

---

## **DIR25FW\100018**

Genetics plays key role in informing successful conservation strategies. Training Madagascan early career researcher Dr. Onja Razanamaro in genetic techniques will build in-country capability and capacity in these skills. Onja will learn innovative genetic tools to prevent the extinction of two threatened mutualistic partners: a baobab and its bat pollinator.

## PRIMARY APPLICANT DETAILS

---

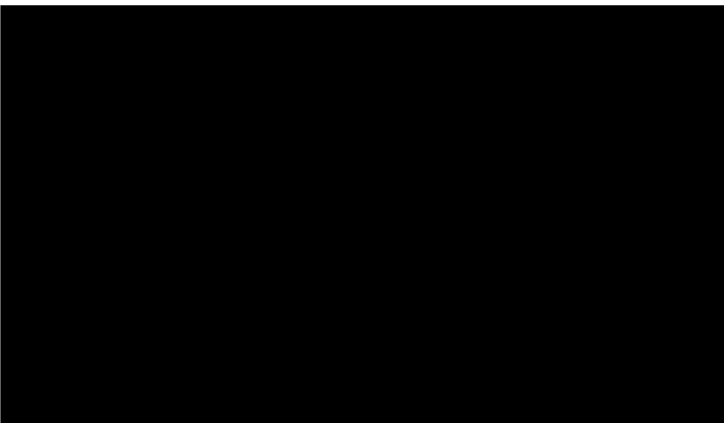
Title	Dr
Name	Juan
Surname	Viruel



## CONTACT DETAILS

---

Title	Dr
Name	Maria
Surname	Fitzpatrick



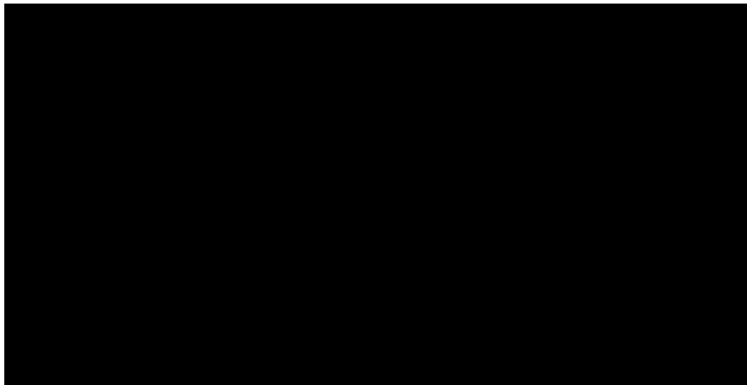
## Section 1 - Contact Details

---

### PRIMARY APPLICANT DETAILS

---

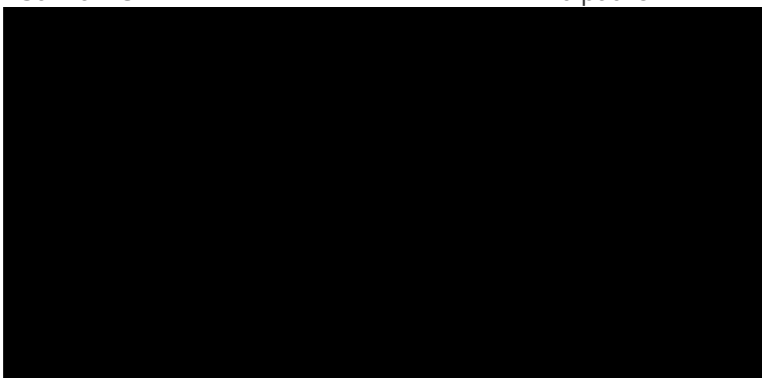
Title	Dr
Name	Juan
Surname	Viruel



### CONTACT DETAILS

---

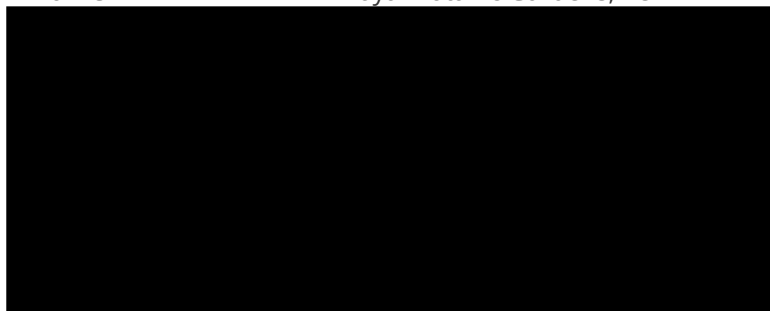
Title	Dr
Name	Maria
Surname	Fitzpatrick



### GMS ORGANISATION

---

Type	General
Name	Royal Botanic Gardens, Kew



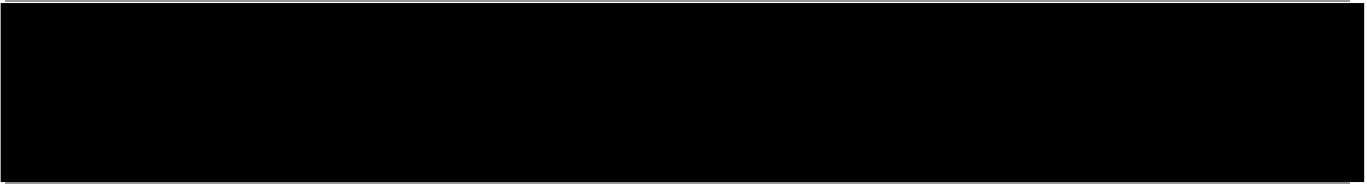
## Section 2 - Title, Dates & Budget Summary

---

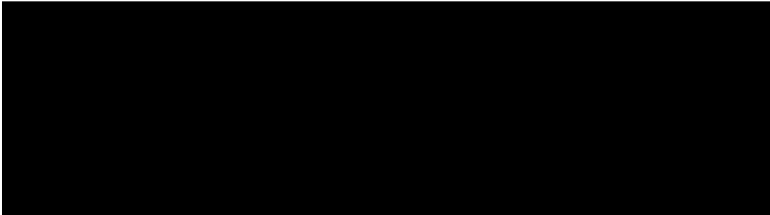
### Q3. Name and official address of proposed Darwin Fellow

Include email and telephone details where available.

Name Onja Razanamaro



Please provide a one page CV.



#### Q4. Summary of proposed Fellowship i.e. Outcome

Genetics plays key role in informing successful conservation strategies. Training Madagascan early career researcher Dr. Onja Razanamaro in genetic techniques will build in-country capability and capacity in these skills. Onja will learn innovative genetic tools to prevent the extinction of two threatened mutualistic partners: a baobab and its bat pollinator.

#### Q5. Project dates

<b>Start date:</b>	<b>End date:</b>	<b>Duration (e.g. 1 year, 2 months):</b>
