical background and market shares of VU compared to EUR, LEI, UU and UvA lead to several important insights.**

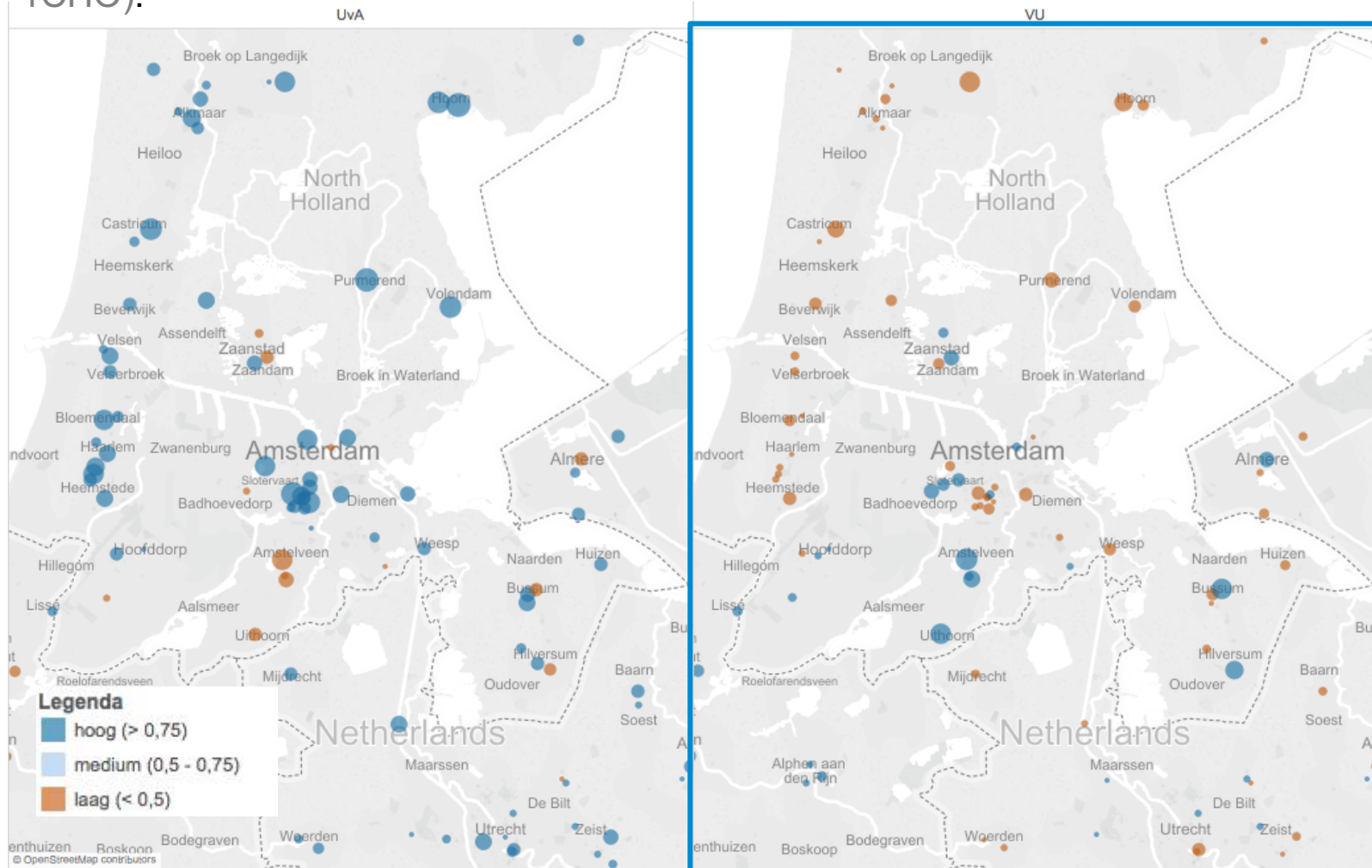


*Geographical background and market shares direct enrollements  
EUR, LEI, UU, UvA en VU in 2014 (1CHO)*



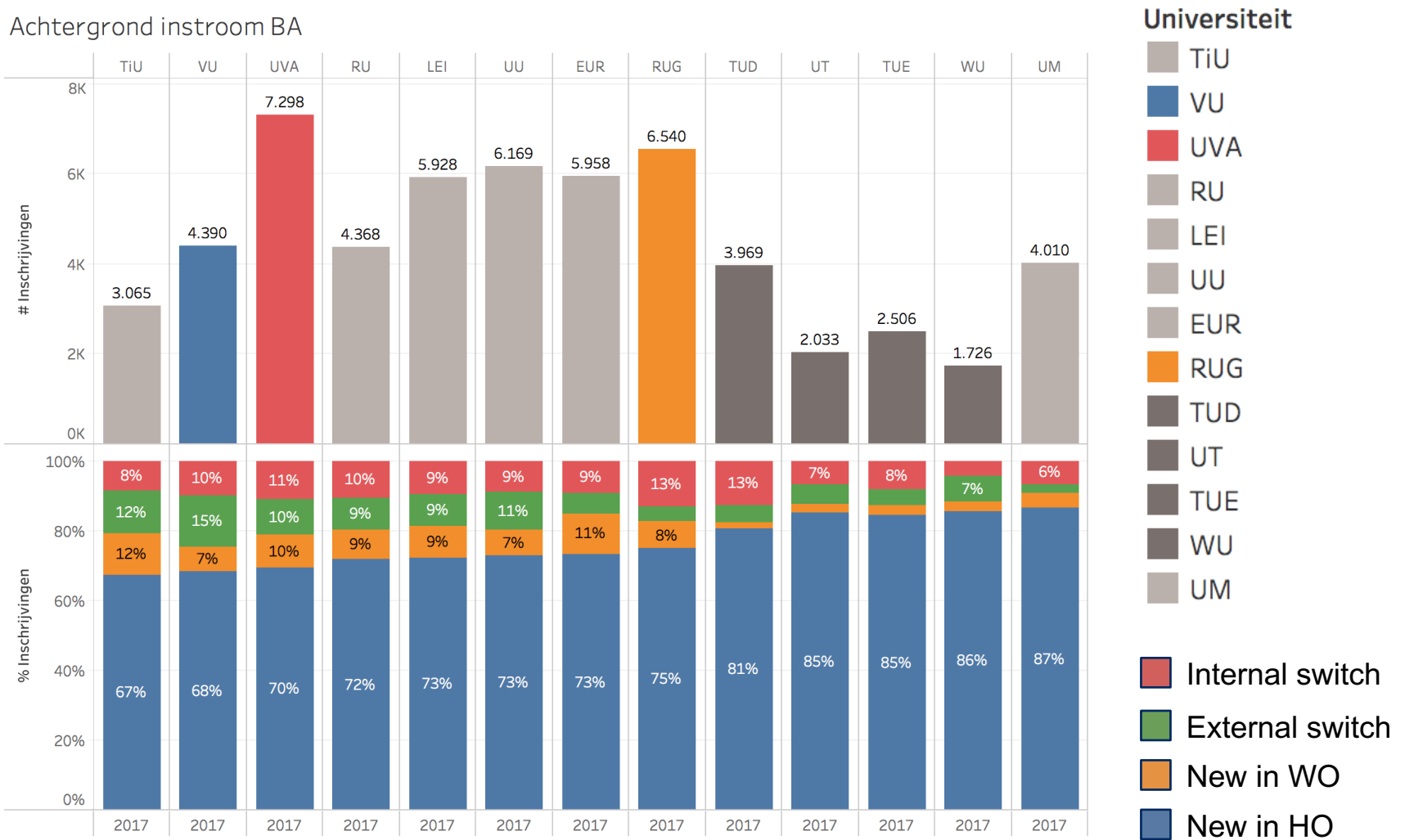
# ENROLLMENT ANALYSIS – BROAD UNIVERSITIES AMSTERDAM (2014)

In the Amsterdam area the VU has in comparison to the UvA limited enrollments from the coastal region, the innercity of Amsterdam and 't Gooi (Source: enrollment VWO **2014**, 1CHO).



# BACKGROUND ENROLLMENTS BACHELOR

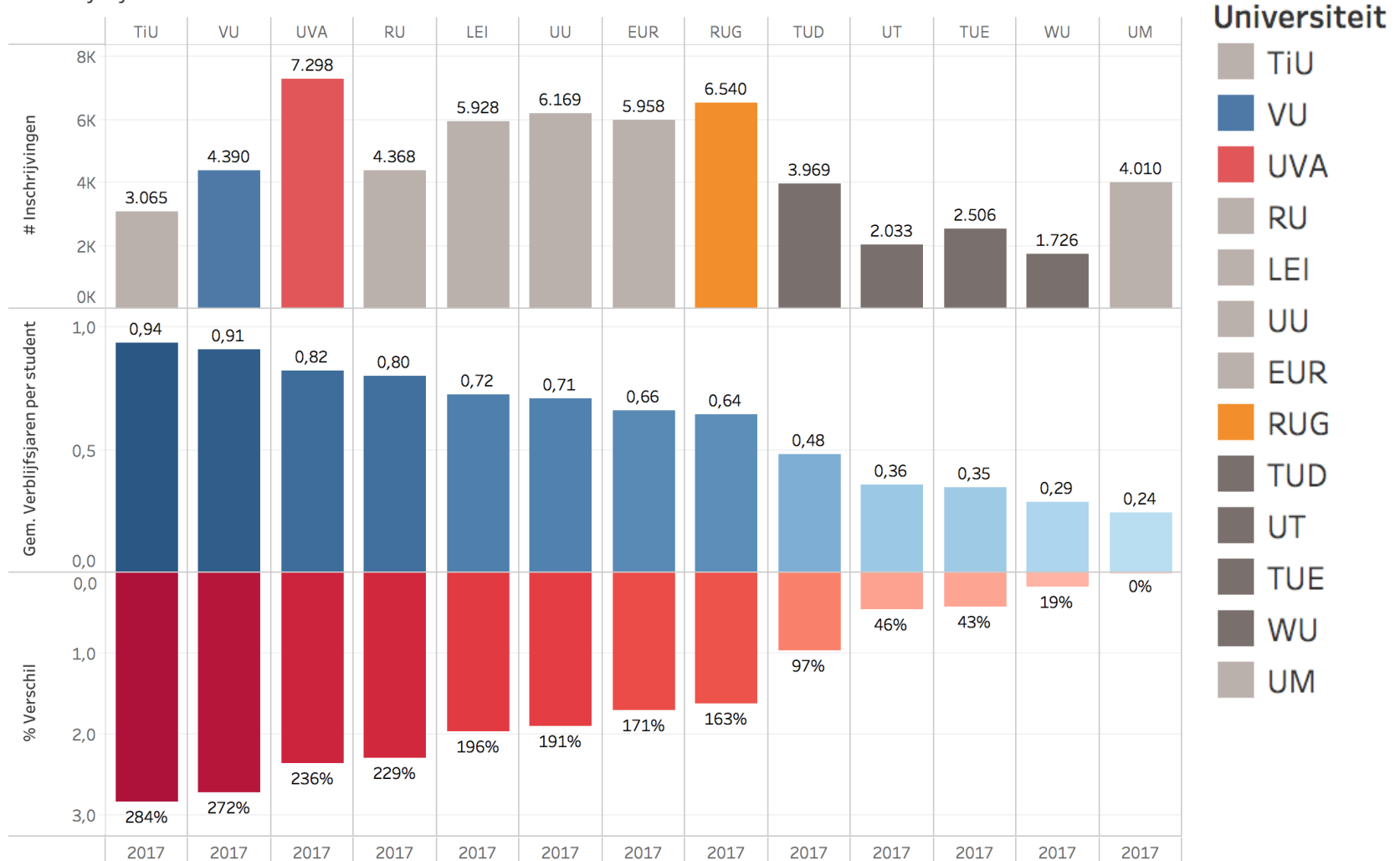
Achtergrond instroom BA



EOI 2017 BA, all universities, all first year students primary enrollments, HBO-Bachelor excluded

