



Responsible reptile keeping

Facilitating responsible ball python
ownership in the Netherlands

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Master Thesis - Strategic Product Design
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Abstract

This report addresses the growing popularity and associated challenges of reptile keeping, with a specific focus on ball python ownership in the Netherlands. While reptile keeping can offer educational and psychological benefits for keepers, it also contributes to biodiversity loss, welfare concerns, invasive species, and public health risks. This project explores how design can stimulate and facilitate responsible reptile keeping in the Netherlands to counter these drawbacks, offering a constructive alternative to restriction- and reduction-based strategies.

Following the Double Diamond methodology, this project progressed through four stages: Discover, Define, Develop, and Deliver. First, the context of reptile keeping was discovered through literature and field research in order to define responsible reptile keeping, analyse its societal impact, and to identify relevant stakeholders, trends, legislation, and past initiatives. The focus was then narrowed to one species as a representative case, the ball python. This allowed for a deep-dive within the reptile keeping context and a contextmapping study was conducted with ball python owners. During the Define stage these insights were translated into nine design scopes, areas where design can contribute towards stimulating and facilitating responsible reptile keeping. The most potentially impactful and demand-reductive design scopes were used as a design frame during the Develop stage. This frame determined the boundaries of the ideation process and two creative sessions. These ideas were synthesised into a roadmap involving multiple stakeholders, offering an inspirational and strategic overview. In the Deliver stage, one promising concept was selected from the roadmap to be further developed and to initiate the journey towards responsible reptile keeping.

As a result from the Discover stage, this project defines that responsible reptile keeping consists of four phases. The **pre-purchase** phase involves contemplated decision-making on whether to get a reptile. The **purchase** phase focuses on ethically acquiring a legally sourced, captive-bred animal. The **care** phase emphasises going beyond the basic needs to survive through enrichment. Finally, the **end-of-care** phase involves ensuring life-long care for the animal. This definition can be summarised as enabling reptiles thrive rather than survive.

At the end of the define stage nine design scopes were developed. Of these, scope '1. Impulsive purchases', '2. Collecting reptiles and ball pythons', '5. Enjoyment of ball python enclosure care', and '6. Science-based information acceptance and knowledge sharing on ball pythons' were prioritised due to their potential impact on reptile welfare and demand reduction. The ideas developed with these scopes became the foundation for the roadmap towards thriving. This roadmap spans three horizons:

Horizon 1: Establish the foundation - Lay the groundwork for responsible reptile keeping by ensuring reliable, accessible information and entry-level interventions are in place.

Horizon 2: Expand science-based keeping - Shift from basic survival to optimised care by promoting deeper knowledge and science-based practices.

Horizon 3: A contributing reptile community - Foster an engaged community that advances reptile welfare through collaboration, knowledge-sharing, and active contribution to science and conservation.

As a final result, the concept Royal: The Best You Can was selected from the first horizon as a promising first intervention towards responsible reptile keeping. It is a visually structured reptile profile combining a ball python persona with science-based care information. The concept aims to reduce impulsive purchases and improve care quality by making readers empathise with ball python needs and focusing on optimal care. Royal frames ownership as an effortful commitment, encouraging potential buyers to reflect before purchasing and motivating reptile keepers to do the best they can.

In conclusion, this project demonstrates how responsible reptile keeping can be stimulated and facilitated by identifying key areas for improvement through the design scopes, an inspirational roadmap toward thriving, and introducing the concept Royal: The Best You Can to lay the foundation for a more ethical and informed future of reptile keeping.

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1. Introduction

1.1 Introduction

Exotic pet keeping has grown into a multi-billion-dollar global industry (Lockwood et al., 2019). However, international trade in wild animals poses considerable threats to biodiversity, public health, and animal welfare (United Nations Office of Drugs and Crime, 2020). Within this global network, the European Union is a primary importer, sustaining one of the world's largest consumer markets (Altherr et al., 2022). The Netherlands has emerged as a crucial destination and transit hub for these animals due to Schiphol Airport and the Port of Rotterdam, with shipments mainly consisting of reptiles and birds (Van der Grijp et al., 2016). Reptiles are an appealing target for illegal wildlife trade as they can easily be transported in suitcases or parcels. They are small, quiet, and capable of surviving extended periods in poor transport conditions (Altherr, 2014). Their popularity with traffickers is confirmed by D'Cruze and Macdonald (2016), who found that 95% of the seized animals between 2010 and 2014 were protected by CITES international trade regulations against over-exploitation were reptiles. While this demonstrates heavy trade pressure on reptiles, the attention of interventions and campaigns tend to focus on large, well-known endangered species like elephants and tigers (Herrel & Van Der Meijden, 2014). Therefore, this project focuses on this comparatively heavily traded and yet overlooked group in the exotic pet trade: reptiles.

Current information campaigns have demonstrated limited effectiveness in reducing the trafficking and demand for exotic pets (United Nations Environment Programme, 2019). In response, this project takes a different approach than reduction, instead focusing on responsible ownership. This reframing creates a more positive and inclusive approach to engage both current and prospective reptile keepers. Rather than simply discouraging people from owning reptiles, the focus is on fostering more ethical ownership practices that prioritise animal welfare, legality, and lifelong commitment. This project examines the Dutch reptile-keeping scene, with a specific focus on the ball python (*Python regius*), also known as the royal python. As one of the most widely traded and kept reptile species (Valdez, 2021), the ball

python is considered a frontrunner in the industry and serves as a strong representative case for identifying actionable ways to improve responsible reptile ownership. The goal is to develop inspiring design interventions which stimulate and facilitate responsible reptile keeping to ensure a future where reptiles can thrive.

1.2 Assignment

This graduation project serves as an advisory report for the TU Delft research team working on exotic pets. The team is part of a European consortium that focuses on reducing the demand for exotic pets. This graduation project takes a different but complementary approach: it explores the reptile scene in the Netherlands and investigates how design can be used to stimulate and facilitate responsible reptile keeping. This reframing to responsible reptile keeping explores how to mitigate the negative impact of reptile keeping while appealing to a broader array of stakeholders through a more positive narrative. This raises the research question:

How to stimulate and facilitate responsible ball python keeping in the Netherlands?

To address this challenge and meet the client's request for an in-depth exploration of the context, this project places a specific emphasis on a single, representative species: the ball python. This approach provides depth while also generating insights that reflect broader challenges within the reptile keeping context. The rationale behind this choice is explained in Chapter 3: Scope – Ball Python. From that point, the project uses the ball python as a representative case to explore the overarching question in greater depth, specified as:

How to stimulate and facilitate responsible ball python keeping in the Netherlands?

Therefore, the resulting design interventions are tailored to the ball python. However, the project is structured to reflect the insights, scopes, and

outcomes on reptile keeping more broadly. By starting with a general analysis of reptile keeping, this project not only builds a strong contextual foundation for selecting the focal species, but also creates the possibility to reflect on whether the developed interventions are transferable across responsible reptile keeping more broadly. The general-to-specific approach enables that the outcomes are both deeply informed and broadly applicable.

To understand how to stimulate and facilitate responsible reptile keeping it is necessary to understand the context, raising the following sub-questions:

Understanding the context of reptile keeping and determining the focal species for this project

- *What is the impact of reptile keeping?*
- *Who are the relevant stakeholders in the Dutch reptile industry?*
- *How is responsible reptile keeping defined?*
- *What trends and developments shape the reptile pet sector?*
- *What species is most meaningful for in-depth contextual exploration?*

Ball python specific context

- *To what extent does the ball python keeping context align with the reptile keeping context?*
- *Are there any ball python-specific aspects to take into account?*

The consumer is a key stakeholder and the client seeks a deeper understanding of this group. To support this, the project includes a contextmapping study to explore their motivations, behaviours, and needs.

Understanding the consumer

- *What motivates people to keep ball pythons?*
- *What considerations do consumers make when buying and caring for a ball python?*
- *What influences the consumers' degree of responsible ball python keeping?*

This project aims to provide the TU Delft research team with an in-depth understanding of ball python keeping and design-driven inspiration for future interventions.

First, design scopes provide a contextual understanding by summarising the research

into thematic areas where design can enhance responsible reptile keeping.

Second, a roadmap offers inspiration through an explorative overview of interventions structured across three horizons and linked to key stakeholders.

Finally, the most meaningful idea from the roadmap is conceptualised to provide an accessible and valuable starting point towards responsible reptile keeping.

The TU Delft research team seeks inspiration on how design can contribute to this field without relying heavily on legislation. In line with this ambition, the project prioritises design interventions over regulatory measures, exploring the creative and strategic potential of design for responsible reptile keeping.

1.3 Approach

The approach for this project is inspired by the Double Diamond methodology (Design Council, 2005). This adapted version of the iterative process is structured into four phases, organised across three diamonds with both a divergent and convergent phase.

Discover

The purpose of this phase is to explore and understand the context of reptile keeping. The phase starts with literature and field research. The impact, stakeholders, trends, legislation, and the meaning of responsible reptile keeping are explored. However, this first phase of the double diamond method is slightly different from the original due to an extra partial 'diamond'. This is where a reptile species is identified for whom interventions for responsible reptile keeping would be most relevant, and their owners become the key stakeholder for the remainder of the project. With this key stakeholder a contextmapping study is conducted to gain deeper insight into their drivers, needs, and wishes regarding reptile keeping.

Define

During the 'define' phase the findings of the context exploration are translated towards a solution space for the 'develop' phase. The results of the contextmapping study are combined with literature and field research to form design scopes. These are topics or areas where there is potential to improve responsible reptile keeping. The design scopes are then evaluated by looking at the impact on responsible reptile keeping they can make and their influence on demand for reptiles. The most promising design scopes are selected to form a design frame, the solution space guiding the development of interventions.

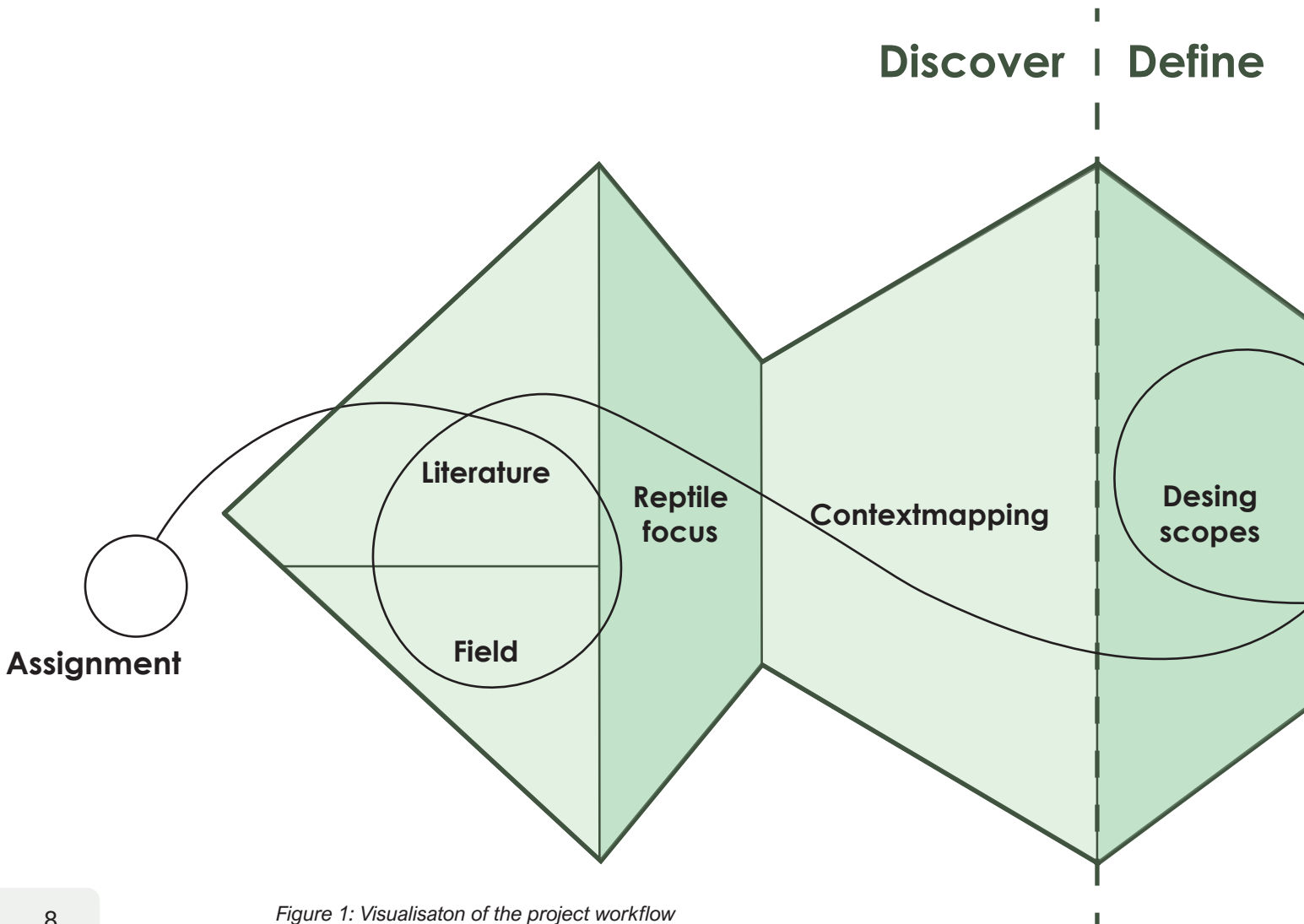


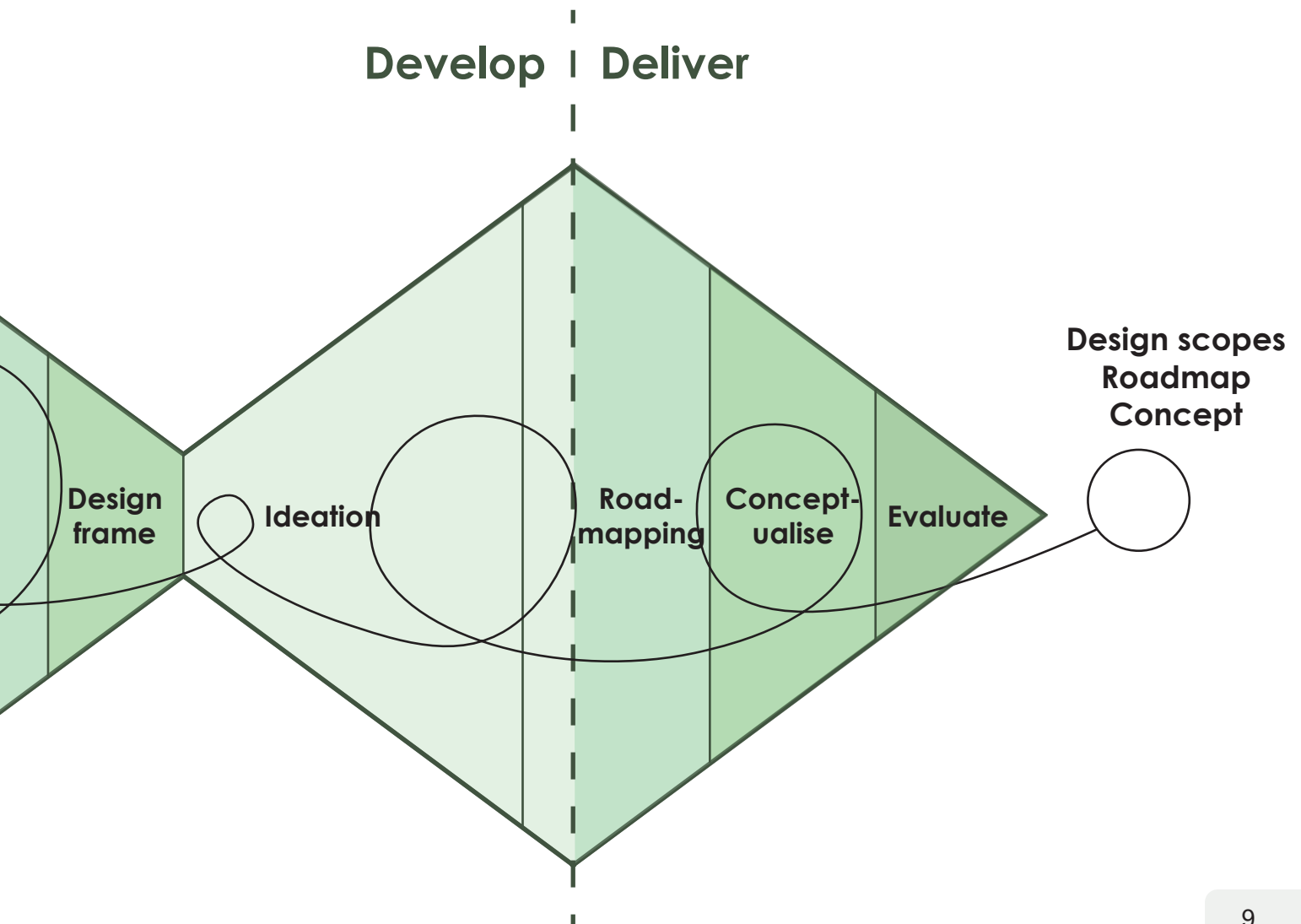
Figure 1: Visualisation of the project workflow

Develop

This phase uses the previously defined solution space to develop ideas and interventions that stimulate and facilitate responsible reptile keeping. The design frame serves as a template for these solutions and is enhanced with two creative sessions. After clustering the resulting ideas, they are matched with relevant stakeholders within the context of reptile keeping. These outcomes form the foundation of the roadmap, which is further developed by embedding transitional ideas and interventions.

Delivery

In this final phase, the roadmap is completed to structure the inspirational ideas. From this overview, the most meaningful idea is selected, linked to a relevant stakeholder, further conceptualised, and validated for its potential impact. The phase concludes with two key outcomes: a explorative roadmap with inspiring interventions, and a defined concept that offers an accessible and valuable starting point for the TU Delft research team.



Discover

In the Discover stage, the project investigates the broader context of reptile keeping in the Netherlands. Through literature and field research, it explores the impact of the exotic pet trade, identifies relevant stakeholders, and defines what responsible reptile keeping entails. To narrow the focus and gain depth, the ball python is selected as a representative species. A contextmapping study with ball python owners provides rich, user-centred insights into their motivations, behaviours, and care practices.

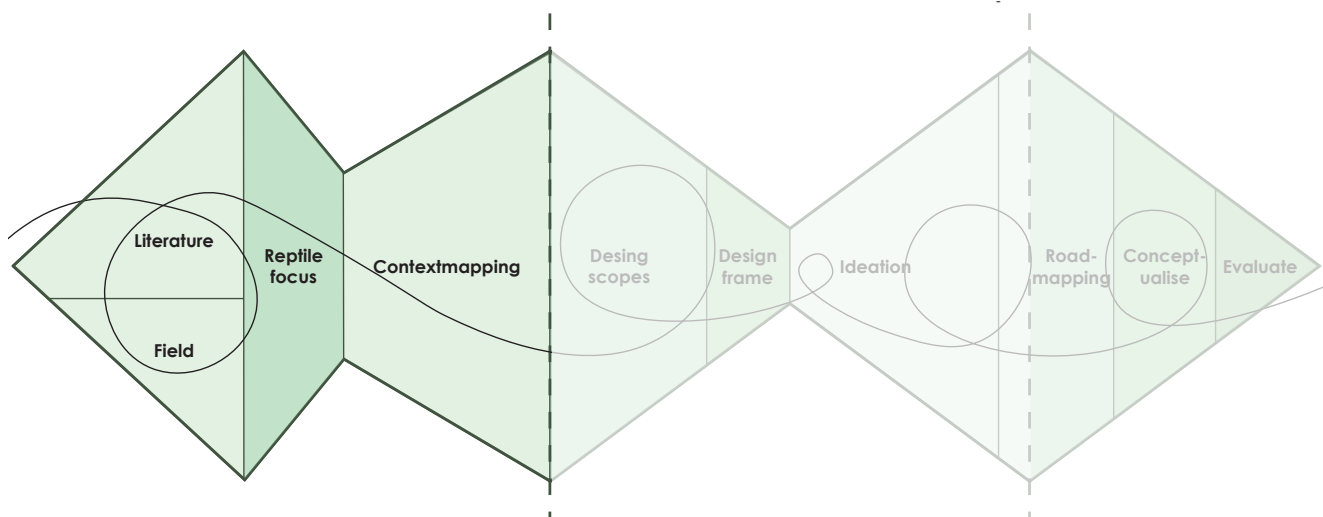
2. Analysis

- 2.1 The impact
- 2.2 Stakeholders
- 2.3 Responsible reptile keeping
- 2.4 Trends
- 2.5 Legislation and Initiatives

3. Scope: Ball Python

4. Contextmapping

- 4.1 Contextmapping goal
- 4.2 Method
- 4.3 Results



2. Analysis

2.1 The impact

The market for exotic pets has grown into a multi-billion-dollar global industry (Lockwood et al., 2019) and continues to expand both globally and within the European Union (European Parliament, 2022). Reptiles are among the most popular exotic pets worldwide, representing a substantial portion of the trade (Valdez, 2021). The European Union plays a significant role in this global wildlife trade, acting as one of the primary importers of reptiles and amphibians and sustaining a large consumer market (Altherr et al., 2022). The Netherlands is no exception, serving as both a key destination and a major transit hub, with Schiphol Airport and the Port of Rotterdam identified as hotspots in the international trade of exotic animals (Van der Grijp et al., 2016).

The benefits

Keeping companionship animals provides several benefits to human well-being, contributing to psychological, physiological, and social health and development (Wells, 2009; Smith 2012). This is not limited to highly interactive pets, such as dogs and cats, but also non- or low-interactive pets such as fish have been shown to improve their owner's overall health (Whiteford, 1997; Langfield & James, 2009). Although, some studies did not find this positive effect, or even detected a negative one (Herzog, 2011). It is important to note however, that these benefits primarily apply to pet keeping in general and are not specific to reptiles, unless the individual would only be interested in keeping reptiles.

Another beneficial impact of reptile keeping is the enhancement of the connection between people and reptiles, contributing to public education, nurturing interest, and countering prejudices regarding these animals. Many European herpetologists in academia or museums mentioned that the keeping of reptiles and amphibians in their youth stimulated their lifelong interest in herpetology (Li Vigni, 2013).

The private sector of reptile keeping can also contribute to conservation by sharing their expertise and capacity to off-site breeding programs focusing on reintroduction and

conservation. Animals from the private sector itself are typically not used for reintroduction due to guidelines from the IUCN (International Union for Conservation of Nature) (Gascon et al., 2007; Tapley et al., 2015).

Lastly, reptile keeping can contribute to research. Captive-bred reptiles and amphibians from hobbyists have contributed to researchers' understanding of emerging disease epidemiology (Martel et al., 2013; Martel et al., 2014). Occasionally research led by hobbyists themselves have led to pivotal contributions to the comprehension of reptiles and amphibians, even resulting in publication of standard reference literature (Sparreboom, 2014).

The downsides

However, exotic pet keeping also has some major drawbacks. The demand for exotic pets contributes to one of the largest and most profitable crime sectors in the world, wildlife crime (INTERPOL, 2023). Illegal wildlife trafficking has become an appealing endeavour for criminals, as the chances of getting caught and the fines are low, while the profits can be very high. According to Associate Professor of Criminology at Utrecht University, Daan van Uhm, some animals can be more valuable pound for pound than gold or drugs (Heijligenberg, 2021). He also mentions that the market dynamic of 'supply and demand' plays a major role in wildlife trafficking. The high demand of exotic pets is what makes it such a lucrative business for criminals (Hausmann et al., 2023).

“Wildlife crime has become one of the world's largest criminal activities. We have seen that wildlife crime relies on armed violence, corruption and is intertwined with financial crimes.”

- Stephen Kavanagh (INTERPOL, 2023)
INTERPOL's Executive Director of Police Services

The attention and political debate about animal welfare and trafficking tend to focus on the well-known, big, endangered species such as elephants and tigers, but smaller, lesser-known animals like reptiles and amphibians are also seriously harmed by the trade pressure (Hughes, 2017; Dominguez et al., 2024). Reptiles are an

appealing target for criminal groups as they can easily be transported in suitcases or parcels, they often survive for long periods of time under poor transport conditions, and they are quiet (Altherr, 2014). Their popularity by traffickers is confirmed by D’Cruze and Macdonald (2016) who found that 95% of the seized animals between 2010 and 2014 which were protected by CITES international trade regulations against over-exploitation were reptiles.

The Netherlands plays a significant role in reptile trade as it hosts one of Europe’s biggest reptile fairs, ‘Terraria’ in Houten, every quarter (World Animal Protection, 2020). Furthermore, the yearly ‘Snake Day’ fair in Houten is also considered among the most important reptile events in Europe and is often quoted as the largest snake-only fair in the world (Janssen & Blanken, 2016).

The demand for- and trade in reptiles for pet keeping has consequences, and since it is not always done responsibly it has an impact on the environment and society.

Biodiversity

One of the primary concerns surrounding exotic pet keeping is the collection of wild specimens to fulfil consumer needs. Many reptiles are sourced from the wild to meet demand and therefore threaten the existence of thousands of reptile species, making wildlife trade a key driver of the biodiversity crisis (Marshall et al., 2020). The entire wild population of at least 21 reptile species are harvested by collectors and many other species have suffered declines from over-collecting (Auliya et al., 2016).

There are policies and regulations to protect endangered species, but these are not sufficient. The largest global initiative is CITES, an international agreement between governments with the primary goal to ensure that international trade does not threaten the survival of wild populations of plants and animals. The treaty achieves this by regulating certain international wildlife trade through a system of permits and certificates.

However, research from Marshall et al. (2020) showed that a minimum of 79% of traded species are not subject to the CITES trade regulations. This study also notes that newly discovered species are very vulnerable and desirable, but due to the time-consuming process of listing, are

not yet protected by CITES regulations. Rarity sells in the wildlife trade, leading traffickers to target new, rare, and endangered species. This exploitation contributes to increased scarcity, creating a downward spiral (Brook & Sodhi, 2006; Altherr & Lameter, 2020).

Animal welfare

Another major issue is reptile welfare. Illegal reptile trafficking to fuel the pet trade often occurs under harmful conditions, resulting in high mortality rates (United Nations Office of Drugs and Crime, 2020). Furthermore, estimates of first-year mortality rates for pet reptiles in household settings vary widely, ranging from 3.6% (Robinson et al., 2015) to as high as 75% (Toland et al., 2012). This significant difference reflects a current debate within the reptile trade. Industry representatives tend to promote lower mortality figures, while those concerned about animal welfare suspect the true rates are much higher. This suspicion stems from potential underreporting due to deaths occurring during trade and inadequate record-keeping practices among some pet owners (Warwick et al., 2018).

A study in Portugal by Azevedo et al. (2021) on reptile welfare found that 85% of respondents (n=220) failed to provide all four essential husbandry needs (temperature, lighting, diet, and refuge), while 43% met just two or fewer of these needs. This highlights significant gaps in proper husbandry among reptile keepers. A lack of knowledge and species-specific information, over-reliance on anecdotal advice, misconceptions about reptile keeping, difficulty in recreating natural environments, and inadequate enclosures were identified in the study as contributing factors.

Moreover, according to Burghardt (2013) there is a tendency to underestimate the need for enriched and stimulating environments, essential for reptiles and amphibians given their capacity for learning, social complexity, and potential for emotional experiences. Unlike free-roaming dogs, reptiles and amphibians face the burden of captivity and confinement, making proper enrichment crucial. The use of barren cages in breeding facilities is discouraged, and efforts to promote ethologically informed design should be encouraged to facilitate normal behavioural expression and development. However, even with enrichment, reptiles and amphibians may still experience “controlled deprivation” due to

the absence of important natural aspects such as predator avoidance.

Lastly, the breeding of unique colour morphs in reptiles and other species is becoming increasingly popular, driven by high commercial value (Tapley et al., 2011). However, this trend raises concerns about inbreeding depression and disease risks, as seen in cases such as the neurological dysfunction that 'spider' morph ball pythons are susceptible to (Rose & Williams, 2014).

Public health

Reptile pet keeping and trade also pose risks to public health. The most prominent concern is the risk of zoonotic diseases, those spread from animals to humans. International wildlife trade is a high-risk activity for such diseases, and due to COVID-19, we were reminded of that once again (Rush et al., 2021), further raising awareness of the need for responsible conduct (United Nations Office on Drugs and Crime & COVID-19 Response, 2020).

Beyond trade, reptile keeping itself carries specific disease risks, particularly salmonella. According to the National Information Centre for Companion Animals (LICG, n.d.) in the Netherlands, salmonella can be found in 50% of reptiles in captivity and 80% of terrariums, resulting in a 5% chance of contamination. Furthermore, 'reptile' salmonella results in a higher chance of hospital admission than other types of salmonella. In the Netherlands, reptile-related salmonella cases have increased over the past decades, while the overall number of cases has declined. This is mainly due to the increase in reptile pet keeping. The number of salmonella infections in 2018 was approximately 26,545, of which 7% was caused by contact with reptiles (Van Pelt et al., 2019). Reptile-related salmonella is still estimated to account for less than 10% of all cases, and the risk of contamination remains low when regular hygienic measures are followed.

Public and personal health can also be in danger when keeping hazardous animals. Currently, there are no specific regulations in the Netherlands that restrict reptile keeping based on the risk posed by the species. Keeping venomous snakes or caimans is legal, but can pose a threat to the keeper or surrounding when escaped or not handled properly. Recent examples in the Netherlands

are an escaped cobra in February 2024 (NOS) and an eastern green mamba in November 2023 (NOS). Both snakes can be deadly, especially the latter. There is even an example in 2016 where the police did a raid and found two (legally kept) crocodiles guarding drugs money.

Invasive species

Lastly, reptile keeping might not only harm biodiversity in reptiles' countries of origin through wildlife trade, but also negatively impact ecosystems in destination countries. When reptiles escape or when owners release them in the wild, they often die quickly due to the wrong environmental conditions they often die quickly due to unsuitable environmental conditions. However, some species survive and establish themselves in these new ecosystems. This can damage their delicate balance, devastating ecological communities (Pitt et al., 2005).

A well-known invasive reptile in the Netherlands and Europe in general, is the red-eared slider (*Trachemys scripta elegans*) (Cadi & Joly, 2004). This species was frequently released by owners who underestimated the care requirements or long lifespan of the turtle. Because they survived and disrupted local ecosystems, they were added to the European *Invasive Alien Species of Union Concern* list and are now banned from trade within the European Union.

To conclude

In conclusion, the practice of keeping exotic pets such as reptiles and amphibians offers certain benefits, but it also presents significant drawbacks. Reptile keepers experience psychological, physiological, and social benefits, although these are mainly attributed to pet keeping in general. Reptile keeping specifically can strengthen the connection between people and reptiles, which supports education and conservation efforts. In addition, the private sector has contributed, and can continue to contribute, to conservation and research through its expertise and capacity.

However, there are also significant drawbacks linked to reptile keeping. The global demand for exotic pets fuels a lucrative wildlife trade, contributing to biodiversity loss, animal welfare concerns, public health risks, and invasive species concerns. Despite regulatory efforts like CITES, many species remain vulnerable to overexploitation, with newly discovered and rare

species particularly at risk.

Furthermore, animal welfare is under pressure, with high mortality rates during trafficking. It is also a concern during private care, due to factors such as lack of knowledge and species-specific information, reliance on anecdotal advice, misconceptions about reptile keeping, difficulty in recreating natural environments, and inadequate enclosures. Key concerns include first year mortality rates, failure to meet basic husbandry needs, and lack of enrichment and natural behaviour stimulation leading to reptiles in captivity living in “controlled deprivation”. Breeding also raises animal welfare concerns, with inbreeding depression and disease risks on the rise due to the demand for unique morphs.