01 July 2019	31 August 2020	1 year 2 months

#### Q6. Budget summary

2019/2020	2020/2021	Total
-----------	-----------	-------



### Section 3 - Principals

#### Q7. Principals in the Project

Please give the details of the individuals from the Lead Organisation (and other institutions if relevant) who would be directly involved in supervising/working with the Darwin Fellow. Please provide a one page CV for each of these named individuals.

Details	Project Leader	Other Expert	Other Expert	Other Expert
---------	----------------	--------------	--------------	--------------

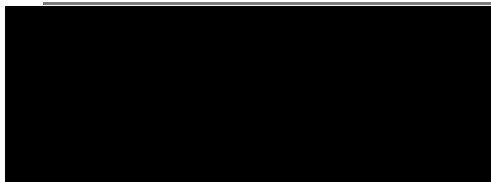
<b>Surname</b>	Viruel	Fay	Barbara	Andriafidison
<b>Forenames(s)</b>	Juan	Mike	Gravendeel	Daudet
<b>Post held</b>	Research Leader in Conservation Genetics	Senior Researcher	Senior Researcher	Senior researcher
<b>Organisation</b>	RBG Kew	RBG Kew	Naturalis	Madagascar Voakajy NGO



**Do you require more fields?**

No

**Please provide a one page CV for each of these named individuals uploaded as one PDF.**



## Section 4 - Aims, Activities & Achievements

**Q8. Describe briefly the aims, activities and achievements of the Lead Organisation.**

**(Large organisations please note this should describe your unit or department)**

RBG Kew's conservation science is underpinned by unparalleled living collections, one of the world's largest herbaria, and the largest DNA plant bank in the world. The Conservation Science department undertakes rigorous, evidence-based research and conservation activities to improve the global biodiversity outlook. Partnering in the UK and overseas, we provide evidence to enable monitoring, conservation and evaluation of the status of the world's plants, fungi and protected areas.