# YEARS OF STAY 'VERBLIJFSJAREN' ENROLLMENT BACHELOR

Verblifjaren instroom BA



EOI 2017 BA, all universities, all first year students primary enrollments, HBO-Bachelor excluded

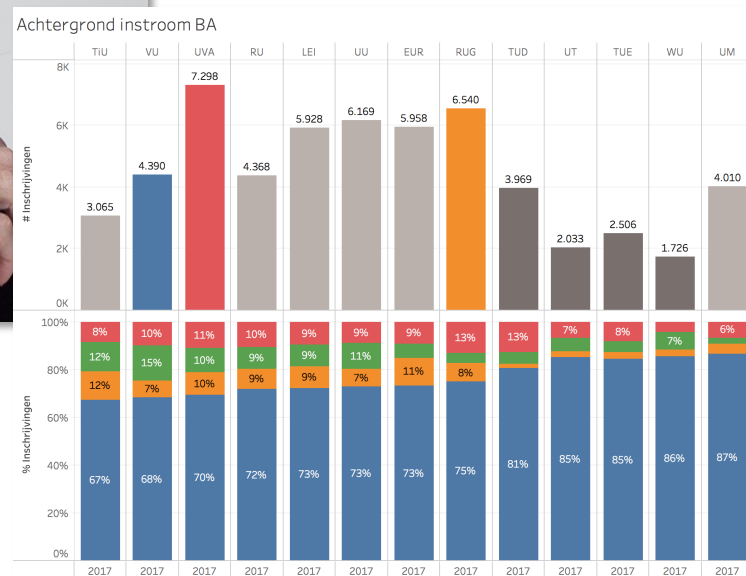
# IMPACT – WHAT VALUE DOES IT ADD TO THE VU?



**We start to understand the unique identity of the VU**  
**Much improved self awareness** that we use in internal policy making and in our communication with external parties, such as the Ministry of Education  
**More financial benefits** because of a better balance in our finances



Source: [trajectum.hu.nl](http://trajectum.hu.nl)



# IMPACT – WHAT VALUE DOES IT ADD TO THE VU COMMUNITY

## VU community



## We try to empower the VU Community

Improved flow of students from their former education  
 More possibilities to **reflect on the student life cycle** of students and appropriate counseling or interventions.  
 More possibilities to **research interventions**



Source: Ad Valvas

### VU Student Analytics Monitor - 2016 - Periode 3

Naam  
 Studentnummer  
 Faculteit\*/Opleiding  
 Academisch jaar 2016 - 2017

Geslacht  
 Leeftijd (op 1-10-2016)\*  
 Vooropleiding VWO  
 Uitvalskans opleiding vorig jaar\* 24%

Kans op uitval  
 Periode 3  
 15,7%

#### Verloop kans op uitval

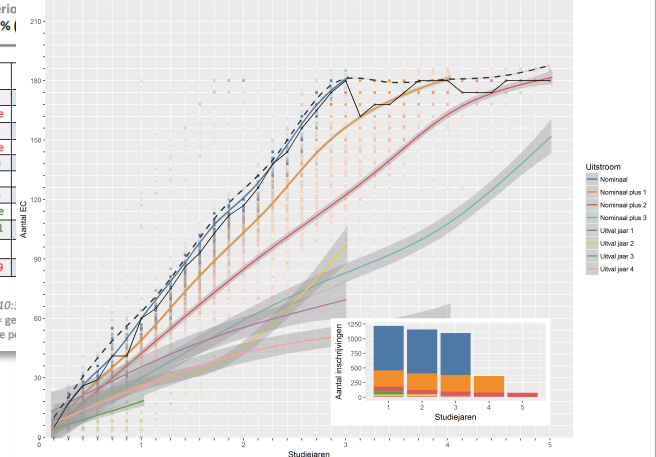
Voor de start	Periode 1	Perio
14,0%	17,1% (12 EC)	19,6%

#### Motivatie

• Oriëntatie komt voor	Ja
• Meeloopdag	Nee
• Open dag	Ja
• Brochure	Nee
• Vertrouwen in studiesucces	10
• Proactief studeergedrag	7
• Uren werk en nevenactiviteiten	20
• Volgt dubbele studie bij de VU	Nee
• Aantal dagen van tevoren aangemeld	331
• Aantal studies in de afgelopen 2 jaar	1
• Reistijd OV naar de VU (minuten)	109

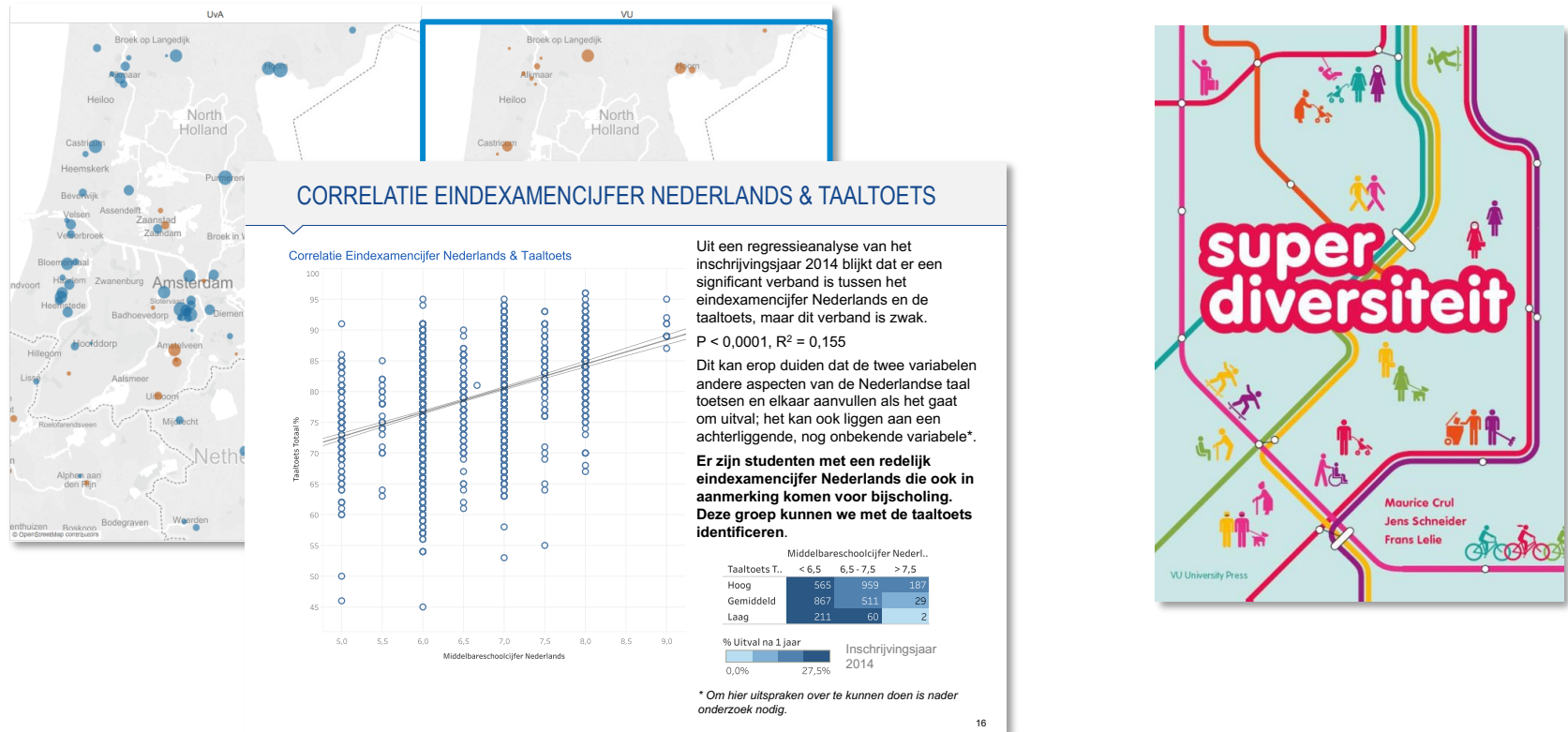
SAM2016 v10; gegevens bijgewerkt op 16-02-2017 10:  
 Groen = bovengemiddelde/positieve score; oranje = ge  
 \* Variabele weegt mee in kans op uitval in de laatste pi

#### B Geneeskunde





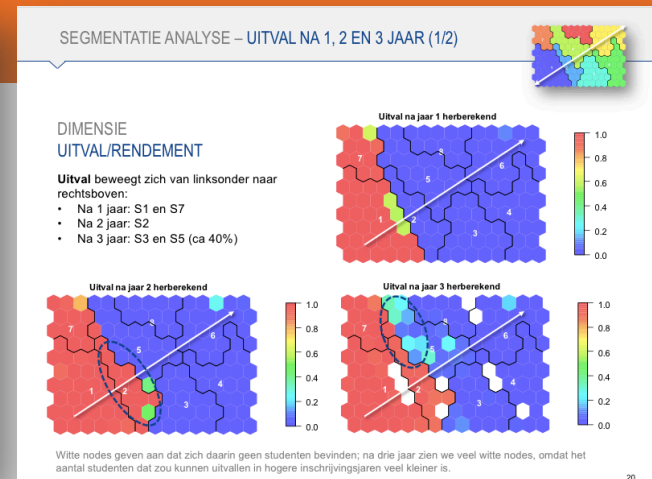
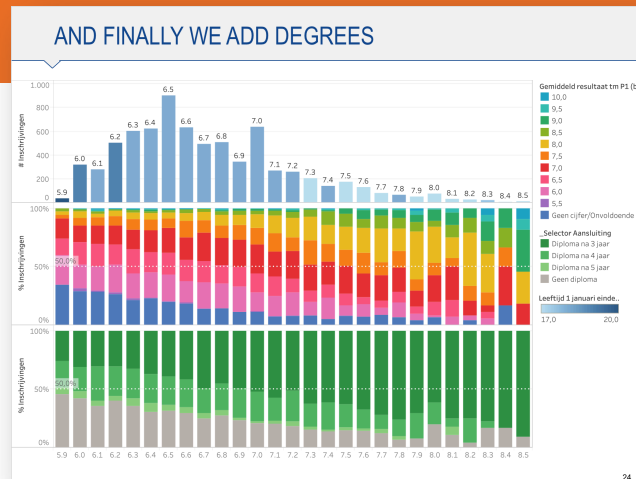
# IMPACT – WHAT VALUE DOES IT ADD TO POLICY MAKING & RESEARCH