Public health risks include the spread of zoonotic diseases, a concern recently underscored by the COVID-19 pandemic. In addition, reptile keeping itself is associated with salmonella. While the risk of contamination is low with proper hygiene, reptile-related salmonella cases in the Netherlands have increased in recent years. Keeping venomous or dangerous reptiles, such as cobras or caimans, also presents safety risks if not handled properly.

Lastly, escaped or released reptiles can disrupt local ecosystems and become invasive, as seen with the red-eared slider, now listed as an invasive species in Europe.

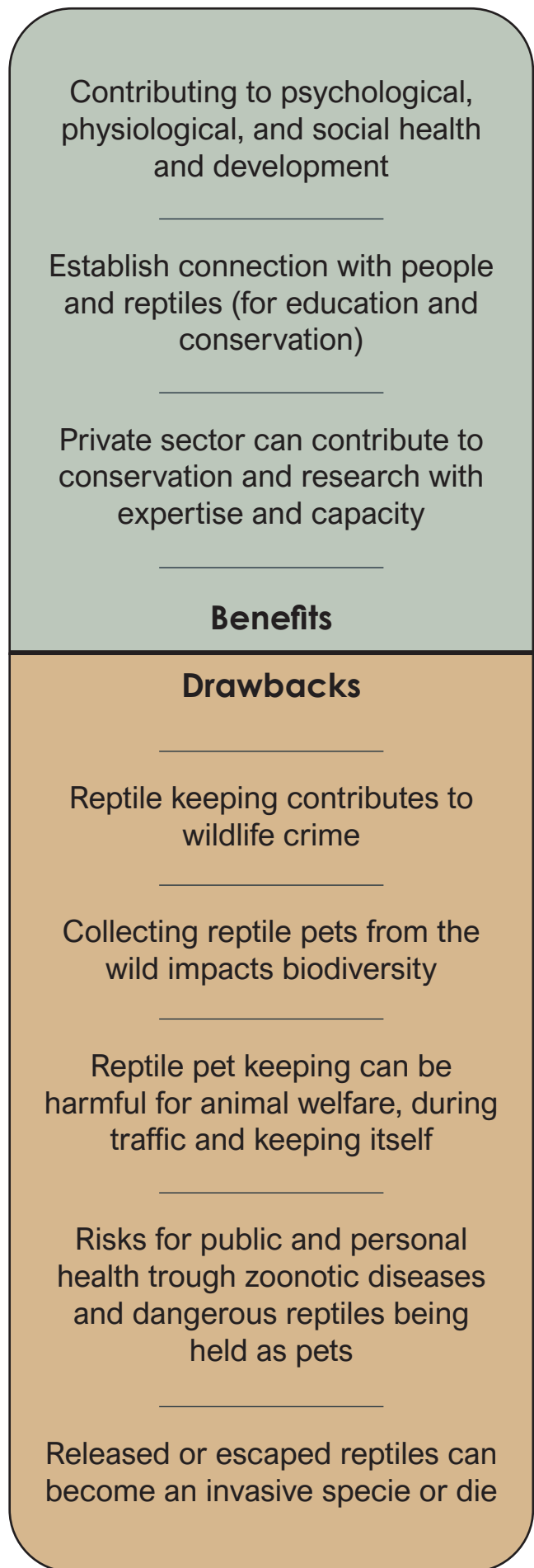


Figure 2: An overview of benefits and drawbacks of reptile pet keeping and trade

2.2 Stakeholders

The amount of stakeholders within reptile keeping is extensive. Reaching from the poachers and traffickers of wild-caught animals, to national and global regulators and institutions, to the individual owning a reptile pet. This project limits this list to the stakeholders within the scope of the Netherlands and therefore excludes reptile poachers and traffickers. In Figure 3 is a schematic journey of a reptile pet and corresponding stakeholders visualized.

In this analysis, the stakeholders are divided into four tiers to structure their roles, influence, and impact on responsible reptile keeping. For an overview see Figure 4.

Tier I: The key stakeholder

The first tier is the key stakeholder. The key stakeholder is defined as **reptile pet owners**, the consumers on the reptile pet market. This project seeks possibilities to use design and create interventions which stimulate reptile owners towards more responsible reptile keeping. Consumer demand influences the dynamics of market structures and innovation within industries (Malerba et al., 2007), and therefore responsible demand from the consumers stimulates responsible innovation and supply from the market. Other tiers will be impacted as well when this key stakeholder changes their view on reptile keeping. For example, when reptile consumers only buy responsibly sourced reptiles, the sellers

will eventually have to tailor to their needs to stay profitable. On the other hand, stakeholders from other tiers can in their turn also influence the key stakeholder, and their positive or negative impact on reptile keepers must be utilized or mitigated in the project's design interventions.

The key stakeholder 'reptile pet owners' is defined for this project as recreational reptile keepers, people who own reptiles in their private setting or home. This encompasses both casual pet owners and more dedicated hobbyists or hobby breeders. Zoos, educational institutions, and commercial breeders are not taken into account as their reptiles are not kept as pets. Hobby breeders are still considered reptile pet owners as they own them as pets, but expand the hobby of reptile keeping to breeding and selling as well. A distinction within the key stakeholder of reptile pet owners can be established between the *reptile pet keepers*, who own reptiles solely as pets, and the *reptile hobby breeders*, who also breed their reptiles. Nonetheless, reptile keepers are a very diverse group by default due to all the different reptile species and different drivers to keep them as pets. On Reptifiles.com, an online resource for information on reptile care, Healey (2015) describes 14 reptile keeper types in her (non-scientific) article. Mentioning personas such as 'collector', 'specialist', and 'morph snob'. However, she also mentions that a lot of these personas flow into each other, as they correlate with a development of experience in reptile keeping.

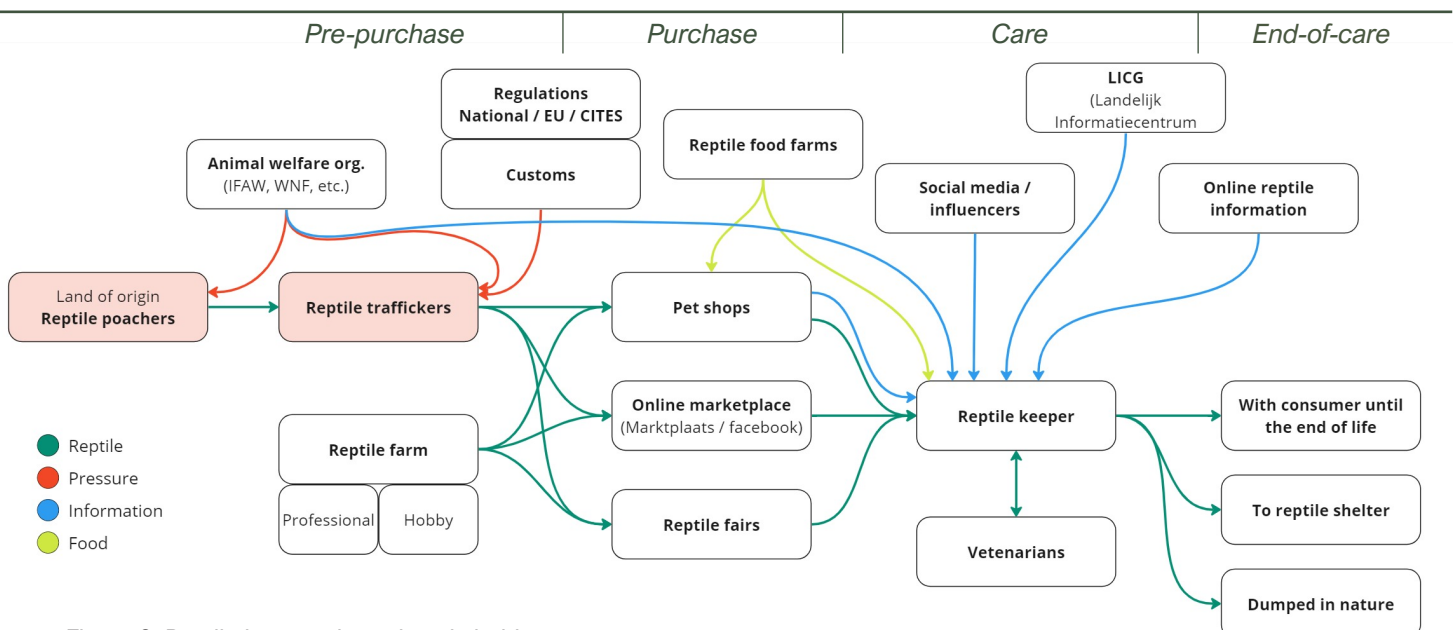


Figure 3: Reptile journey through stakeholders

Tier II: The influencers

The influencers are in the second tier. This is the group that actively tries to impact the reptile market and owners. *Regulatory institutions, animal welfare organizations, and social media / influencers* are among this group.

Regulatory institutions can be seen as the enforcers and gatekeepers of reptile pet keeping. They set the rules, developing and upholding the laws regarding reptile keeping and trafficking. For reptile keeping and trade in the Netherlands there are international regulations and agreements established through *CITES* and the *European Union*. The Netherlands also has national regulations on (exotic) pet keeping. The *NWVA* (Netherlands Food and Consumer Product Safety Authority) and *Dutch customs* have significant responsibility in enforcing these regulations in the Netherlands. Section 2.5: Legislation & Initiatives, provides an overview of the legislation regarding reptile keeping in the Netherlands.

Other influencers are **animal welfare organizations** strive to influence the reptile market to focus more on animal welfare and take action against wildlife trafficking. Not only national animal welfare organizations such as *Dierenbescherming, Stichting AAP, and Dierenlot* influence the exotic pet market in the Netherlands, but international organizations like *IFAW, WWF, TRAFFIC, World Animal Protection, and Eurogroup for Animals* do so as well. This influence is exerted through e.g. campaigns, lobbying, or research. There are several of such initiatives highlighted in Section 2.5: Legislation & Initiatives.

At last, **social media influencers** are in the influencer tier. Studies show that social media can influence demand for exotic pets (Anagnostou & Doberstein, 2024). Albeit intentional or unintentional, social media presence and influencers have an impact on reptile pet keeping. Relevant influencers regarding animals and reptiles in the Netherlands are *Freek Vonk, Sterrin Smalbrugge, and Floris Göbel*. In 2013 Trouw even coined the term Freek Vonk-effect, which meant an increase of reptile pets due to his presence with- and enthusiasm for reptiles. Floris Göbel also talks openly about his many interesting pets (around 120) such as a ball python and many

axolotls (AT5, 2022), and about how bearded dragons make amazing pets (Göbel, 2022).

Tier III: Impacted in contact with reptile

The third tier are stakeholders which are also impacted by shifts in the Dutch reptile market and are at some point in contact with the reptile pets. This tier consists of *pet shops, reptile fairs, veterinarians, and reptile shelters*. Reptile poachers and traffickers would also fall in this tier. However, as this project focuses on the reptile owners in the Netherlands, these stakeholders fall beyond the scope of this project.

Pet shops sell pets and pet supplies. These shops are spread around the country and offer an accessible entry to reptile pet keeping. However, according to an interview with a pet shop owner and an interview with a terrarium supply seller during field research, there is a decrease of pet store franchises selling reptiles. This is due to competition from reptile fairs, who are selling reptiles for prices the shops can't compete with.

These **reptile fairs** focus on selling reptiles, amphibians, insects, and supplies. There are a lot of reptiles and reptile species available at a fair, offered at a price the reptile shops can not compete with. There are several reptile fairs throughout the Netherlands. The most well-known is the quarterly fair in Houten, which is one of the biggest in Europe (World Animal Protection, 2020).

Pet shops and reptile fairs are often where reptile keeping begins. A stakeholder relevant during the keeping-phase itself are the **veterinarians**. When the reptile needs medical care they can be brought to the vet. However, many veterinarians are not trained in medical care for reptile pets. Therefore, reptile owners need to seek out specific veterinarians who have undergone additional training to specialize themselves in reptiles mentions a veterinarian in a conducted interview.

A stakeholder in contact with the reptile in the final stage of keeping can be the **reptile shelter**. If the owner can not care for their reptile any longer, they can bring it to such a shelter who will take care of it until the reptile is hopefully adopted by another owner.

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Key stakeholder

- Reptile pet owners
- Reptile pet hobby breeders

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II



Influencers

- Regulatory institutions (Dutch government, EU and CITES)
- Animal welfare organizations
- Social media / influencers

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III



Impacted in contact with reptile

- Pet shops
- Reptile fairs
- Veterinarians
- Reptile shelters
- Reptile poachers
- Reptile traffickers

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IV



Impacted not in contact with reptile

- Terrarium accessories shop
- Reptile food farms

Tier IV: Impacted not in contact with reptile

In the final tier are the other stakeholders impacted by changes in the Dutch reptile market, but whom are not in direct contact with the reptile itself.

These are the **terrarium vendors**, whom sell terrariums and accessories, and **reptile food farms**, which supply the food that the reptile pets need, such as rodents and insects.

To conclude

The stakeholder landscape of reptile keeping in the Netherlands is extensive and varied. For this project the key stakeholder is defined as recreational reptile pet owners (essentially the consumers in the industry). Their demand plays a key role in shaping market dynamics and industry development. When consumer preferences shift towards more responsible practices, it can drive the market to follow with more responsible innovation and supply (Malerba et al., 2007). As the ones purchasing, keeping, and potentially rehoming the animals, their role spans the biggest part of the reptile's life.

Surrounding them are other stakeholders, divided into three additional tiers. The second tier consists of active influencers such as regulatory bodies, animal welfare organisations, and social media figures. These actors aim to shape perceptions and practices around reptile keeping through policy, advocacy, and public engagement.

The third tier includes stakeholders that are directly in contact with reptiles at specific moments in the keeping journey, such as pet shops, reptile fairs, veterinarians, and shelters. Their active impact on reptile welfare and contact with the key stakeholder highlight their relevance.

The final tier consists of stakeholders that are impacted by reptile keeping developments but have no direct contact with the animals. These include terrarium and equipment suppliers, as well as food providers. While not actively shaping the market, their presence influences availability, care quality, and consumer choices.

This structure provides a clearer understanding of how the different stakeholders relate to reptile keeping and highlights where potential influence or collaboration may lie.

Figure 4: Stakeholder tiers

2.3 Responsible reptile keeping

This project focuses on responsible reptile keeping, so it is important to define what this entails. However, many stakeholders are influencing, impacting, and depending on the reptile pet market. Each of these stakeholders has a different view of what the reptile market should look like and when it is considered responsible. Figure 5 shows the positioning of different stakeholders regarding reptile pet keeping. It is noticeable that there is a lot of deviation between the different stakeholders, as well as within the group of stakeholders themselves. This figure is based on assumptions drawn from impressions conveyed in literature and field research. A more rigorous study is needed to further define the boundaries of all the stakeholders, but that's not part of this graduation project. However, this figure does raise the question, can there be *one* definition? And can there be a common vision established among the different stakeholders?

Nonetheless, a definition for responsible reptile keeping is vital for this project. It establishes the base for what the design interventions aim to achieve. Since there is no predetermined definition on what responsible reptile keeping entails, the following chapter will define it's meaning for this project. This definition strives to be objectively grounded from literature and field research to determine a well-reasoned interpretation. The

goal of the definition is not to become an idealistic vision for this project, but to give a feasible and realistic meaning to the concept of responsible reptile keeping.

Defining responsible reptile keeping

If reptiles were kept responsibly, then the downsides of reptile keeping should be negligible. Currently, there is a negative impact on biodiversity, animal welfare, public health, and there is a risk for invasive species (see Chapter 2.1: The Impact). Responsible reptile keeping needs a holistic approach as it is not just about ensuring that the reptile is kept properly; it also means ensuring that it was responsibly sourced and there is an appropriate end of keeping. Therefore, to define responsible reptile keeping all stages of ownership should be considered; *purchase*, *care*, and *end-of-care*. However, after a visit to a reptile shelter during field research, the shelter's owner mentioned that most discarded reptiles on that location were there due to improper knowledge about reptile keeping *before* purchase. In an interview with a veterinarian during field research it was mentioned that impulsively bought reptiles are a common problem, resulting in neglected animals as the owners are unaware of the care the reptiles require. Due to this importance of knowledge *before* buying a reptile, the phase *pre-purchase* is added to the responsible reptile keeping definition, taking into account the

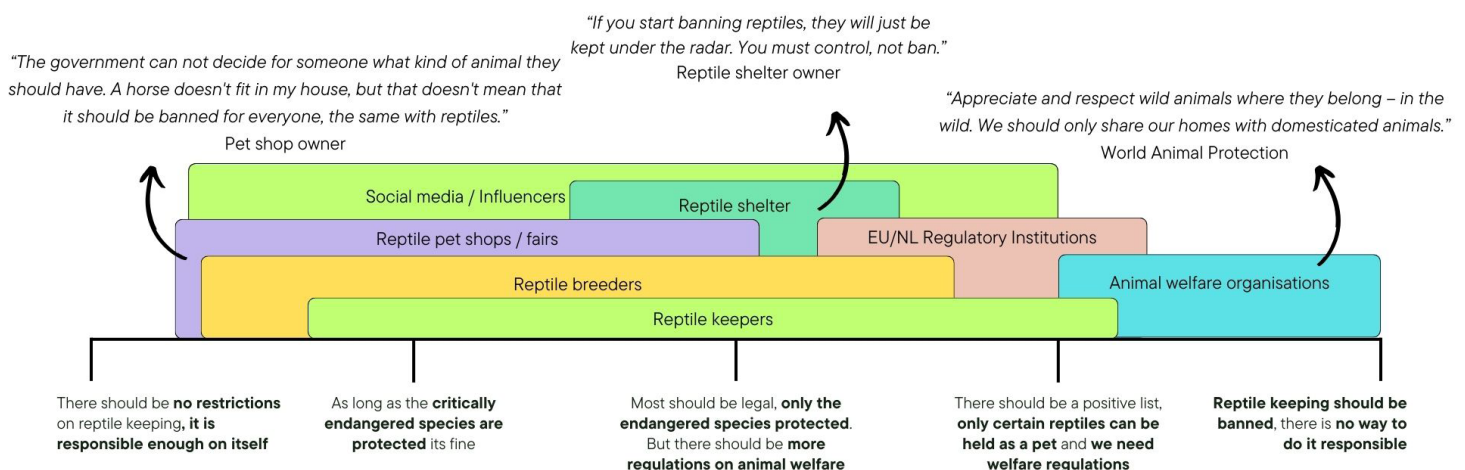


Figure 5: Visualization of the diverse view on responsible reptile keeping from the stakeholder

considerations and impact of reptile keeping before purchase. All these phases add to the overall picture of responsible reptile keeping creating an elaborate definition based on literature studies and stakeholder interviews;

Responsible reptile keeping is making the contemplated decision to ensure life-long care for a legally sourced, captive-bred reptile, caring for it beyond the basic needs to survive, by making them thrive through enrichment while keeping the safety of the reptile, you, and the surrounding as a priority.

This definition is derived from the meaning of responsible reptile keeping in the different phases; *pre-purchase, purchase, care, and end-of-care*. The following subchapters will explain how each phase impacts this definition.

Pre-purchase

Responsible reptile keeping in this stage is about making the contemplated decision to purchase a reptile. Some reptiles are prone to be bought impulsively due to being easily obtainable, affordably priced, and small in size when young (Valdez, 2021). When reptiles are bought impulsively, certain considerations on proper caretaking and origin are neglected. According to the visited reptile shelter from field research, many people do not consider the lifespan of a reptile. Even the common 'beginner' reptiles take a huge commitment considering the years they can be your pet. Bearded dragons have a life expectancy in captivity of 10 years, leopard geckos of 15 years, ball pythons of 30 years, and the Russian tortoise can even reach up to 80 years old, despite all being considered beginner reptiles. When someone impulsively buys a ball python for €20,-, they might not consider the consequence of it becoming their pet for the next 30 years. Therefore for buyers it is important to not only look at whether they can enjoy and take care of it now, but will they still be able to in 10-20 years? Other considerations which are often overlooked according to the field research are the costs of keeping, that reptiles are not social animals, and the complexity of care, such as terrarium requirements, temperature and humidity management, the feeding of other animals (insects and rodents), and the difficulty of finding reptile pet sitters and veterinarians. Even when impulsive buyers start to look into husbandry, they tend to gravitate towards simple,

poor-quality information according to Mendyk & Warwick (2023), resulting in improper care of their reptiles. Therefore, impulsive buying behaviour does not fit in responsible reptile keeping. Buyers should be aware of what they get into and be able to refrain from purchasing if they do not fulfill the requirements. This is not only for first-time purchases, but for all reptile purchases. If you have a few reptiles already and want more, but you don't have the space, money, or time to properly take care of them, then it is irresponsible to purchase new ones. If a reptile can not be kept responsibly, not buying one is the responsible option. Responsible reptile keeping starts with making the contemplated decision of whether it is the right fit for you.

Responsible reptile keeping is making the contemplated decision to care for a reptile

Purchase

After the consumer determines whether a reptile and which reptile is the right for them, they will go into the next phase of the responsible reptile keeping definition, purchase. This phase is about responsible consumer behaviour when acquiring a new reptile pet. The first aspect of responsible reptile purchasing is legality. There are regulations regarding the reptile pet trade (see Chapter 2.5), and being responsible means adhering to those rules. For the reptile pet trade it means complying with CITES Appendices (global), European Union Annexes (EU), EU List of Invasive Alien Species (EU), Omgevingwet [Environmental Law] (NL), and Wet dieren [Animal Law] (NL). Besides purchasing the reptile legally, it is also better to purchase captive-bred over wild-caught reptiles. An overview of the benefits and drawbacks of the different sourcing methods can be found in Figure 6. The main reason that captive-bred is preferred is due to the strain wild-caught places on biodiversity, animal welfare, and disease transmission. Reptiles being caught for pet keeping decrease their wild populations and can disrupt ecosystems. Next, these reptiles are trafficked in poor conditions to their destination country, where they can pose a threat to transmit diseases and parasites to captive populations. However, captive breeding also has some issues due to genetic homogeneity, leading to increased susceptibility to diseases and genetic disorders, especially when breeding for certain morphs. Nonetheless, these issues can be mitigated with conscientious breeding programs, where

breeders exchange specimens to get new gene variety in their population. So despite the potential downsides of captive-breeding, it can still fit within responsible reptile keeping if the breeding is done well and the risks are mitigated. This highlights the need for responsible reptile breeding, besides just responsible reptile keeping. Therefore choosing a reputable breeder is also part of a responsible purchase, to support the breeders who prioritize health and well-being over unknown and shady sources. Nevertheless, it is as a buyer difficult to determine who is shady and who is trustworthy. And lastly, the purchase is done responsibly if the buyer comes prepared. Reptiles are stress-sensitive animals and handling during purchase

is a stressful period. Ensure to minimize stress at transport and that the animal can be placed immediately in their functioning terrarium once at home.

*Responsible reptile keeping is making the contemplated decision to care for a **legally sourced, captive-bred** reptile*

Care

Proper care is crucial. Reptile health depends on proper husbandry, such as temperature, lighting, diet, and refuge (Azevedo et al., 2021). Furthermore, improper care and excessive handling can stress a reptile, making it more

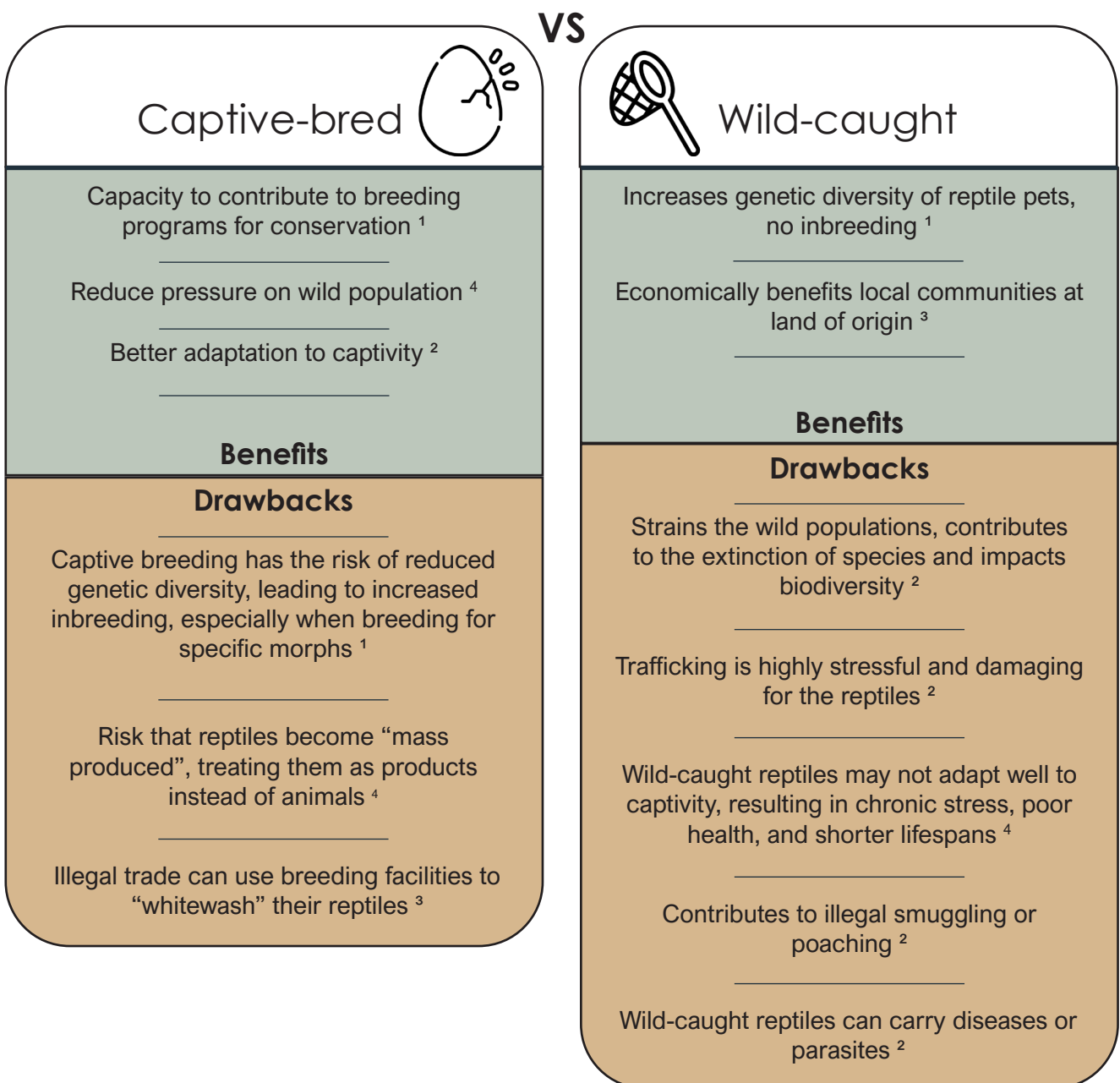


Figure 6: An overview of the benefits and drawbacks of captive-breeding versus wild-caught sourcing reptile pet sourcing. ¹Anastasia et al. (2023), ²Green et al. (2020), ³Wilson-Holt and Roe (2021), ⁴Lyons & Natusch (2006)

susceptible to disease (Wilkinson, 2015). According to the interviewed vet during field research, improper husbandry and handling are the main cause for their reptile patients. Creating a singular guide on how to care for reptiles is impossible, as there are many different species, coming from very different environments, with very different needs. A desert snake has very different needs than a rainforest gecko. However, the variables which influence the well-being and care for these reptiles does have similarities, they need a specific temperature, a specific humidity, a specific diet, etc. Therefore there is no one-size-fits-all solution, but there is a similarity in topics that should be attended to. Current care sheets often mention the basic, minimum needs for the reptiles. These often consist of; habitat set-up (enclosure size, temperature, humidity, and lighting) and diet (carnivore, herbivore, omnivore, or insectivore). Fulfilling these needs will make sure the reptile survives. However, more research is supporting the sentience and cognitive abilities of reptiles and these findings suggest that many reptiles kept as pets might be suffering due to inadequate environments that don't meet their more complex needs and stimulation (Lambert et al., 2019). It is also important to remember that reptiles are not domesticated animals, not even when they are multi-generation captive-bred reptiles. Reptiles are essentially still wild (Warwick, 2023). However, replicating the wild completely can never be done in captivity resulting in 'controlled deprivation' according to Burghardt (2013). Nevertheless, replicating this natural environment is an important factor for reptile well-being, as it decreases stress and encourages natural behaviour (Wilkinson, 2015). It also provides enrichment, stimulating the reptile physically and mentally, benefiting their overall health and welfare. More and more research is supporting the need for enrichment in reptile

keeping to stimulate the natural behaviour of reptiles (Burghardt, 2013; Mendyk & Augustine, 2023). Such enrichment can be done, depending on the needs of specific reptiles, by having enclosures with varied levels, rocks, branches, and plants to encourage natural behaviours like climbing and burrowing. This variety also offers choices for the reptile, allowing it to find its preferred basking spots, humidity levels, and hiding places (Wilkinson, 2015). Therefore responsible reptile care-taking goes beyond providing the basic needs to survive, but also providing enrichment for them to truly thrive. The understanding of reptiles is growing, but there is still a lot to be discovered. Reptile keeping is an endeavor with constant learning and development. Lastly, responsible care-taking should be safe for the reptile, the owner, and the environment. Many reptiles are escape artists (De Vosjoli, 1999) and therefore enclosures should be escape-proof, reptiles should be handled with care, and working hygienically is needed to decrease the risk of spreading disease to the reptile, and to the owner (i.e. salmonella). Reptiles which can harm humans significantly are not considered responsible in this definition of responsible reptile keeping. These reptiles would pose a threat to the keeper during handling and even the surrounding when escaped.

*Responsible reptile keeping is making the contemplated decision to care for a legally sourced, captive-bred reptile, **caring for it beyond the basic needs to survive, but making them thrive through enrichment while keeping the safety of the reptile, you, and the surrounding as a priority.***

End-of-Care

The last stage is end-of-care. The concept of this phase is that the owner considers himself

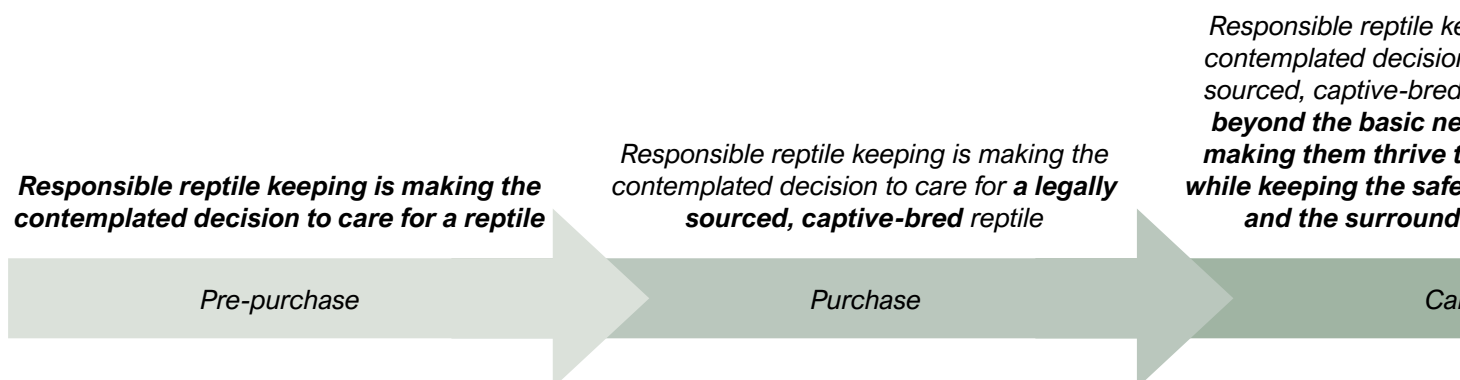


Figure 7: The development of the definition of responsible reptile keeping over the different phases.

responsible for the reptile receiving care his whole life. This does not necessarily mean that the owner himself *needs* to take care of the reptile its whole life, even if they are not able to anymore due to e.g. financial problems or sickness. But it means that they will ensure that the reptiles are cared for if they are not able to anymore, by finding a new owner or bringing it to a reptile shelter. The most important aspect of this stage is that they should not be dumped into nature. Most reptiles will not survive the Dutch climate, resulting in death. And when they survive, they will pose a risk of becoming an invasive species, disrupting Dutch ecosystems. Ideally, the reptile dies of old age at the first owner, but this is not always feasible. Then it is important to find another suitable owner, or to bring it to a reptile shelter when no suitable owner is found.

