

# Is the PhD funding period sufficiently long to successfully complete a PhD – the situation in Flanders (Belgium)

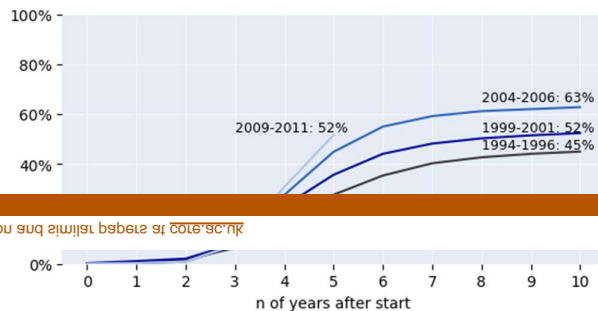
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## HOW LONG DOES IT TAKE TO OBTAIN A PHD?

In Flanders doctoral funding is usually provided for a time span of four years given the assumption that completing a PhD should be possible within that time frame. Only a small part of the fellowships are awarded for three years only, namely the Innovative Training Networks of the Marie Skłodowska-Curie actions. Exceptions in the other direction are the assistants who combine research with teaching activities and thus need more time to complete the PhD. However, excluding the latter, we observe that only a minority of the junior researchers obtain their PhD within four years. Indeed, as can be observed in Figure 1, overall only 52% obtained the PhD within five years after start (result for the researchers who started their PhD in 2009-2011). Comparison with the preceding cohorts indicates that not only success rates have improved over time but that the time to degree is getting shorter.

Figure 1: The share of researchers obtaining the PhD n years after start for different cohorts of starting junior researchers\*



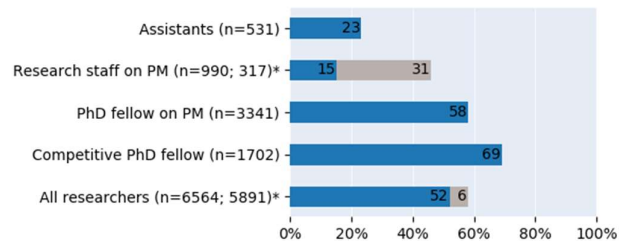
\* We consider all researchers, i.e. competitive PhD fellows, assistants and PhD fellows and research staff on project means.

Considerable differences exist between the researcher's funding type (Figure 2, results for the researchers who started their PhD in 2009-2011) ( $\chi^2(3, N=6564)=969.80, p<0.001$ ): among the competitive PhD

fellows 69% obtained their PhD within five years after start; this was the case for 58% of PhD fellows and 15% of research staff (both funded by project means). As can be expected low five-year success rates are observed for assistants (23%).

So research staff on project means have the lowest five-year success rates, but not all of them are aiming for a PhD. When including only those with a PhD registration (only possible for the cohorts starting from 2006-2007 onwards) their five-year success rates rise up to 46%. The differences between the funding types remain significant ( $\chi^2(3, N=5891)=368.04, p<0.001$ ).

Figure 2: The share of researchers obtaining the PhD within five years after start broken down by the dominant funding type - junior researchers who started their research in 2009-2011



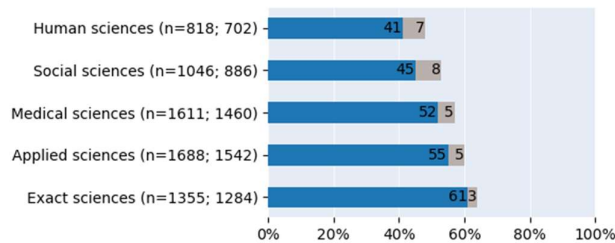
\* If we consider the research staff on project means with a PhD registration, their five-year success rate increases up to 46.1% (n=317) and the overall five-year success rate up to 58% (n=5891, combination of the blue and grey bars). In the past data however, PhD registration information was not complete, so for making comparisons over time as in Figure 1 we include the entire sample of research staff regardless of whether there was a PhD registration or not.

there are also differences with respect to the scientific cluster in which the research is carried out: in exact sciences 61% had obtained the PhD within five years after start, in humanities this was 41% (Figure 3).