We strategically prioritise island research, with 'Provision of baseline science to underpin conservation policies for plants and fungi. Key activities comprise baseline inventories, conservation assessments, collections and recommendations for conservation management' and, 'Undertake studies in population genetics, phylogenetics and genome size, using high-throughput sequencing technology and other techniques to ensure that conservation actions are informed by sound genetic evidence.'

We have a track record of successful partnerships in Madagascar including collaborative management of the Itremo Massif Protected Area with local communities.

**Q9. Describe briefly the aims, activities and achievements of the proposed Darwin Fellow's employing organisation.**

**(Large organisations please note this should describe your unit or department)**

The proposed fellow belongs to the Department of Plant Biology and Ecology (DBEV) at the University of Antananarivo in Madagascar. The Department's mission is to conduct research and training activities in plant sciences and conservation in Madagascar. To achieve its mission, it undertakes research collaborations at national and international levels. DBEV is a long-term partner of RBG Kew since its establishment in Madagascar and has developed several collaborative projects in Malagasy plant species conservation. This collaborative research has assisted Madagascar to meet its targets under the Global Strategy for Plant Conservation. Since 2003, DBEV was listed as a CITES scientific authority on plants in Madagascar, managing CITES licenses and hunting permits.

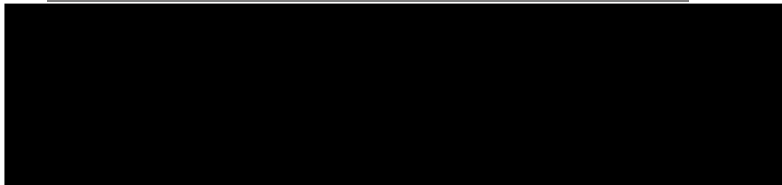
**Q10. Describe briefly the proposed Fellow's current role within their organisation and their link to a Darwin project (if applicable), including the project reference number, his/her role in that project and any ongoing involvement.**

**If the Fellow has no link to a Darwin project please discuss their involvement in implementing the biodiversity conventions, treaties and agreements supported by the Darwin Initiative.**

The fellow has made an important contribution in Malagasy plant conservation projects since 2009 during her MSc and PhD at the DBEV. Her thesis focused on the sustainable management of economically important baobab species and its wider ecosystem in Madagascar. In 2017, she has been a key individual, providing important data to enable inclusion of *Adansonia grandidieri* under CITES law due to illegal trade. She was an invited expert to review the baobab species conservation strategy organised by Madagascar Voakajy NGO and has contributed to writing the conservation strategy reports. She obtained funding on two occasions from the International Foundation for Science to assess the human impacts on baobab populations and habitat loss, and she also studied the reproductive structure of *A. grandidieri*.

The proposed fellow will develop conservation genetic studies, which constitutes a capability gap in Madagascar, for two mutualistic species classified as Endangered (*Adansonia suarezensis*) and Vulnerable (*Eidolon dupreanum*) by the IUCN, fitting with the objectives of the biodiversity conventions that the Darwin Initiative supports. The proposed fellow will obtain skills in population genetics that will enable her to develop conservation strategies in Madagascar, a country rich in biodiversity and in need of financial resources to conserve it.

**Please provide a combined PDF of all letters of support.**



## **Section 5 - Outcomes & Objectives**

---

**Q11. Provide a concept note for the Darwin Fellowship. This should include:**

**Q11a. A clear outline of the aim and objectives of the Fellowship, and an indication of how the achievement will be measured**

Objective: Establish Malagasy expertise in cutting-edge laboratory and bioinformatics methods in ecological and conservation genetics that can be applied to species conservation in Madagascar. Knowledge dissemination by the fellow will facilitate longer-term capacity building.

Aims: To conduct conservation genetic studies of two endangered mutualistic species (*Adansonia suarezensis* and *Eidolon dupreanum*) and to improve their conservation status according to the Darwin Initiative's goals.

Specifically:

1. To learn research skills on population genetics (not available at the Malagasy University). The proposed fellow

will obtain skills related to DNA extraction, characterization of microsatellite markers, genotyping, genetic diversity and structure analyses, and Next-Generation sequencing (NGS) techniques.