*Responsible reptile keeping is making the contemplated decision to **ensure life-long** care for a legally sourced, captive-bred reptile, caring for it beyond the basic needs to survive by making them thrive through enrichment, while keeping the safety of the reptile, you, and the surrounding as a priority.*

To conclude

Currently there is no existing vision on what responsible reptile keeping is, and its meaning varies significantly among different stakeholder groups. Nonetheless, to design for responsible reptile keeping it is necessary to understand it. Therefore for the purpose of this project a definition was developed by synthesising findings from literature and field research. This definition of responsible reptile keeping may be elaborate, but its essence is simple: reptiles should thrive instead of survive. By focusing on informed decisions, legal and ethical sourcing, proper care and enrichment, and no dumping animals in the

wild, responsible reptile keeping shifts the goal from mere survival to fostering a fulfilling and healthy life for the animal. . This step-by-step definition, from pre-purchase to end-of-care, forms the foundation for what this project's design interventions aim to support:

To make reptiles thrive instead of survive

The full definition is created developed through four phases, each including specific considerations.

The pre-purchase phase focuses on making a well-considered decision before acquiring a reptile. This includes reflecting on the animal's lifespan, care requirements, costs, and whether the keeper is able to provide appropriate care in the long term.

The purchase phase is about acquiring a reptile responsibly. That means buying legally, choosing a reputable captive-bred source, and preparing for a smooth transfer to minimise stress for the animal.

The care phase involves fulfilling both basic husbandry needs and offering enrichment that supports the reptile's physical and mental wellbeing. It also includes safe handling, hygiene, and keeping reptiles in secure and suitable environments.

Finally, the end-of-care phase emphasises life-long responsibility. If an owner can no longer care for their reptile, they should ensure a humane handover, either by finding a new keeper or involving a shelter. Releasing animals into the wild is never a responsible option.

*Responsible reptile keeping is making the contemplated decision to care for a legally sourced, captive-bred reptile, **caring for it beyond the basic needs to survive, but making them thrive through enrichment** while keeping the safety of the reptile, you, and the surrounding as a priority.*

*Responsible reptile keeping is making the contemplated decision to **ensure life-long** care for a legally sourced, captive-bred reptile, caring for it beyond the basic needs to survive by making them thrive through enrichment while keeping the safety of the reptile, you, and the surrounding as a priority.*

Making reptiles thrive instead of survive

End-of-care
& Full definition

Summarized

2.4 Trends

The following chapter provides an overview of different trends in the Dutch and global reptile market. These are trends that influence the exotic pet market and are important to consider while designing interventions, to capitalize on the positive trends, and be aware of and potentially counter the negative trends.

Growing market

The market for reptile pets is still growing (LICG, 2024). Reports from Dibevo (2022, 2023) on pet ownership in the Netherlands indicate that the number of pet reptiles increased from 150,000 in 2021 to 300,000 in 2022, doubling within a year. Yet, this number still represents only one percent of the total pet count in the Netherlands. Nonetheless, Marc Krikke, chairman of the European Snake Society estimates that there were in 2021 already 400.000 snakes alone in the Netherlands, excluding other types of reptiles (Schippers, 2021). This market growth is not limited to the Netherlands, but according to Ostović et al. (2021) reptile pets are becoming ever more popular globally. It is estimated that at least a third of all described reptile species are currently being traded online (Marshall et al., 2020).

This growth does not come without risk. As mentioned in Section 2.1: The impact, demand is an important driver of the negative impact regarding reptile keeping. An increased demand can further strain biodiversity, animal welfare, and public health if not dealt with responsibly. However, this increase in demand and popularity might also result in increased attention towards reptiles, leading to more research, knowledge, and regulations similar to more mainstream pets like cats, dogs, or rabbits. This increase in understanding of the species also results in better knowledge on how to care for these animals.

Urbanization

The growth in demand is driven by urbanization according to the market intelligence and consulting firms Coherent Market Insights (2022) and The Freedonia Group (2020). Reptile pets can be held in relatively tight spaces and therefore be more accessible in urban households compared to cats or dogs. Reptiles are also considered low-maintenance pets, which is ideal for working households.

However, while it is true that reptiles are less demanding in terms of space and attention than many conventional pets, they do still need proper enclosures and very specific care. Therefore it is important that urbanization does not lead to reptiles becoming the pet to buy because it is “the least harmed pet” in urban environments, but that their husbandry needs are still fulfilled properly or buyers refrain from purchase if not.

Millennials

Another explanation for the market growth is the rise of millennials according to Coherent Market Insights (2022) and The Freedonia Group (2020). This demographic has a growing inclination towards unique pets and an increasing disposable income. Furthermore, their presence on social media exposes them to influencers normalizing the keeping of exotic pets.

Online communities

Despite not being a very recent trend, it is still worth mentioning. The rise of online communities in reptile keeping. There are many forums and social media groups with reptile keepers communicating and sharing knowledge. According to conversations at reptile fairs, these online communities are a place to be able to discuss specific questions and concerns and learn from the experiences of others. Not all reptile owners know other keepers and the online communities ensure that they can find people with a common interest. These online communities are often also a marketplace, with people offering and showcasing their reptiles for sale.

These online communities can be very beneficial to share knowledge, information, and learn from the experiences of others. However, with such online communities there is also a risk of misinformation being spread.

Online marketplaces

The online communities functioning as a marketplace reflects the trend that the internet has become a significant platform for the trade of reptiles in the Netherlands, with both legal and illegal transactions on the rise (Janssen and Blanken, 2016). The internet is now one of the primary channels for Dutch reptile commerce. Trading activities predominantly occur on Dutch websites like Marktplaats and social media

platforms, especially Facebook. Morphmarket, an international online reptile marketplace is also active in the Netherlands.

These online marketplaces can make it accessible for responsible (hobby) breeders to sell their reptiles. But it also makes it more accessible for less ethical traders to sell directly to (unknowing) buyers. This highlights the need for transparency and supervision on buyers by such platforms.

From shops to fairs

Another trend was mentioned in interviews with a pet shop owner including reptiles, and a terrarium seller / small-scale reptile shelter / ex-reptile trader during the field research. They noted the decreasing amount of pet shops selling reptiles in the Netherlands. Most chains ceased selling reptiles because it was not profitable anymore. They could not compete with the prices from breeders at reptile fairs. Therefore most reptile trade is now being done online, or at reptile fairs.

“A private breeder doesn’t have rent to worry about. Additionally, it’s a hobby, he doesn’t need to derive income from it, he doesn’t need to pay staff. It’s logical that he can sell it at the fair for much lower than we can in the shop.” - Pet shop owner

Popular reptiles

According to a study from Valdez (2021) based on Google Trends, the most popular reptile pet globally is the bearded dragon, followed by ball pythons and leopard geckos. Crested geckos have seen the most significant rise in search interest the recent years. The ball python is the most popular search for the Netherlands specifically, with the blue-tongued skink having the most significant rise. The popularity of the ball python, leopard geckos, and crested geckos was especially noticeable during visits to the reptile fair at Houten (31 May 2024) and Amstelveen (17 May 2024) in the Netherlands. The bearded dragon and boa constrictor were also popular at the fairs but to a lesser extent.

It is noticeable that the most popular reptiles are also the reptiles often considered as the “beginner reptiles”. The five best beginner reptiles according to Peters (2022) from the blog huisdieradvies.nl are the leopard gecko, crested gecko, bearded dragon, corn snake, and ball python.

An opportunity for responsible reptile keeping lies in this correlation between popular and starter reptiles. By stimulating responsible reptile keeping for these reptiles you reach a big target group at the beginning of developing their reptile keeping habits.

Rush for rarity

An ongoing trend in reptile keeping is that rarity sells. This is represented by the hunt for rare species and by the prices certain morphs can fetch.

Rarity bites

According to Brook and Sodhi (2006), the demand for rare species creates a positive feedback loop where rarity increases price, making them more desirable for collections or pets. This outweighs the difficulty of finding them, leading to overexploitation and extinction. This is especially a problem for rare and newly discovered reptiles and amphibians according to Altherr and Lameter (2020). Seventy-five percent of online traded reptile species lack international protection (Marshall et al., 2020), and it takes time to list and protect newly discovered species through CITES, making them attractive and vulnerable to exploitation due to their rarity.

Rare morphs

Captive-bred reptiles are increasingly being preferred over wild-caught by reptile owners and collectors (Collis & Fenili, 2011). However, this doesn’t mean that the rush for rarity is gone. It has solely shifted from rare species to rare colour and pattern variations, i.e. rare morphs. The deliberate breeding of these “designer” reptiles has the potential to elevate the worth of even the most common and basic species, fetching prices reaching far into the thousands of euros.

Stabilizing after Covid-19 & Energy prices

During Covid-19 the number of pets in the Netherlands increased according to research agency Ipsos I&O, since people had more time and sought companionship at home (Brookman, 2022). Reptiles were also becoming more popular as pets during the pandemic, as demonstrated by reptile stores in the United States struggling to keep up with demand (Charnock, 2022). However, many of these pet purchases were too impulsive

and when the world slowly returned to normal, many animals were brought to shelters (Radar, 2021; Van den Berg, 2023). This was similar for reptiles according to the visited reptile shelter during field research. They mention this effect was even strengthened for reptiles due to the high gas and energy prices between 2021 and 2023 in the Netherlands (Doolaard, 2024). Reptiles require heating and lights, which became too expensive for some keepers. A Dutch breeder I spoke to during the biggest reptile fair in Hamm, Germany, discussed a similar trend. He mentioned that during Covid-19 many people started reptile keeping, but also hobby breeding. This resulted in an oversaturated market, especially when keepers and breeders stopped their hobby when energy prices surged and reptile keeping became less appealing, resulting in more reptiles on the market, while fewer new keepers were beginning. The breeder at Hamm mentioned that the market is now stabilizing again, expecting to have sold as many reptiles in Q1 of 2024 as he has done in the whole of 2022.

Re-opening the debate on wildlife trade

Another role of COVID-19 was re-opening the debate on exotic pet trade from the perspective of zoonotic diseases (Loeb, 2020). The pandemic highlighted the disease risks associated with the exotic pet trade to the public. Moorhouse et al. already noted in 2016 that information campaigns on zoonotic disease risks associated with the trade could reduce demand for exotic pets, and this effect is likely to have grown after the pandemic. It is currently also a common strategy for campaigns by animal welfare organizations (World Animal Protection, 2020a; IFAW, 2022). Nevertheless, a study by Ribeiro et al. (2022) suggests that despite concerns about zoonotic diseases persist, demand and supply for legally traded exotic pets may either remain stable or temporarily decrease while demand for illegal exotic pets is expected to remain unchanged.

Positive lists

A positive list for pets is a list of animal species which are approved and legal for pet ownership, all animals excluded from this list will be illegal to keep as new pets. Such a list will be enforced in the Netherlands from 1 July 2024. However, this list solely focuses on mammals and not yet on other animals like birds, reptiles, and amphibians. Many animal welfare organizations have been advocating such a list for a long time and want to expand it to

all animals, not just mammals (Claessen, 2023). There is even a probability that there will come a positive applicable to all of Europe, instead of on a national level (Eurogroup for Animals & Stichting AAP, 2023). The Ministry of Economic Affairs and Climate Policy (2024) claims that a positive list on reptiles and amphibians is coming for the Netherlands, but it is not yet determined when it will come. This positive list will strongly impact the reptile market in the Netherlands as it will determine what is legal and illegal to keep as a pet. Potentially popularizing and increasing demand for certain species, while decreasing it for others. However, it also raises the challenge of increased illegal trade as more reptiles become illegal to trade.

To conclude

The Dutch reptile market is expanding due to urbanization, millennial interest, and online trading platforms. This highlights an interesting group [urban millennials] regarding responsible reptile keeping. However, market expansion also raises the risk of and increased impact from the downsides of reptile keeping. Nonetheless, it might also open doors for more research and conservation efforts for reptiles, improving understanding and wellbeing of these animals. The trend of urbanization is also relevant for the quality of care for reptiles, as they are considered more suitable in urban homes and for working individuals than more conventional pets. Nonetheless, reptiles do still need a spacious enclosure and specific care. They will not be suitable in every urban setting and for every owner, making integration into the right home important.

The growing presence of online communities has become a notable trend within reptile keeping. These forums and social media groups provide spaces for reptile enthusiasts to exchange knowledge, seek advice, and connect with others who share similar interests. While they can support learning and engagement, they also carry the risk of spreading misinformation, particularly when guidance is shared without verification or expertise.

In parallel, online marketplaces have become a key channel for reptile sales in the Netherlands. Platforms such as Marktplaats, Facebook, and MorphMarket have increased accessibility for both buyers and sellers. This shift has made it easier for responsible hobby breeders to reach potential owners, but it also enables less ethical

sellers to bypass oversight.

reptiles.

Alongside this development, traditional pet shops have declined in relevance, with reptile fairs becoming another major point of sale. These fairs now represent a significant part of the trade landscape and play a growing role in how reptiles are bought and sold. The movement of reptile sales from shops to online platforms and fairs marks an important shift in the market dynamic.

Furthermore, commonly kept reptiles such as the ball python, leopard gecko, bearded dragon, and crested gecko are also frequently listed as suitable beginner species. As these reptiles are both popular and often kept by relatively inexperienced owners, they represent a large audience whose reptile keeping practices and beliefs are still in development.

In addition to the more commonly kept species, rare reptiles are also a notable trend in reptile keeping. Rare reptiles are more desirable for reptile collectors creating a feedback loop stimulating overexploitation. This focus on rarity also extends to captive bred reptiles, where the breeding of distinctive colour and pattern variations, known as “designer” morphs, has become increasingly popular.

The reptile market is currently stabilising from the turbulent time during COVID-19 and the energy crisis. During the pandemic there was an increase in reptile keeping and breeding. However, during the energy crisis more people quit the hobby and sold their reptiles, while less new keepers started reptile keeping. This created a high surplus in reptile supply on the market, which is still stabilising from this impact.

COVID-19 also reignited the debate on wildlife trade, drawing renewed attention to the potential disease risks linked to the exotic pet market. However, it is not expected that the pandemic will significantly reduce demand for exotic pets (Ribeiro et al., 2022). A regulatory development with greater potential impact is the introduction of positive lists, which define the animals that may be kept as pets. Since July 2024, the Netherlands has implemented a positive list for mammals and is in the process of developing one for reptiles. Such a list is likely to influence the reptile market by altering which species are legally permitted, affecting the popularity and availability of certain

2.5 Legislation and Initiatives

Responsible reptile keeping also means adhering to the legislation. To create initiatives and designs which support responsible reptile keeping it is therefore necessary to understand the regulatory framework of reptile keeping in the Netherlands. This section will also review past intervention regarding reptile pet keeping to identify any strong suits or shortcomings which can be utilised for the intervention development in this project.

Legislation

The Dutch reptile pet trade operates within a complex web of international and national regulations designed to ensure the welfare of animals, protect biodiversity, and prevent the spread of invasive species. This chapter will give an overview of these legal frameworks.

Global Regulations - CITES

The Convention on International Trade in Endangered Species (CITES) is an international agreement regulating the trade of wildlife species, including reptiles. CITES categorizes species into three appendices based on their conservation status:

- **Appendix I:** Species threatened with extinction. International trade in specimens of these species is generally prohibited, with exceptions for specific purposes like scientific research or captive breeding programs, requiring permits from both exporting and importing countries. All wild-caught animals and first generation captive-bred are illegal to trade commercially.
- **Appendix II:** Species not necessarily threatened with extinction but could become so if trade is not controlled. International trade in Appendix II species requires a permit from the exporting country, ensuring the trade is legal and sustainable for the wild population.
- **Appendix III:** Species included at the request of a particular country to control trade within its borders. This allows countries to regulate trade in species that are not necessarily threatened globally but pose a conservation concern domestically. Trade requires a permit or certificate from the exporting country. Trade in CITES I and II species is only legal with the appropriate certificates, and when purchasing a CITES-listed animal as a pet, a transfer declaration is required. This is not always mandatory for CITES III animals, though a 'certificate of origin' may be required in

some cases.

European Union Regulations

The European Union (EU) has its own regulations that build upon and complement the CITES appendices. These regulations are implemented through EU Annexes, which provide a more detailed breakdown of reptile species and the level of control required for their trade within the EU compared to the broader categorizations of CITES. The EU annexes bridge the gap between CITES appendices and the actual trade within the EU. It goes a step further by defining specific requirements for trade permits and certificates depending on the species and the level of control needed. Here's how the EU annexes function:

- **EU Annex A:** This annex lists species that are equivalent to CITES Appendix I. It includes species threatened with extinction, and international trade in specimens of these species is generally prohibited within the EU. Exceptions might be granted for specific purposes like scientific research or captive breeding programs, but these require permits from both the exporting and importing EU member states.
- **EU Annex B:** This annex mirrors CITES Appendix II. It contains species not necessarily threatened with extinction but could become so if trade is not controlled. Trade in these species within the EU requires a permit from the exporting member state. This is to ensure the trade is legal, sustainable for the wild population, and meets the stricter requirements set by the EU compared to global CITES regulations.
- **EU Annex C:** This annex is similar to CITES Appendix III. It includes species that a particular country wants to control trade of within its borders, even if the species is not necessarily threatened globally. This allows countries to regulate trade in species that might pose a conservation concern domestically.
- **EU Annex D:** This annex consists of some animals from CITES Appendix III, but mostly non-CITES species which comply with other EU regulations.

EU List of Invasive Alien Species:

Furthermore, the EU has regulations regarding invasive species. This list identifies plant and animal species considered a threat to native ecosystems in the EU. The import, keeping, and breeding of species on this list are generally prohibited. This regulation aims to prevent the

introduction and spread of invasive species that could harm native wildlife and ecosystems.

National Regulations

Besides these international regulations, the Netherlands also has some national legislation.

- **Omgevingwet** [Environmental Law]: The Omgevingswet largely regulates the CITES and EU agreements in the Netherlands, but it also has regulations on for example catching local wildlife and keeping them as pets. This is illegal for most animals, including all the reptiles living in the Netherlands.

- **Wet dieren** [Animal Law]: This law focuses more on the keeping of animals itself. The active positive lists are defined in this law. Currently there is only a positive list regarding mammals as pets, but it is expected that more lists, such as for reptiles, will eventually be added. It also has regulations on animal well-being. The law prohibits abuse and neglect, requiring that animals are cared for according to their natural needs. However, what these needs for a specific species are is not defined for reptiles. Owners must provide food, shelter, and medical care. Unnecessary suffering or killing of animals is banned, and caretakers must actively protect and promote their welfare.

Initiatives

This project will eventually create design interventions to improve responsible reptile keeping. Therefore it is relevant to look at past initiatives, to draw inspiration and insights from what already exists.

Exotic pet campaigns

A lot of initiatives regarding exotic pets are through animal welfare organisations (tier II stakeholder; influencer). These organisation mainly focus on the pre-purchase and purchase phase of responsible reptile keeping. Organization like IFAW, World Animal Protection, Stichting AAP, and WWF are actively campaigning against exotic pets and its trade. Often the mammals are the centrepiece of these campaigns. Campaigns, and even scientific research, funding in conservation efforts, and media coverage are often biased towards mammals according to Mather (2019). Nevertheless, these campaign do still target reptiles as part of exotic pets. For many exotic pets campaigns targeting the public there is a common thread. It warns and raises awareness

on the impact of exotic pets on biodiversity, animal welfare, public health, and the risk of invasive species. Then, it mentions what the organization is doing to counter these negative impacts, and asks to sign a petition or give a donation for support. These organizations often aim to influence legislation, fund conservation and research, and influence the public opinion. Many recent campaigns have focused on pushing for the implementation of positive lists. Figure 8 shows examples of exotic pet campaigns.

However, it is difficult to determine what the impact of these campaigns was, as data on the results are not openly available. Nonetheless, there are some findings that are relevant to this project. First, it highlights that current campaigns primarily target exotic pets as a whole, with a strong emphasis on larger mammals rather than reptiles specifically. The main message is often the negative impact of the exotic pet trade on biodiversity, animal welfare, public health (zoonotic diseases), and the risk of invasive species. These campaigns are mostly conducted online, through ads or social media initiatives, with calls to action typically focused on supporting animal welfare organisations, signing petitions, or discouraging exotic pet purchases. This suggests that if this project were to develop a campaign as an intervention, it should distinguish itself to effectively reach an audience that may not be engaged by conventional approaches. This could be achieved by designing a campaign specifically tailored to reptile keeping or by exploring alternative channels or novel methods to reach the key stakeholder through alternative means.

Some existing campaigns distinguish themselves by focusing primarily on the pre-purchase phase of responsible reptile keeping. The Not a Pet campaign by the Association of Zoos and Aquariums and the IFAW shares a similar message with conventional campaigns but stands out in a few ways. Instead of integrating the campaign within their organization, they created an external website dedicated to providing information. Additionally, the campaign adopts a cartoon-style design, including animated videos, which gives the impression that it is aimed at a younger audience. The website's goal is to educate potential pet owners so they can make informed and well-considered decisions about purchasing an exotic pet, fully aware of the potential consequences. This principle strongly

Why the concern about exotic pets and other non-native species concerns us all

IFAW - 2023



Target audience:

Animal and conservation enthusiasts

Goal: Donate to IFAW

Channel: Online ads

Message

The rise in invasive species globally threatens biodiversity and human welfare. Releasing exotic pets into the wild is the primary way non-native species spread to new areas. We need more regulations and a positive list. We fight for this so support us.

Petition: Don't let wild animals become globetrotters!

World Animal Protection, IFAW, Stichting SPOTS, Stichting AAP - 2021



Target audience: Afraid of pandemic and/or animal lover

Goal: Sign the petition against trade in wild animals

Channel: ?

Message

Wildlife trade is a risk for zoonotic diseases and is sad for the animals. This wildlife trade is also in the Netherlands, through Rotterdam and Schiphol, but also through fairs. Sign the petition to raise awareness to the Dutch government.

AAP helps wild animals in despair

Stichting AAP - 2023



Target audience: Animal welfare and conservation enthusiasts

Goal: Donate to Stichting AAP

Channel: Online ads

Message

Stichting AAP tackles animal suffering at the source of the problem, focusing on exotic pets, illegal trade in wild animals, and wild animals in entertainment. More regulations are needed, such as the positive list. Advertisements are often sad, showing abused mammals the suffering they endure.

aligns with the pre-purchase phase of responsible reptile keeping. The campaign also discourages the promotion of exotic pets on social media and encourages sharing its message with others.

Other campaigns that focus on the pre-purchase phase include Don't Make a Jungle from Your Living Room by World Animal Protection (2019) and the Exotic Pet Suitability Guide by WWF (2023). The former is a checklist with thirteen questions designed to help potential owners assess whether keeping an exotic pet is responsible. While the checklist never results in a straightforward 'yes, buy one' answer, it encourages readers to critically reflect on the ethical implications of owning an exotic pet. Similarly, WWF's Exotic Pet Suitability Guide aids in the pre-purchase phase by evaluating whether an animal is appropriate to keep as a pet. It assesses the impact on conservation, legality, human and public health, invasiveness, and animal welfare for specific exotic pets. The guide provides an overall risk assessment, offering readers a quick and accessible way to determine the suitability of their desired pet. However, its current scope is quite limited, covering only a small number of species, including just three reptiles.

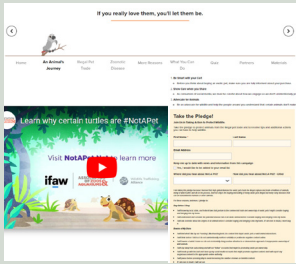
World Animal Protection and WWF showcase two distinct approaches to promoting thoughtful decision-making regarding exotic pet ownership, particularly in terms of its broader impact. World Animal Protection's checklist encourages potential buyers to critically reflect on their decision rather than simply telling them what to do—though it is clearly biased towards discouraging exotic pet ownership. In contrast, WWF's Exotic Pet Suitability Guide offers a highly accessible overview of the impact of keeping specific exotic animals as pets. It is particularly useful in illustrating how an exotic pet may affect different areas, such as conservation, legality, human and public health, invasiveness, and animal welfare. Both approaches contribute to more informed and deliberate decision-making in the pre-purchase phase of responsible reptile keeping.

Reptile pet campaigns

There are few reptile-specific campaigns. In the Netherlands, World Animal Protection, in collaboration with IFAW, Stichting Spots, Stichting AAP, and the Dierencoalitie, has campaigned against reptile fairs like the one in Houten. This gained particular relevance after COVID-19, when

Figure 8: Exotic pet campaigns.

Not a Pet
AZA, WTC, IFAW - 2022



Target audience: Younger animal enthusiasts and potential exotic pet owners

Goal: Reconsider exotic pet purchase and become an advocate for animals

Channel: Website and at several zoos

Message

Educate potential exotic pet owners about the risks and challenges of keeping wild animals as pets, including legal issues, animal welfare concerns, and the spread of zoonotic diseases. Become an advocate for animal welfare.

Don't make a jungle from your living room
World Animal Protection - 2019



Target audience: Potential exotic pet owners

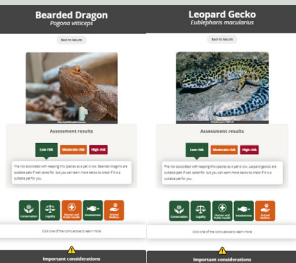
Goal: Discourage exotic pet purchase

Channel: World Animal Protection website

Message

A brochure with a checklist on whether you could keep an exotic pet. It has thirteen questions to help the reader reconsider purchasing an exotic pet, since the result from the checklist will never be 'yes, you should buy one'.

Exotic Pet Suitability Guide
WWF - 2023



Target audience: Potential exotic pet owners

Goal: Stimulate informed decision making in exotic pet keeping

Channel: WWF website and social media

Message

The guide educates prospective exotic pet owners on assessing species' suitability by considering risks related to conservation, legality, human health, invasiveness, and animal welfare, promoting informed exotic pet ownership.

the risks of animal markets were widely discussed. The campaign aimed to raise awareness and urge the government to ban such fairs (IFAW, 2021).

Additionally, World Animal Protection (2024) organises a Reptile Awareness Day on October 21st, featuring a webpage with educational content about reptiles and the risks of keeping them as pets. However, it does not resemble a large-scale campaign. Other reptile-specific advocacy efforts in the Netherlands have been relatively small. For instance, in 2023, Dierenbescherming called for a positive list for reptiles through newspaper articles (Trouw, 2023). Similarly, in 2016, city councillors in major cities sent a letter to the State Secretary for Economic Affairs advocating for a reptile-positive list to promote animal welfare and reduce risks (RTL, 2016).

This highlights an opportunity for more dedicated reptile campaigns, as they are often overshadowed by broader exotic pet initiatives. A reptile-specific campaign would more effectively communicate its message and reach the demographic of potential reptile pet buyers.

Counter-campaign

Animal welfare organizations primarily advocate for stricter regulations and bans on exotic pets and the pet trade. However, a counter-movement organization also campaigns in opposition to these efforts. This organization is called Responsible Reptile Keeping (RRK), they are an opposing voice to organizations who want to put an end to- or restrict reptile keeping. RRK tries to influence politics, fund research, and educate to promote responsible reptile keeping in an unrestricted environment. They create 'informative and compelling media content to highlight the wonderful world of reptile keeping'. The organization is mainly active in the UK, with some supporting stores in the US (Figure 11).

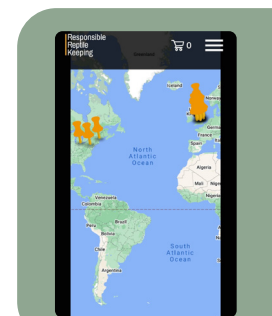
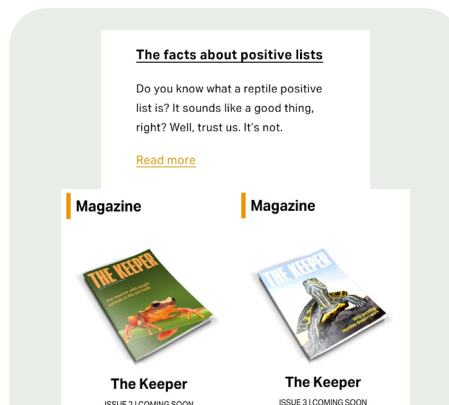


Figure 11: Locations of reptile shops supporting RRK

Figure 10: A magazine and blog posts of RRK, with topics that oppose animal welfare organizations (anti positive list and supporting wild-caught reptiles)

Figure 9: Exotic pet campaigns which differentiate themselves slightly and have more focus on the pre-purchase phase.

They have a combined following of over 8,000 on Facebook, Instagram, TikTok, and YouTube (as of October 21, 2024). However, their impact on the Dutch reptile market is likely limited, as they are not based in the Netherlands and don't have a very large following on social media. Nevertheless, it is an organization trying to make international impact, and it is an interesting opposing voice to the more common animal welfare campaigns. Both parties strive for responsible reptile keeping and care about the welfare of reptiles, yet one party aims for an opener market with a focus on proper reptile care, while the other party focuses on tightening or banning the reptile pet market.

RRK does stand for the opinion of certain reptile keepers and this emphasizes the opportunity of using design beyond the scope of legislation and regulations, by creating interventions to improve and steer towards responsible reptile keeping without the use of a legislative framework. Furthermore, as both RRK and animal welfare organizations care about the welfare of reptiles, it might be interesting, yet complicated, to look for a common-ground in future interventions.

Terrafile

An example of an intervention stimulating responsible reptile keeping is Terrafile. Terrafile is an online administration system and reptile marketplace that helps hobbyists and breeders manage and document their reptiles and amphibians. Its mission is to harmonize the rules for documenting terrarium animals, starting in Europe and expanding worldwide, to reduce inconsistencies in regulations and provide clarity for both hobbyists and enforcement agencies. By reducing administrative burdens and increasing transparency, Terrafile also collects valuable data, such as information about the number of offspring, the animals' origins, and their health. This data could improve the care and welfare of the animals, but also contribute to better species protection and community support. This initiative contributes to the purchase phase of responsible reptile keeping, focusing on legality and transparency in reptile keeping. The initiative of Terrafile is an inspiring example on how to combine certain needs of a user, ease in administration and documentation, while developing a platform that can also improve reptile welfare.