These results, taken from the database Human Resources in Research Flanders (HRRF, see further for more information), indicate that the planned funding period may be too short for at least a part of the researchers to cover the entire process of realising a PhD. For the interpretation of the above mentioned results it is however important

to take into account the method used to determine the moment of both PhD start and PhD completion. To determine the moment of PhD start we use the following two dates: the first PhD registration date and the date of the first appointment as a junior researcher; the first one in time is the moment of PhD start. This means that the period before a researcher receives his/her core funding, if any, is included in the time to realise a PhD. The moment of PhD completion on the other hand is the date of the public doctoral defence, which can take place three to six months after the PhD was submitted (situation for Flanders).

Figure 3: The share of researchers obtaining the PhD within five years after start broken down by scientific cluster - junior researchers who started their research in 2009-2011



The blue bars show the results when including the entire pool of research staff ( $\chi^2(4, N=6518)=108.85, p<0.001$ ); the combination of the blue and grey bars present the results when including the research staff with a PhD registration only ( $\chi^2(4, N=5874)=62.46, p<0.001$ ).

## SCOPE OF THIS BRIEF

To obtain more insights into whether the length of the funding period is sufficient or not to complete the PhD we will take a look at the funding situation at the moment of the public doctoral defence at the Flemish universities:

1. Does the PhD candidate still receive PhD research funding?
2. If not, how long was the time between PhD research funding discontinuation and the public doctoral defence?
3. To what extent has there been an extension of the PhD research funding period before the public doctoral defence leading to a change of PhD researcher type (for example from competitive PhD fellow to research staff on project means)?
4. Were there any differences between the core PhD research funding types with respect to the three previous points?

## MARKING OUT DATA SOURCE AND DEFINITIONS

The HRRF database contains the appointments of all researchers associated with one of the five Flemish universities since 1990. In addition, it also includes all doctoral enrolments and public defences. The latest update on which this brief is based contains the data of the academic year 2016-2017. The main goal of this database is to monitor academic careers in Flanders. In the HRRF we usually work with a 'dominant funding' type which is also used in Figure 2. It is determined by using a hierarchic tree (appendix 1) and is slightly different from the 'core funding' type that we will use for the further analysis in this brief. The 'core funding' type is determined by looking at all the different funding types that a researcher has had during the PhD track (from start

until doctoral defence) and taking the funding type that covered the longest period. For determining the dominant funding type the time element comes only at the second place. For example, for a researcher receiving funding for two years as an FWO PhD fellow combined with three years employment as research staff on other project means, the dominant funding type will be FWO PhD fellow, while the core funding type will be research staff on other project means. Overall, the dominant and the core funding type are largely the same, but for the purpose of the current brief it is more correct to use the core funding type.

For the comprehension of the various funding types and the abbreviations used, Table 1 provides some explanatory information.

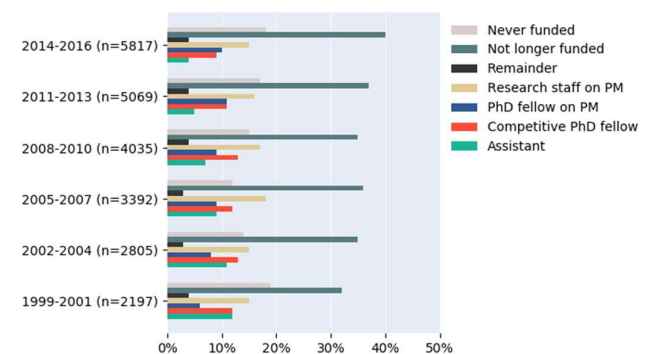
Table 1: Funding types: definitions and abbreviations used

FWO PhD fellow	Holder of a doctoral fellowship awarded by the FWO for fundamental research.
SB PhD fellow	Holder of a Doctoral fellowship for Strategic Basic (SB) research nowadays awarded by the FWO (since 1/1/2016) and formerly by the IWT (until 31/12/2015). Given the time frame used in this present brief this category consists solely of SB fellows funded by the IWT.
Baekeland	Holder of a doctoral fellowship awarded by VLAIO (formerly known as IWT) to build bridges between research and industry.
BOF PhD fellow	Holder of a doctoral fellowship awarded by the universities' special research fund (BOF).
Competitive PhD fellow	Includes the previous four groups: Baekeland and BOF, FWO and SB doctoral fellows.
Assistant	Research assistant combining teaching duties with research duties.
PhD fellow on project means (PM)	Holder of a doctoral fellowship funded by fundamental or other project means.
Research staff on project means (PM)	Researcher appointed as research staff funded by fundamental or other project means.
Remainder	This is a group consisting of staff that do not belong to one of the categories described above: teaching assistants, members of staff on detached duty, lecturers, visiting professors, substitutes, ...