2. To optimize molecular lab procedures to conduct pollen genotyping. This technique will allow us to assess the baobab's pollen flow by directly genotyping the pollen grains transported by the bat pollinators. Quantitative and qualitative factors of transported pollen grains (e.g., amount of pollen, transported distance, genetic diversity) are key elements, because these factors will determine the reproductive success and fitness of plant individuals and the genetic structure of the populations.

Indication of the achievement:

1. The fellow has obtained skills in population genetic analyses and molecular techniques that can be implemented in Madagascar. The characterization of molecular markers to genotype baobab specimens constitutes a clear milestone to measure the learning process of the proposed fellow in molecular techniques and bioinformatics.

2. Pollen grains sampled from the bat pollinators have been genotyped. This milestone will result in subsequent genetic diversity and structure analyses, and the fellow will gain the associated bioinformatic skills.

3. A conservation plan informed by the results of the genetic analyses has been produced. This is the main output of the fellowship. It will include a restoration programme of baobabs in a protected area of Madagascar, which will constitute the keystone of success of this project.

## Q11b. The role of the Lead Organisation, and others where relevant

The main core of this project will be carried out and led at Royal Botanic Gardens, Kew (RBG Kew, UK). The Lead organisation has long-term experience in population genetics and phylogeographic studies of endangered species. RBG Kew led research programmes that promoted conservation plans of endangered species and has capabilities to partner in Madagascar (<https://www.kew.org/science/projects/madagascan-plants-threat-assessment>).

Onja will be incorporated in the conservation genetics team led by Dr. Mike Fay. Dr. Juan Viruel will supervise and be responsible for transferring knowledge to Onja. Dr. Viruel has experience in training researchers at different levels (MSc, PhD and postdocs), and skills in population genetics and genomic techniques. Sampling strategies, genomic tools characterization and project management will be supervised and developed at RBG Kew.

Onja will be hosted by RBG Kew to carry out the population genetic analyses of the baobabs and bats, which is pivotal to understand the genetic diversity and structure of these two mutualistic species with conservation needs. The laboratory and computational facilities to undertake this genetic study are not available in Madagascar and it is essential to achieve the protection or enhancement of those species in term of conservation genetics.

A secondment will be undertaken at Naturalis in Leiden (The Netherlands) with the collaboration of Dr. Barbara Gravendeel a senior researcher and group leader of Endless Forms research group. Single pollen DNA extractions and genotyping will be carried out in their ancient DNA lab facilities (<https://science.naturalis.nl/en/labs-services/laboratories/molecular-biology-facilities/#ancient>).

The main objective of this proposal is developing a conservation plan for *A. suarezensis*. The proposed fellow will design it in collaboration with Daudet Andriafidison, Coordinator of the Conservation and Communities Programme, at Madagasikara Voakajy NGO ([www.madagasikara-voakajy.org](http://www.madagasikara-voakajy.org)). Dr. Andriafidison's collaboration is essential to ensure the achievement of the proposed conservation plan.

## Section 6 - Legacy & Collaboration

---

### Q12. Legacy

**Provide information on how the Darwin Fellow will utilise, promote and disseminate the benefits of the Fellowship on return to his/her home country. Will a strategy be developed during the Fellowship to ensure this is achieved?**

The DBEV plans to build a genetic laboratory to undertake basic genetic analyses simultaneously to the development of this proposal. In this case, Onja will be the key person to manage this laboratory using the skills obtained through this project in the UK. She will be able to train others at the end of their fellowship to facilitate longer-term capacity building. In addition, she will develop a research program in Madagascar on genetic

conservation and lead strengthening of the partnership between Madagascar and the UK. The genetic results obtained during Onja's visit will be used to improve the population size and area occupancy of these species as part of the conservation plan objective. She will undertake an ecological restoration test of *A. suarezensis* considering the population genetic outputs. She will trial reintroduction of this species to a protected area site that she has identified as promising based on a pilot study of seed germination. The final report of this project will be disseminated among these Malagasy partners, including the managers of the Madagascar National Park (MNP) and the government manager (DSAPM: Protected area system management in Madagascar) to promote an efficient management plan of these species.