Information initiatives

Lack of knowledge and species-specific information, reliance on unreliable information, misconceptions about reptile needs, difficulty in recreating natural environments, and inadequate enclosures were some explanations by Azevedo et al. (2021) to account for the shortcomings in husbandry for reptiles in their research (Section 2.1: The Impact). It is noticeable how many of these explanations are related to information. There are several initiatives to make this information more accessible. There are many sites and blogs that provide information, and that might even contribute to the problem of 'reliance on unreliable information', as it is difficult to determine what is true and what is false or outdated. Even the interviewed veterinarian during field research mentioned the difficulty in finding reliable information.

“There are good sites to find information for your reptiles, but also bad sites. Sometimes even when reptile owners think they are doing good, it's actually harming the animal.” - Veterinarian

An initiative to provide objective and correct information on pet keeping is the LICG, the Dutch national information centre for companion animals. It offers information and advice to pet owners on responsible animal care and welfare. It offers information on all kind of companionship animals, including reptiles. The LICG is considered a trustworthy organisation, as it is non-commercial and is established to prioritise animal welfare and responsible ownership. They are supported by reputable institutions as the Ministry of Agriculture, Nature and Food Quality, Dierenbescherming (Animal protection), Faculty of Veterinary Medicine at Utrecht University, Dactari (cooperative association for veterinarians), and Dibevo (independent trade association for the pet industry) according to the annual report of LICG (2023). The LICG is an important initiative to offer reliable information on reptile keeping, and provides value in the pre-purchase, purchase, and care phase of responsible reptile keeping. However, as they offer information on such a broad array of companionship animals, it can also pose a challenge to keep all reptile care information up to date. Nevertheless, it is a promising stakeholder to utilize or support with interventions regarding this project.

There are also initiatives to improve reptile keeping knowledge by keepers themselves. They are mentioned before in Section 2.4: Trends, the online communities. Communities are created by reptile keepers to stimulate knowledge sharing and to support each other. On Reddit and Facebook there general reptile communities, or species specific. Reptile owners can ask questions in these communities, or ask for feedback on their set-ups. It is an accessible way to gain knowledge from other (more) experienced keepers. But it also raises challenges regarding reliability of information. A lot of such information is experience based. Such anecdotal information can be helpful, but also misleading when it is not proven to be correct. These communities provide valuable social support and oversight in reptile keeping but also risk spreading misleading information. While they provide a platform for seeking advice on purchasing reptiles, its main contribution lies in the care phase of responsible reptile keeping. The right initiative might leverage on the benefits of these communities while mitigating the risks.

Positive list

Another trend which can be considered as an initiative is the positive list. This list to specify which reptile species are permitted for ownership as pets is already discussed in Section 2.4: Trends and will likely be implemented in the near future. This should promote responsible reptile keeping by only making the most suitable companionship reptiles legal as a pet, focusing on the pre-purchase and especially purchase phase of responsible reptile keeping..

Reptile shelter

The final initiative in this section is the reptile shelter. Without a reptile shelter many reptiles will not decent home once the owner can not or will not care for the animal anymore. After visiting one of the most prominent reptile shelters in the Netherlands they mentioned the difficulties sustaining the facility. Financially it is a challenge to sustain, especially due to increasing costs in groceries, gas, and electricity. Nevertheless, their importance in the final stage of responsible reptile keeping, end-of-care, is significant.

To conclude

The legislative framework surrounding reptile keeping is multifaceted, comprising international, European, and national regulations. Global and

European laws such as CITES and the EU annexes primarily address the trade of reptile species, determining which species can be legally traded and under what conditions. However, species not listed remain outside the scope of protection. National laws, such as the Wet dieren, shift the focus to animal keeping and welfare. While this law prohibits neglect and requires care according to the animal's natural needs, it does not specify what those needs entail for the animals. According to the interviewed veterinarian during field research, it is often difficult to recognise neglect in reptiles, making enforcement of these regulations challenging. This indicates a regulatory gap in the care phase of responsible reptile keeping as one can not follow or enforce a law that is not comprehensible.

When analysing past initiatives, few examples were found that specifically target reptile pet keeping. Most campaigns focus on exotic pets in general, often emphasising mammals, with reptiles receiving comparatively little attention. This points to an opportunity for targeted interventions aimed at reptile owners. Campaigns like 'Not a Pet' and WWF's suitability guide show potential, and similar efforts with a stronger reptile-specific focus could help inform and influence prospective owners more effectively, increasing reflection on reptile pet ownership and improving the pre-purchase phase of responsible reptile keeping.

The organisation Responsible Reptile Keeping (RRK) presents a contrasting view to animal welfare campaigns as it advocates for less restricted reptile trade. RRK is mainly active in the UK and influences politics, funds research, and educates the public about responsible reptile care. While RRK opposes animal welfare organisations, they do want to improve reptile welfare. Yet, RRK believes that this should be done through education and knowledge rather than restrictions. Thus, while both organisations have different strategies and even oppose each other, they do have overlap in their goal of improving reptile welfare.

Interventions such as the Terrafile platform exemplify a middle ground where the beliefs of both RRK and animal welfare advocates might intersect. By creating user-friendly systems for documenting and managing reptile care and trade, such platforms can enhance transparency and

accountability in the reptile keeping community, positively impacting the purchase phase of responsible reptile keeping.

Improving access to reliable information remains essential. The LICG provides trustworthy, non-commercial care information and is backed by credible institutions, making it a key stakeholder. In addition, peer-led online communities contribute to knowledge sharing, though they can also perpetuate misinformation. Initiatives that support evidence-based knowledge while reducing misinformation could help address husbandry challenges in the care phase.

The final interventions impacting the scope of responsible reptile keeping are (upcoming) positive lists and reptile shelters. Positive lists will have a significant impact on the purchase phase, limiting the available legal reptiles in the Netherlands. On the other hand, reptile shelters play a crucial role in the end-of-care phase by sheltering and rehoming reptiles that owners can no longer care for.

3. Scope: Ball Python

The reptile pet market is large and very diverse. Marshall et al. (2020) recorded 3,943 reptile species traded online, but this represents the minimum, as not all platforms were included in the study. The goal of this project is to conduct a deep dive into the context of reptile keeping. However, there are many reptile species with different origins and care requirements. Therefore, to gain in-depth contextual knowledge, it is more effective to focus on one specific but highly relevant species rather than the entire class of Reptilia. This also highlights the importance of selecting a prominent species within reptile keeping, one that can serve as a meaningful case for understanding and improving responsible reptile ownership. This focal species within the project is the ball python.

3.1 Why ball pythons?

Ball pythons are the most popular reptile pet species in the Netherlands according to Valdez (2021), and his Google Trends analysis determined ball pythons to be the second most popular reptile worldwide (behind the bearded dragon). Nonetheless, 86.8% of the people involved in reptile trade who were surveyed by Valdez expected ball pythons to be the most popular. They are a phenomenon in reptile keeping, crowding the Dutch reptile fairs in Houten and Amstelveen [observation from visits]. Ball pythons are often described as beginner reptiles (Valdez, 2021), due to their relatively easy care and availability, but their popularity is present among both beginner and experienced keepers, attracting first-timers and collectors alike. This differentiation in buyers also makes it an interesting target group to discover the different needs and experiences regarding ball python keeping.

The reptile market is expected to continue growing (see Section 2.4: Trends), and the demand for ball pythons is likely to grow alongside it, due to the species' relevance for beginners and its popularity. One of the reasons that ball pythons remain so popular among reptile owners is their huge diversity in morphs, with over 7,000 morphs catalogued (Giggs, 2024). The rush for rarity is apparent in ball python keeping, with the most

Why ball pythons as scope?

-  They are the most popular reptile pet in the Netherlands
-  Most heavily traded CITES-list species exported from Africa
-  'Near Threatened' on the IUCN Red List, with decreasing numbers due to poaching for pet keeping
-  High popularity among beginners and collectors
-  Rarity rush through morphs (over 7000 morphs catalogued)
-  Largely populating the visited reptile shelter and common patients of the interviewed vet

common and basic morphs starting at thirty Euros and the rarest reaching into the thousands, if not tens of thousands, of euros (Barten & Mader, 2013).

The popularity and accessibility of ball pythons in the Netherlands also has its drawbacks, as they were largely populating the visited reptile shelter and are common patients for the veterinarian I interviewed during the field research. Ball pythons are not only the most popular reptile in the Netherlands, but also appeal to both novice and experienced keepers, and they represent the most prominent species in terms of morph diversity. Due to this leading role, they are ideally suited as a representative species for the exotic pet trade.

Improving responsible reptile keeping for ball pythons has the potential to set a benchmark for the broader reptile-keeping community, making

them an impactful case study. By focusing on this species, interventions and learnings can be made scalable to other reptile species, given its relevance, visibility, and prevalence.

Ball pythons are the most heavily traded CITES-listed reptile exported from Africa (Toudonou, 2015) and thereby play a significant role in the global exotic pet trade. While they are not currently endangered, they are classified as 'near threatened' by the IUCN (D'Cruze et al., 2022), with wild populations declining. The IUCN identifies the pet trade as the primary threat to this species, highlighting the urgency to stimulate responsible sourcing to mitigate its impact on wild populations.

Lastly, this project aims to develop a roadmap including long-term interventions. To ensure its relevance in the future, the chosen species must have a clear regulatory framework for the coming years. Highly dangerous or endangered reptiles are more likely to face radical legislative changes, particularly with the potential introduction of a reptile positive list (see Section 2.4: Trends). This makes long-term planning too uncertain for such species. In contrast, the ball python is expected to remain permitted, regardless of its CITES II status, similar to Belgium's reptile positive list (Politie België, 2019) and due to its relatively safe and manageable nature as a reptile pet.

3.2 Ball Pythons background

To give some context on the target species of this project; ball pythons originate in sub-Saharan Africa, including Togo, Ghana, and Benin (Figure 13) They reside in grasslands, savannas, and open forests with good hiding spots. They have a solitary nature and spend most of their time hidden underground in burrows, emerging primarily at night to hunt. They are ambush predators, striking unsuspecting rodents with a powerful coil and suffocating them. Unlike their



Figure 12: Ball python in its natural habitat (World Animal Protection, 2022)

larger python cousins, ball pythons are known for their docile nature. When threatened or stressed, ball pythons have a tendency to coil into a tight ball, tucking their head and neck inside the coils and protecting their vulnerable body parts, hence the name "ball python".



Figure 13: Native regions of the ball python

3.3 Ball python specific impact

In Section 2.1: The impact the impact of reptile keeping in general is analysed. This section will give a short explanation on what this impact is for ball pythons specifically.

Biodiversity

As mentioned before, the ball pythons are considered 'Near Threatened' on the IUCN Red List. They are decreasing in numbers with the main cause being poaching for pet keeping according to the IUCN (D'Cruze et al., 2022). Besides this, the harvesting of ball pythons can impact the population dynamics and can damage local ecosystems by the use of practices like digging up abandoned rodent burrows, breaking termite mounds, and overturning dead palm trunks to find the snakes or their eggs (D'Cruze et al., 2020). Despite the increasing demand for captive-bred reptiles, ball pythons are still taken from the wild. Ranching was another potential solution to replace wild-caught ball pythons. These ranches breed ball pythons in captivity, often using breeding stock originally captured in the wild. Ranches ensure a steady supply and new genetic diversity for the pet market without impacting wild populations too much. This approach can offer economic opportunities for local people while promoting conservation efforts. However, is not as flawless as hoped. D'Cruze et al. (2020) found that releasing captive-bred snakes can cause genetic pollution and disease transmission

to wild populations. Furthermore, gravid females and juveniles are often targeted, destabilizing population dynamics. Regarding animal welfare, the catching process causes stress to the animals and the housing conditions are often poor, failing to meet basic welfare standards and potentially fostering disease. Additionally, reports of declining wild populations and quota violations in python exports from Togo raise concerns about the sustainability and regulation of ranching. Therefore captive-bred ball pythons are still the most ethical source.

Animal welfare

So there are ball python welfare considerations during the sourcing, making wild-caught and ranching especially stressful and harmful for the ball pythons. As discussed in Section 2.3: Responsible Reptile Keeping - Purchase, captive-bred is the most ethical option, especially when buying from a quality breeder. But ball python keeping itself might also complicate their welfare. Scientific studies reveal that many are kept in inadequate housing that restricts natural behaviours (D’Cruze, et al., 2020). Proper enclosures should allow full body extension and include enrichment features like hiding spots, climbing opportunities, and basking areas. Such opportunities are especially lacking in so called ‘rack systems’, where ball pythons are kept in a shelving unit (Hollandt et al., 2021). It is an issue that many owners lack proper education on care requirements, resulting in inadequate care (D’Cruze, et al., 2020; Green et al., 2020). Lastly, health issues and genetic concerns from selective breeding also pose a problem, especially for ball pythons due to their broad array of morphs which vary highly in value (Green et al., 2020). While popular as pets, current evidence suggests that captive conditions often fail to meet ball pythons’ welfare needs, highlighting the importance of improved care standards.



Figure 15: Ball python in front of its rack system

Public health

The risks on public health due to ball pythons does not really differ from the risk of reptiles in general, described in Section 2.1: Impact - Public health. This means a small risk regarding zoonotic diseases, with salmonella being the most common (Mendoza-Roldan et al., 2020).

Ball pythons are known for their docile nature, and are therefore not really hazardous animals for public or personal health while keeping (Rizzo, 2014). They are generally reluctant to bite and are considered one of the most gentle snake species kept as pets. When threatened they tend to curl in a ball (hence the name ball python) rather than strike. Bites are rare, but can happen, especially when the snake mistakes a hand for food. Ball pythons are constriction animals, but too small to pose a significant risk for adults. There are no documented cases of ball pythons killing a human, but extra caution around children is advised. With proper care and handling these snakes should not pose a threat. Also when escaped or in public they do not pose a real threat to others. A more conventional pet as a dog could be considered as more dangerous than a ball python in that sense. Nonetheless, they can give a scare when encountered, as for example in The Hague, where an inhabitant found an escaped (or released) ball python behind his radiator (Bosman, 2024).



Figure 16: Ball python is taken from behind a radiator from a resident in The Hague, photo by Gielens (2024), Regio15

Invasive species

Ball pythons are not an invasive species in the Netherlands. They cannot survive the Dutch climate. Potentially they could survive for a some time during the summer, but in general the conditions are not right. They are invasive in for example Puerto Rico or Florida, USA, but this is not within the scope of this project.

To conclude

When focusing on interventions for responsible ball python the impact on biodiversity and animal welfare is most interesting. The impact on public health and especially invasive species are low.

However, ball python keeping does have an impact on their wild population and biodiversity. Ranched ball pythons were introduced as an alternative for wild-caught ball pythons, but this alternative does not have the desired effect. Quality ball python breeders are the best option to minimize the biodiversity impact.

Furthermore, ball python welfare is besides harvesting / poaching and transportation also at risk during keeping. Many ball pythons are kept in inadequate housing that restrict natural behaviours, such as in rack systems and many owners lack proper education on care requirements. Furthermore, selective breeding (for i.e. morphs) can lead to health and genetic concerns. These are all potential points of improvement in responsible ball python keeping.

3.4 Specific stakeholders

There are no specific stakeholder focusing on ball python pet keeping. The stakeholders from Chapter 2.2 are basically the same, with the only change in key stakeholder definition, narrowing it down from 'reptile keepers and breeders' to 'ball python keepers and breeders'.

3.5 Responsible ball python keeping

The definition of responsible reptile keeping in Section 2.3 is also relevant to ball python keeping, with the primary difference being a narrower key stakeholder. This narrowed focus offers an opportunity to refine the definition further to address the specific needs of this species. This section will delve deeper into how the definition applies to ball pythons at each phase.

*Making **ball pythons** thrive instead of survive*

Pre-purchase

Responsible ball python keeping is making the contemplated decision to care for the python

Reptiles are prone to be bought impulsively, as they are easily obtainable, affordably priced, and small in size when young. Ball pythons specifically are very sensitive for impulsive purchases, as they are one of the most easily obtainable and affordable species, with a lot of morphs to make them attractive to impulsive purchases from beginners and collectors. However, impulsive purchases often negatively impact their quality of care. Therefore it is important that purchasing a ball python is a contemplated decision. Some considerations that buyers must have before acquiring a ball python are:

- Ball pythons can reach an age of 30+ years, so it is a long term commitment.
- Ball pythons are docile, but no social animals. They are not cuddly animals. They can tolerate handling, but it often also stresses them out.
- Costs of keeping ball pythons. You need a proper set-up, which can be quite expensive. But you also have recurring costs for electricity for heating and lighting, for food (rats/mice), and substrate.
- The buyer must be willing to feed other animals, such as rats and mice.
- It should be considered beforehand whether you can provide the care and it's complexity, of maintaining the right environment (such as terrarium size, temperature, and humidity).
- It is difficult to find a pet sitter for ball pythons.
- Ball pythons is a relatively common pet for reptile, but it is still challenging to find a suitable veterinarian.

So this is an important phase in responsible ball python keeping. Ball pythons are a common species to buy impulsively, but this can result to inadequate care and increased stress. But it can also be frustrating for the owner due to unexpected costs, challenging care, and regret, leading to re-homing. A ball python should only be purchased when it can be properly cared for by the buyer, otherwise it is not responsible.

Purchase

*Responsible ball python keeping is making the contemplated decision to care for a **legally sourced, captive-bred** ball python*

Legality is important in this phase. Ball pythons are a CITES II listed and in the Netherlands this

entails that you need a certificate of origin, and a transfer declaration when purchased from a breeder or shop. Ball python owners need these documents as proof of legal origin. In Section 2.3 it is discussed that captive-bred reptiles are preferred over wild-caught due to the negative impact wild-caught reptiles have on biodiversity, animal welfare, and disease transmission. The same applies for ball pythons. However, ball pythons are already very common as captive-bred reptiles. They are popular due to their vast array of morphs and this is done through breeding. Yet, this breeding also brings some risks as it can lead to genetic homogeneity and inbreeding, and as a result there are certain morphs with genetic disorders. Therefore, while breeding is better than capturing from the wild, it still needs to be done responsibly, and morphs with disorders, such as the spider, champagne, super cinnamon morph, and more (Schrenk et al., 2022) should not be bred with. A responsible breeder breeds (with) healthy ball pythons in a clean environment and focusing on genetic diversity without harmful morphs. Preferably they are also transparent in their breeding and the genetic lines of the snakes being sold, and can act as an educator to the buyer. So, responsible and reputable ball python breeders are the preferred source for a ball python pet. However, it is currently difficult for buyers to determine when a breeder is responsible. Some considerations the buyer can make are: Do the pythons look healthy and are they healthy morphs? Does it feel like the seller prioritises profit over health and well-being of the animals? What do reviews say? Are they knowledgeable and do they answer questions? Another tell-tale that a seller is likely responsible is when they provide care instruction such as a care sheet and especially when they also interview the buyer, to see whether they are suitable for a ball python. To conclude, ball pythons are already commonly and legally captive-bred, however, there are still challenges in breeding *responsible* with ball pythons.

Care

Responsible ball python keeping is making the contemplated decision to care for a legally sourced, captive-bred ball python, **caring for it beyond the basic needs to survive, but making them thrive through enrichment while keeping the safety of the reptile, you, and the surrounding as a priority**

This phase of the responsible ball pythons keeping definition mentions 'caring for it beyond the basic needs to survive'. This is especially relevant for ball pythons (and snakes in general) due to the usage of rack systems. An increasing amount of research is advocating terrariums over racks (Hollandt et al., 2021). Racks fulfil the basic needs to survive and is a very easy and low maintenance method to keep ball pythons. They are small, so it's simple to keep the temperature and humidity proper, and due to the otherwise little stimulation feeding is relatively easy. However, as racks barely have any stimulation, the ball pythons are unable to express their natural behaviour in such enclosures, which negatively impacts their welfare. This also highlights why enrichment is important as discussed in Section 2.3: Responsible Reptile Keeping - Care. So as a bare minimum a ball python will survive in an enclosure with a temperature of roughly 27°C, a humidity around 50-60%, water, and regular feeding. Yet, making a ball python thrive takes much more, then a thermogradient with a warm side around 31-32°C, and a cool side around 24-27°C is needed, and a hotspot of 35°C is also recommended. They want multiple hiding spots spread over different areas of the thermogradient. The humidity should be around 50-60% but increase to approximately 80% when the python is shedding. They want a substrate they could burrow in, and climbing opportunities. A day/night cycle to support their circadian rhythm, and while they survive without UVB light, they will benefit from it. Different textures and occasional habitat changes can stimulate their senses and provide enrichment. As mentioned before, it is an issue that many ball python owners lack proper education on care requirements and scientific studies reveal that many are kept in inadequate housing that restricts natural behaviours (D'Cruze, et al., 2020). So, keeping a ball python alive does not have to be too difficult, however, making them thrive in captivity requires a lot more.

Regarding safety for the owner and the surrounding ball pythons do not pose a real threat, but carefulness is always important in reptile keeping. So, enclosures should be escape-proof, and ball pythons must be handled with care, working hygienically to decrease the risk of spreading disease to the reptile, and to the owner (i.e. salmonella). Caution around children and smaller, other pets is also important.

So this phase is important for ball pythons, as their basic husbandry needs are not even always sufficient, and they need way more to truly thrive.

End-of-care

Responsible ball python keeping is making the contemplated decision to **ensure life-long care** for a legally sourced, captive-bred ball python, caring for it beyond the basic needs to survive, but making them thrive through enrichment while keeping the safety of the reptile, you, and the surrounding as a priority

As mentioned in Section 2.3, the priority of this phase is to minimize reptiles released in the wild. For ball pythons specifically this would mean death, as they are not suitable for the Dutch climate. If owners can no longer care for their ball python, responsible options include finding a new owner or otherwise bringing the animal to a reptile shelter, ensuring that the animal's well-being remains a priority until the very end. This is not the most crucial phase, as it is not common that ball pythons are released in the wild.

To conclude

The responsible reptile definition is also applicable to ball pythons, yet some phases and topics are more relevant than others. The pre-purchase phase is important for ball pythons due to their sensitivity for impulsive purchases. For the purchase phase the issue is not so much captive-bred vs wild-caught, as most ball pythons are captive-bred, but that the breeding is done so responsibly, with healthy animals and genetic diversity. The care phase is also very important for responsible ball python keeping. There is improvement to make sure all basic husbandry needs are met, and then to go beyond, simulating natural behaviour and enrichment. The final phase, end-of-care is the least important phase for ball python keeping.

3.6 Specific trends

The trends in Section 2.4 are also applicable to ball pythons, but there are a few trends to highlight for the ball pythons specifically.

Morphs

Ball pythons are known, and popular for their broad array of morphs. They play an even more important role than with many other reptile species

with over 7000 morphs catalogued (Giggs, 2024).

Ball python managing software

This trend hops on the importance of morphs for ball pythons. Currently there is software available to manage your ball python collection. This software mainly focuses on breeders. An example is CLTCH, this software allows users to create, search, and filter their ball python records, keep track of clutches and their expected hatch dates, family tree and genes tracking, genetic testing, and make calculations for hatchling genes (Cltch, 2024). This makes it easier to manage your ball pythons and especially their genes.

Terrariums over racks

The terrariums against racks comparison is already discussed multiple times in this report, but this is a trend that is becoming increasingly more prominent in ball python keeping. Research is demonstrating the impact of keeping ball pythons in racks and advocating for terrariums (Hollandt et al., 2021).

Enrichment

Just like the terrariums over racks, enrichment is also gaining importance in ball python keeping. More research is showcasing the improvement on reptile welfare through enrichment (Hoehfurtner et al., 2021).

3.7 Legislation and Initiatives

This section will discuss the legislation and initiatives which are specifically targeted for the ball python, to further understand the scope of this project and draw insights from these past initiatives.

Legislation

Ball pythons are CITES II listed and thereby a certificate of origin is needed to guarantee legal origin of the animal.

However, the legal aspect becomes a bit more complicated while keeping the ball python. In the 'Wet dieren' [Animal Law] it is stated that abuse and neglect are prohibited, requiring that animals are cared for according to their natural needs. Owners must provide food, shelter, and medical care. Unnecessary suffering or killing of animals is banned, and caretakers must actively protect and promote their welfare. However, what

this entails for a ball python is not defined by the government. So, a rack system is according to research not optimal and limits the ball pythons in expressing their natural behaviours. So by the standard of 'Wet dieren' it could even be considered illegal, as it is requiring that animals are cared for according to their natural needs. Yet rack systems are accepted in reptile keeping. So ball pythons should be protected by this law, but is unclear what the boundaries of this law are.

Initiatives

Ball python trade documentary

It is interesting to see that while there are little reptile specific campaigns, there is a ball python documentary highlighting problems behind ball python trade by World Animal Protection (2020a). In this documentary they discuss the exploitation of Ball pythons in the global exotic pet trade, particularly from West Africa. It outlines major welfare concerns, including poor

captive conditions, selective breeding leading to genetic disorders, and risks of zoonotic diseases. They also visit Benin and Ghana to discuss the conservation impact from hunting and ranching.

The documentary aired on YouTube and has 17,000 views on their main channel, 5,300 views on their UK channel, and 1,300 views on their Canadian channel as of October 22, 2024. The documentary was not aired on the Dutch World Animal Protection channel. The documentary was received as controversial. While highlighting some major issues in ball python trade, many reactions on the documentary were on the biased view on reptile keeping in the documentary. The main channel turned the YouTube reactions off, but in Figure 17 there are some public reactions highlighted from the UK channel.

While the documentary has value and is relevant to highlight the risks of ball python keeping, it also

It obvious that the people who made this "documentary" have no idea what they are talking about, and they continue to say that people fear these animals and that snakes are considered as terrible animals by the general public but it is at that show and the people who keep them that do view as cute and enjoy taking care of them, know what they truly are, and care about thier well being as well as public education, this video is downright shameful and made by people who clearly have no idea what they are talking about

👍 12 🗨 Beantwoorden

This is blown completely out of proportion, cherry picked information to showcase your personal grief with the reptile hobby. If you're going to show the world that they live in display cases you see at reptile expos as normal life for them, you are completely misinformed. This is fear mongering at best, I am all for the best care mentally and physically for snakes in captivity which is why I'm sure you're covering this subject but this a poor excuse of highlighting the snake keeping standards as a whole. Get your facts right and get some real data as a whole, just even in the US. Hell, maybe interview some actual renowned breeders and tour the facilities and the customers who own these animals across the states. But no, that would be too easy. This is a joke!

Minder tonen

👍 22 🗨 Beantwoorden

1. These are temporary cages used for expos, where the snakes would only be inside for maybe a couple days, the majority of them have adequate enclosures once they are not on display, it is just to save space at the expo.

2. If you know anything about snakes you know they don't need food and water available 24/7, you only feed every 1-2 weeks and for larger species even less. Snakes can go from weeks to months without water so one or two days without it is going to do no damage.

3. Wild caught ball pythons are not that easy to find, due to them reproducing so well in captivity, and most of the time it is frowned upon in the reptile keeping hobby to take any reptile out of the wild, this documentary is all misinformation.

4. "people aren't providing them with basic animal welfare" - This person is clearly not educated on the topic he's talking about and has come to this conclusion... why? He has no proper evidence, and has just looked at one bad example and spoke to a veterinarian who cannot speak English very well. The vast majority of reptile owners (at least in the more developed countries) are committed to providing correct living conditions for their animals and high standards of welfare. If you go into the average snake owner's home you will not see wild caught ball pythons with burns and in tiny plastic tubs with no water and never being fed. No, we give the right size enclosure and proper lighting, heating and enrichment. If we kept them so badly they obviously would not be living past a year, let alone 30+ years, which is what we actually see in captivity.

5. Morphs of ball pythons should really not be demonised, what's wrong with spending money on a beautiful animal you will be able to enjoy for decades? And as for 'debilitating abnormalities' only a few out of the many morphs cause mental or physical issues, and many people do not support the selling of these particular animals. But even so, many of the problems are not too serious.

6. The breeder they went to is not typical of most breeders, especially the part about all of their snakes being imported from Africa. If you are mostly talking about American ball python trade why talk to a Czech snake breeder?

Whoever made this, do your research. You are worsening the attitudes of the public towards reptile keeping. I don't understand why you wanted to create a documentary without having any relevant, proper evidence towards your point and not taking information from people who are actually experienced in the reptile keeping hobby. It is not okay to just cherry pick the information that you want to hear and ignore the truth.

Minder tonen

👍 27 🗨 Beantwoorden

✓ 2 antwoorden

Figure 17: Most popular type of reactions on the ball python documentary by World Animal Protection on their UK YouTube channel

looks like there are inaccuracies or misleading information in the documentary. An easy example is that the presenter mentions that hunters can sell their ball pythons for up to a thousand dollars, while on MorphMarket.com, the common coloured wild-caught ball pythons are being sold between 40 and 100 dollars, and the most expensive is a wild-caught albino for 500 dollars. That is the price in the country of destination for the consumer, not the price being paid to the hunter at the country of origin. If a hunter could sell their wild-caught ball python for a thousand dollar, that would be highly exceptional.

This documentary and the reactions show the polarization effect a misleading or inaccurate documentary can have. The documentary discusses important problems, but is overshadowed by inaccuracies, therefore triggering reptile keepers instead of educating them. This polarizes, with the reptile keepers further distancing themselves from the animal welfare organizations due to them untruthfully attacking their hobby, and the animal welfare organizations feeling unheard in the relevant risks and downsides of reptile keeping.

Online communities for ball pythons

Online communities were already discussed as trend in Section 2.4 and initiative in Section 2.5, but it is still relevant to mention that there are also ball python specific online communities. On Reddit there is the subreddit [online community] 'r/ballpython' and on Facebook there are also ball python groups, such as 'Koningspython's NL/BE' for Dutch and Belgian ball python owners. These online communities are used to share knowledge, ask questions, and support each other in ball python keeping.

4. Contextmapping

The focus of this project is on ball python keepers and hobby breeders, in other words, the consumers in the ball python market. Consumer demand influences the dynamics of market structures and innovation within industries (Malerba et al., 2007). Therefore, when ball python consumers focus on responsible keeping, demanding legally sourced, well-cared-for, captive-bred pythons, accurate information, and quality care accessories to help ball pythons thrive, they can influence the market as well.

However, to be able to design for these consumers, it is necessary to understand them and their context regarding ball python ownership. Contextmapping is a qualitative research method used in human-centred design and involves exploring the context in which users experience a particular topic. Contextmapping leads to rich, broad insights into users' lives and experiences, which can then inform and inspire innovative product designs that better fit within the users' context (Sanders & Stappers, 2012). Such a study directly aligns with the need to understand ball python owners and allows for the exploration of how to support them in keeping ball pythons more responsibly.

4.1 Contextmapping goal

To be able to create interventions and designs to stimulate responsible ball python keeping and align this with the needs and wishes of owners, it is necessary to thoroughly understand this key stakeholder. Ultimately, the aim is to answer the question:

*How to stimulate and facilitate **ball python owners** towards responsible ball python keeping?*

Understanding how to stimulate consumers towards responsible ball python keeping will lay the foundation for the next step, developing interventions to facilitate the ball python owners towards responsible ball python keeping.

To ensure a thorough understanding, multiple topics of interest will be discussed during the contextmapping interviews: their owners' drivers, considerations, information gathering, care, perspective on reptile keeping, and goals in related to reptile keeping.

Drivers: *What motivates ball python owners to keep their reptiles?*

Considerations: *What considerations do they have before, during and after their ball python purchase?*

Information gathering: *How do they acquire their information on ball pythons?*

Care: *How do they care for their python?*

Perspective: *What is their view on reptile keeping?*

Their goals: *What does their future in reptile keeping look like?*

These topics of interest will create an overview of ball python owners and their (tacit) knowledge and values, necessary for the overarching goal to discover how to stimulate them to responsible reptile keeping.