## RESULTS

We start looking at the details of the funding situation at the moment of the public doctoral defence (Figure 4).

Figure 4: Funding situation at the moment of the public doctoral defence for different cohorts of defended PhDs

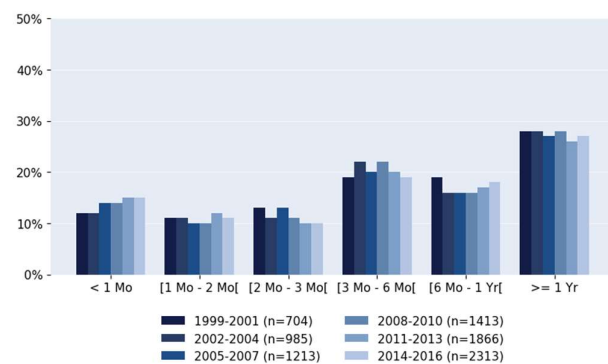


We observe an important share of researchers who received PhD research funding, but who were no longer funded as a researcher at a Flemish university at the moment of the public PhD defence (grey-blue

bar). Remarkably this share does not decrease over time, on the contrary, it rather presents a small but significant increase from 2011-2013 onwards ( $\chi^2(10, N=23315)=177.97, p<0.001$ ). In 2014-2016 it reaches up to 40%. Inversely the share that still received PhD research funding at the moment of the public PhD defence is declining in that same period (from 49% in 1999-2001 to 42% in 2014-2016). Among these, research staff funded on project means make out the largest group (15% among defended PhDs in 2014-2016).

So this graph indicates that for about half of the researchers who finally obtained the PhD, the funding period was too short to finalize the PhD including the public doctoral defence: for 40% research funding stopped before the PhD was defended and 15% was funded as research staff, a funding type that is usually added to the career track to extend the PhD period. Of course it is important to realise that for the no longer funded part, PhD research funding might have stopped shortly before defending the PhD. Indeed for somewhat more than one in three the funding stopped within three months before defending the PhD (Figure 5). Taking into account the time lapse between the actual PhD submission and the final public defence, this can still be considered as an on-time successful PhD completion. On the other hand somewhat more than one in four defended the PhD more than one year after funding discontinuation. There are no important changes over time.

Figure 5: Time lapse between the discontinuation of the PhD research funding and the public doctoral defence for researchers who are no longer funded at the moment of the doctoral defence – different cohorts of defended PhDs



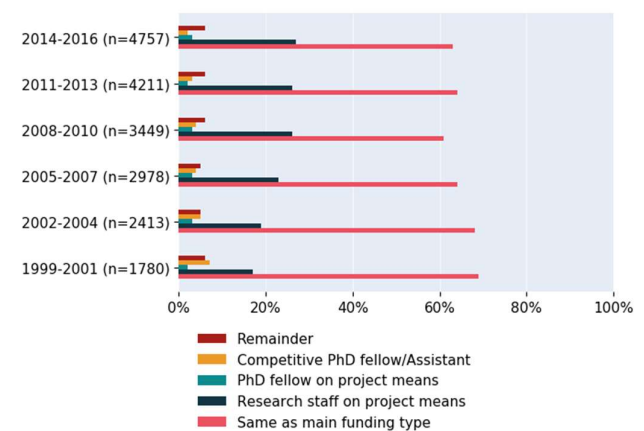
In Figure 4 we added for the sake of completeness the PhDs defended by researchers who never received any funding through the typical pathways. They are shown in the light grey bars. Among the completed PhDs in 2014-2016 this group covered 18%. It concerns researchers who are appointed by the academic university hospitals, non-Belgian researchers who are funded by their home institutions or by specific funding types that cannot be traced in the regular universities' staff databases (e.g. VLIR-UOS), researchers who work outside university and carry out a PhD within the framework of their job (different from Baekeland) and researchers who carry out their research in their free time. In the further results however we will focus on the group that received PhD research funding through the typical pathways at a certain point during their PhD track.