### **Q13. How will the Fellowship assist the Fellow's organisation and/or local communities and/or home country in working towards the objectives (or implementation) of the Conventions, Treaties and Agreements supported by the Darwin Initiative?**

**Please refer to specific Articles or cross cutting themes as appropriate.**

The outcomes will directly contribute towards local communities and state government needs through the development of a conservation plan that includes local restoration activities, and meeting Madagascar's Convention of Biological Diversity (CBD) commitment to prevent the extinction of targeted species. Baobabs attract thousands of tourists and constitute an economically important resource. This baobab species is currently classified as Endangered by the IUCN, and its bat pollinator as a Vulnerable species. The main objective of this project aligns with the Aichi mission to take effective and urgent action to halt the loss of biodiversity. This fellowship will enable Madagascar University (DBEV) to improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity (Aichi, Strategic Goal C) and by developing sustainable management approaches by reintroducing *A. suarezensis* in a protected area that the fellow identified as promising based on a pilot study of seed germination. In addition, this project will promote the CBD article 12 'establishing and maintaining programmes for scientific and technical education and training in measures for the identification, conservation and sustainable use of biological diversity and its components and provide support for such education and training for the specific needs of developing countries'.

### **Q14. What collaboration has there been with the Darwin Fellow to date in developing the proposal, and what collaboration is planned for the duration of the Fellowship?**

**Where relevant, describe any consultation or collaboration by the proposed Fellow within his/her own country.**

The proposal has been developed in close collaboration with the proposed Darwin fellow (Onja Razanamaro). The proposed fellow has formed contacts with government managers of protected areas and a Malagasy Organization dedicated to the conservation of biodiversity and the sustainable use of natural resources in Madagascar named "Madagascar Voakajy NGO". These institutions have agreed to support this project. The manager of the Madagascar National Park (MNP) has agreed to assist on this project to implement the conservation activities. The reintroduction programme for the baobab proposed here was agreed collaboratively, and a programme of monitoring and evaluation will be in place throughout the fellowship to ensure that the relationship between all partners remains positive, and to identify future opportunities for collaboration. These agreements are essential to ensure the success of the reintroduction objectives of baobab seedlings as part of the objective to build a conservation plan.

### **Q15. Where will the Darwin Fellow be based?**

**Please be specific with organisational details and dates (where more than one location).**

For the majority of the fellowship (August 2019 to January 2020; and June to August 2020), the fellow will be based in the Conservation Science department at RBG Kew (UK). Desk space, laboratory space and computing facilities are available.

During the fellowship (February to May 2020), the fellow will visit the Naturalis Institution at Sylvius Laboratory,



Sylviusweg 72, 2333 BE, Leiden (The Netherlands). She will be integrated in the Endless Forms research group led and supervised by Dr. Barbara Gravendeel.

## Section 7 - Programme of Work & Funding

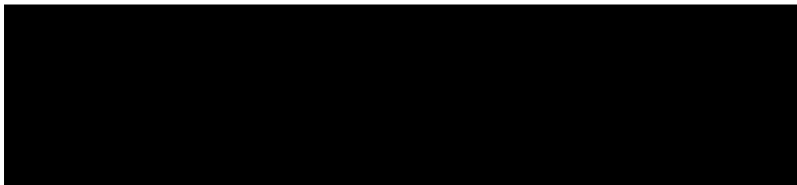
---

### Q16. Provide a programme of work, including key milestones, through the duration of the Fellowship

Please complete the Excel spreadsheet linked below to describe the intended workplan for your project.

#### Fellowship Implementation Timetable Template

For each activity (add/remove rows as appropriate) indicate the number of months it will last, and shade only the months in which an activity will be carried out. The workplan can span multiple pages if necessary.

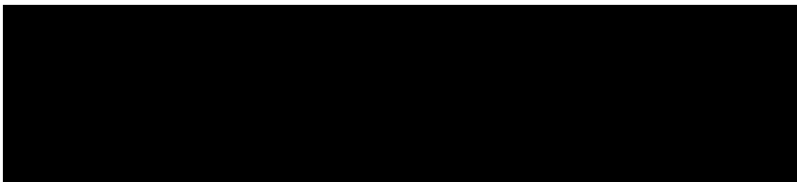


### Q17. Costs

Using UK Government Financial Years i.e. April 2019 – March 2020 etc., please complete your budget using the template provided here and upload below.