4.2 Method

The method of this contextmapping study is based on the guidelines from the 'Convivial Toolbox' by Sanders & Stappers (2012) and the paper 'Contextmapping: experiences from practice' by Visser et al. (2005). Nine in-depth interviews were conducted within the context of the participants' home, meeting and witnessing the handling of the ball python pet as well. Participants also completed a sensitising exercise prior to the interviews to help prepare them for the conversation.

Participants

Five individuals and four couples (13 participants in total) aged between 20 and 64 years old were interviewed in nine sessions. The sample consists of seven males and six females, with a ball python keeping experience ranging from a few months to over 30 years. The number of ball pythons they currently owned ranged from 1 to 17, and 6 out of 9 interviewed households had other reptiles as well.

Recruitment of participants was done through convenience sampling by actively reaching out to ball python keepers and encouraging voluntary response through flyers and open invitations shared in their context (reptile Facebook groups and forums, reptile fairs, a pet shop, and a reptile shelter). This resulted in eight interviews, mainly

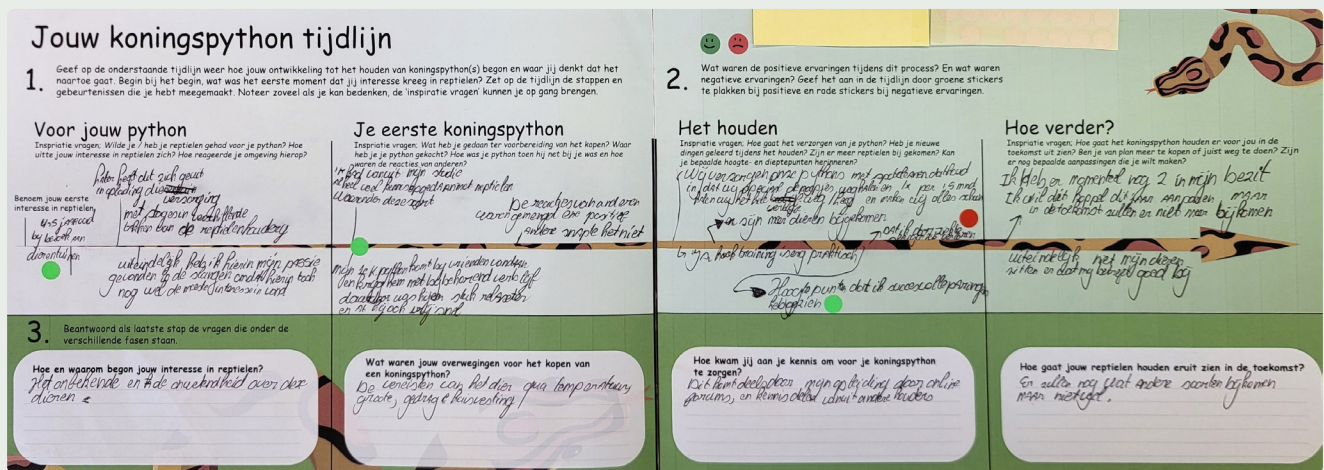


Figure 18: Sensitising exercise

consisting of participants reacting to a call in the Facebook group ‘Koningspython’s NL/BE’ [‘Ball pythons NL/BE’]. The ninth participant was recruited through snowball sampling. For more details on the recruitment methodology, participants, and supporting files like the recruitment flyers, see Appendix A: Recruitment.

Sensitising

To prepare the participants for the interview, they received an assignment by mail several days in advance. The goal of this exercise was to take the participant through their whole reptile keeping journey, starting with questions about the past to remember how it all started. This was followed by questions about the present, to make them actively aware of what they are currently doing, and the exercise concluded with the future, to give them time to process their wishes and goals before the interview. This exercise helps participants become more aware of their own motivations and behaviours, and encourages to think more openly beforehand, enabling them to go more in-depth during the interview itself.

Figure 18 shows the result of the exercise. It’s a timeline to map their reptile keeping journey starting from their first interest in reptiles and ending with their future expectations. The timeline is divided into four phases with some questions to support them to get started. After writing down their reptile keeping development they could highlight what they considered the good or bad moments with green and red stickers. Lastly, they were asked to answer a question for each phase in the timeline. The timeline consisted of these four phases:

Before the python: focus on how their interest in reptiles and ball pythons started and grew to the point of their first ball python.

Your first ball python: focus on their steps and considerations to get their first ball python.

Keeping: discovering what it takes to keep a ball python, touching topics like information gathering, the highs and lows of keeping, and whether they expanded their reptile collection.

What’s next?: focus on what they would like in the future, what are they dreams and wishes regarding reptile keeping.

Interview structure

The nine interviews were conducted at the participants’ homes to immerse in their context of ball python keeping, experience how they handled their ball pythons, and make the participants feel at ease. The interviews were semi-structured and the duration varied from 90 to 140 minutes. The semi-structured interview provided flexibility for the participants to steer the conversation towards the topics they considered important and interesting regarding ball python keeping.

The interview started with an introduction, explaining the goal one more. After the introduction the consent form was signed by the participant, confirming that the interview is voluntary and that they could withdraw at any time. It also stated that it is allowed to record the interview and take pictures when given consent, and that this data would be stored on a TU Delft OneDrive for processing and analysis purposes.

After these formalities the goal was to establish a more informal and open, comfortable setting by visiting the ball python(s) and other reptile

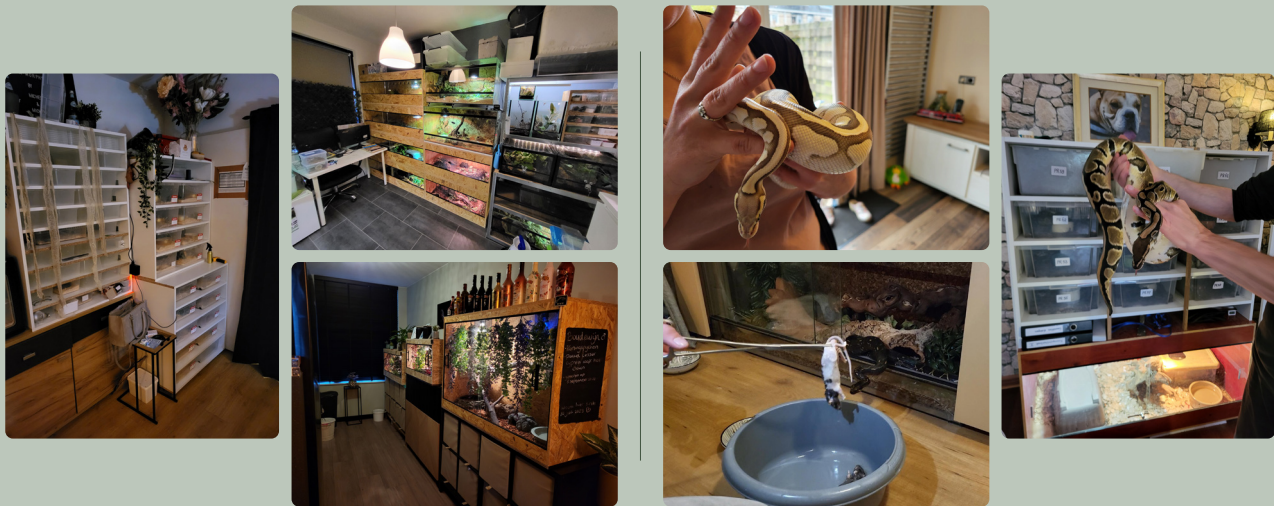


Figure 19: Doing the interviews at the homes of the participants provided an immersion in their context of reptile keeping

pets. The structure of the interview ensured that participants felt at ease from the start through easy-to-answer questions and a tour of their pets. This allowed them to talk about their interests, their ball python and its care regimen. This was also a great moment to observe their behaviour handling the reptile pet (Figure 19).

This tour was followed by an association mindmap, to explore what the first thoughts of the owner were when thinking about ball pythons (Figure 20). This facilitated communication on topics that were most “obviously” related to ball pythons by the keeper, clearing away superficial or familiar topics, paving the way for more in-depth discussion during the next step.

This next step involved discussing the sensitising exercise with in-depth interview questions relevant to each specific phase. The questions

asked during the interview correlated with the topics of interest mentioned before: drivers, considerations, information gathering, care, perspective, and goals.

In the end participants were given the opportunity to add anything to their association mindmap, as during the interview they might become aware of new insights they found relevant to ball pythons. The first mindmap session focused mainly on the participant’s initial associations with ball pythons, while the final iteration allowed participants to go more in-depth as they had over an hour to reflect on this topic. They were stimulated to write down what feelings or values they associate with the ball python.

To conclude and finalise the interview, the participants were asked to complete the statement ‘My ball python means to me...’. This allowed the participant to conclude and summarise the interview in their own words. After an extensive discussion and reflection on ball pythons, this statement provided a clear overview of the value that the ball python brings to its owner (Figure 20).

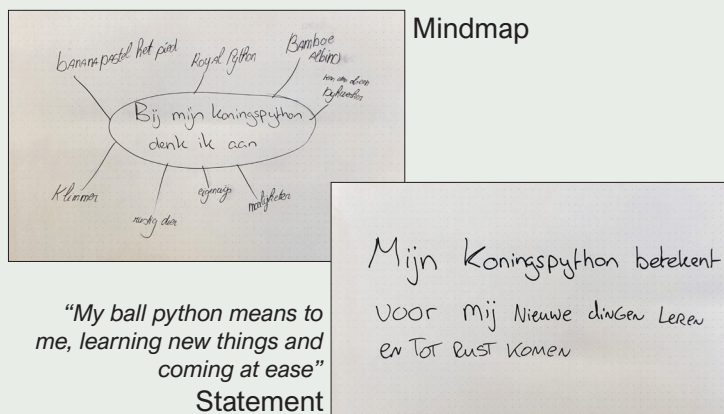


Figure 20: Examples of the mindmap and final statement

Analysis

The recordings of the interviews were transcribed to allow for thorough analysis. The data from the transcriptions was processed to statement cards. These cards contain rich data with the potential to become insights. A statement card consists of a quote from a participant, a paraphrase for easier understanding, and a fitting title (see Figure 21).

The large and beautiful selection at fairs makes you want to buy more

At a fair, you're tempted to want to buy more reptiles because there are so many beautiful species and colours.

"Yes, so when you're at the fair, I must admit, you get stimulated much more quickly because you see all those beautiful snakes or other reptiles there. Then you think, oh cool, those would also be really cool to keep. You think this at the fair, because you see so many different types, sizes, colours, everything. And we've also got a few nice ones ourselves. Therefore it triggers more."

Title

Paraphrase

Quote

Figure 21: Statement card example

After creating 708 of these statement cards, they were further processed through inductive clustering. This clustering created different levels of depth, going from overarching themes, to general topics, and then topic-specific insights (Figure 22).

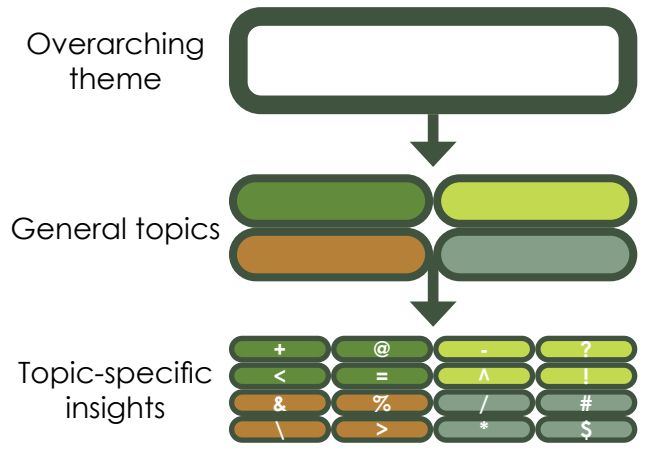


Figure 22: From overarching themes to insights

The clustering of the statement cards was done inductively to potentially discover new themes or topics that were not initially considered. As a result, the resulting themes and topics are not the same as the topics of interest determined in Section 4.1: Contextmapping goal (the drivers, considerations, information gathering, care, perspective, and goals). However, they are strongly related as most insights constructing the resulting themes and topics were derived from questions about drivers, considerations, information gathering, care, perspective, and goals.

The goal of the overarching themes and general topics is mainly to create a structure in the analysis. The most value for this project lies in the topic-specific insights. These insights illustrate the perspective, behaviour, and needs and wishes of the ball python keepers concerning the overarching themes and topics. The clusters over these topics and insights are connected through arrows to demonstrate their relation to each other. An example of this structure is shown in Figure 23. In this example the overarching theme is 'Influence on expansion' consisting of the general topics 'Wanting more BPs [Ball pythons]', 'Wanting more species', 'Impulsive buying', and 'Stop of new purchases'. These general topics are further divided into topic-specific insights as shown in Figure 24.

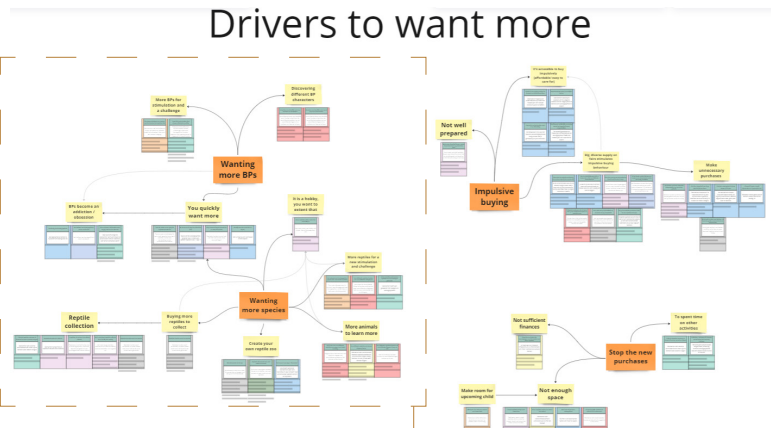


Figure 23: Clustering example starting from theme

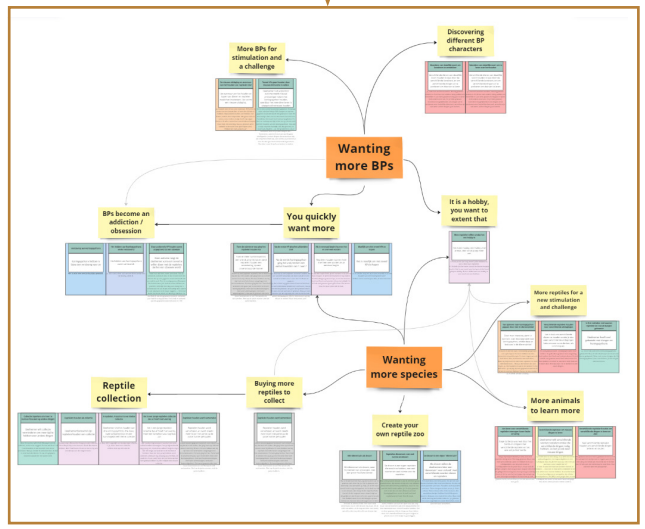


Figure 24: Clustering example starting from topic

In this example the topic-specific insights demonstrate that participants can get an urge to quickly want more ball pythons, and that ball pythons could even become like an addiction.

Keepers want to expand because it's their hobby, they want to get new stimulation, a new challenge, and discover different characters. Not just by getting more ball pythons, but also by getting different species, to learn new things, or to expand the collection, as many dream of eventually having their own reptile zoo.

Almost all statement cards were organised into similar cluster structures. These structures provide insights into ball python keepers' perspectives on the themes and topics that emerged during the interviews.

4.3 Results

The results of the contextmapping study consists of nine overarching themes consisting of different topics and insightful clusters. The complete clustering is provided in Appendix C. This section summarises these themes, and offers insight into the ball python keepers and relate to the topics of interest determined in Section 4.1: Contextmapping goal.

The first interest in reptiles (drivers)

Most participants developed an interest in reptiles at a young age, often sparked by an encounter with reptiles in a pet shop, at school, or at the zoo. For the remaining participants, their interest started at a later age, often influenced by their partner's enthusiasm for reptiles. Reptile keeping can sometimes be contagious, as seen in the developing interest from partners, but also because some participants mentioned the role of friends contributing to their growing interest.

Partners can co-own reptiles, or one person may act as the "main" owner, with shared agreements on the number or type of reptiles kept. Many participants noted that the more exposure they had to reptiles, the more their initial interest grew.

Considerations to get a ball python (considerations)

Participants were interested in reptiles or snakes in general, not necessarily ball pythons specifically. Yet, there were a few considerations that drew them to the ball python. An important step was finding what kind of pet or reptile suited the participant's needs.

First of all, the ball python is considered a starter reptile and therefore relatively easy to keep. This

made the ball python especially appealing to beginner keepers, but even the more experienced keepers appreciated their relative ease of care.

Another consideration was safety. Ball pythons were not considered dangerous. This was a small concern for participants' own safety and that of their family or pets. One participant did consider the safety of the neighbourhood in case the reptile escaped.

Another reason was their character. Ball pythons were described as gentle, sweet, and calm. They are easy to handle and do not behave aggressively. This makes them accessible, enjoyable, and calming to keep. Two participants kept reptiles for educational purposes (one professionally and one as a hobby), and the calm nature of ball pythons suited that purpose as well.

Other reasons for choosing a ball python included their relatively small space requirements compared to other pets and reptiles, their affordability, and the fact that they are more robust and resilient than other smaller beginner snakes.

Some considerations that participants had, although they did not outweigh the benefits, were that ball pythons can be picky eaters, are nocturnal, or that other reptiles might be more challenging and therefore more fun to keep. Lastly, one participant's son got a ball python but found it too frightening in the end, and they had to return it to the shop.

Considering which ball python to pick (considerations)

In addition to deciding whether they wanted a ball python, participants also considered which specific one to choose. The first factor was the snake's origin. Most participants wanted a captive-bred ball python for ethical or conservation reasons. They observed this trend in the supply of ball pythons as well, noting that wild-caught individuals were very difficult to find. One participant still had some interest in wild-caught ball pythons, as these potentially have unique genetic abnormalities to discover.

Beginner ball python keepers chose their animals based on appearance. While they did not care about a specific morph, they were drawn to certain colours or patterns. They picked a python they found attractive, with some even expressing

a feeling of love at first sight.

More experienced keepers selected their new ball pythons based on morphs. These participants were also involved in hobby breeding, and therefore chose morphs that fit their breeding plans.

While some participants believed a ball python's character might vary by morph, and nearly all agreed that individual personality differs, this was not an active consideration when buying a ball python.

Drivers of ball python keeping (drivers)

The third theme demonstrates what drives the participants to keep ball pythons. The main driver for their interest in reptiles and ball pythons was the mystery of these animals. They have something unique, something special; they are so different. That makes them unknown and interesting. Their appearance and behaviour are fascinating. For some participants this stimulates a prehistoric, exciting feeling. They offer a sense of adventure, and some were drawn to them because of their negative image.

A huge driver for ball python keeping is enjoyment. All participants enjoy ball python keeping, but this enjoyment stemmed from different aspects. Nonetheless, the most common reason was the tranquillity that reptile care stimulates. Ball pythons specifically stimulate this even more than other reptiles due to their calm and gentle nature.

This calmness was experienced in three aspects of ball python keeping. First of all was the calming effect of the ball python itself. Looking at the reptile provides a sense of calmness. Many participants occasionally took some time just to look at their ball python in their enclosure, and the activities of the ball python were mesmerising. It was a way to clear the mind and think of nothing else. Sometimes the ball pythons provided a listening ear, with participants talking to them for fun or to clear their heart.

Handling the ball python had a calming effect as well, especially due to the ball python's calm demeanour. Most participants took the ball python out of the enclosure to relax with it. These interactions with their ball pythons made the keeping fun as well. Most participants only did this in their home, with warm temperatures, not too

often, and not when the python had eaten. One participant also took their ball python outside, visiting the supermarket with a python around their neck.

Besides the calming effect of the animal itself, caring for a reptile was also considered peaceful and fun. Especially setting up the enclosure was calming, to be able to only think about what they could change or improve for their pet. Reptiles gave a sense of purpose and routine. Five participants also considered the terrarium for their ball python an aesthetic aspect in their home, making it appealing to upgrade the set-up.

As mentioned before, reptiles are intriguing due to their mystery. A driver for reptile keeping was uncovering this mystery and learning about these fascinating creatures. This could be regarding their behaviour and care, but also regarding their genes and different morphs.

Besides learning themselves, some participants also found a passion in educating others about reptiles. Some participants wanted to teach and enthuse others about reptiles, to break the prejudices and fear regarding these animals, or even try to stimulate conservation through education.

The ball python can feel like a member of the family, though reptile keeping overall was described as a hobby by the participants.

Influence on expansion (drivers/considerations/goals)

The fact that ball python keeping was considered a hobby likely contributed to why many reptile keepers expand their collection. The participants enjoy caring for their reptile, it was their hobby, and a hobby is something one wants to expand when possible. Participants could be driven to increase the number of ball pythons as a way to seek new stimulation and challenge. They could learn new things from having multiple ball pythons, such as discovering different characters among them.

However, the most common reason mentioned was to start breeding. This offered a new challenge, the opportunity to discover their genes, or the excitement of new hatchlings. Drivers for breeding will be discussed in more detail in the next theme.

Another way to expand is to get more and different species. This was also mentioned as a way to seek a new challenge or renewed stimulation in reptile keeping. New species meant new things to learn and new enclosures to set up. However, expansion to new species could also be driven by a tendency to collect. Eventually, one gets familiar with what they have, so another species might become more appealing. In four interviews, it was even mentioned that a dream of the participants would be to have a small reptile zoo.

Another aspect that influences expansion is impulsive purchases. Most participants were familiar with this. Reptiles are accessible to buy impulsively, as they are affordable, relatively easy to care for, and easy to obtain. Impulsive purchases were especially common at reptile fairs, where both expansion of ball pythons and other species occurred. The huge and diverse supply of morphs and reptiles makes it tempting to buy, and multiple participants had bought reptiles at fairs even though they had not intended to.

A final reason for expansion mentioned by a few participants was an urge to rescue. This did not happen often, but when a malnourished reptile was spotted, some participants felt the urge to rescue it by buying it. However, they were aware that this would likely support irresponsible sellers and therefore refrained from purchase.

The most commonly mentioned reason for stopping expansion was lack of space. Participants found that with their current available space, they could not house a new ball python or reptile properly. One participant mentioned finances as a reason to refrain from expanding, one participant mentioned an upcoming child, and one participant was decreasing his collection to have more time for other things.

Drivers for breeding (drivers)

Breeding is mentioned earlier as a reason for expansion. The participants who bred ball pythons mainly did so for fun, as a hobby, and out of personal passion. They started it as a new stimulation or challenge in ball python keeping, or because of an interest in genetics.

Ball pythons are very interesting to breed when interested in genetics, due to their broad array of morphs. However, while not breeding for profit, they still considered it a way to make some side

income, or as a way for the hobby to sustain itself financially. There was one interview in which a beginner breeder expressed their dream of earning a full-time income from ball python breeding.

However, there were a few participants who mentioned that the ball python market is saturated and going in a downward spiral. This was mentioned as one of the main reasons that ball python breeding was not profitable.

Furthermore, participants noted the trend sensitivity in ball python morph value and even reptile species. A certain morph or species becomes popular and therefore valuable. People start breeding this specific morph or species, and as a result there is an influx of supply and its value decreases. According to the participants, it was nearly impossible to be at the beginning of such a trend wave as a hobby breeder.

Information (information gathering)

Lack of knowledge is still an issue in reptile care. Participants mentioned that some keepers do not know enough, or think they know more than they really do. A participant working at a pet shop mentioned that it is 50/50 whether a buyer has done proper research beforehand. Nonetheless, participants agreed that finding the right information is crucial in reptile care. Preparatory research is important for responsible reptile keeping, as this ensures that the buyer is able to care for it properly from the start. It is best to have the terrarium fully functioning even before you buy the reptile. Four participants mentioned that their first reptile pet died too soon due to lack of knowledge. Most participants are aware that reptile knowledge keeps developing, even after purchase. Therefore, reptile keeping also involves continuously developing your knowledge, your enclosure, and your care routine. Old care sheets might contain outdated information.

Participants obtained their information from different sources. The most common source was mentioned as 'the internet', but this itself also contained different sources. One source is Google, using the search engine to find the knowledge you need, and some mentioned the LICG. YouTube was also a source for information and inspiration. Brian Barczyk was especially often mentioned for ball python knowledge on YouTube.

Another common source for information online was online communities. Facebook, Reddit, forums, or even LinkedIn were used to gain knowledge, ask questions, or test your knowledge by answering questions. These communities can sometimes be judgemental or harsh, but were generally seen as great sources of information.

Besides online communities, keepers also shared information in person. Most participants got to know people in the hobby over time and were able to share information among each other. Fairs and symposiums were mentioned as ways to meet other like-minded people to share the hobby and exchange knowledge. Ball python keepers felt connected to each other, and beyond merely owning a pet, reptile keeping could become an integral part of one's social life.

As another source for information, four participants used reading materials such as books or scientific articles to improve their knowledge. Furthermore, trial and error, or personal experience, was a major part of improving reptile keeping knowledge. Less common, but still applicable, was getting information from a vet, or from formal education or work. Four participants were or are active in a field where reptile knowledge is required.

A final important source of information is the seller. However, this is also a controversial one. Some participants had a great experience where the seller felt reliable and gave good information on reptile care. Some even asked questions to the buyer to assess whether they were suitable, or allowed buyers to ask follow-up questions about the ball python after purchase. But there were also many experiences with misinformation from sellers, or sellers and pet shops that did not care for their reptiles properly themselves. Sellers are often seen as experts and have the potential to become gatekeepers for responsible purchases. Sadly, this is often not the case. Passionate reptile sellers were more likely to fulfil such a role than sellers focused on profit, as some believed that sharing too much information might discourage potential buyers.

Another major issue in reptile and ball python knowledge is mis- or contradictory information. It is difficult to find reliable information as many different things are claimed. This may be because certain information is outdated, because opinion

or experience-based beliefs are presented as facts, or because keepers are stuck in their own outdated beliefs and myths. The most common way participants tried to filter through this information was to look for a common thread. What is mentioned the most, and most recently, is likely to be the truth. Another method is trial and error: see what works for the ball python and use experience as a fact-checker.

The care for a ball python

Ball pythons were generally considered to be easy to care for by the participants. They do not need a lot of attention and are not demanding. One could even go on a short holiday while keeping a python. However, when going on a longer holiday, it might be difficult to find a babysitter for the pets.

There are also some other challenges regarding ball python keeping. They are picky eaters, sometimes not eating for long periods of time, which worries the owner. Ball pythons need quite some space for their enclosures, and they are escape artists. Furthermore, the infrastructure regarding reptile keeping is not ideal. It is not always easy to get food or find a vet nearby. They can also be expensive to keep, due to the cost of electricity and food. Attributes such as terrariums or hideouts can also be costly. Therefore, some people try to reduce costs by breeding their own rodents for food or creating their own terrarium attributes.

While the participants did consider ball pythons to be easy to care for, creating the perfect terrarium for the reptile was a challenge. The main challenge is maintaining the right humidity and temperature in the terrarium. This also correlates with the next issue: terrarium attributes do not always fit the needs of a ball python. For example, some terrariums vent too much, losing too much moisture and temperature. Some terrariums cannot handle the humidity and start to rot, ball pythons can burn themselves on the heat lamps, or cut themselves on sharp edges in their hideouts. It is difficult to find or create the ideal ball python enclosure, but a smart set-up that auto-regulates humidity or temperature can be useful to make maintenance easier. Yet this also makes the enclosure more expensive. A few participants were aware that their enclosure could be improved but mentioned that they lacked the finances or time to change it.

Most participants kept their ball pythons in terrariums, but two participants used a rack system. The participants agreed that it is easier to care for ball pythons in rack systems. Racks require less space and less money, it is easier to maintain the correct climate, and ball pythons eat and breed well in racks. The latter were considered indicators of reptile well-being for a long time, yet this is becoming outdated. One of the participants with a rack system mentioned that they initially did not intend to use one, but since many of their inspiration sources on YouTube had such a system, it seemed like a good choice—especially because they wanted to start breeding. The other participant with a rack system was planning to change it to terrariums, as he came to the conclusion that rack systems are not ideal for the python.

Ball pythons do love small spaces, but they also need movement and like to become active at night. Enrichment was mentioned as an underrated aspect in the hobby by half of the participants. They paired this with 'giving the ball python the option to choose' and stimulation. An example that most participants gave was climbing. Ball pythons are considered ground dwellers, yet when given the opportunity, they can choose to climb if they want to, and all of them did.

Recreating the natural environment was also mentioned as a way to improve ball python welfare. This was done to stimulate their natural behaviour and improve well-being. It allowed them to have choices: to decide whether to climb or not, to choose which hideout to use, or where to bask. Some even did this by offering live food to trigger their hunting instinct, despite it being prohibited by law.

One participant had a bio-active terrarium and mentioned this was becoming a trend. In this case, everything in the terrarium was made from natural materials, plants, and an automated humidity, temperature, and light regulator. The soil even contained living organisms to clean organic waste. The terrarium was built to mimic the natural environment and be auto-regulated (excluding the ball python food).

However, ball pythons are very stress-sensitive and therefore should not be overstimulated. Handling, in particular, is stressful, as is being over-exposed. This highlights the importance of

hiding spots and minimal handling. Moving the ball python, for example due to purchase, is also a stressful moment. Ball pythons will stop eating when stressed, and this could even become fatal for them. Especially young ball pythons are fragile, highlighting the need for tactful treatment at ball python sales.

Hygienic handling and care is always important when dealing with ball pythons to minimise the risk of disease. Especially at and after a fair, the risks of disease transmission are higher. Common illnesses include mites and scale rot. These can often be treated at home. However, it is difficult to assess ball python well-being, and participants mentioned they would never know for sure whether a ball python is happy. Most participants monitored the physical well-being of their snake, noting what and when they eat, their weight, and the presence of parasites. Some used a notebook or app for this.

Perspective on ball python keeping (perspective/goals)

Participants often considered themselves and other reptile keepers as different or alternative. It was mentioned that unique pets appeal to unique people. Passion for reptiles is often not limited to keeping them as pets, but also includes watching documentaries, or going to the zoo to watch them. Five participants even used their passion for reptiles in their careers, for example by studying animal care or working in pet shops.

The participants looked at ball python keeping with a sense of responsibility. A popular remark was: "I chose to keep this animal in my home, so it is my responsibility to care for it as well as I can." When discussing responsible reptile keeping, it mainly correlated with reptile welfare for the participants, and with the idea that the owner is knowledgeable in what he or she does.

The connection participants had to the ball pythons differed, but most considered them to be family. One participant called them friends, and one participant said that owning the ball python was more a fascination than a connection. About half of the participants thought the connection with their ball python is one-sided. A ball python will accept you, but not love you; that love is only from the human to the python. The other half of the participants did feel like the connection was two-sided, but were aware that the love was likely

not evenly distributed.

One participant mentioned that she deliberately believes that the connection is two-sided, despite hearing stories that reptiles do not feel such a connection. Yet, participants did believe that reptiles are more complex than often given credit for, and that they would get used to their owner.

Owning a ball python can give mixed reactions from one's surrounding. It is fun when you receive positive feedback, yet there is also negativity. Some people consider it scary or weird, and neighbours might not like the idea of a reptile in their neighbourhood.

However, the participants also had some aspects in ball python keeping that sometimes raised concerns. The rack system was mentioned several times as a way of keeping that some found unethical or sad. Reptile fairs were also mentioned a few times, yet these were often considered sad, but temporary. They would like to see it improved, but would likely still visit the fair if it did not.