When we exclude this group of researchers who never received PhD research funding, we observe that 78% of the researchers who obtained

their PhD in 2014-2016 were still being funded at the time of the public doctoral defence or received funding until at least six months before the defence; for the remaining 22% the PhD research funding had stopped at least six months before the public doctoral defence. However for the former group this does not necessarily mean that the original funding period was sufficiently long. It may have been extended to allow more time to finalise the PhD. In order to verify that we look into what extent the last research funding type coincides with the core funding type (Figure 6). When looking at these results it is important to bear in mind that we only look at changes in funding situation that lead to a different statute. For example, a researcher employed as research staff for whom the funding source changed but who remains employed as research staff is categorised in 'Same as core funding type'.

More than 60% of the researchers ends his/her PhD track in the same funding type as his/her core funding type (pink bars). However we observe a slight but significant decrease over time: in 1999-2001 69% ended the PhD track with the core funding type whereas this was 63% in 2014-2016 ( $\chi^2(20, N=19588)=233.87, p<0.001$ ). So respectively 31% and 37% extended the core PhD research funding by other means. Research staff on project means was the main backup funding type (dark blue bars) (27% in 2014-2016).

Figure 6: The last PhD research funding situation broken down by different cohorts of defended PhDs

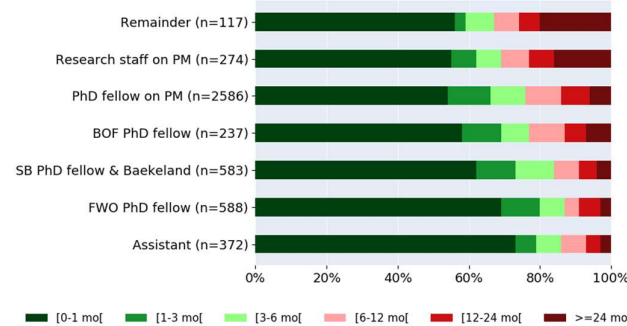


As was shown in Figure 2 PhD success rates vary between the different funding types. This is repeated in Figure 7, where we observe important differences between the core funding types when looking at the time lapse between the PhD research funding discontinuation and the public doctoral defence. Among assistants, FWO PhD fellows, SB PhD fellows and Baekeland fellows at least 84% received PhD research funding until at least six months before the public doctoral defence (green part of the bars). Among BOF PhD fellows this was 77%, among PhD fellows on project means 75% and among research staff on project means 69% ( $\chi^2(6, N=4757)=83.88, p<0.001$ ). The remainder group scores worst with only 67% receiving PhD research funding until at least six months before the public doctoral defence.

When looking at the different cohorts of researchers obtaining their PhD we only observe for the PhD fellows on project means a steady and

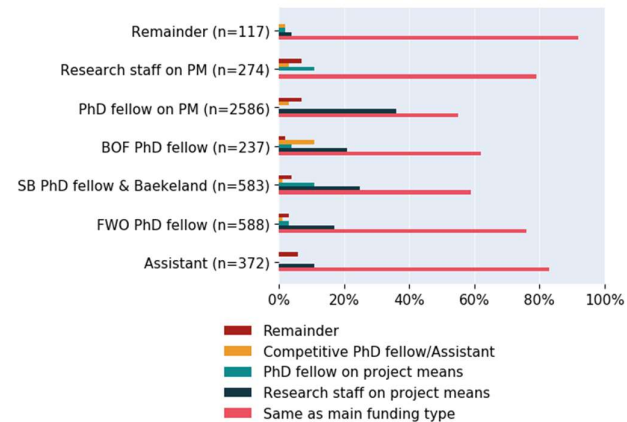
significant decrease of the share of researchers receiving PhD research funding until at least six months before the public doctoral defence: it reached 84% in 1999-2001 (n=359) and ended up at 75% in 2014-2016 (n=2586) ( $X^2(5, N=8458)=38.11, p<0.001$ ). As PhD fellows on project means make up the majority of the group of researchers and their share among the total group of researchers has increased substantially, this decline is very likely the cause of the overall decrease of researchers receiving PhD research funding until at least six months before the public doctoral defence.

Figure 7: The number of months between the discontinuation of the PhD research funding and the public doctoral defence broken down by core funding type – PhDs defended in 2014-2016



Next we look at the type of funding in which the junior researcher ends his/her PhD track: to what extent does this coincide with the core funding type or not? We take a look at the different core funding types for the cohort of obtained PhDs in 2014-2016 (Figure 8).