#### Fellowship Budget Template

Please note, this should not be presented as academic years.



### Q18. Other Sources of funding: provide details and amounts

Date applied for	Donor Organisation	Amount (include currency)	Comments (including confirmed/unconfirmed)
19 July 2018	Rufford Small Grant, Rufford Organization	euros	Confirmed by Onja
01 September 2018	Linnean Society Appleyard Fund	£	Unconfirmed
12 October 2018	Idea Wild	£	Unconfirmed
<i>No Response</i>	<i>No Response</i>	<i>No Response</i>	<i>No Response</i>

### Q19. FCO Notification

Please check the box if you think that there are sensitivities that the Foreign and Commonwealth Office will

need to be aware of should they want to publicise details of the Darwin Fellowship and the resultant work in the UK or the Darwin Fellow's home country.

Checked

**Please comment on whether you require a visa to undertake this Fellowship. If you require a visa, do you foresee any difficulty in being granted a visa?**

Government authorities will be consulted, but we do not envisage there being difficulty in being granted a visa.

## Section 8 - Certification

---

### Q20. Certification

**On behalf of the**

Trustees

**of**

Royal Botanic Gardens, Kew

**I apply for a grant of**

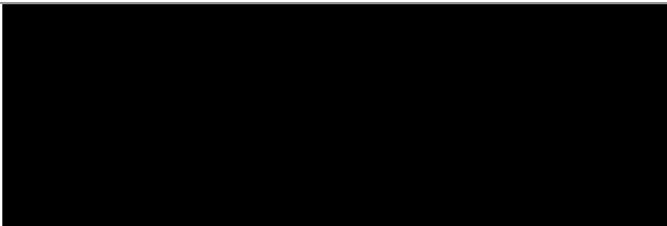
£25,400.00

**I certify that, to the best of our knowledge and belief, the statements made by us in this application are true and the information provided is correct. I am aware that this application form will form the basis of the project schedule should this application be successful.**

**(This form should be signed by an individual authorised by the applicant institution to submit applications and sign contracts on their behalf.)**

- **I have uploaded CVs for project principals and letters of support.**

Checked

<b>Name</b>	Dr Paul Wilkin
<b>Position in Organisation</b>	Acting Director of Science
<b>Signed</b>	
<b>Dated</b>	12 November 2018

## Section 9 - Submission Checklist

---

**Have you provided actual start and end dates for the Fellowship?**

Checked

Have you provided your budget based on UK government financial years i.e. 1 April – 31 March?	Checked
Have you checked that your budget is complete, correctly adds up and that you have included the correct final total in the application?	Checked
Has your application been signed by a suitably authorised individual?	Checked
Have you included a 1 page CV for the proposed Fellow and the experts listed in Question 7?	Checked
Have you provided the relevant letters of support?	Checked
Have you read the Guidance?	Checked
Have you read and can you meet the current Terms and Conditions for this fund?	Checked
Have you checked the Darwin website immediately prior to submission to ensure there are no late updates?	Checked
Have you read and understood the Privacy Notice on GOV.UK?	Checked

**We would like to keep in touch! Please check this box if you would be happy for the lead applicant (Flexi-Grant Account Holder) and project leader (if different) to be added to our mailing list. Through our mailing list we share updates on upcoming and current application rounds under the Darwin Initiative and our sister grant scheme, the IWT Challenge Fund. We also provide occasional updates on other UK Government activities related to biodiversity conservation and share our quarterly project newsletter. You are free to unsubscribe at any time.**

Checked

## Data protection and use of personal data

Information supplied in this application form, including personal data, will be used by Defra as set out in the latest copy of the Privacy Notice for Darwin, Darwin Plus and the Illegal Wildlife Trade Challenge Fund available [here](#). This Privacy Notice must be provided to all individuals whose personal data is supplied in the application form. Some information, but not personal data, may be used when publicising the Darwin Initiative including project details (usually title, lead organization, location, and total grant value) on the GOV.UK and other websites.

Information relating to the project or its results may also be released on request, including under the 2004 Environmental Information Regulations and the Freedom of Information Act 2000. However, Defra will not permit any unwarranted breach of confidentiality nor will we act in contravention of our obligations under the General Data Protection Regulation (Regulation (EU) 2016/679).