Another issue for some is improper care by some people, who see the reptile as a product to profit from, or as a status symbol, something cool to have. An issue that was mentioned more often was inbreeding. Most participants were aware that some morphs are harmed by inbreeding and that it hurts their welfare.

An issue where participants had a different view concerned regulations and monitoring. Some participants advocated for a positive list and stricter regulation, while other participants feared that the positive list would lead to massive reptile pet dumping and only wanted to improve reptile pet monitoring.

Limitations

The contextmapping study has given many rich and interesting insights to further understand the ball python keepers in the Netherlands. However, it is important to note that there are some limitations to take into consideration while drawing conclusions from this study.

One thing that became evident during the data analysis was the difficulty in making a clear distinction between reptiles and ball pythons. Many questions about ball pythons were answered

in terms of reptiles in general. Creating a complete distinction between ball pythons and reptiles in the results was not feasible, due to the complexity of restructuring the data. In the current results, both 'ball python' and 'reptile' are used, based on terminology used by the quotes of the participant in the corresponding cluster.

Furthermore, an important limitation of this contextmapping study is a certain bias in participants. Most participants were recruited through voluntary response to a recruitment call to ball python keepers offering a small compensation. Voluntary response sampling is often prone to biases. For example, people who are not satisfied with their ball python care are probably less likely to respond to such a call than reptile keepers who do provide adequate care, likely resulting in a bias towards the "better" reptile keepers.

The impact of this bias is accepted as long as we stay aware of its presence during the project. General questions about reptile keepers and what might go wrong at other keepers were asked to try and mitigate the bias to a certain extent. This was helpful as participants who were doing certain things well themselves could explain that this is likely not the norm, or that other keepers do it differently. Furthermore, when participants admitted that they had periods of inadequate care, we would discuss those as well, focusing not only on what they are doing right at the moment, but also what could have been improved in their past, and what others still might be doing.

In the end, saturation was reached on the topics of interest, the contextmapping goal. However, due to the open structure of the interview, some new but less relevant topics could still arise. Despite this partial saturation in secondary topics, data collection was concluded as the primary concepts were fully addressed.

Define

The Define stage translates these research findings into actionable directions for design. Insights from the contextmapping study and earlier analysis are synthesised into nine design scopes, representing thematic areas where design could support more responsible ball python keeping. These scopes are then evaluated for their potential to reduce demand and improve animal welfare. The most impactful scopes form a design frame to guide further development.

5. Research to design

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5.1 From clusters to design scopes

53

5.2 Design scopes

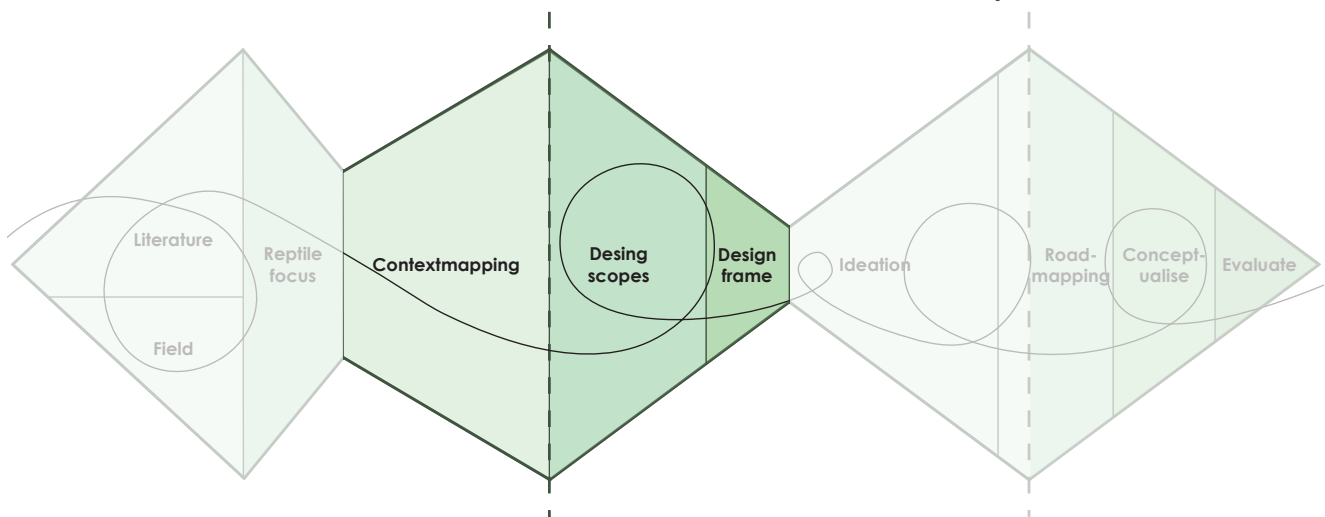
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5.3 The scopes to focus on

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5.4 Design frame

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5. Research to design

The contextmapping study provided a lot of rich data, and the resulting themes offer a better understanding of the key stakeholder. To create interventions that stimulate and facilitate responsible reptile keeping, the insights within these themes need to be translated into design goals and directions. To make this transition, the insightful clusters within the themes were revised with the mission of the project in mind, 'to make ball pythons thrive instead of survive'. The insights were restructured into potential design opportunities during the different phases of responsible reptile keeping. These design opportunities were merged with the literature and field research from Chapter 2, resulting in nine design scopes (Figure 25). These design scopes are areas where design to play a role to make ball pythons thrive instead of survive. The following section explains how the design scopes were created, focusing on the process and how each step contributed to the final result. Instead of going into detail after every phase, the aim is to keep the story clear and structured, since the key findings and insights are already captured in the design scopes themselves.

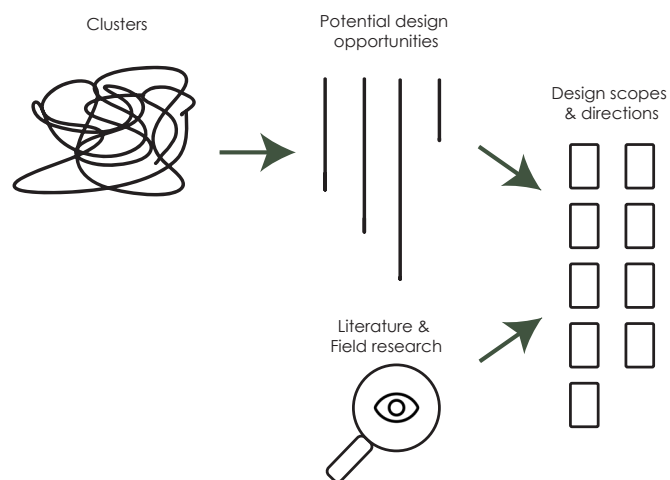


Figure 25: From insightful clusters to design scopes

5.1 From clusters to design scopes

To revise and rewrite the clusters into potential design opportunities, the focus was on identifying what currently works well and could be further stimulated, and what challenges are there and could be addressed to improve ball python keeping. The result is shown in Figure 26. This was an intermediate step to eventually determine the design scopes for this project. Aspects considered during re-structuring were:

Goal

Stimulate and facilitate responsible ball python keeping

Mission

To make ball pythons thrive instead of survive

Definition responsible ball python keeping

Responsible ball python keeping is making the contemplated decision to ensure life-long care for a legally sourced, captive-bred reptile, caring for it beyond the basic needs to survive, but making them thrive through enrichment while keeping the safety of the reptile, you, and the surrounding as a priority.

Looking for

What goes well and could be stimulated / What are issues and could be improved

Considerations

The goal of the client is demand reduction and countering illegal trafficking

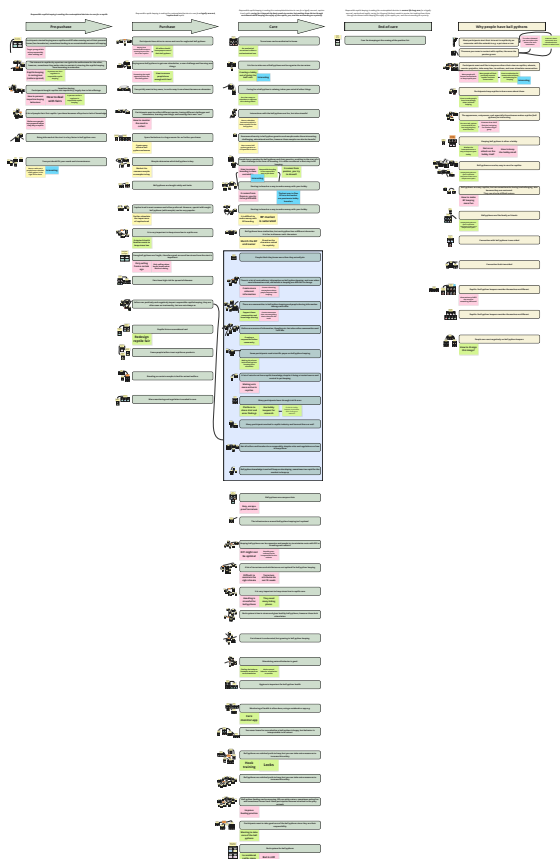


Figure 26: Potential opportunities ordered per phase of responsible reptile keeping

The mission is to make ball pythons thrive, and to do so, the responsible ball python definition should be adhered. Therefore the restructuring was done on the different phases of this definition, 'pre-purchase', 'purchase', 'care', and 'end-of-care'. The insightful clusters were divided among the phases, demonstrating where potential opportunities lie according to the contextmapping studies. It is noticeable in Figure 26 that the 'care' phase has a lot of potential opportunities and the 'end-of-care' very little. This is likely because that's where the priority of most keepers lie. They expect themselves to take life-long care of their reptiles,

so in their future perspective discarding was not often mentioned. Sometimes ideas could overlap multiple phases, these are mainly opportunities regarding ball python knowledge and information among keepers (the blue quadrant in Figure 26). These overlapping potential opportunities are placed in their most relevant phase to keep the overview organised. During a later stage in the process the potential overlap of opportunities will be revisited (section 5.4 Design Frame).

This restructuring made it clear where opportunities lie, but it is too complex and unclear to use in the design process. The goal was to create design scopes, areas where design can contribute to making ball pythons thrive instead of survive. To determine those areas, the opportunities of each phase were merged and compressed to their core meaning. This created design goals and correlating design directions per phase of responsible reptile keeping, and thereby identifying the areas of improvement. This step is shown in Figure 27. These design goals and directions became the foundation for the design scopes.

5.2 Design scopes

The design scopes were created by combining the findings from the contextmapping study with insights from the literature and field research. This led to nine scopes that bring together the most important research outcomes to demonstrate the areas where design could improve responsible reptile keeping. Figure 28 shows the layout of a design scope.

The following section briefly summarises all design scopes. The full versions can be found in Appendix A. In addition, the four most relevant design scopes are presented in full at the end of this chapter, following Section 5.4: Design Frame.

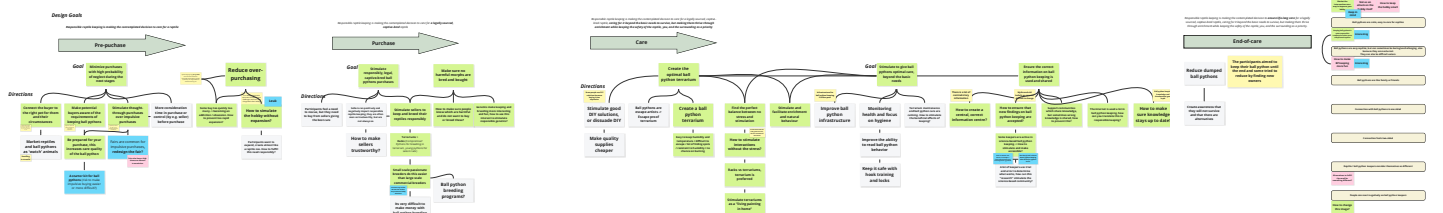


Figure 27: From insightful clusters to design scopes

Title & Summary

Research Literature, field & contextmapping

Supporting quotes contextmapping

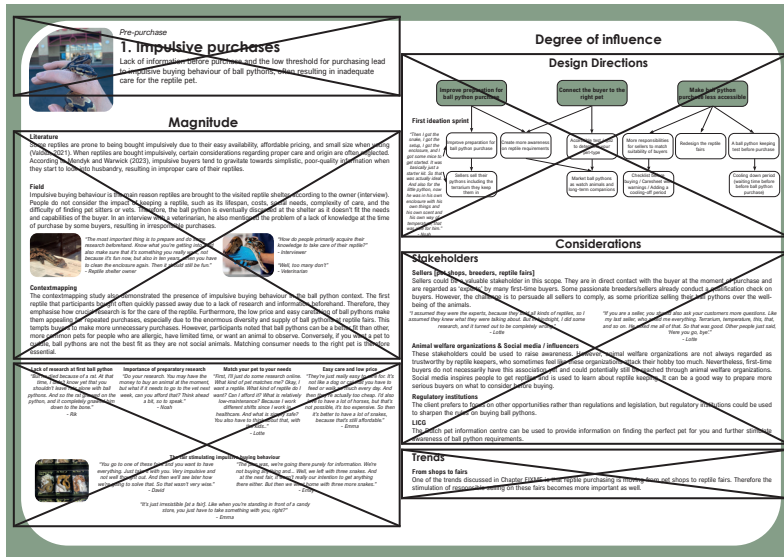


Figure 28: Lay-out of a design scope

First design directions from contextmapping

Relevant stakeholders

Relevant trends

1. Impulsive purchases

Lack of information before purchase and the low threshold for purchasing lead to impulsive buying behaviour of ball pythons, often resulting in inadequate care for the reptile pet.

2. Collecting reptiles and ball pythons

Keeping reptiles is a hobby, and many people want to expand their hobby by acquiring more ball pythons or other reptiles to collect new morphs or species, to learn new things, and to find new challenges and stimulation. However, there is a risk of it becoming an “addiction,” leading to unsustainable expansion.

3. Responsible, legal, captive-bred ball pythons purchases

Captive-bred ball pythons are very common and mostly preferred by buyers. Yet this doesn't mean that wild-caught ball pythons are not there anymore. The development of preference for pythons with a responsible origin should be celebrated and further enhanced. Demand drives the market, well-maintained, healthy (morph) breeders are stimulated to become the standard consumers are steered towards purchasing from such breeders.

4. Responsible breeding

Ball python pets are mainly brought to the Dutch market through breeders. These can be more small-scale hobby breeders, or larger and more commercial breeders. Racks are often used for ball python breeding due to its space efficiency,

but this compromises on ball python well-being. Another issue coming with breeding is inbreeding, leading to medical issues. This is especially common with certain morphs.

5. The enjoyment of optimal ball python care

The improvements and care of for the enclosure of the ball python is enjoyable, it's part of the hobby. It can take your mind of anything else and have a calming effect. The terrarium itself can also be an asset in home, like a living painting.

6. Knowledge sharing and information acceptance about ball pythons

There's a lot of conflicting and sometimes wrong information about ball python care. Even though the understanding of this care has significantly improved, many old habits and myths persist. The internet and online communities are key places to get information, but this can be incorrect, outdated, or contradictory.

7. The optimal ball python terrarium

The optimal ball python terrarium is difficult to find at the moment. Some enclosures or supplies are even harmful for the snakes and it is often difficult to regulate the climate. To save costs people use DIY supplies. Therefore designing the optimal terrarium make the owner and ball pythons life easier.

8. Dumping of ball pythons

Dumping of ball pythons is not a common issue,

but still an issue. Though few, there are still news messages on pythons being found. Ball pythons can not survive being on the loose in the Netherlands.

9. Expressing ball python enthusiasm without stimulating purchase by others

Interest in reptiles often starts young and due to an encounter. There are also keepers eager to educate and enthusiasm others about reptile keeping, especially with ball pythons. This combined poses the risk for increased demand for reptiles. Therefore, how do you express enthusiasm without stimulating purchases by others?

All design scopes can offer value to responsible ball python keeping. However, some can make a bigger impact than others, especially with the needs of the client in mind. Therefore from these design scopes a few were selected to be the focus for the remainder of the project.

5.3 The scopes to focus on

Two criteria were taken into consideration to determine which scopes to focus on, the impact on ball python well-being and demand reduction.

The first criteria relates to the mission of this project, to make ball pythons thrive instead of survive. Therefore this criteria is the impact the design scope can make on overall ball python well-being. This impact is defined by the *magnitude of the topic* and the *degree of influence* of the scope. The two variables are specified as:

Magnitude of the topic - The size of the issue or opportunity within this scope and its potential improvement on responsible reptile keeping. *How big is the issue or opportunity?*

Degree of influence - The extent to which it is feasible to make a change in this issue or opportunity. So the level of influence that can be exerted on it. *To what extent can we change it?*

Greater emphasis is placed on the “magnitude of the topic,” directing attention to the most significant issues or opportunities in ball python care. Nonetheless, degree of influence remains important to highlight accessible topics or reduce the attractiveness of topics that are less feasible to address.

The second criteria is taken from the client’s

perspective, who has demand reduction as a goal for their own project. So while the graduation project is a stand-alone project on responsible ball python keeping, it is important that the used scope should at the very least not stimulate, and preferably reduce demand.

These two criteria, impact and demand reduction, are used to create a C-Box. The nine design scopes are assessed and plotted in this C-Box (Figure 29).

Assessment of design scopes

The following subsection will argue the position of the nine design scopes on the C-Box (Figure 29). The scopes are assessed on the two axes of the C-Box ‘impact on well-being’ and ‘effect on demand’.

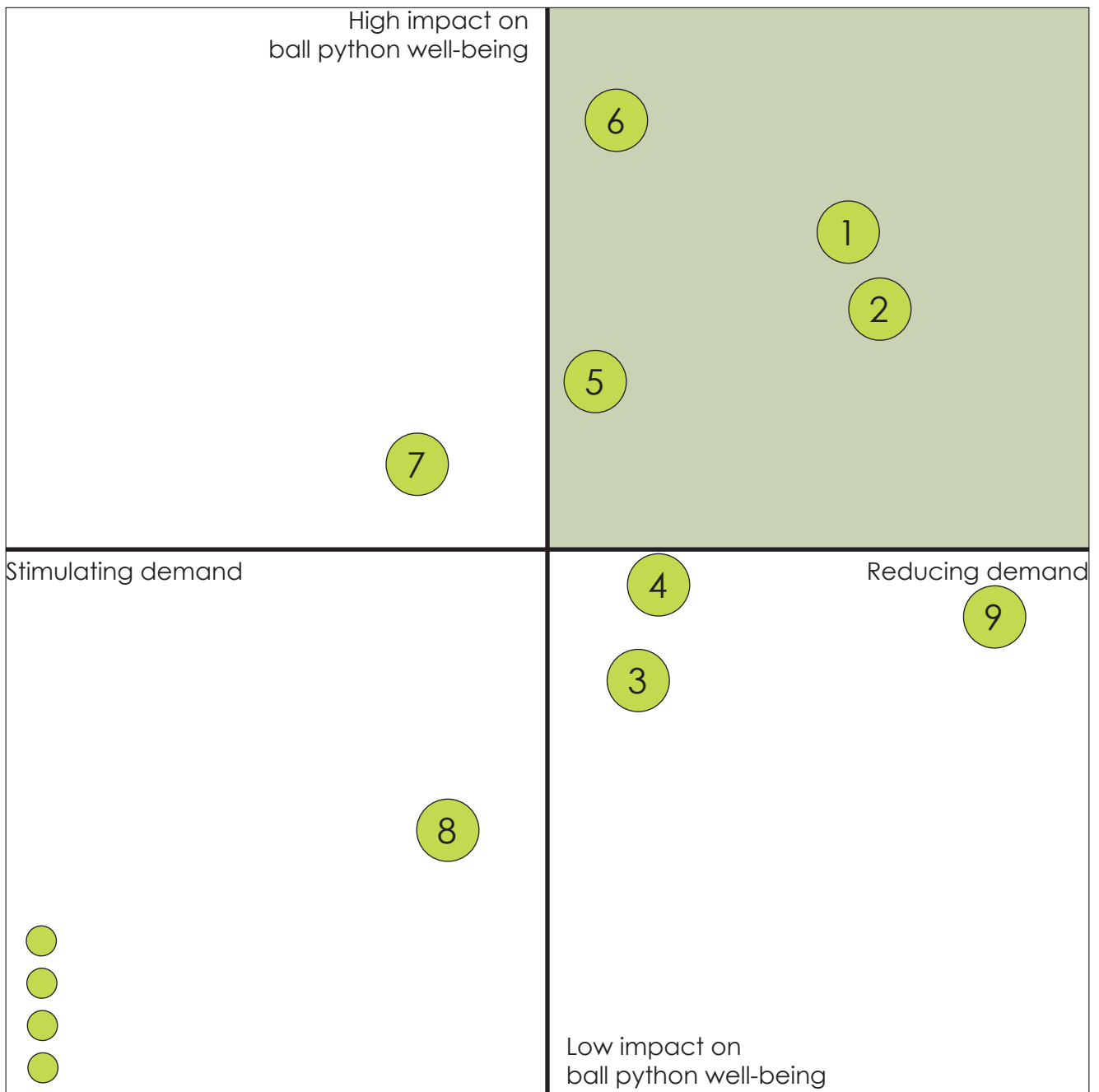
1. Impulsive purchases

The first assessed design scope is impulsive purchases. This scope has a relative high impact on well-being and demand reduction.

The literature, field, and context mapping research all highlight the problem of impulsive purchases in the reptile world. Impulsive purchases are common among reptiles and ball pythons due to their availability, affordability, and small size when young. Especially reptile fairs tempt buyers to make impulsive purchases due to their enormous diversity and supply. These impulsive purchases negatively impact the well-being of ball pythons, as considerations regarding proper care and origin are often neglected with impulsive purchases. Research and information beforehand are important to improve the care quality of the reptile and reduce premature deaths of ball pythons. Furthermore, impulsive purchases might result in inadequate research on the (legal) origin of the animal. While impulsive purchases are a significant problem, it’s important to note that not all ball pythons are bought impulsively. There are also buyers who purchase a ball python well-prepared.

Therefore the **magnitude of the topic** can be considered high. It is a substantial topic regarding ball python keeping and could improve their well-being.

Regarding the **degree of influence**, there are multiple design directions and stakeholders



1. Impulsive purchases
2. Collecting reptiles and ball pythons
3. Responsible, legal, captive-bred ball pythons purchases
4. Responsible breeding
5. Enjoyment of ball python enclosure care
6. Science-based information acceptance and knowledge sharing on ball pythons
7. The optimal ball python terrarium
8. Dumping of ball pythons
9. Expressing ball python enthusiasm without stimulating purchase by others

Figure 29: C-Box plotting the design scopes on the impact and demand reduction

to address this topic. There is potential in better preparing the consumer for a purchase, connecting them to the pet that fits them best, or in making ball python purchases less accessible to them. Tier II influencers can be used to provide information and steer the buyer, or tier III stakeholders such as the seller or reptile fairs can contribute to reducing irresponsible, impulsive purchases. There are already passionate hobby breeders/seller who do so. However, there is still a challenge in convincing these stakeholders to cooperate. For example, while there are passionate sellers, who are willing to contribute to the reduction of irresponsible, impulsive purchases, there are also more commercial sellers, making money of such impulsive purchases. The causes of this issue, such as lack of research and information beforehand, and the easy availability are well defined, and the right interventions could have a high degree of influence.

So considering the magnitude of the topic and the degree of influence design interventions could make, this design scope has a relative high impact on ball python well-being.

Reducing impulsive purchases will reduce purchases overall. The consumers who realize that a ball python is not the right fit for them will refrain from buying. Nevertheless, it will not reduce all demand, not for the people who are prepared and for whom the ball python might be a proper fit as pet. It scores good on **demand reduction**, with as benefit reducing the demand on a target group which purchases are more likely irresponsible.

2. Collecting reptiles and ball pythons

The second scope, regarding the collection of reptiles and ball pythons, has a relative high impact on ball python well-being and demand reduction.

Ball python and reptile keepers often have the urge to expand the amount of reptiles they have, whether this is by getting more ball pythons, or by getting new reptile species. It's their hobby and they want to expand their hobby, looking for new stimulation, new things to learn, and new challenges. However, sometimes the expansion of a reptile collection can escalate to the point where it resembles an addiction or obsession, leading to unsustainable keeping. As a result reptiles are kept in inadequate environments, and

for ball pythons the use of rack systems. In reptile keeping there is a rush for rarity and this goes hand in hand with collecting, wanting the rarest reptiles and morphs. This supports irresponsible wild-caught practices to obtain the rarest species and irresponsible breeding programs to obtain the rarest morphs. Nonetheless, having the urge to expand does not always mean irresponsible collecting of reptiles. Many participants from the contextmapping dreamed of having their own (small) reptile zoo, but currently refrained from expanding as they could not responsibly keep those reptile due to lack of time, space, or finances.

So, the **magnitude of the topic** is significant. Keeping reptiles or ball pythons can become like an obsession or addiction and the urge to collect can lead to inadequate care and irresponsible sourcing of reptiles. As the reptile pet market is growing it becomes even more important that these keepers do not become collectors.

Regarding the **degree of influence**, there are multiple directions and stakeholders which can be utilized to improve the issue. People expand to seek new stimulation for their hobby, so perhaps this stimulation could be triggered with something else, like environment/care optimisation, researching your own reptile, or even sharing reptiles. Tier II stakeholders (influencers) could be used to make collectors aware of their impact, or steer towards new challenges and stimulation besides expanding. Tier III stakeholders like fairs and sellers could also contribute to reducing collecting by for example making rare reptiles less accessible, or screening buyers on the responsibility of their purchase, but this is difficult as it goes against their goal of making money. Even Tier IV stakeholders, like terrarium supply sellers could be used to introduce products that could create stimulation for reptile keepers besides expansion.

So overall, the impact on ball python well-being is significant considering the magnitude of the topic and its degree of influence.

It also has a good impact on **demand reduction**. Being able to reduce collecting naturally relates to reducing reptile demand. While it does not reduce the amount of new reptile keepers, it does reduce amount of reptiles that they might keep.

3. Legal, captive-bred ball python purchases

The third scope is positioned relatively low regarding impact on ball python well-being and has a slight positive impact on demand reduction.

The scope sounds like the ideal scenario, and therefore it feels strange to determine that the **magnitude of the topic** is low. This is simply because ball pythons in the Netherlands are commonly sold legally and captive-bred. So while it is a relevant topic, there is not a lot of improvement to be made for ball pythons.

The **degree of influence** is a bit higher, as most stakeholders would be willing to support legal, captive-bred ball pythons. This is something that Tier I, the owners are already looking for and the influencers of Tier II already endorse. Tier III, regarding the sellers and fairs, would also benefit from captive-bred reptiles as this is already the norm and improves their image. As most stakeholders already try to improve this topic it is plausible to assume they will cooperate, however, it also raises the question on how much additional influence could be exerted?

So, the impact on ball python well-being of this scope is not so high due to the low magnitude of the topic and medium degree of influence.

The scope does have a small impact on **demand reduction**. Reducing illegal or wild-caught ball python purchases might decrease the purchases, but it is more likely that these people then buy them legally and captive-bred.

4. Responsible breeding

The reptile market is shifting more toward captive-bred reptiles, with captive-bred ball pythons being in higher demand than wild-caught ones (Collis & Fenili, 2011). While this trend alleviates pressure on wild populations, it also raises concerns regarding inbreeding depression and disease risks, as evidenced by the neurological dysfunctions found in 'spider' morph ball pythons (Rose & Williams, 2014). Additionally, many ball pythons are bred in rack systems, prioritizing space efficiency but offering little to no enrichment or natural stimulation—an aspect often underestimated in reptile care (Burghardt, 2013; Mendyk & Augustine, 2023). These concerns highlight the high magnitude of

the topic within the industry. However, this project focuses on reptile keepers and hobby breeders. When solely focusing on hobby breeders the **magnitude of the topic** significantly drops. This project has analysed the hobby breeders and not the large commercial breeders, and while improving breeding standards among small-scale breeders would be beneficial, the overall impact on the industry remains limited.

For the **degree of influence** the conclusion is similar. While interventions focusing on hobby breeders could definitely improve the issue in their context, the influence on the overall industry will stay limited. Nonetheless, the influence on hobby breeders specifically is significant, as these breeders often do it rather for the hobby than the financial benefit (Section 4.3: Results - Drivers for breeding), and would therefore be more likely to incorporate responsible practices.

So, while responsible breeding could have a significant impact on ball python well-being, it would only do so if the whole industry adopted these practices, including larger and commercial breeders. Since this project focuses on keepers and hobby breeders, its overall influence on industry-wide ball python well-being remains limited.

Responsible breeding initiatives might influence **demand reduction** by increasing the complexity of breeding due to the extra effort necessary to make do it responsibly. This could make it a more deliberate and informed process, reducing the expansion of ball python keepers becoming breeders. At the same time, making responsible breeding more accessible and transparent could at the same time encourage more individuals to start breeding, counteracting prior mentioned effect. Furthermore, stricter breeding standards could lead to higher prices due to increased welfare considerations, which might reduce demand. However, some buyers may be willing to pay a premium for ethically bred ball pythons, making the long-term impact on demand uncertain.

5. The enjoyment of optimal ball python care

This scope scores well regarding the impact on ball python well-being and is slightly positive considering demand reduction.

The literature research demonstrated that reptiles are not always properly cared for in captivity, with a study by Azevedo et al. (2021) finding that 85% of their participants did not provide all four essential husbandry needs (temperature, lighting, diet, and refuge). Improper care make reptiles more susceptible to disease and ball pythons have, just as most other reptiles, very specific needs. Furthermore, their cognitive abilities and need for stimulation is often underestimated, as demonstrated by the use of rack systems. Reptile pets are in a state of 'controlled deprivation' according to Burghardt (2013). However, the contextmapping demonstrated that there is a movement towards and enjoyment in optimising the enclosure for their ball pythons and reptiles. Many participants enjoyed improving the living conditions for their pet, seeking a sense of optimisation. It gives them a sense of purpose and peace. It is calming as they can take their mind of anything else. And lastly, a great terrarium looks like living painting in their home, expanding reptile keeping beyond just 'owning a reptile', to benefit from the enclosure as well. If all keepers would strive for this enjoyment of optimisation, it will lead to a huge improvement in care for the ball pythons in captivity. Therefore the **magnitude of the topic** is significant.

The **degree of influence** however poses a bigger challenge. The contextmapping demonstrated this movement by Tier I stakeholders, the keepers, towards such optimisation. However, as it was a qualitative study with likely a bias towards the 'better keepers' (Chapter 4: Contextmapping - Limitations), it is unknown to what extent this movement towards optimisation is applicable for all keepers. Therefore probably not all keepers could be influenced towards optimisation, yet expansion in this movement can definitely be made. The influencers of Tier II can be used to stimulate this, and Tier IV stakeholders such as terrarium sellers can profit from products focusing on optimisation and fairs could alter their supply towards optimisation as well. However, commercial reptile sellers might not like this movement as it stimulates the *caring for* the reptiles over *owning* the reptiles. To conclude, the degree of influence is good as there is already a movement and stakeholders which could contribute. However, it is unclear what proportion of the key stakeholder could be influenced.

Therefore, the impact on ball python well-being is good, with a good magnitude of the topic and decent degree of influence.

Stimulating the enjoyment of optimal ball python care can cause **demand reduction** regarding expansion. Keepers focus more on one animal, optimising their needs. Therefore they have a bigger stimuli and challenge from this animal. Furthermore, they probably put more resources in this animal, more time, money, and space, increasing the barrier of expansion. However, stimulating this enjoyment in optimisation might attract new reptile keepers. By making it less about owning a reptile, and more about creating an optimal environment in-house for the reptile and a living painting, it might appeal to new potential keepers. Nonetheless, it is unlikely that this will attract completely new people not already interested in reptiles. Therefore the estimated impact this scope can have on reducing expansion is considered higher than the impact of attracting new keepers, resulting in a slight demand reduction.