**We facilitate evidence based policy making and scientific research**  
 Research into enrollments, student retention, orientation, introduction, orientation, the Dutch proficiency test, etc. to **improve policy making and evaluation**  
 The analysis set is made available to **VU scientist** under specific conditions



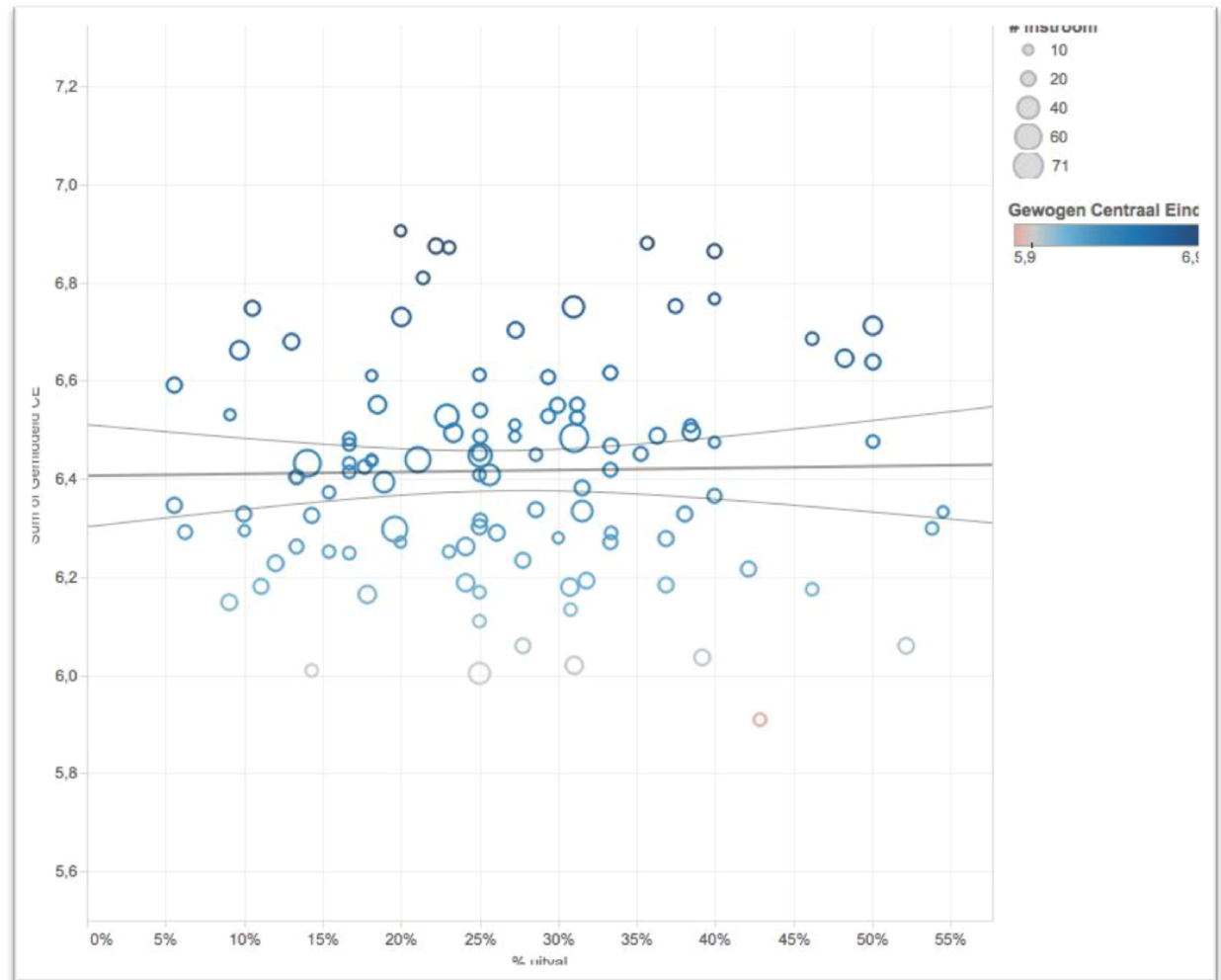
## What kind of analyses do we conduct?



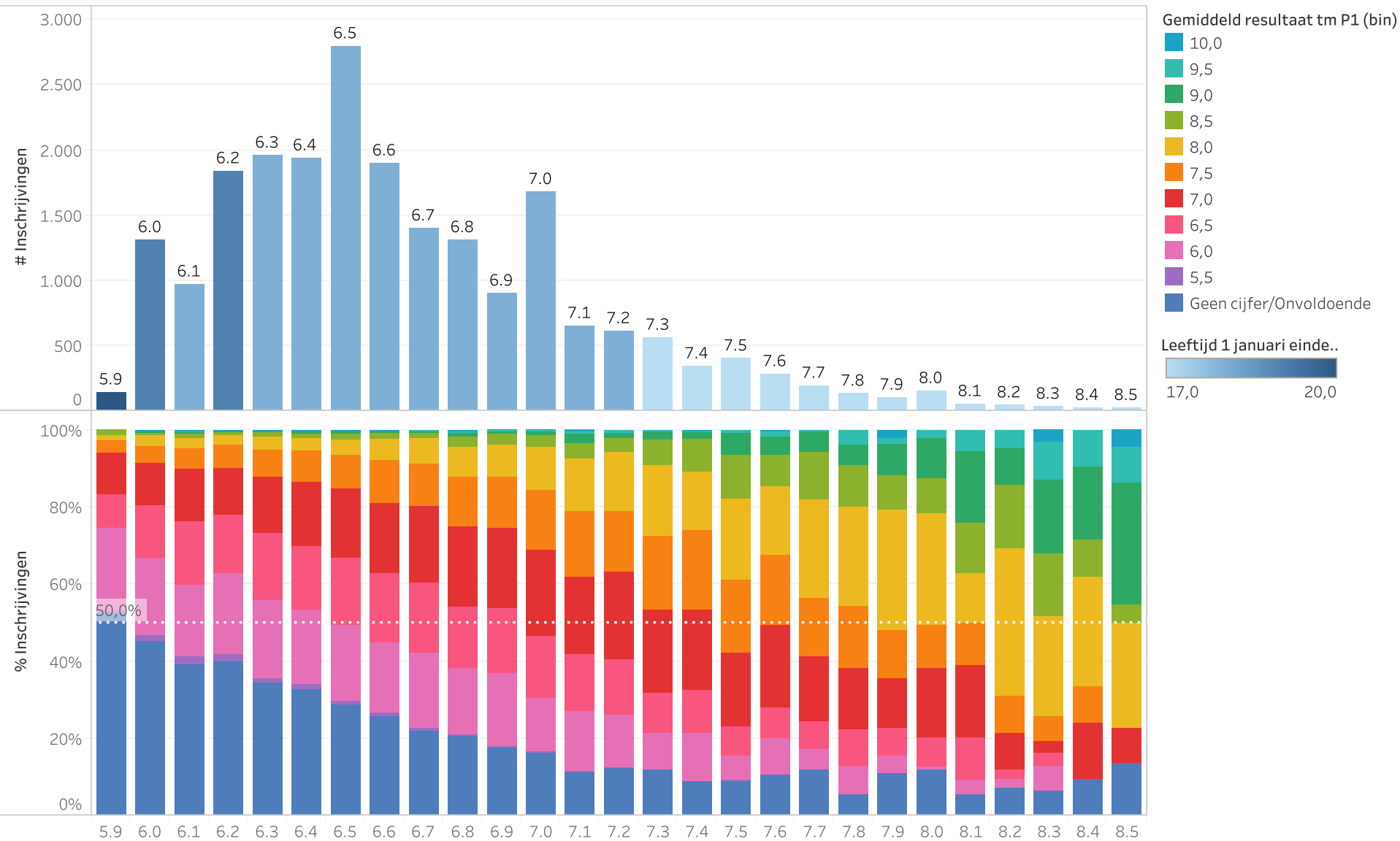
# CORRELATION DROP OUT AND AVERAGE EXAMINATION GRADES OF HIGH SCHOOLS

We found **no correlation** between drop out at the VU and the average examinations grades of high schools (**of their entire population**).