Figure 8: The last PhD research funding situation broken down by the core funding type (Y-axis) – PhDs defended in 2014-2016

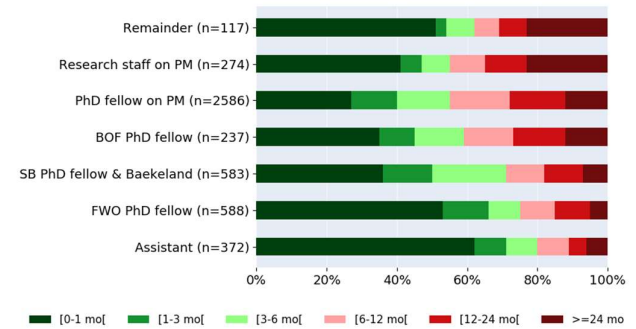


Again there are significant differences between the core funding groups ( $X^2(24, N=4757)=763.76, p<0.001$ ). We observe the highest funding shifts among PhD fellows on project means, among SB PhD fellows (including Baekeland) and among BOF PhD fellows, respectively 45%, 41% and 38%. Research staff on project means is the most important back-up funding, but among the SB PhD fellows (including Baekeland) we also observe 11% that ends his/her PhD track appointed as PhD fellow on project means. Among BOF PhD fellows 11% ends his/her PhD track funded as a competitive PhD fellow/assistant. For the latter group

however this is mainly caused by a shift from a competitive BOF fellowship to competitive BOF research staff.

We end this analysis by looking at how long before the public doctoral defence the core funding ended. The results are shown in Figure 9. Overall 62% of the researchers received their core funding until at least six months before defending their PhD (green part of the bars). Again there are important differences between the core funding types ( $X^2(6, N=4757)=169.74, p<0.001$ ). Assistants and FWO PhD fellows have the best scores with respectively 80% and 75%. Both research staff and PhD fellows on project means scored worst with 55% who defended the PhD maximum six months after the core funding had ended. Mainly for PhD fellows on project means this implies that a large number of junior researchers would need to finalise their PhD without receiving further research funding: indeed 28% defends the PhD one year or more after their core PhD funding type ended. As has been shown in this brief (Figure 7 and Figure 8) an important part of these receive an extension to their core funding. That finally leads to 'only' 15% of the PhD fellows on project means who defended the PhD one year or more after the PhD funding stopped (Figure 7).

Figure 9: The number of months between the discontinuation of the core PhD research funding and the public doctoral defence broken down by core funding type – PhDs defended in 2014-2016



## DISCUSSION

In this brief we had a closer look at the funding situation at the moment of the public doctoral defence to find out to what extent the PhD funding period is sufficiently long to allow junior researchers to successfully complete their PhD.

We carried out this analysis using the HRRF database containing data from 1990-1991 until 2016-2017.

As we can deduce from the figures that we use to monitor the PhD success rates, most researchers need more time than the time usually covered by PhD research funding, namely four years. Indeed, as shown in Figure 2, only 58% obtained the PhD within five years after start, with important differences between the dominant funding types. However, the methods used to determine these success rates, although useful for the monitoring of the PhD track, do not provide enough details for funding systems and organisations to gain more insight into whether the funding period is sufficiently long or not. The analyses carried out in the current brief allow us to do so.

We learned that an important part of the researchers was no longer funded at the moment of the public doctoral defence (40% of all the

researchers having obtained the PhD in 2014-2016 and 49% after excluding the researchers who never received funding through the typical pathways) (Figure 4). However, the period between the PhD submission and the final public PhD defence can take up to three to six months. Hence we take into account a time margin of six months; this means that researchers defending their PhD maximum six months after the discontinuation of PhD research funding are considered as researchers for whom the funding period was sufficiently long. We first look at the core funding, i.e. the funding type in which most time was spent during the PhD track and that can be considered as the funding assigned in order to successfully obtain a PhD (Figure 9). Overall the core funding period was sufficiently long for 62% of the researchers. Assistants had the best score (80%), followed by FWO PhD fellows (75%) and SB PhD fellows (including Baekeland) (71%) (results for the most recent cohort of obtained PhDs in 2014-2016). For both PhD fellows and research staff on project means the period was sufficiently long for only 55%.