6. Knowledge sharing and information acceptance about ball pythons

This scope could have a high impact on reptile well-being and slightly on demand reduction.

This topic arose multiple times during the literature, field, and contextmapping research. The knowledge on reptile and ball python keeping has improved over the years, but there is still much to be discovered. However, despite the issue of not knowing everything, the main problem lies in not implementing what is known. There are a lot misconceptions and contradictory claims in reptile and ball python keeping, and there is a lot of arbitrary or outdated information in circulation. This makes it hard for keepers to determine what's right and what isn't, leading in insufficient care. This insufficient care due to lack of- or incorrect information is the reason many reptiles turn ill. Sometimes keepers might even think that their actions are the best for their pet, while it could actually harm them. A ball python can not be kept responsibly if a keeper doesn't know how to. The significance of this issue is highlighted by the study from Azevedo et al. (2021) where many owners believed they had good knowledge of their pets', while only 15% actually met all four essential husbandry needs (temperature, lighting, diet, and refuge). Having accessible, correct

information will improve welfare in the care phase of responsible ball python keeping, but can also contribute to the pre-purchase and purchase phase by improving knowledge when starting ball python keeping and improving knowledge on how to purchase responsibly. Therefore, the **magnitude of the topic** is high. Especially knowledge on enrichment and racks vs terrariums could improve ball python welfare in captivity.

The **degree of influence** of this scope is good, yet difficult. The contextmapping showed that this is an issue the key stakeholder (tier I) wants to improve dearly. Other stakeholders are also interested in a well educated reptile community. For example, the Tier II influencers can take the role as educators, and the initiative LICG can play a major role in improving accessible information on reptile keeping. However, stakeholders with a financial interest in reptiles are known to offer misinformation to sell their animals or products, despite buyers seeing them as 'experts'. Improving knowledge sharing and information acceptance will prepare the buyer against such misinformation, but a seller spreading misinformation for financial gain will not contribute in this improvement. However, the main reason that the degree of influence on this topic is difficult, is the complexity of the issue. Many people want, and want to contribute to improving knowledge and information, yet what is the correct information? Much knowledge stems from experience, beliefs, or habits, and these are subjective. The only objective driver is science. So science should be the backbone for reptile knowledge, while experience and beliefs could fill the gaps of missing information, and should be tested for the truth.

So the impact on reptile well-being is high, the magnitude of the topic and degree of influence of the topic are significant, yet the complexity of the issue poses a challenge.

This scope will **reduce demand** slightly. Improved knowledge and information will improve reptile care. When individuals are exposed to accurate, science-based information about the requirements and challenges of caring for ball pythons, they may reconsider whether they are suited to keeping such a pet. Improved knowledge and information can nudge people to make better decisions (Thaler & Sunstein, 2021). Furthermore, reptile keepers are less likely to expand as

science-based knowledge likely requires their current reptiles to have more resources, like a bigger terrarium, more enrichment, or a better regulated environment. Space and finances were the main restrictions for expansion according to the contextmapping, and science-based keeping will likely increase pressure on both. While the scope may reduce reptile demand, it could also act as a double-edged sword. Making information more accessible might encourage new people to start keeping reptiles. However, it is more likely to have a deterrent effect by emphasising the complexities of reptile care, which are often underestimated in the current situation.

7. The perfect ball python terrarium

Creating the perfect ball python terrarium will have a medium impact on reptile well-being, and a slightly negative impact on demand reduction.

Scope 5 demonstrated that people enjoy setting up the terrarium for their reptile. However, it is not always easy to do, as it is difficult to find the perfect terrarium for a ball python. Terrariums and attributes are often made for reptiles in general, and not ball python specific. As a result many of these terrariums and attributes are not optimal, and sometimes harmful for the ball python. For example terrariums that can not handle the humidity for ball pythons, or have a roster that lets the heat and humidity escape too quick. Attributes can also be harmful, as ball pythons love to climb on lamps, but can burn themselves doing so, or hiding places with sharp edges where they cut themselves. These issues can be prevented with diligent research and preparation, but it is strange that there is no accessible terrarium designed for the most popular reptile, ball pythons. Doing so, creating a perfect terrarium for ball pythons, could improve their well-being especially in the beginning of the care phase. It is the right fit from the start, and the keeper does not have to make multiple iterations with trial & error which might harm the ball python. Therefore, the **magnitude of the topic** is decent. It is not a major issue in ball python keeping, but there is still room for improvement.

The **degree of influence** is good, but complicated. It might be a great opportunity for the Tier IV stakeholder, the terrarium supplier. Creating the benchmark terrarium for the most popular reptile pet sounds like a promising endeavour. Yet, no manufacturer as made one yet. The desirability is

there according to the contextmapping, only the viability and feasibility need more research.

Therefore the impact on reptile well-being is decent. It can certainly improve, but it is just not the biggest issue in reptile keeping.

This scope has a slight negative impact on demand reduction. The research did not discover any people who currently refrained from buying a ball python due to the complexity of finding a terrarium. However, creating the perfect ball python terrarium could still lower threshold of purchase, as it does become easier to start ball python keeper.

8. Dumping of ball pythons

Scope 8 will not have a significant impact on reptile well-being nor have an impact on demand reduction.

The issue of ball pythons dumped in the wild is just not that big. It does exist, as sometimes the Dutch news mentions rogue ball pythons being found. But these are exceptions, and is not common. Therefore, the **magnitude of the topic** is low.

The **degree of influence** is a bit higher. The Tier III stakeholder reptile shelter can play a major role, but also the trend of online marketplaces. These are already relevant in the end-of-care for reptile keepers.

Nonetheless, the magnitude is just too small, and therefore the impact on reptile well-being is low.

It also doesn't really impact demand, as this scope focuses on the end-of-care phase. It could slightly increase demand as end-of-care reptile could supply the market for new keepers, offering a feeling of rescuing for potential buyers. However, this would reduce demand for new ball python import or breeding. So it might increase supply and demand slightly, but this supply could reduce influx of "new" ball pythons.

9. Expressing ball python enthusiasm without stimulating purchase by others

This scope has a below average impact on reptile well-being and a high impact on demand reduction.

Determining the magnitude of the topic for this scope is complicated. If people start to express their

reptile enthusiasm without stimulating purchase, the main focus is demand reduction. Therefore, the main discussion point on impact on well-being is how much does demand reduction impact ball python well-being? It is mentioned before that reptile keeping can have a negative impact on biodiversity and animal welfare, and therefore a strong demand reduction should positively impact ball python well-being. Nevertheless, this project focuses on responsible reptile keeping and thereby demonstrates that reptile keeping does not necessarily have such an impact if done responsibly. So yes, this scope can have a positive impact on ball python well-being, but this impact is reduced once combined with responsible reptile keeping. Nonetheless, it can potentially contribute to making contemplated decisions in reptile keeping and thereby contribute to the pre-purchase phase of responsible reptile keeping. On the other hand, literature has shown that keeping reptiles in their youth inspired many European herpetologists to work in academia or museums. It can build a connection between people and reptiles, contributing to public education, nurturing interest, and countering prejudices, which in turn can contribute to conservation efforts for reptiles. In the contextmapping study there were also multiple participants who chose a career path due to their interest in reptiles and reptile keeping, pursuing animal care education, veterinarian studies, or educating others about reptiles. This demonstrates that reptile keeping also has some positive aspects on ball python well-being as it can stimulate research and conservation. This especially becomes relevant once the negative impact is mitigated through responsible reptile keeping. Therefore, the **magnitude of the topic** is complicated, and placed as mediocre for this topic. It might not make the biggest impact, but there is still improvement to be made.

The **degree of influence** is moderate. The Tier II influencers, especially animal welfare organizations and to an extent regulatory institutions, will be the likely facilitators of this scope. However, most other stakeholders would be more opposed. Fairs, sellers, and terrarium suppliers all support and benefit from reptile keeping. Furthermore, these stakeholders often don't see eye to eye with animal welfare organisations. Using animal welfare organisations for this scope might lead to more resistance from the other stakeholders. Nonetheless, this could also be mitigated by using a separate initiative

only supported by the welfare organisations. So, there are strong supporters in this scope, yet is also comes with certain challenges.

Both the magnitude of the topic and degree of influence are mediocre.

What this scope does really well is **demand reduction**. The goal is reducing stimuli to purchase reptiles, while still being able to enjoy them. People their interest in reptiles is ignited by an encounter with a reptile, they express this through reptile keeping, and sometimes even showing and educating others on reptiles, which could again ignite interest and foster potential reptile keepers. This scope would still focus on igniting the interest, yet without the consequence of purchase.

To conclude

By combining a high impact on ball python well-being with the potential to reduce unnecessary demand, four scopes were selected to further focus on during this project: '1. Impulsive purchases', '2. Collecting reptiles and ball pythons', '5. Enjoyment of ball python enclosure care', and '6. Science-based information acceptance and knowledge sharing on ball pythons'. The selected scopes are shown on the following pages.

Scope 1 focuses on the high-impact issue of impulsive purchases by addressing the root causes of inadequate care and prematurely high turnover. Scope 2 strives to reduce the drive for excessive collecting, thereby curbing unsustainable ownership practices. Scope 5 highlights the existing enthusiasm for enhancing enclosure

set-ups, creating a positive ripple effect on welfare and discouraging over-expansion. Finally, Scope 6 targets widespread misconceptions and outdated practices by advocating science-based, accessible knowledge—an essential foundation for responsible ball python keeping. By concentrating efforts on these four scopes, the project maximizes its impact on animal welfare while supporting the client's goal of reducing unnecessary demand.

5.4 Design frame

This project continues with the design scopes '1. Impulsive purchases', '2. Collecting reptiles and ball pythons', '5. Enjoyment of ball python enclosure care', and '6. Science-based information acceptance and knowledge sharing on ball pythons'. As mentioned in Section 5.1, there was some overlap in the opportunities of different phases. Therefore, there can be overlap in the design scopes as well. When the four scopes are mapped side by side, the overlap becomes evident For example, improved knowledge and information (scope 6) can also reduce impulsive purchases (scope 1), and making purchases less accessible could reduce impulsive and collector purchases (scope 1 & 2). The scopes and their connections are framed in Figure 30.

This frame will serve as the foundation for the forthcoming design interventions. The design frame sets the boundaries of the creative process, and will be used for ideation.

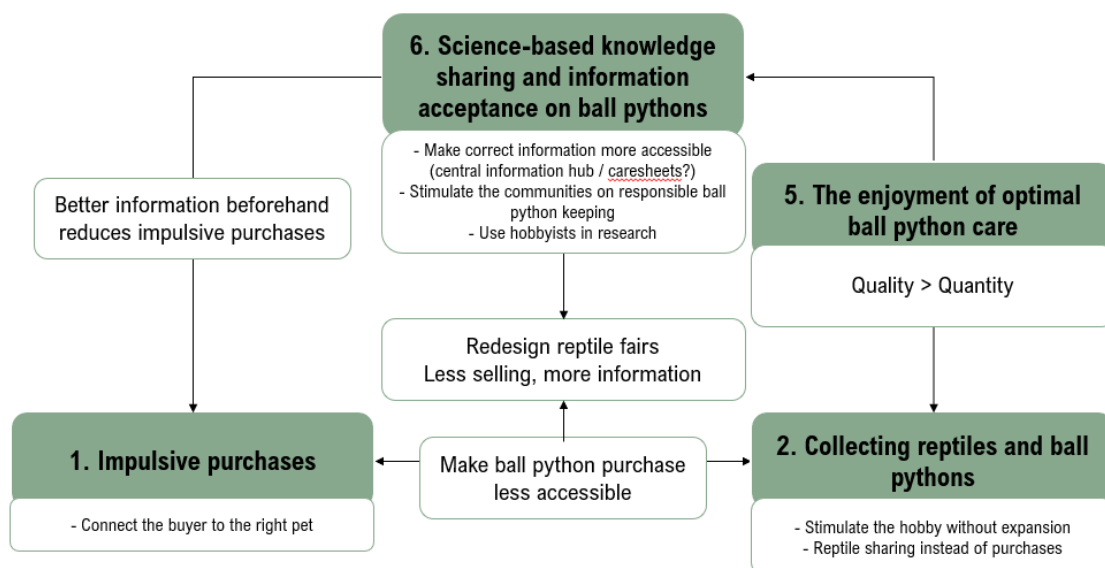


Figure 30: The design frame, showing the design scopes and their connection. This is the foundation for the design process.



Pre-purchase

1. Impulsive purchases

Lack of information before purchase and the low threshold for purchasing lead to impulsive buying behaviour of ball pythons, often resulting in inadequate care for the reptile pet.

Magnitude

Literature

Some reptiles are prone to being bought impulsively due to their easy availability, affordable pricing, and small size when young (Valdez, 2021). When reptiles are bought impulsively, certain considerations regarding proper care and origin are often neglected. According to Mendyk and Warwick (2023), impulsive buyers tend to gravitate towards simplistic, poor-quality information when they start to look into husbandry, resulting in improper care of their reptiles.

Field

Impulsive buying behaviour is the main reason reptiles are brought to the visited reptile shelter, according to the owner (interview). People do not consider the impact of keeping a reptile, such as its lifespan, costs, social needs, complexity of care, and the difficulty of finding pet sitters or vets. Therefore, the ball python is eventually discarded at the shelter as it doesn't fit the needs and capabilities of the buyer. In an interview with a veterinarian, he also mentioned the problem of a lack of knowledge at the time of purchase by some buyers, resulting in irresponsible purchases.



"The most important thing is to prepare and do some research beforehand. Know what you're getting into. And also make sure that it's something you really want, not because it's fun now, but also in ten years, when you have to clean the enclosure again. Then it should still be fun."
- Reptile shelter owner



"How do people primarily acquire their knowledge to take care of their reptile?"
- Interviewer

"Well, too many don't"
- Veterinarian

Contextmapping

The contextmapping study also demonstrated the presence of impulsive buying behaviour in the ball python context. The first reptile that participants bought often quickly passed away due to a lack of research and information beforehand. Therefore, they emphasise how crucial research is for the care of the reptile. Furthermore, the low price and easy caretaking of ball pythons make them appealing for repeated purchases, especially due to the enormous diversity and supply of ball pythons at reptile fairs. This tempts buyers to make more unnecessary purchases. However, participants noted that ball pythons can be a better fit than other, more common pets for people who are allergic, have limited time, or want an animal to observe. Conversely, if you want a pet to cuddle, ball pythons are not the best fit as they are not social animals. Matching consumer needs to the right pet is therefore essential.

Lack of research at first ball python

"But he died because of a rat. At that time, I didn't know yet that you shouldn't leave rats alone with ball pythons. And so the rat gnawed on the python, and it completely gnawed him down to the bone."
- Rik

Importance of preparatory research

"Do your research. You may have the money to buy an animal at the moment, but what if it needs to go to the vet next week, can you afford that? Think ahead a bit, so to speak."
- Noah

Match your pet to your needs

"First, I'll just do some research online. What kind of pet matches me? Okay, I want a reptile. What kind of reptile do I want? Can I afford it? What is relatively low-maintenance? Because I work different shifts since I work in healthcare. And what is simply safe? You also have to think about that, with the kids.."
- Lotte

Easy care and low price

"They're just really easy to care for. It's not like a dog or cat that you have to feed or walk so much every day. And then they're actually too cheap. I'd also love to have a lot of horses, but that's not possible, it's too expensive. So then it's better to have a lot of snakes, because that's still affordable."
- Emma

The fair stimulating impulsive buying behaviour

"You go to one of these fairs and you want to have everything. Just take it with you. Very impulsive and not well thought out. And then we'll see later how we're going to solve that. So that wasn't very wise."
- David

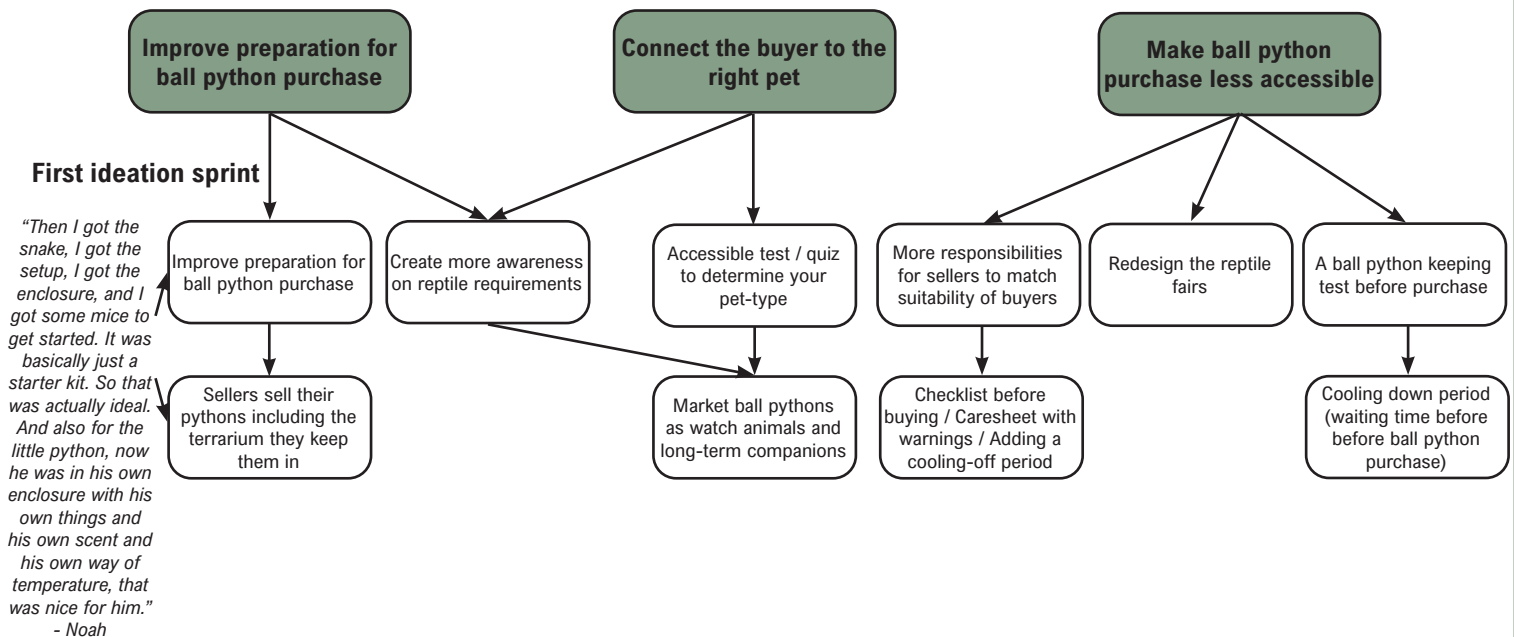
"The plan was, we're going there purely for information. We're not buying anything and... Well, we left with three snakes. And at the next fair, it wasn't really our intention to get anything there either. But then we went home with three more snakes."
- Emily



"It's just irresistible [at a fair]. Like when you're standing in front of a candy store, you just have to take something with you, right?"
- Emma

Degree of influence

Design Directions



Considerations

Stakeholders

Sellers [pet shops, breeders, reptile fairs]

Sellers could be a valuable stakeholder in this scope. They are in direct contact with the buyer at the moment of purchase and are regarded as 'experts' by many first-time buyers. Some passionate breeders/sellers already conduct a qualification check on buyers. However, the challenge is to persuade all sellers to comply, as some prioritize selling their ball pythons over the well-being of the animals.

"I assumed they were the experts, because they sold all kinds of reptiles, so I assumed they knew what they were talking about. But in hindsight, I did some research, and it turned out to be completely wrong."
- Lotte

"If you are a seller, you should also ask your customers more questions. Like my last seller, who asked me everything. Terrarium, temperature, this, that, and so on. He asked me all of that. So that was good. Other people just said, 'Here you go, bye.'"
- Lotte

Animal welfare organizations & Social media / influencers

These stakeholders could be used to raise awareness. However, animal welfare organizations are not always regarded as trustworthy by reptile keepers, who sometimes feel like these organizations attack their hobby too much. Nevertheless, first-time buyers do not necessarily have this association yet and could potentially still be reached through animal welfare organizations. Social media inspires people to get reptiles and is used to learn about reptile keeping. It can be a good way to prepare more serious buyers on what to consider before buying.

Regulatory institutions

The client prefers to focus on other opportunities rather than regulations and legislation, but regulatory institutions could be used to sharpen the rules on buying ball pythons.

LICG

The Dutch pet information centre can be used to provide information on finding the perfect pet for you and further stimulate awareness of ball python requirements.

Trends

From shops to fairs

One of the trends discussed in Section 2.4: Trends is that reptile purchasing is moving from pet shops to reptile fairs. Therefore the stimulation of responsible selling on these fairs becomes more important as well.



Pre-purchase

2. Collecting reptiles and ball pythons

Keeping reptiles is a hobby, and many people want to expand their hobby by acquiring more ball pythons or other reptiles to collect new morphs or species, to learn new things, and to find new challenges and stimulation. However, there is a risk of it becoming an “addiction,” leading to unsustainable expansion.

Literature

The literature mainly focuses on the impact of collecting on the demand for rare species. Rarer reptiles are more desirable pets for collection, initiating a negative feedback loop as these rare reptiles become even scarcer due to the demand for wild-caught specimens of this species (Brook & Sodhi, 2006). However, as captive breeding becomes more preferred by reptile owners, the rush for rarity in collecting is shifting towards a demand for rare morphs in addition to rare species (Collis & Fenili, 2011).

Field

The reptile shelter and a terrarium supply seller/small scale reptile shelter supported the literature by mentioning the demand for morphs. However, they did not specifically mention this as a problem contributing to unsustainable reptile collecting.



“That’s why those morphs are so popular; they are something extra special and unique for a target audience that values exactly that.”

- Terrarium supply seller / small scale reptile shelter

Contextmapping

Most participants from the contextmapping study viewed reptile keeping as a hobby. While the ball python might be considered part of the family, the act of keeping and caring for it is a hobby. A hobby is often something one desires to expand, progress in, or stimulate or challenge oneself with. This desire to expand their hobby is one of the reasons why participants buy more reptiles. They seek new stimulation, challenges, or opportunities to learn that come with expanding the collection. This new stimulation can come through acquiring more ball pythons, discovering new species, or starting breeding projects. However, sometimes the expansion of a ball python collection can escalate to the point where it resembles an addiction or obsession. A risk associated with rapid expansion is observed among young adults moving out on their own. When they start living independently, they are more prone to buying too many reptiles. Some participants also expressed a savior impulse upon seeing neglected ball pythons, which tempted them to purchase more reptiles with the idea of rescuing the animal. However, they could mostly refrain from doing so to avoid supporting irresponsible sellers. The primary reason participants stopped buying more ball pythons and reptiles was due to lack of space. If given the opportunity, many expressed a desire to create their own reptile zoo.

More ball pythons for stimulation

“Also the character. That it’s just different. I can take another ball python and expose it to the same thing, and it will handle it very differently. And you just have multiple opportunities to try things out with the same species, which will lead you to discover new things.”

- Sam

Different reptiles for stimulation

“I enjoy having broader knowledge. A bearded dragon and a gecko are both desert animals. This [ball python] is a jungle animal, and a turtle probably lives in the water. So that’s all fun and different.”

- Lotte

“Just to learn more, to see more. And also to be able to say, I have a snake and I have this and I have that. I have a zoo in my house.”

- Sam

Breeding as new stimulation

“It just seems fun to me. Just to try it. I think it would be really fun to see how morphs develop genetically. I also find it very interesting how genetics work in snakes and how it can manifest. And what new things you can observe. And just the whole process behind eggs, incubator, and that sort of thing.”

- Sam

High risk for young adults moving out

“And at some point, you leave the doors, have your own house. One terrarium, two terrariums, three terrariums, and so on.”

- Jacob

“He moved out at 18, and we turned a room into a terrarium space. Then it began. Within a few years, I had loads of king pythons, hognose snakes, rat snakes, leopard geckos. It became a real collection. But not in the right way, not with the right enclosures.”

- David

Expansion of ball pythons can go quickly, becoming like an addiction or obsession

“It’s almost like an addiction.”

- Emma

“And if I’m not careful, I get into an obsession, so to speak. ... At first, I get more and start breeding. And then at some point, last year, I had 40 here. And at one point, I even had 150.”

- Jacob

“There are rules about how many are allowed in our house. I don’t know how many other households have had, but it can quickly become a lot if you’re not careful.”

- Noah

“This is maybe a little bit of an addiction, I think.”

- Emily

Space as limitation for expansion

“The limit is really until there is no space anymore to ethically keep more reptiles in this space.”

- Sam

Dreaming of your own reptile zoo

“My biggest dream is to have my own large reptile zoo, like a zoo. Perhaps very ambitious, but that’s what I’d love.”

- Rik

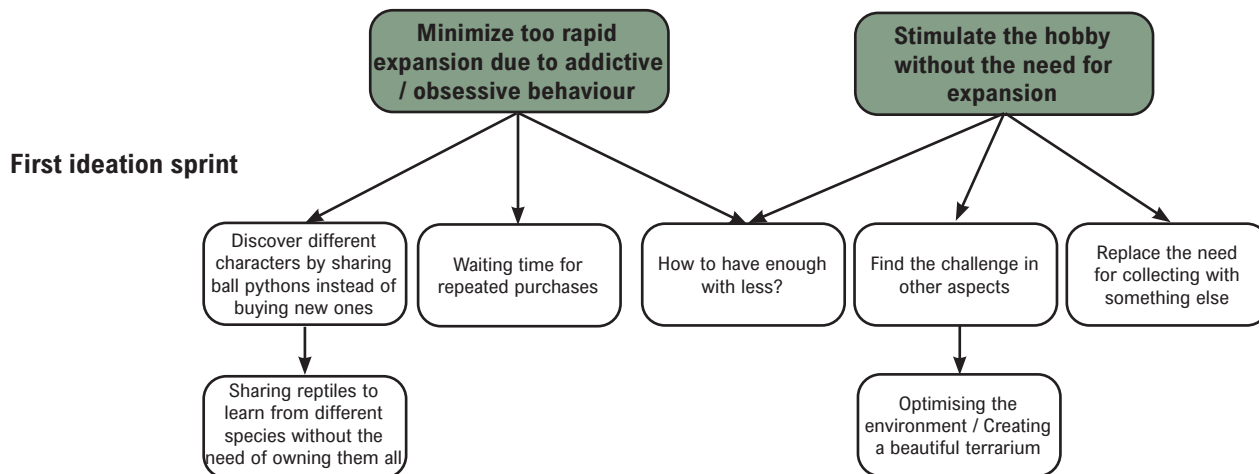
“Is there anything that is sometimes difficult about keeping a ball python?”

- Interviewer

“Well, not buying too many. No, I don’t know.”

- Emma

Design Directions



Considerations

Stakeholders

Animal welfare organizations

This stakeholder is most focused on minimizing the expansion of reptile pets. If there is a way to stimulate the hobby without expanding the collection, this would be of interest to these organisations. However, not all solutions will align with their goals. Even with 'optimising the environment' as an alternative form of stimulation, it would imply that the organisation endorses responsible reptile keeping. Most organisations, however, are against reptile keeping altogether.

LICG, veterinarians, reptile shelter

These stakeholders will all support efforts to combat unsustainable collecting and could support and promote ideas and interventions in this scope. However, except for LICG, they are unlikely to be the executing stakeholders due to a lack of resources. Nevertheless, they could be valuable in promoting these initiatives.

Sellers [pet shops, breeders, reptile fairs]

Despite the relevance to this topic, they are unlikely to support an intervention that dissuades buyers from making repeated purchases, as these stakeholders benefit from selling reptiles. They will only support such ideas if they can monetize them, rather than profiting from the sale of reptiles.

Terrarium supply sellers

Depending on the intervention, this group could be relevant. While they benefit from reptiles being sold, they could also profit from people investing more in their singular reptile. Promoting terrariums and focusing on optimising the environment, instead of owners collecting snakes in (sometimes self-made) racks, could be more profitable for them due to the variety of supplies they can sell.

Trends

From shops to fairs

Fairs also support the unsustainable collecting of reptiles due to their tendency to trigger impulsive purchases. The increase in sales at fairs might further exacerbate this buying behaviour.

Young adults moving out

While not necessarily a trend, a significant consideration is the risk of young adults quickly expanding their collection once they move out. This is something that should be accounted for in the ideation of interventions as well.



Care

5. Enjoyment of ball python enclosure care

The improvements and care of for the enclosure of the ball python is enjoyable, it's part of the hobby. It can take your mind of anything else and have a calming effect. The terrarium itself can also be an asset in home, like a living painting.

Magnitude

Literature

There is no scientific literature to back-up these findings on enjoyment in enclosure maintenance and improvements.

Field

The field research also did not yield any findings similar to these contextmapping findings. However, this topic was also not actively researched during the field visits to the reptile shelters, shop, vet, and not even mentioned at the terrarium supply seller.

Contextmapping

Reptile keeping is not only about the animal, but the terrarium itself can also give enjoyment. Optimising it and improving it for your pet is fun and gives a feeling of purpose. When participants work on the enclosure they can take their mind of anything else. The enclosures stimulates a calm and peaceful effect with it. And lastly, terrariums can be an asset in your home. They can be like a living painting, or part of the interior. This also increases the enjoyment of having a terrarium.

Terrarium as a living painting

"I just see it as a living painting, really. The way you just beautifully arrange it. The same with my TV setup downstairs, you know, [a terrarium serving as a TV stand], that construction and everything. It's just like a living painting because something is happening. It's not something static. If you can create something very beautiful, I can really become calmer here."

- Noah

Working on the terrarium setup has a calming effect

"I can find a lot of peace in it. ... Well, I'm quite a chaotic person. Occasionally. A bit ADD. And when I'm standing, for example, looking at the enclosure, I can become very calm. Because then I automatically start thinking about what I'm going to improve."

- Lotte

"If you can create something very beautiful, it just makes me feel calmer. Even when I'm setting up those enclosures. It's my hobby; it relaxes me."

- Noah

"Yeah, they absolutely bring me peace. Mentally, absolutely. Yeah, that's right."

- Jacob

"Yeah, when I'm just busy with her, I really don't think about anything else. So all my other stress factors just aren't there. So that's always nice. I can just focus on her enclosure or just spend time with her. It brings peace, both when I'm working on the enclosure and just spending time with the Ball Python herself."

- Sam

Enjoyment from organizing and improving the enclosure

"And you can just, what I just said, with setting up the enclosure and developing them, you can really put a lot into it. And that's just, yeah... I find that really nice."

- Lotte

"But at some point, when you have to set up an entire habitat from scratch, I find it to be the most enjoyable thing there is."

- Noah

"Just really learning new things. Yeah. And things like setting up enclosures and stuff, I just find it cool to do."

- Sam

What makes it enjoyable for you, keeping Ball Pythons? - Interviewer

Yeah, just the interaction with your pet sometimes. And just the fun of decorating your enclosures. That's really enjoyable.

- Emma

Caring for ball pythons gives a purpose

"So they've given me a purpose. Yeah, and it's silly, but they're also social contacts that are really important to me."