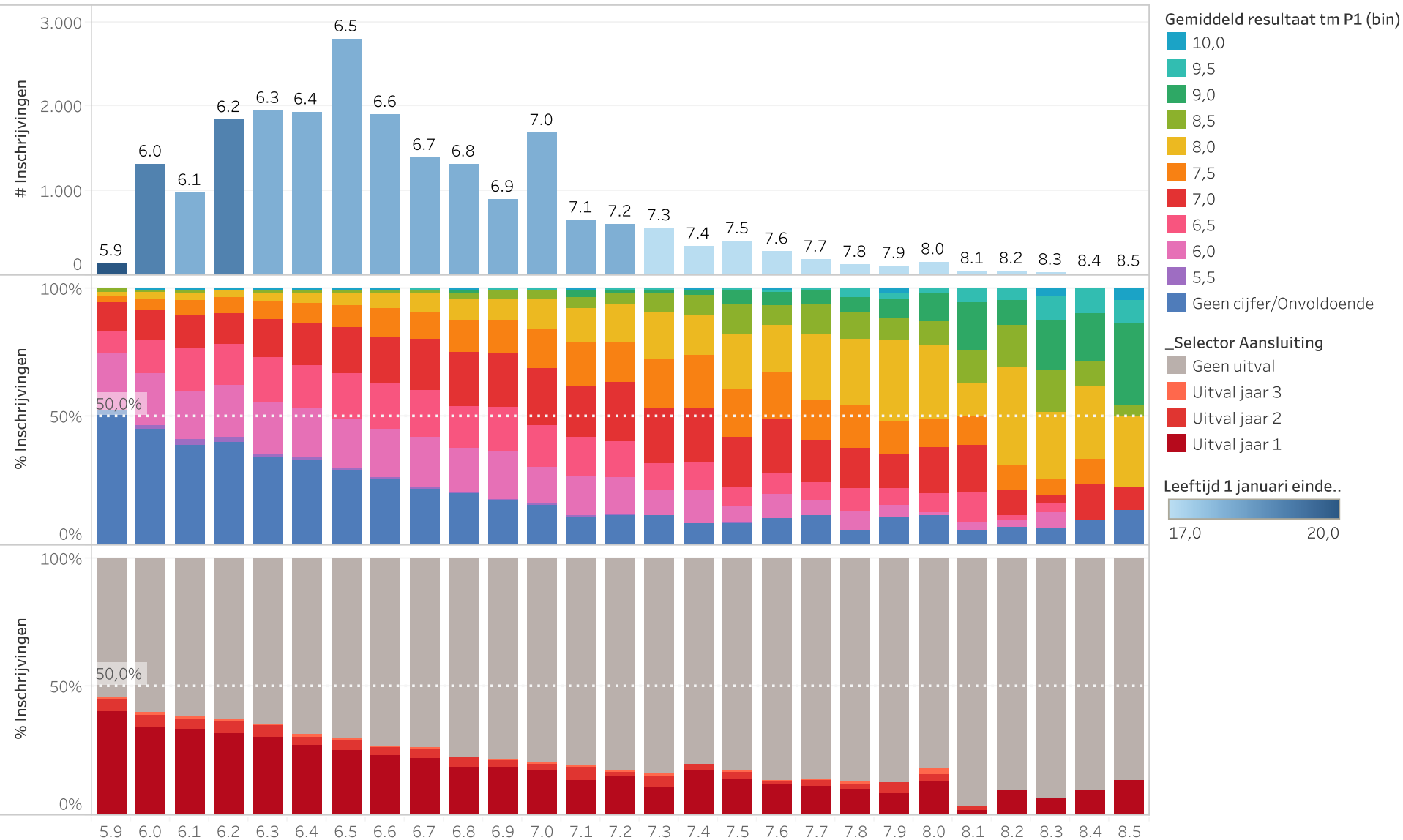
Source: Student Analytics, totale instroom en uitval 2013-2014



# EXAMINATION GRADES VERSUS RESULTS 1-ST TERM

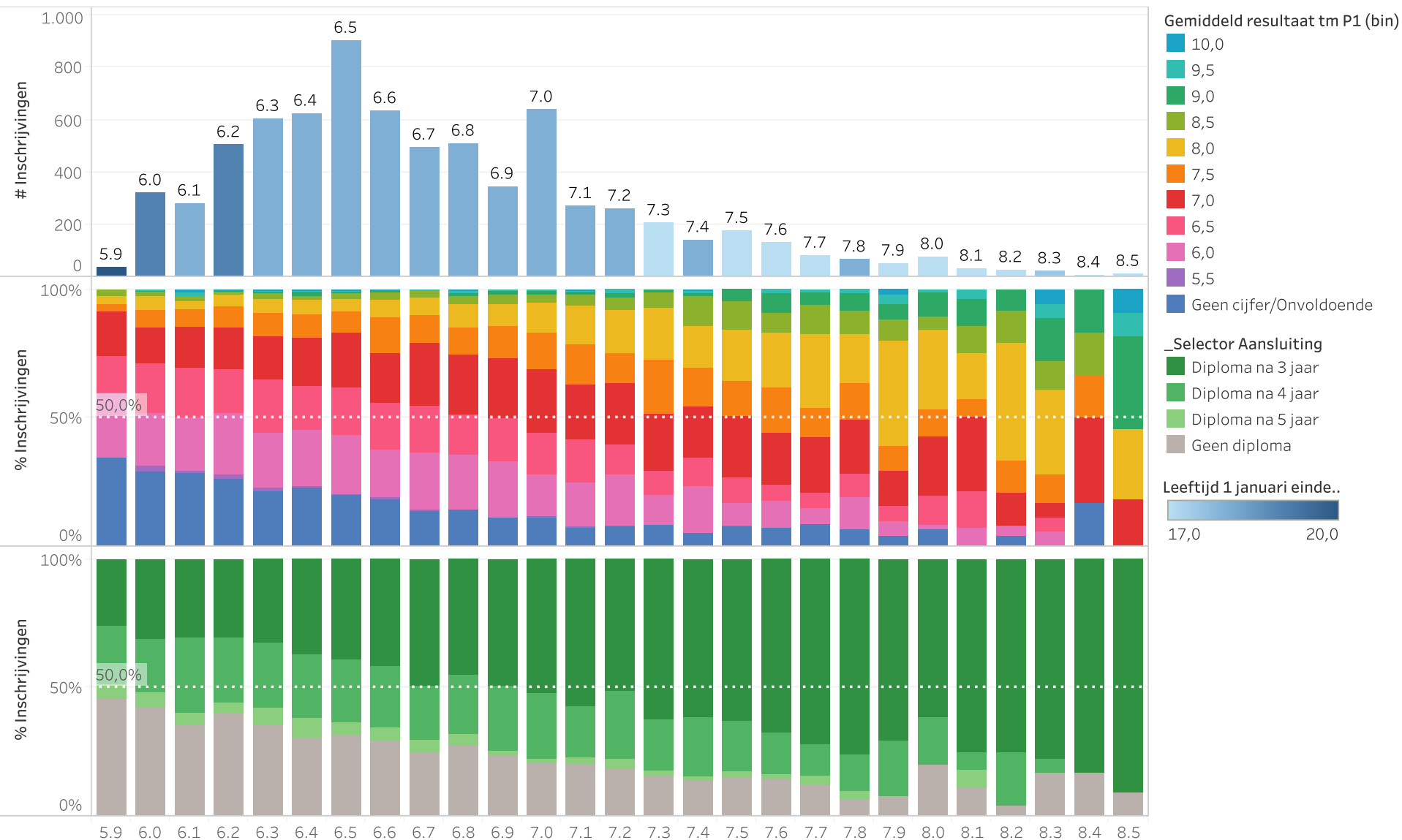


# NOW WE ADD DROPOUT / CHURNING





# AND FINALLY WE ADD DEGREES



# SEGMENTATION ANALYSIS – TURNING INFORMATION INTO INSPIRATION



Source: Ajax.nl

23,500 students  
of the VU  
meet each other  
in the Arena  
stadium



# SEGMENTATION ANALYSIS – A FIRST IMPRESSION

## Scope of the data set

The segmentation analysis is conducted on all enrolments of 2010-2014 (N=23.425)\*.

## Number of segment and weighting

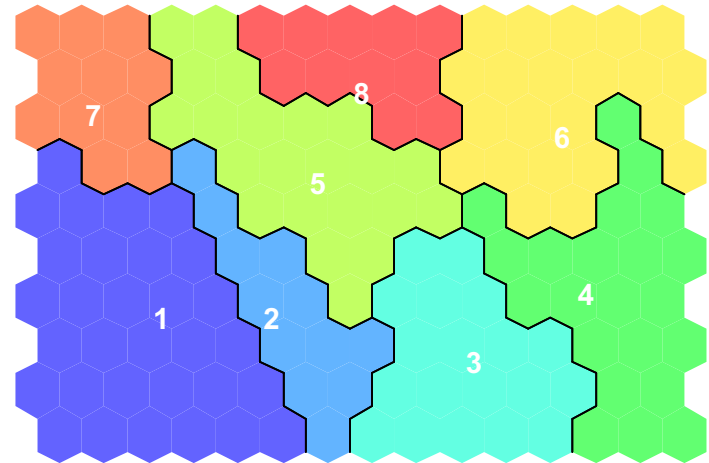
We chose 8 segments. Features for clustering were chosen because of their known relationship to churning and student success:

- Age on October 1
- # Years in higher education
- Average examination grade at high school
- # EC after period 3

## We were especially interested in

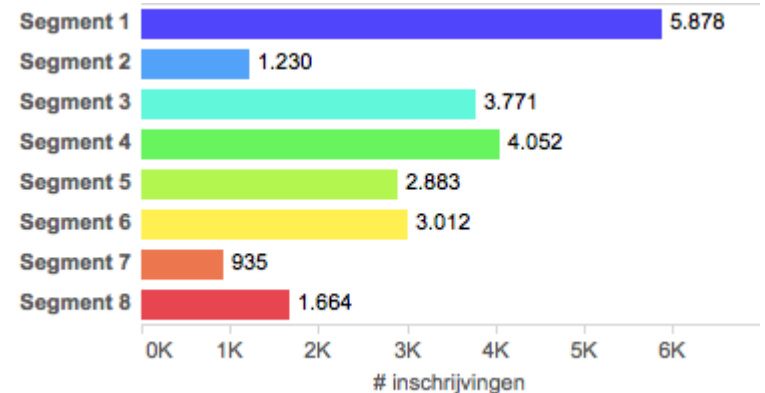
- Churning after 1, 2, 3 years
- Degree within 3, 4, 5 years

R: Self Organizing Maps (Kohonen)

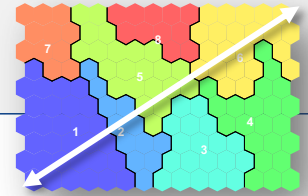


### Guide

- A student who is enrolled in multiple study programs will be represented accordingly
- Students don't change position on the map
- Nodes have different amounts of data points (see below)
- The number of segments has no special meaning



# SEGMENTATION ANALYSIS – CHURNING AFTER 1, 2 AND 3 YEARS

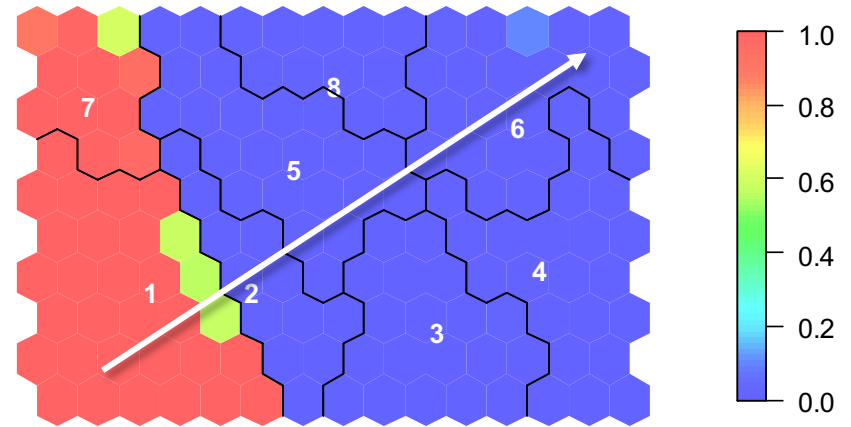


## DROP OUT / SUCCESS

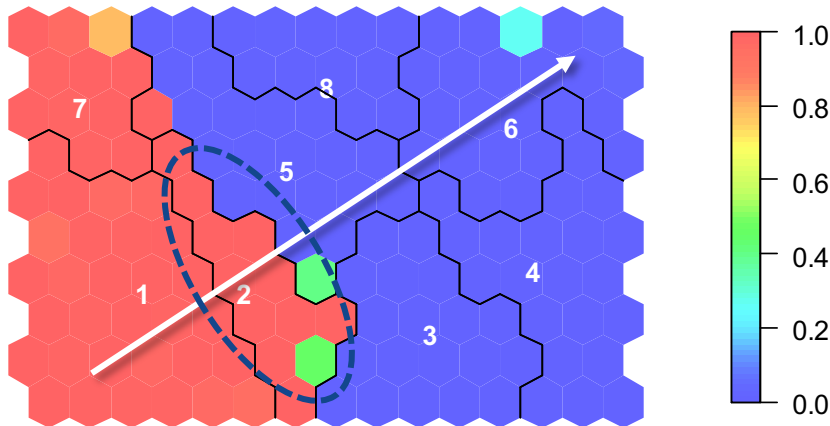
**Churning** moves from the bottom left to the top right:

- After 1 year: S1 & S7
- After 2 years: S2
- After 3 years: S3 & S5 (ca 40%)

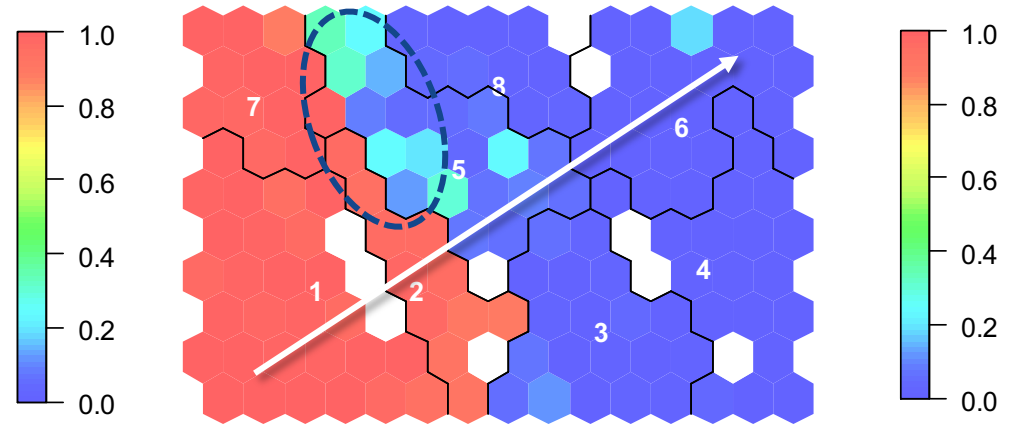
Churning after 1 year



Churning after 2 years

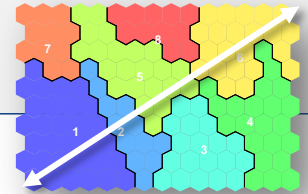


Churning after 3 years



White nodes indicate no students are present

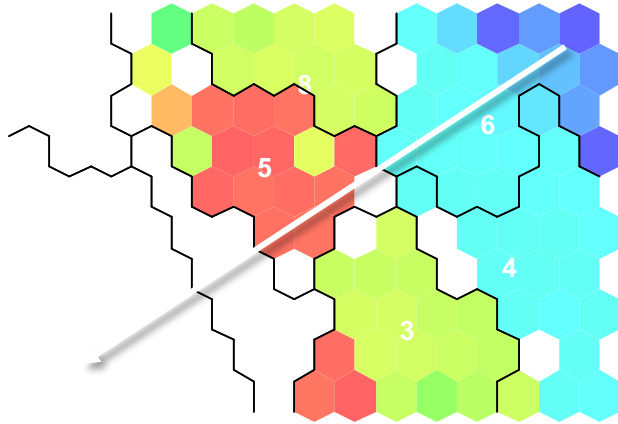
# SEGMENTATION ANALYSIS – DEGREE AFTER 3, 4 AND 5 YEARS



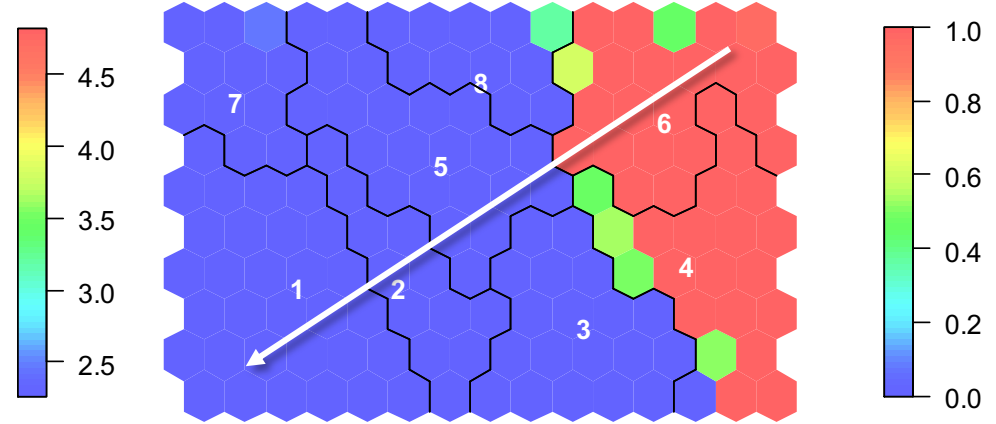
**Degrees** move from the top right to bottom left:

After 2.5/3 years: S6 & S4; after 4 years: S8 & S3; after 5 years: S3 & S5

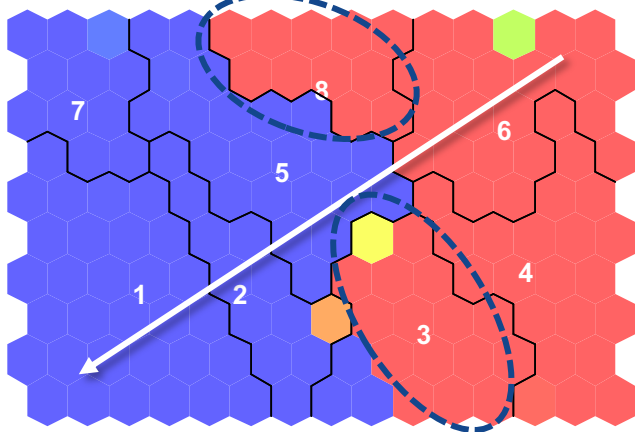
Years to degree



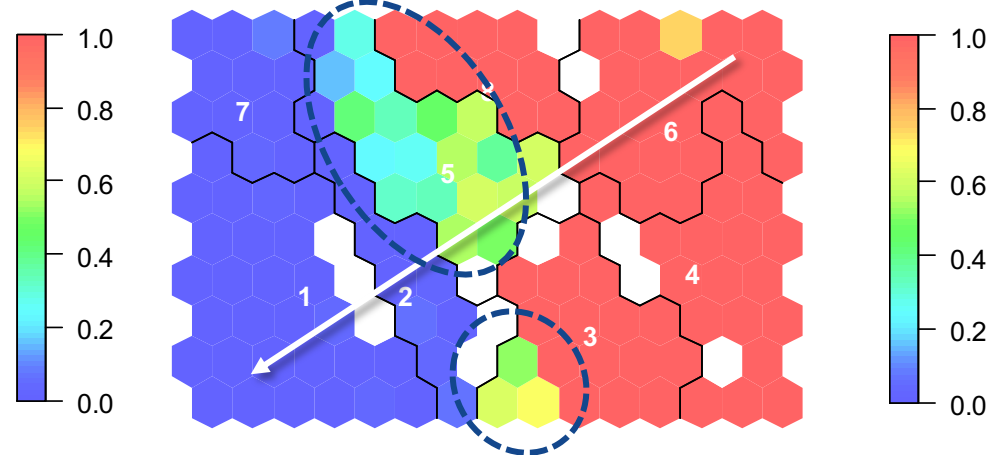
Degree in 3 years time



Degree in 4 years time



Degree in 5 years time



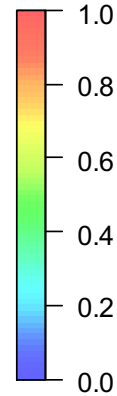
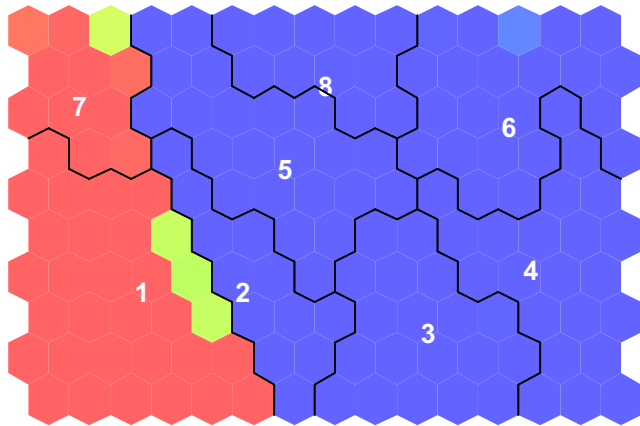


# SEGMENTATION ANALYSIS – CHURNING AFTER 1 YEAR

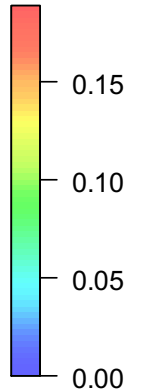
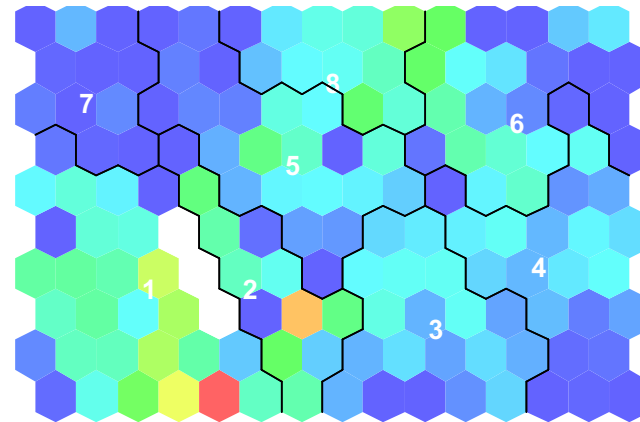


What are differences between segments 1 and 7?