Altogether the core funding period seems suboptimal to successfully complete the PhD for 38% of the PhD researchers. Of course, researchers are only humans and there may be several reasons why it was impossible to obtain the PhD within the core funding period. We observe that to some extent back-up funding is provided (Figure 6, Figure 7 and Figure 8). This is mainly done by the universities through appointments as research staff. There is no obligation to do so, and, as far as we know, there is no policy in this respect. It is expected that the decision to provide back-up funding may depend on a combination of various factors, such as the reason why a PhD was not completed within time, the relation of the researcher with the research group and/or the supervisor, but also the financial situation of the research group and/or project, given that an appointment as research staff causes a substantial financial burden.

Anyhow, overall, in the most recent cohort, 37% of the researchers received an addition to the core funding (Figure 6). Among PhD fellows on project means we observed the largest share who received this addition (45%), whereas we observed the smallest share among assistants (17%) and FWO PhD fellows (24%) (Figure 8). Due to this addition to the core funding we finally obtain a higher share of researchers for whom the total funding period was sufficiently long to successfully obtain a PhD, namely 78% received PhD funding until at least six months before the public doctoral defence (Figure 7). Inversely, for somewhat more than one on five researchers the PhD funding period was too short (actually, that share is even bigger, considering we're only looking at the PhDs that were ultimately defended).

But does this necessarily mean that the PhD funding period should be longer? We tend to answer 'no' to this question. The Flemish research funding system is known to be comparable to the systems of the surrounding European countries or even has a somewhat longer core funding period (1). The Flemish PhD success rates have increased continuously since we started monitoring the junior researchers and they are comparable to other countries (2), (3). And the fact that PhD students needed more time to finalise their PhD than was provided by the funding is also observed in other countries (4). It is important to

realise that the overall results are to a large extent determined by the PhD fellows on project means who make up more than half of the group of defended PhDs and this group not only scores worst (more back-up funding is needed and even then the funding period is too short), but their results also deteriorate over time. It is not entirely surprising that PhD fellows on project means on average need more time to complete their PhD compared to competitive PhD fellows: the researchers in the latter group are expected to be already more determined about the direction of their research when their PhD funding eventually starts. When working on project means however usually the direction of the personal role in the research project still has to be developed when PhD funding starts. Also researchers appointed as PhD fellows on project means may be assigned more tasks and duties that are not directly related to their individual PhD. It is thus not necessarily the case that the funding period is too short, but that the circumstances in which the PhD needs to be completed are sub optimal. It is an interesting observation that the share of PhD fellows on project means for whom the PhD funding period is too short is increasing somewhat. We did not expect to see this given that time to degree is not deteriorating over time. A possible explanation is their sharply growing number over time (nearly 700 PhD fellows on PM in 1993-1996 over 2534 in 2000-2004 up to 5262 in 2013-2016) (5). So more and more PhD fellows start working on project means, but it might have become more difficult to provide additional PhD research funding to these researchers to the same extent as 15 years ago.

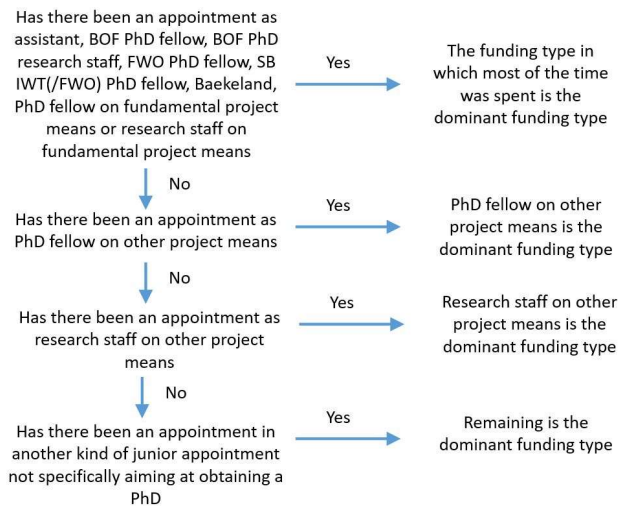
This brief provides detailed data on the funding situation at the public doctoral defence that can serve policy makers, funding organisations and institutions. We can conclude that the length of the funding period is sufficiently long for the majority of the assistants, FWO PhD fellows and SB PhD fellows (Baekeland included). The other researchers rely more on back-up funding to extend the PhD period and an important share among these do receive this back-up funding.

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## APPENDICES

### Appendix 1: Hierarchic tree used to determine the dominant funding type in the HRRF



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