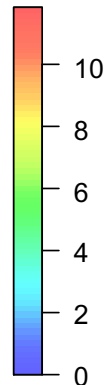
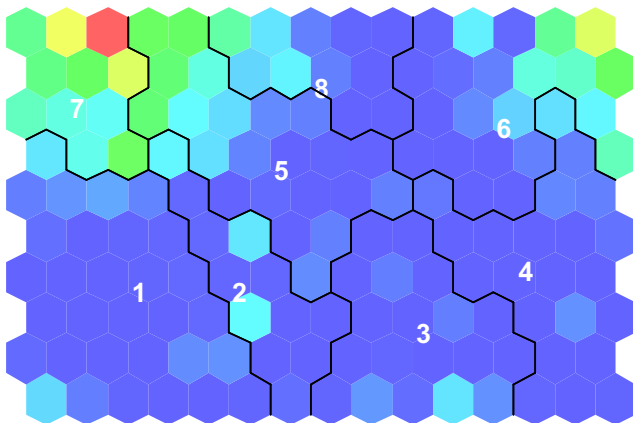
Churning after 1 year



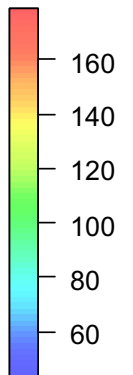
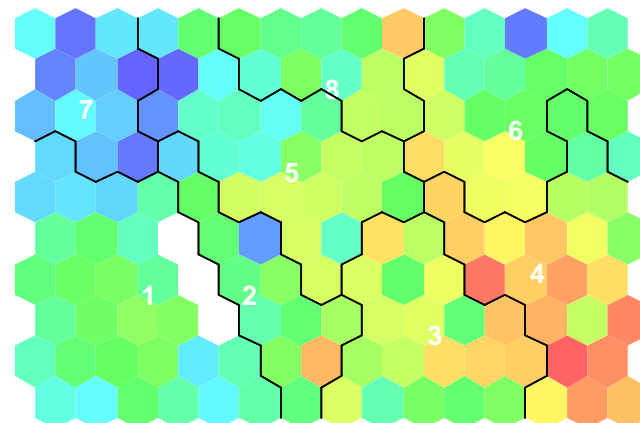
Not admitted to study program (lottery)



Years in higher education



Days between enrolment and September 1

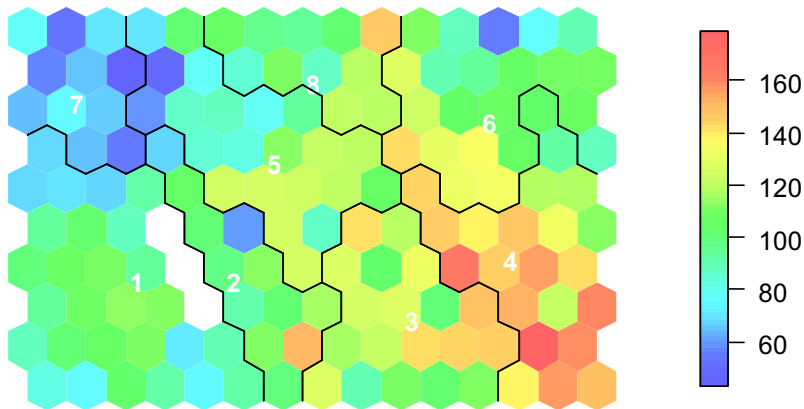


# SEGMENTATION ANALYSIS – CHURNING AFTER 1 YEAR

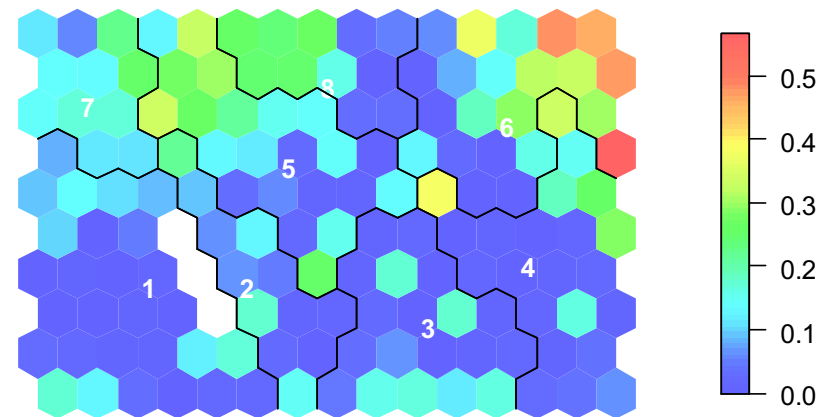


What **preparatory actions** do students take before enrolment?  
What could explain differences?  
What could this mean for policy making?

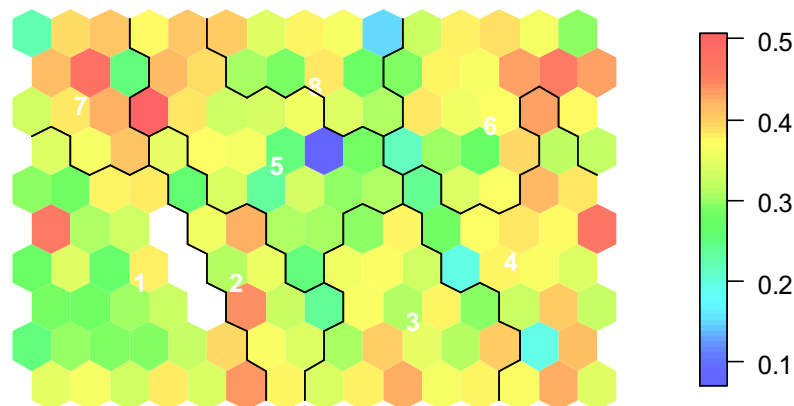
Days between enrolment and September 1



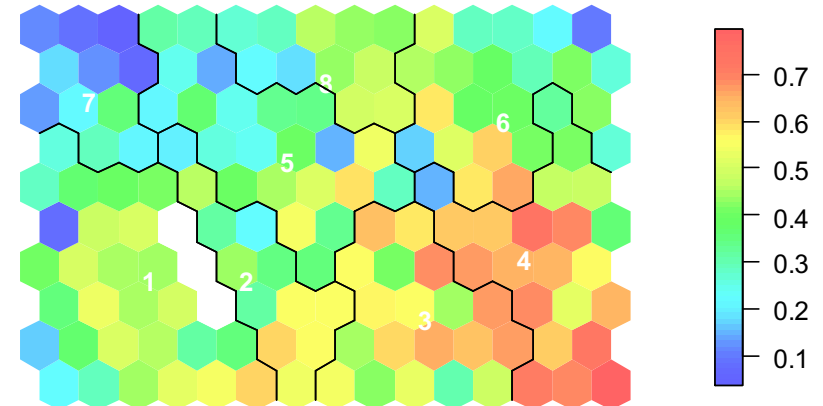
More than 1 exemption



Online brochure



Visited an open day



# IMPACT – WHAT VALUE DOES IT ADD TO THE VU COMMUNITY

## VU community



## We try to empower the VU Community

More possibilities to **reflect on the student life cycle** of students and appropriate counseling or interventions.  
 More possibilities to **research interventions**



Source: Ad Valvas

### VU Student Analytics Monitor - 2016 - Periode 3

Naam  
 Studentnummer  
 Faculteit\*/Opleiding  
 Academisch jaar 2016 - 2017

Geslacht  
 Leeftijd (op 1-10-2016)\*  
 Vooropleiding VWO  
 Uitvalkans opleiding vorig jaar\* 24%

Kans op uitval  
 Periode 3  
 15,7%

#### Verloop kans op uitval

Voor de start 14,0%	Periode 1 17,1% (12 EC)	Periode 2 19,6% (18 EC)	Periode 3 15,7% (24 EC)
------------------------	----------------------------	----------------------------	----------------------------

Motivatie		Gem.	Top
• Oriëntatie komt voor	Ja	97%	97%
• Meeloopdag	Nee	64%	64%
• Open dag	Ja	96%	96%
• Brochure	Nee	18%	18%
• Vertrouwen in studiesucces	10	8	9
• Proactief studeergedrag	7	7	8
• Uren werk en nevenactiviteiten	20	14	4
• Volgt dubbele studie bij de VU	Nee	1%	1%
• Aantal dagen van tevoren aangemeld	331	152	303
• Aantal studies in de afgelopen 2 jaar	1	1	1
• Reistijd OV naar de VU (minuten)	109	59	20

Prestaties		Gem.	Top
• Gemiddeld cijfer middelbare school	6,9	6,8	7,8
• Wiskundecijfer middelbare school	7	6,7	8,4
• Uitslag taaltoets	92	79	92
• Hoogste toetsresultaat	8,5	7,5	9,7
• Aantal EC*	24	24	30
• Aantal EC deelresultaten*	0	0	0
• Aantal no-shows op tentamens*	0	0	0

Datum aanmelding: 06-10-2015  
 Datum inschrijving: 01-09-2016  
 Datum uitschrijving: 31-08-2017

SAM2016 v10; gegevens bijgewerkt op 16-02-2017 10:30 uur

Groen = bovengemiddelde/positieve score; oranje = gemiddelde score; rood = benedengemiddelde/negatieve scores

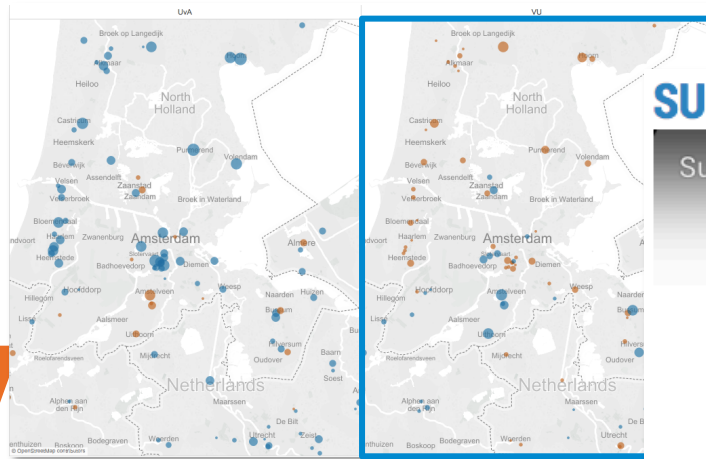
\* Variabele weegt mee in kans op uitval in de laatste periode

# IMPACT – WHAT VALUE DOES STUDENT ANALYTICS ADD TO THE VU?

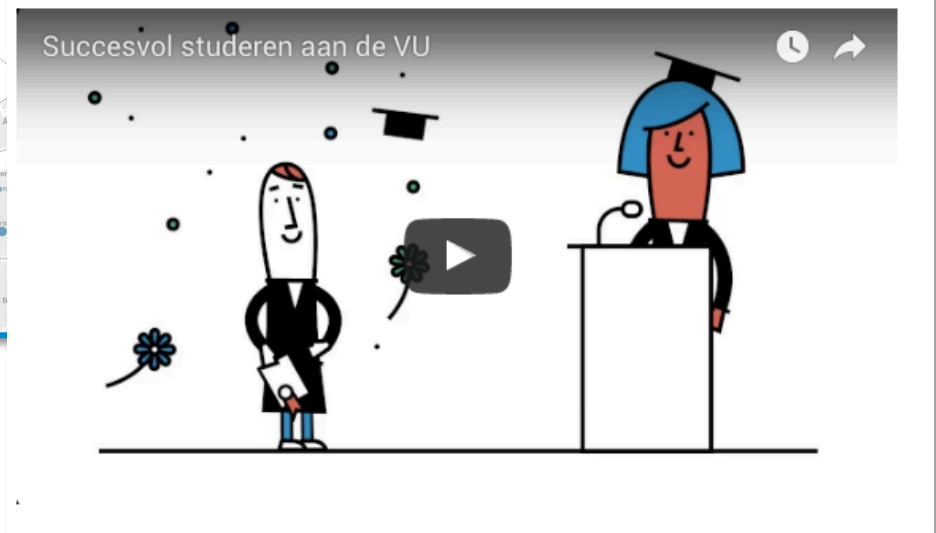
## VU community



**We try to empower the VU Community**  
**Improved flow** of students from their former education  
**Targeted actions and nudging**, but still for the **entire population.**



## SUCCESSVOL STUDEREN

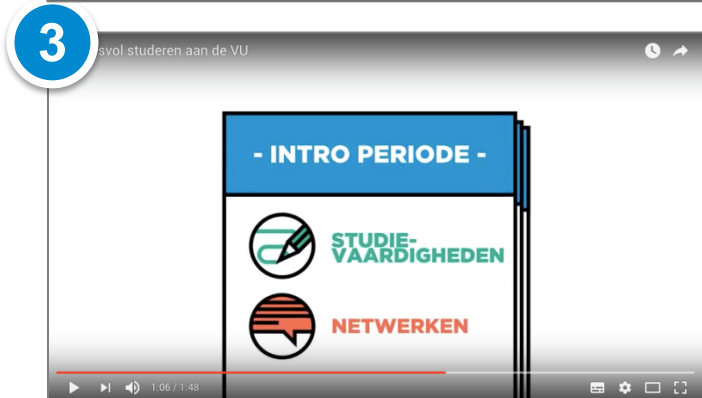
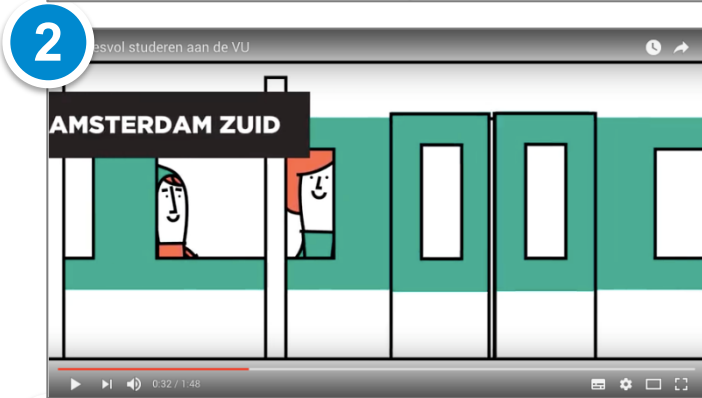


## SUCCESVOL STUDEREN



[Youtube: Succesvol studeren aan de VU](#)

# IMPACT – WHAT VALUE DOES STUDENT ANALYTICS ADD TO THE VU?



## Application of Student Analytics

1. Wie zich goed oriënteert valt minder vaak uit en haalt sneller een diploma (0:22)
2. (...) Ga dan op pad (0:32)
3. Er komt nogal veel op je af als je gaat studeren. Heb je eenmaal gekozen, dan zorgen wij dat je start zo soepel mogelijk verloopt. (1:03)  
Daarom organiseren wij een introductieperiode met handige workshops en colleges (1:09)

# APPLICATION - WE ANALYSE THE DATA AT SEVERAL LEVELS

**Primary reason**  
Can we create  
a grading table ?



VU

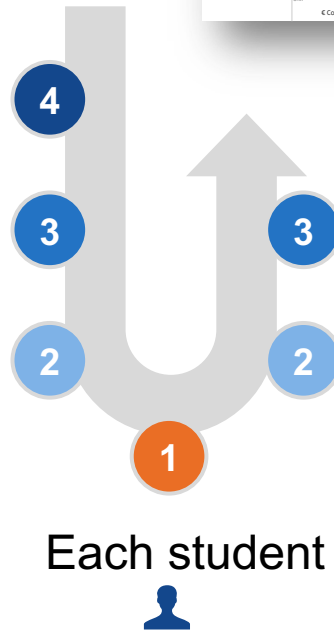


Study program

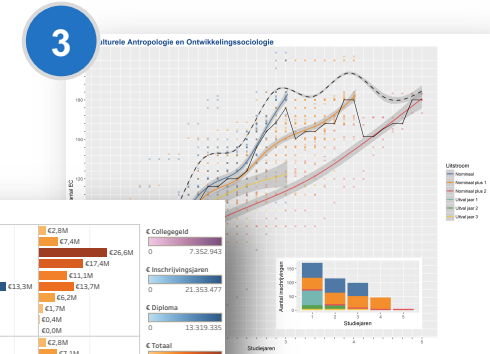


Course

*Drill down*



Each student



Inschrijvingscijfers - Cohort 2017

Year	SA	10MA	10M	20M	30M	DM	10M	15M	CO,OK	CO,000,OK
2017	€2,8M	€0,0M	€0,0M	€0,0M	€0,0M	€2,8M	€1,4M	€26,6M	€7,352,943	€0,0K
2018	€7,4M	€0,0M	€0,0M	€0,0M	€0,0M	€7,4M	€1,4M	€26,6M	€7,352,943	€0,0K
2019	€6,2M	€0,0M	€0,0M	€0,0M	€0,0M	€6,2M	€1,4M	€26,6M	€7,352,943	€0,0K
2020	€3,9M	€0,0M	€0,0M	€0,0M	€0,0M	€3,9M	€1,4M	€26,6M	€7,352,943	€0,0K
2021	€1,3M	€0,0M	€0,0M	€0,0M	€0,0M	€1,3M	€1,4M	€26,6M	€7,352,943	€0,0K
2022	€0,0M	€0,0M	€0,0M	€0,0M	€0,0M	€0,0M	€1,4M	€26,6M	€7,352,943	€0,0K
2023	€0,1M	€0,0M	€0,0M	€0,0M	€0,0M	€0,1M	€1,4M	€26,6M	€7,352,943	€0,0K
2024	€0,0M	€0,0M	€0,0M	€0,0M	€0,0M	€0,0M	€1,4M	€26,6M	€7,352,943	€0,0K
2025	€0,0M	€0,0M	€0,0M	€0,0M	€0,0M	€0,0M	€1,4M	€26,6M	€7,352,943	€0,0K
2026	€0,0M	€0,0M	€0,0M	€0,0M	€0,0M	€0,0M	€1,4M	€26,6M	€7,352,943	€0,0K
<b>Totaal</b>	<b>€2,8M</b>	<b>€0,0M</b>	<b>€0,0M</b>	<b>€0,0M</b>	<b>€0,0M</b>	<b>€2,8M</b>	<b>€7,3M</b>	<b>€22,9M</b>	<b>€0,0K</b>	<b>€28,994,5K</b>

Curriculum



Study path

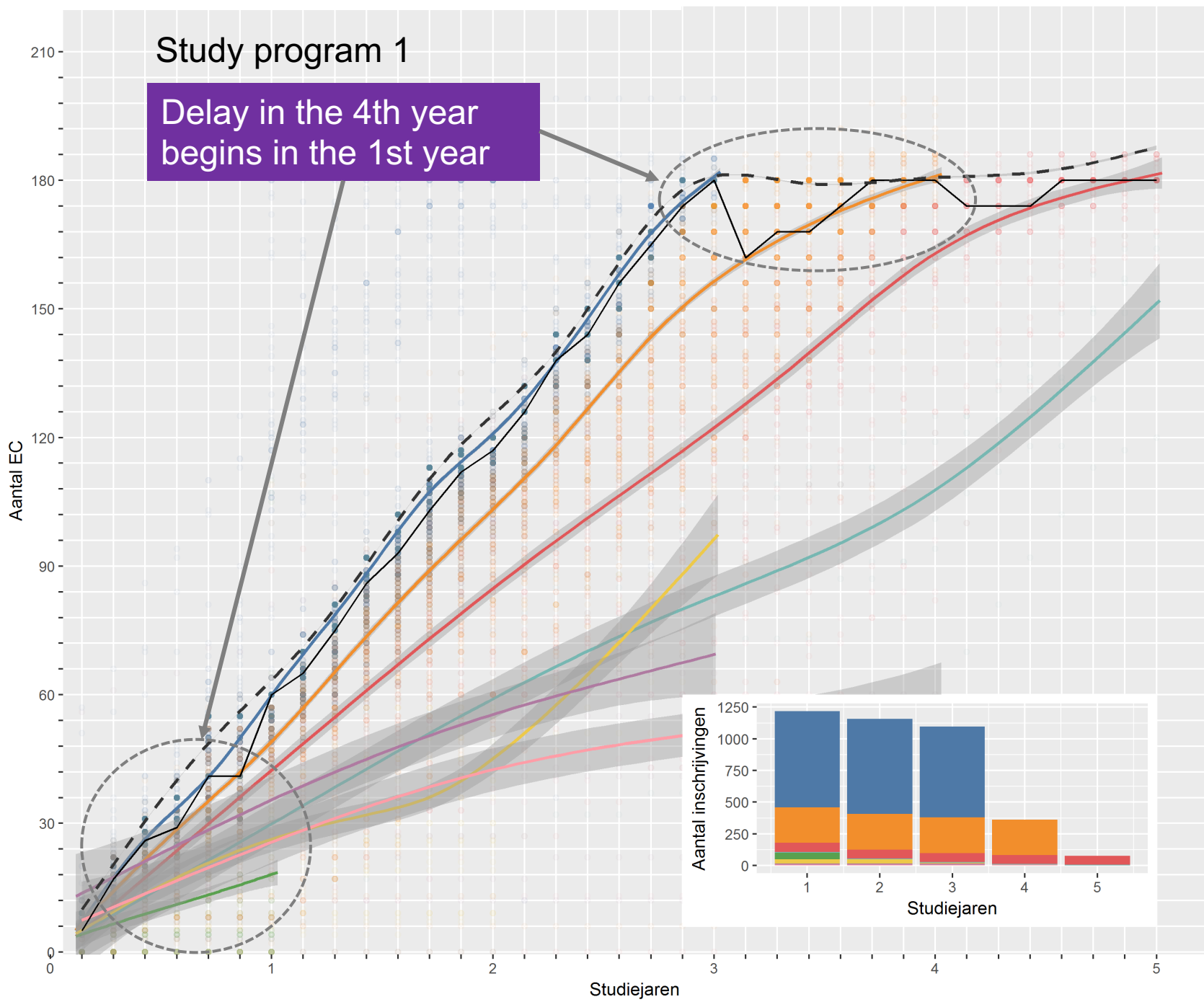


*'Drill' up*

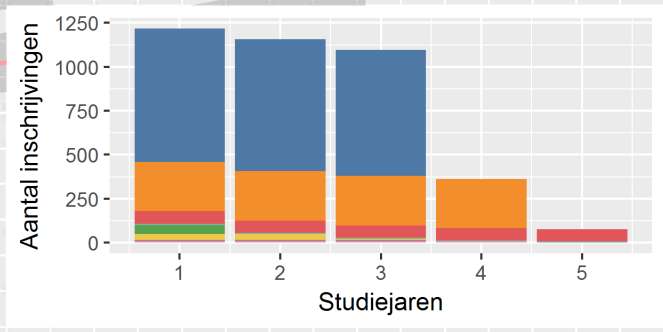


# Study program 1

Delay in the 4th year begins in the 1st year

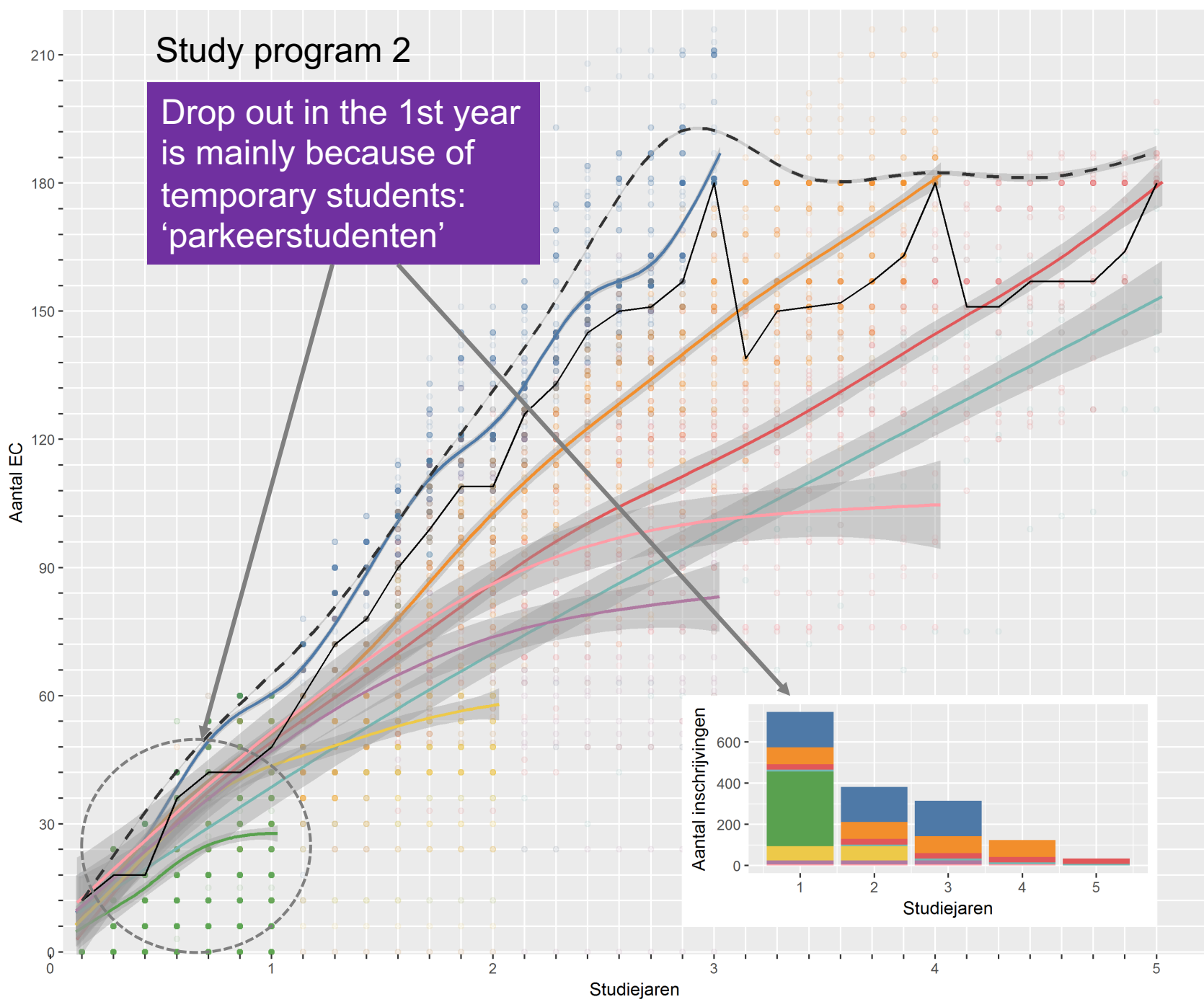
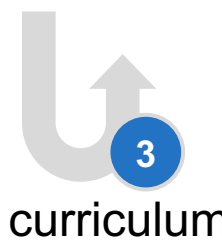


- Uitstroom**
- Nominaal
  - Nominaal plus 1
  - Nominaal plus 2
  - Nominaal plus 3
  - Uitval jaar 1
  - Uitval jaar 2
  - Uitval jaar 3
  - Uitval jaar 4



# Study program 2

Drop out in the 1st year is mainly because of temporary students: 'parkeerstudenten'



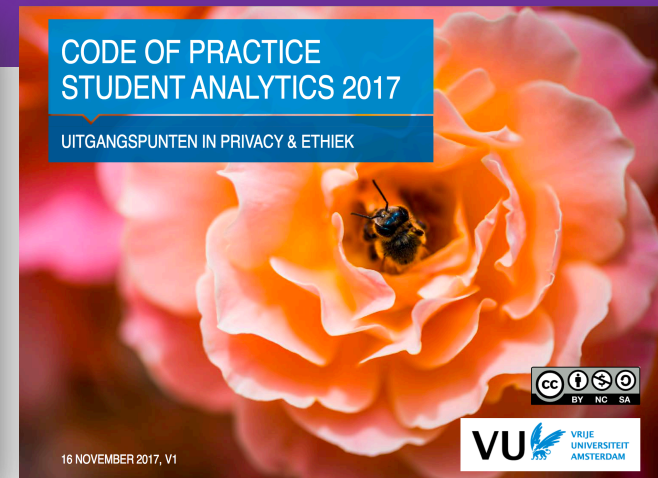
- Uitstroom
- Nominaal
  - Nominaal plus 1
  - Nominaal plus 2
  - Nominaal plus 3
  - Uitval jaar 1
  - Uitval jaar 2
  - Uitval jaar 3
  - Uitval jaar 4



# CODE OF PRACTICE

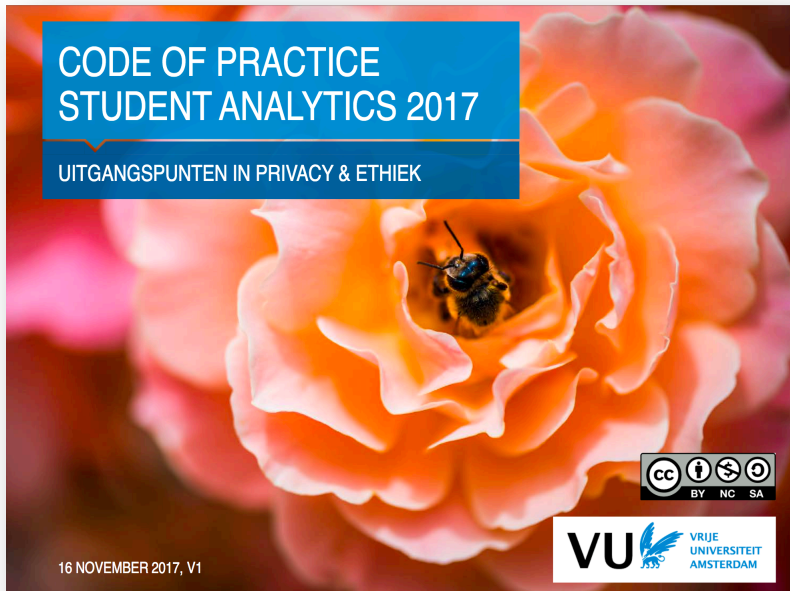


## Code of Practice Privacy & Ethics





In February 2018 the VU published a **Code of Practice Privacy & Ethics** for Student Analytics



Cover photo: [Diana Măceșanu](#) on [Unsplash](#)

This Code of Practice intends to inform:

- I. **Students** about Student Analytics and its intentions, and in what way their personal data is processed and for what purposes it is analysed.
- II. **Employees and researchers** how Student Analytics is allowed to be analysed and used within the VU and what safeguards must be in place.

## Code of Practice

What does the VU stand for in the development and application of Student Analytics



To elaborate on several subjects and dilemmas we organised a meeting with students and employees



## A. Consent

Responsibility

Transparency & **Consent**

Access



## B. Enabling positive interventions

Privacy

Validity (scientific quality assurance)

**Enabling positive interventions**



## C. Minimise adverse impacts

**Minimise adverse impacts**

Stewardship of data



## The ethical guidelines are linked to the core values of the VU



### Student interests

- A responsible and essential part of our educational practice
- Impartial and inclusive participation in education
- Privacy compliance and careful consideration of advantages and disadvantages

RESPONSIBLE



PERSONAL



OPEN



### Student retention

- Improvement of evidence based counselling, policy making, transition to higher education and support of scientific research

### Transparency

- Use of data in daily practice and decision making
- Instructions to users
- Individual use of prediction models only with student consent



For each domain the purposes and privacy guidelines are elaborated



1. **Vision**
2. **Ethical basis**
  - a. Student interests
  - b. Student retention
  - c. Transparency
3. **Domains & purposes**
  - a. Policy making
  - b. Student counselling
  - c. Scientific research
  - d. Transition to higher education
4. **Privacy**
  - I. Policy making
  - II. Student counselling
  - III. Scientific research
  - IV. Transition to higher education

I. Policy making



II. Student counselling



III. Scientific research



IV. Transition to higher education



**Components**

1. What data, special personal data, purpose
2. Legal basis
3. Special conditions
4. Information to students
5. Responsibility
6. Access
7. Sharing with third parties
8. Security
9. Storage period
10. Student rights

1

2

3



“The best technology  
is human-empowered  
and computer assisted.”

*- Prof. Gary King*



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(Vervolg)



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