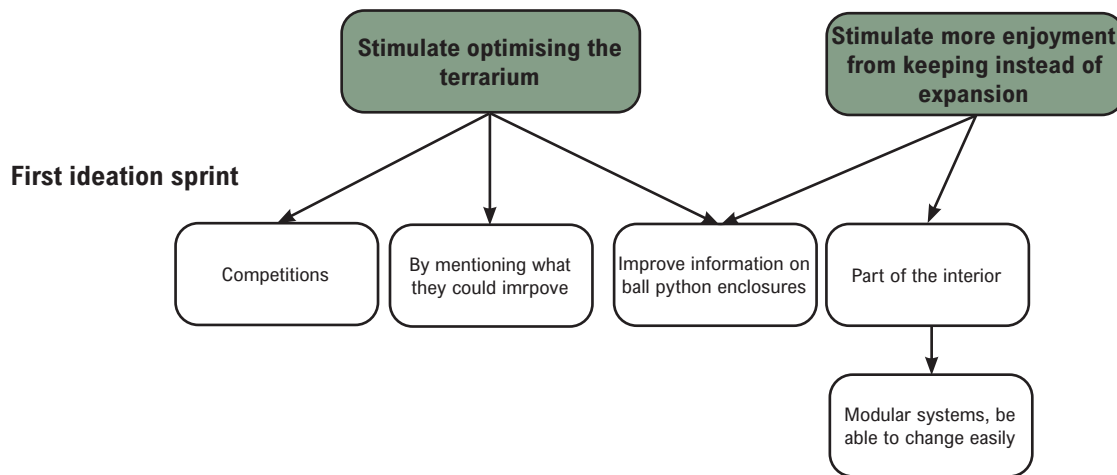
- Jacob

"The hobby is the enclosure."

- Lotte

Influence

Design Directions



Considerations

Stakeholders

Terrarium supply sellers

These are the most obvious stakeholders to stimulate this design scope. They can tailor their offering to the needs of the consumer and provide supplies to help them optimise their terrariums or challenge them to improve. This is beneficial for the terrarium supply seller as well.

LICG / Reptile associations

These stakeholders can stimulate enclosure management and improvement. Shifting the attention from the reptile to the terrarium. You can only improve your terrarium if you know what to improve. These informative stakeholders can demonstrate where the opportunities lie.

Online communities

Online communities can share set-ups with each other, to ask and give each other tips on how to improve, but also to show of their own enclosures.

Trends

Bio-active terrariums and enrichment

These are both two upcoming elements in terrarium keeping. A lot of improvement for reptile welfare through reptile enclosures can be done using enrichment. Bio-active terrariums are interesting for people trying to automate and optimise. It is about creating an eco-system besides just caring for your reptile.



Care

6. Science-based information acceptance and knowledge sharing on ball pythons

There's a lot of conflicting and sometimes wrong information about ball python care. Even though the understanding of this care has significantly improved, many old habits and myths persist. The internet and online communities are key places to get information, but this can be incorrect, outdated, or contradictory.

Literature

Mendyk and Warwick (2023) acknowledge that the available information on reptile care and husbandry has improved significantly over the years and continues to do so. However, much remains to be discovered. The authors mention that many misconceptions arise because keepers follow arbitrary or outdated practices without questioning their validity. Additionally, a lack of education on care, a lack of standardized information, and commercial influences prioritizing profit over welfare further feed these misconceptions.

Field

The reptile shelter, veterinarian, and terrarium supply seller all mentioned the inconsistencies in information. The veterinarian, in particular, raised significant concerns. He noted that even if you do your research and try to provide the best care for your reptile, you could still harm your animal by using incorrect information found on the internet. He also highlighted the lack of legal protection against certain claims in reptile care, such as branding reptile food as 'complete,' implying no additional supplements are needed. Sellers can claim their food is complete despite it missing necessary vitamins. The pet shop, however, did not share the concern about misinformation, stating that reptiles are not too difficult to care for and that different opinions in care will always be present due to its subjectivity.

"So, you still need to use some common sense, but also rely on the right sources and multiple sources, and then compare them. Check if they're not just quoting each other, essentially coming from the same single source. If multiple perspectives are saying the same thing, then it's likely reliable. And of course, you can look at the natural habitat, like how warm it is during the day and night, what the humidity is like. And from there, you can make some educated guesses."

- Veterinarian

Contextmapping

The impact of contradictory and missing information on ball python keeping became especially clear during the contextmapping study, as all participants mentioned it as a problem in the ball python and reptile world in general. Beginner ball python keepers talked about their difficulties in preparing and the need to change their set-up quickly after purchase. Often, to determine what's right, they try to find a common thread in all the information and then use trial and error to see what works best. Experienced keepers often relied on their own experiences to determine their care, but some used scientific research as well, trying to stay up to date with the latest developments. The internet is the main source of information. People use Google to learn about ball python care, YouTube to see and get inspired by how others do it, and online communities, like Facebook groups and Reddit, to share knowledge and experiences. "Communities" in real life are also present, with breeders knowing each other or friends sharing knowledge. Fairs are often used to find like-minded people and share experiences. Sellers are also seen as a source of information, although their information is not always correct. Veterinarians were not a common source, as most don't have any expertise in reptiles. Ball python knowledge will keep developing, and it is important yet difficult to stay up to date.

Contradictory information

"It is also quite difficult to find good information on the internet. There are many different sources. So I really took bits that appeared the most frequently. I thought, okay, they all agree, so that must be correct. It's really tough though, because everyone has a different opinion."

- Lotte

"Yes, sometimes. For example about climbing and not climbing. One site said definitely no branches, they don't climb, others said use branches, they like to climb."

- Emma

Sticking to old beliefs & myths

"And there are, for example, many myths in the ball python world that just cannot be dispelled."

- Jacob

"They just cling to those beliefs. They say things like, 'No, because they breed, so it's fine.' And when you mention research, they respond with, 'Yeah, but I've been doing it this way for years, and it's going well.' Those are the kinds of reactions you get."

- David

Sharing knowledge in the ball python communities

"But ultimately, it's just everyone wanting to help you. In this hobby itself, everyone wants to give you advice, everyone wants to help you."

- Lotte

"Sometimes also use ScienceDirect, which I keep an eye on. But usually it comes through my network that it's kind of like, hey, check out this research. Or via social media, someone then shares something."

- David

Online research

"Yeah, especially on YouTube. Sometimes I also browse forums like Reddit, for example. There's a ton of information there too. Sometimes I just do a simple Google search and click on the first website that pops up to see what it says."

- Sam

Sellers as source for (sometimes wrong) information

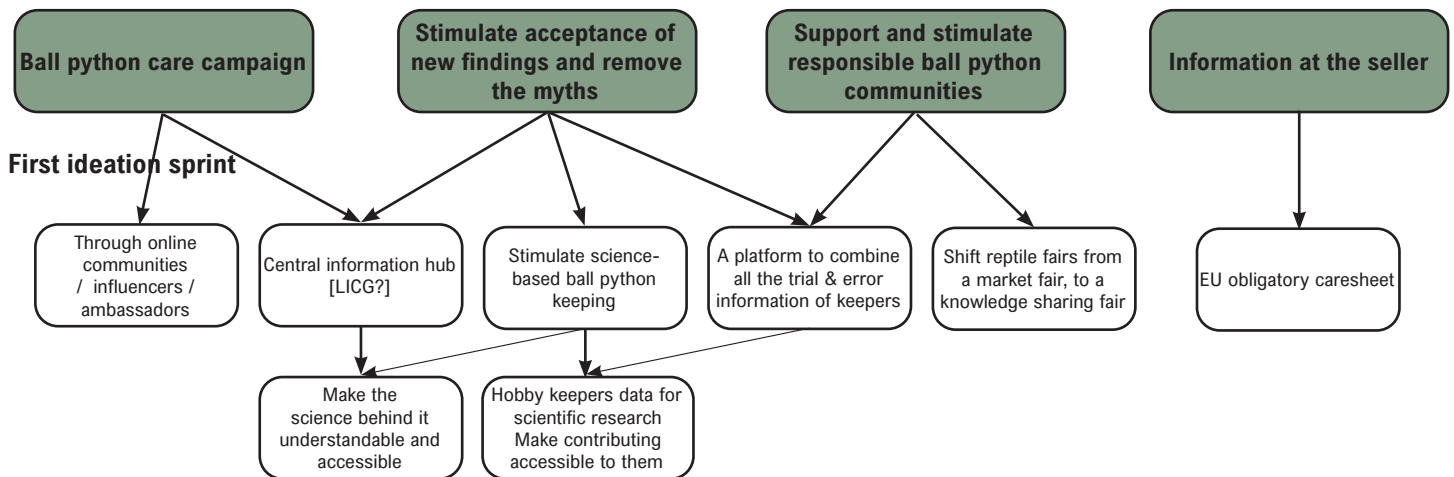
"And then we went to the breeder. We spent quite a while there. He really shared a lot of information because, you know, he's been keeping them his whole life."

- Emma

"Some traders provide better information than others. In fact, one trader gives incorrect information just to make a sale. Or they simply don't possess that knowledge themselves. That's also possible."

- Jacob

Design Directions



Considerations

Stakeholders

LICG

The Dutch pet information centre already has the function to inform pet owners about care. LICG is a very interesting stakeholder for interventions to improve ball python care through information. Especially because they are already used by beginner ball python owners. However its ball python information is sometimes outdated

"Well, I trust an organization like LICG more [because it's government-backed.]"
- Emma

"So, I always say, look at the date when something was published and check multiple websites. LICG has some care sheets, which provide a nice baseline. But even there, I come across things that make me think, 'I've had different experiences with that.'"
- David

Social media / influencers

Another interesting stakeholder is social media influencers. People often look at their set-ups and draw inspiration from their posts and videos. If these influencers promote responsible ball python keeping instead of minimal reptile keeping, then this could become the new norm. One participant from the contextmapping study mentioned how he transitioned from a terrarium to racks because he often saw that on YouTube and thought it would be the right choice. This highlights the influence they can have on how ball pythons are kept. However, for this to happen, influencers must be willing to support optimal care instead of simply efficient care.

"Well, almost everyone in those videos had them. Yeah, he had all of them in racks. So, I think we discussed, well, it can't be that bad then, right?"
- Emily

Sellers [pet shops, breeders, reptile fairs]

First-time buyers often perceive sellers as experts because they have more experience with the animal than they do. However, sellers do not always have accurate information. Nonetheless, sellers can still be utilized to distribute standardized care sheets or promote certain information hubs or communities. Reptile fairs, especially, can play a significant role in connecting people and sharing information on ball python care.

Trends

Online communities

A trend is the growing presence of online communities about reptile care. This could be further enhanced and improved to stimulate knowledge sharing on responsible ball python keeping. Especially since ball pythons are becoming more popular with millennials, a group experienced with online communities.

Develop

In the Develop stage, the selected design frame is used as a starting point for idea development. Through ideation and creative sessions, a wide range of ideas is generated to address issues such as impulsive purchasing and care enrichment. These ideas are structured in an explorative roadmap, which outlines how interventions could be introduced over time and linked to relevant stakeholders to build momentum towards long-term change.

6. Ideation

- 6.1 First creative session: Impulsive purchases
- 6.2 Design frame as template
- 6.3 Second creative session: Stimulating the hobby without expansion
- 6.4 Clustering

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7. Ideas to roadmap

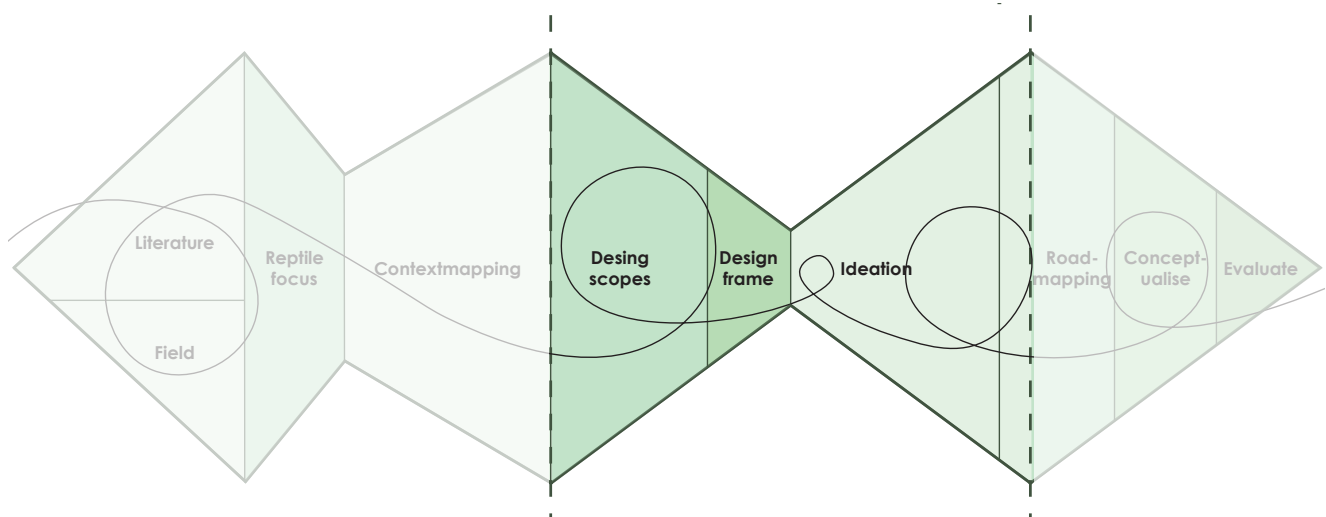
- 7.1 Future vision
- 7.2 Shifting back to reptile keeping
- 7.3 Roadmap development & stakeholders

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6. Ideation

This chapter will discuss the ideation process. The design frame and scopes served as a template for idea development, and two organised creative sessions further expanded and enriched the ideation.

6.1 First creative session: Impulsive purchases

Due to my mentor Lara van der Veen, I could tap into the skills of Industrial Design students at the Delft University of Technology working on a project on exotic pet keeping as well. They formed the ideal group to kickstart the ideation process and to see whether the design scopes give a clear guidance in the ideation process.

The session took around 45 minutes and approximately 14 people participated. These 14 participants were divided in two groups and were both ideating on design scope 1 'Impulsive purchases', though a simplified version considering the limited time of the session. Both teams had to pick a direction within the design scope. One team was ideating on the direction 'Connect the buyer to the right pet' and the other on 'Improve preparation for ball python purchase'.

The ideation began quickly due to the participants' experience as designers. The idea development was stimulated with quick and low-threshold techniques, such as brainwriting and brainstorming. In the end, the two participant groups discussed, combined, and selected their favourite ideas to create a poster draft, which they then presented to the other group.

As a result I got 14 sheets with individually generated ideas, and two poster presentations of their most promising concept per group. In Figure 31 is an overview of the results from this creative session.

The first group, focusing on 'improving preparation for ball python purchases', presented the idea of buying ball pythons through an application-based system. This would include a waiting list where users can improve their ranking by demonstrating their knowledge of ball pythons through tests and courses. Firstly, this approach would

reduce impulsive purchases, as users cannot immediately buy a ball python. Additionally, it introduces a competitive element, encouraging buyers to prepare and invest effort if they are truly committed to having a ball python as a pet.

Nonetheless, the other ideas on the individual sheets of the participants were also inspiring, and included concepts such as obligatory preparations or readings, tests/quizzes, workshops, first caring of a fake ball python, highlighting the negative aspects, trials, care packages or support programs for new keepers, mentor programs, and more.

The second group, focusing on 'connecting the buyer to the right pet', drew inspiration from co-parenting, communal gardens, car sharing, and trial periods to develop the 'Community Pet Keeping' concept. This concept involves a community where reptile ownership is shared, and reptiles are swapped among keepers. This allows people to try and see whether a reptile or a specific species is the right fit for them. When they seek new stimulation from a different species or ball python, they don't necessarily have to commit to its care for the next thirty years. This concept is interesting as it aligns well with the behaviour of reptiles, which don't form strong emotional bonds with their keepers. Therefore, who cares for them is of little importance, as long as they are properly cared for. Furthermore, with co-sharing, there is a shared responsibility, which automatically encourages peers to keep an eye on each other. Nonetheless, strict rules on duration of stay and the amount of swaps should apply as transport can be stressful for reptiles.

Other ideas from the individual sheets were pet vlogs, reptile leasing, speed dating or pet tinder, connecting quiz or decision trees, catalogues with characteristics / care regimens / downsides of pets, VR care courses, pet recruitment agencies, and more.

So, the creative session offered a diverse selection of ideas that were both inspiring and integrated into my own ideation. But perhaps more importantly so, it validated the value of the design scopes. From one design scope a multitude of

promising ideas were developed in merely 45 minutes. Nine of these design scopes will give the client a broad context with areas to improve in reptile keeping, and offer them the information necessary to encourage idea development.

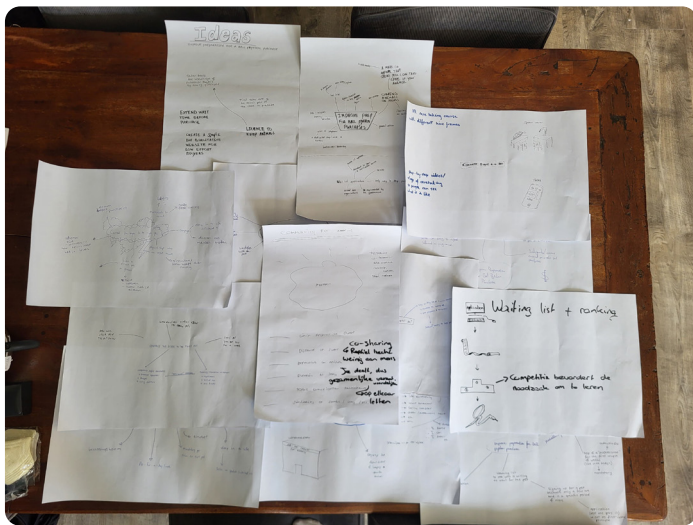


Figure 31: Results from the first ideation session

6.2 Design frame as template

Once the design scope as a tool for ideation was validated, it was time to put it into practice. To do so, the design frame from Section 5.4 was used as a template for idea generation. This process is demonstrated in Figure 32, where the scopes and their connections are mapped, and ideas are generated in these distinct areas.



Figure 32: The design frame as a template for ideation

To foster creativity, there were little limitations during the ideation. The only limitation was to minimize ideas which include legislation, as the client aims to make an impact with alternative measures than regulation.

Ideation went rapid on 'Scope 1. Impulsive

purchases' due to the prior creative session, and on 'Scope 5. Enjoyment of ball python enclosure care' and 'Scope 6. Science-based information acceptance and knowledge sharing on ball pythons' as these were much discussed topics during the contextmapping. However, 'Scope 2. Collecting reptiles and ball pythons' lagged behind in quantity and looked like an area of untapped potential.

6.3 Second creative session: Stimulating the hobby without expansion

To discover whether more ideas could be generated for the second scope, '2. Collecting reptiles and ball pythons', another creative session was initiated. This was done with six participants not involved in this project to gain a fresh perspective.

This creative session quickly re-framed the subject to; what stimulation and challenges can be triggered in reptile keeping that don't result in keeping more reptiles?

Most ideas coming from this creative session could be divided into three groups. The first group strongly correlated with scope '5. Enjoyment of ball python care'. The ideas in this group highlighted optimization and fun in keeping a reptile. Examples include stimulating bio-active terrariums as a challenge, or to create modular terrariums so keepers can change their set-ups, and designing the terrarium as a part of the interior, to create a centerpiece in the home instead of only owning a reptile.



Figure 33: Clustering by participants during the creative session

The second group of ideas sought stimulation in challenges. This could also be challenges in optimization, who can make the most optimal terrarium for a ball python? But it can also be in enrichment, most natural environment, or even most healthy looking ball python.

The final group of ideas in this creative session sought stimulation in supporting each other. Have you become an expert in keeping your ball python? Instead of getting more or new species, try to help other people. This group included ideas such as mentorship programs or creating educational videos and blog posts.

6.4 Clustering

The ideation phase was concluded by clustering all ideas. The main goal of the clustering was to group and potentially combine similar ideas and prepare them for the next step in this project, connecting stakeholders to the right ideas and developing a roadmap towards responsible reptile keeping. The clustering offered an overview of a broad array of ideas, ranging from accessible solutions such as improved care sheets, to extensive VR ball python care simulators or new reptile pet sharing platforms. This highlighted the importance of finding relevant executing stakeholders in the reptile market; there must also be an organisation that can and wants to execute the idea.



Figure 34: The process of idea clustering

7. Ideas to roadmap

In this chapter the ideas generated during the ideation process are translated to a roadmap which aims to inspire the exotic pet research team at the Delft University of Technology. This roadmap offers an explorative overview of interventions which stimulate responsible reptile keeping and highlight interesting stakeholders who could execute these interventions. Consumer demand influences the dynamics of market structures and innovation within industries (Malerba et al., 2007). Robinson, et al. (2015) mentions a similar construct in the reptile industry where the consumer demand drives the supply in reptile keeping. Consequently, most interventions aim to shift reptile owners' behaviour towards responsible reptile keeping, ultimately stimulating market structures and innovations in the same ethical direction. The roadmap is structured based on the Design Roadmapping Guidebook by Simonse (2018). First, a future vision is established, with the roadmap serving as a tool to achieving it across three horizons. This roadmap is built by linking relevant ideas to potential executing stakeholders. From this, the most promising idea is selected for further conceptualisation.

7.1 Future vision

This project aims to stimulate and facilitate responsible reptile keeping in order to make ball pythons thrive. This thriving is thereby the envisioned future achieved through the outlined interventions on the roadmap.

Ball pythons will thrive instead of survive

In the future, ball python will only be kept as pets as a thoroughly contemplated decision. These pets are sourced through responsible captive-breeding, and are cared for whole their lives, with a care beyond their basic needs to survive.

The future vision is based on the responsible ball python keeping definition from Section 3.5, and the interventions to achieve this future vision are developed from the most impactful scopes from Section 5.3.

Currently, ball python owners find joy in caring for their reptile and describe improving their set-up as the "hobby" aspect of keeping (scope 5). However, despite the enjoyment of ball python care, this care is not always sufficient. Contradictory or incorrect information circulates the industry and many keepers do not know for sure how to offer the best care (scope 6). More and more science-based and quality knowledge is becoming available, but is often overshadowed by old myths and habits or anecdotal information presented as facts.

However, in the future, this science-based knowledge and keeping up with the latests developments will be leading. People who enjoy ball python care will have more accessible information and tools to improve and enhance their husbandry. Enrichment and the stimulation of natural behaviour have become the norm, and keepers take responsibility for providing the best possible care for their reptiles. This improved knowledge and ethical expectations from the ball python keepers will also stimulate breeders to raise their standards.

Ball python owners currently seek new simulation and challenges in expanding their reptile collection, sometimes focusing on quantity over quality (scope 2).

In the future is the other way around, with the main focus on quality of care, finding stimulation and challenges in other areas, for example by learning, optimising the enclosure, or supporting others, instead of focusing on expansion.

Furthermore, ball pythons are at the moment prone to be bought impulsively (scope 1). They are bought unprepared, or by people for whom another pet might be a better fit.

In the future ball pythons are only bought if the reptile and the buyer fit each others needs and

when the buyer has the knowledge and capacity to care for it.

Lastly, there are many stakeholders in reptile keeping, with very different views on responsible reptile keeping, as demonstrated in Section 2.3 Responsible Reptile Keeping. However, despite their differences there are also similarities in their ideology. Certain herpetology associations and animal welfare organisations don't get along, but in the end care about the same thing, the well-being of the reptile.

In the future, stakeholders and organisations will focus on collaboration rather than polarisation. The common ground of these organisations becomes a binding factor in the industry.

7.2 Shifting back to reptile keeping

A complication with solely focusing on ball pythons in this project, is that it is too niche for many relevant stakeholders. Most stakeholders which influence ball python keeping are organisations and associations focusing on reptile keeping in general. Therefore, investing time and resources to reach the future vision will only be of interest to them if it benefits reptile keeping as a whole, and not solely the ball pythons.

However, as mentioned in section 3.1 *Why ball pythons?*, ball pythons can be considered as a frontrunning species in reptile keeping due to their popularity, many morphs, accessibility, and captive-breeding programs. With their leading position, ball pythons reflect typical issues that are common in reptile keeping in general. As a result, the design scopes used to develop the ideas and the future vision are also applicable to other species.

In this project, reptile keeping was first analysed on a general level rather than focusing on ball pythons from the outset. Consequently, we can deduct that the design scopes can indeed be extended to reptiles as a whole.

For example scope 1, about impulsive purchases, is an issue for reptiles in general. Valdez (2021) mentions that reptiles as a group are prone to impulsive buying, and the field research findings on impulsive purchases also regarded reptiles in general. Furthermore, contextmapping study

also included participants who had impulsively purchased reptiles other than ball pythons.

The second scope, about collecting reptiles, is also relatable to reptile keeping in general. The literature by Brook & Sodhi (2006) and Collins & Fenili (2011) used in this scope mention reptiles in the broader sense. During the contextmapping, expanding their hobby and collecting reptiles was also not limited to ball pythons.

Scope 5 is also applicable on reptiles in the general. The enjoyment of care and improving the set-up was not limited to ball pythons according to the contextmapping study. However, the participants did specifically mention that ball python care and handling was extra calming due to the calm character of ball pythons.

Lastly, scope 6 regarding information and knowledge, is most likely an even bigger issue in general reptile keeping. Ball pythons are one of the more common and researched reptiles, therefore the issues with misinformation might even be bigger with other reptiles. However, this also reveals a limitation for other species, as less common reptile pets likely have less science-based care research available.

While the research, particularly the context mapping, focuses on enhancing ball python well-being, the findings remain relevant to reptiles in general. Therefore, stakeholders with a broader interest in reptiles, rather than solely ball pythons, will benefit from these interventions. As a result, are more likely to contribute to efforts aimed at improving reptile and ball python well-being. However, it is important to acknowledge that these interventions are designed based on ball pythons. While they may be applicable to reptiles in general, they might not be the most effective solution for reptile, as certain issues are more pressing to some species than others.

7.3 Roadmap development & stakeholders

The roadmap in this project deviates from the traditional approach outlined in the Design Roadmapping Guidebook by Simonse (2018). Rather than reasoning from a single organisation's perspective, this roadmap is built on the collaboration of multiple stakeholders to achieve a shared future vision of for reptiles to thrive. This

multi-stakeholder approach makes stakeholder selection a crucial step, as each party involved must have both the capability and motivation to contribute to the interventions.

The development of the roadmap was a process where interventions from the clusters in section 6.4 *Clustering* were iteratively matched with suitable stakeholders. This matching was based on the following three aspects:

1. The idea offers value to the stakeholder by aligning with their mission or providing additional benefits (e.g. economic, social, or brand-related).
2. The stakeholder has the current or future resources and capacity to execute the idea (e.g. expertise, finances, or technology).
3. The stakeholder has an influential position in the reptile market (e.g. access to the target audience, a credible position, or a valuable network).



Figure 35: A draft of the roadmap, combining potential interventions with executing stakeholders

This iterative process of combining stakeholders with ideas became the draft of the roadmap. An example of such a draft shown in Figure 35. The roadmap contains inspiring ideas and interesting stakeholders which could contribute to achieving the future vision to make ball pythons thrive. The resulting, most important stakeholders for this roadmap are:

- LICG
- Herpetofauna & Lacerta - The roadmap suggest them cooperating under OptiHerpetology
- Terrafile
- OptiTerra - A suggested collaborations between

- OptiHerpetology and Terrafile
- Blue-lagoon / Avonturia
- VHM-Events
- Animal Welfare Organisations
- Government

HerpetoCerta

HerpetoCerta is a **proposed collaboration between Herpetofauna and Lacerta**, combining scientific research and practical care knowledge to improve reptile keeping. Herpetofauna focuses on scientific research, conservation, education, and collaboration, while Lacerta supports reptile keepers with practical knowledge to fulfil their duty of providing the animals their specific care.

Why it's of value to them

The design scopes of this project **strongly align with Herpetofauna's mission**, as it also aims to stimulate reptile welfare, conservation, scientific knowledge, and collaboration. It also **supports Lacerta's mission** to improve reptile husbandry practices and **contributes directly to their goals outlined in the 2023 annual report** by increasing visibility and fostering partnerships to strengthen membership and collaboration.

How they can contribute

HerpetoCerta can strongly support **Scope 6: Science-based information acceptance and knowledge sharing on ball pythons**, and can contribute to **Scope 1, 2, and 5** as well through their extensive expertise in reptile care, science, education, and position within the reptile keeping community.

Alternative stakeholders

The **European Snake Society (ESS)** is a potential alternative, but they only focus on snakes and place less emphasis science-based care.

LICG

The Dutch **national information centre for pet ownership**. It offers expert, accessible information on the care, welfare, and legal aspects of keeping pets, including reptiles.



Why it's of value to them

This project supports LICG's mission by promoting responsible pet choices and raising awareness on species-specific needs—aligning with their goals for informed, responsible pet ownership.



How they can contribute

LICG can support **Scope 1: Impulsive purchases** and **Scope 6: Science-based information acceptance and knowledge sharing on ball pythons** through matching suitable pets with the right buyers and improving access to reliable reptile educational content.



Alternative stakeholders

Huisdierinfo (Belgian equivalent) offers similar content but is tailored to Belgian legislation. Pet stores and reptile associations offer some information, but not as comprehensively or neutrally as LICG.

Terrafile

An **online platform for reptile administration and sales**, founded in the Netherlands. It aims to promote transparent and legal reptile keeping



Why it's of value to them

This project stimulates responsible reptile keepers (consumers). If Terrafile collaborates with this project it can **take a leading position as responsible reptile administration and selling platform**, enhancing its relevance to their consumers. Furthermore, Terrafile focuses on legal, transparent purchase and even reducing impulsive purchases (Terrafile, n.d.), which **aligns with the pre-purchase and purchase phase of responsible reptile keeping this project aims for.**



How they can contribute

Terrafile can contribute strongly in **Scope 1: Impulsive purchases** and **Scope 2: Collecting of reptiles**. As a selling and administrative platform, they can minimise impulsive purchases and monitor unsustainable collecting.



Alternative stakeholders

Morphmarket is a larger online platform, doesn't align that strong with the pre-purchase and purchase phase. **Marktplaats** is prominent in the Netherlands, but does not specialize in reptiles and is less likely to invest resources in this specific area.

Blue-Lagoon / Avonturia

Blue-Lagoon is a Dutch company specialising in **custom and ready-made terrariums**, and shows a knowledge centre for reptile care. Avonturia is the **largest pet store** in the Netherlands with reptiles and active in bioactive terraria.



Why it's of value to them

This project promotes Scope 5: Enjoyment of ball python enclosure care. By enhancing reptile welfare through optimal enclosure care, the demand for high-quality, customisable terrarium products, and advice is likely to increase. This creates **potential revenue streams** for these stakeholders while simultaneously supporting improved husbandry standards.



How they can contribute

They can contribute to **Scope 5: Enjoyment of ball python enclosure care** by offering products that further stimulate this enjoyment of optimizing the enclosure. Furthermore, they can contribute to **Scope 1: Impulsive purchases** to encourage prospective owners to invest in proper housing, stimulating an informed purchase.



Alternative stakeholders

Other terrarium sellers could be suitable, but Blue-Lagoon's custom capabilities and Avonturia's retail reach and promotion of bioactive setups make them the best match.

VHM-Events

VHM-Events **organises animal fairs**, including the largest reptile fair in the Netherlands in Houten.



Why it's of value to them

Reptile fairs have received criticism from animal welfare groups and the public, with 81% of Dutch citizens opposing reptile fairs (DirectResearch, 2020). This project offers VHM-Events a path to **reduce criticism by promoting responsible sales and reptile welfare.**



How they can contribute

Reptile fairs are currently a huge factor influencing impulsive purchases, and therefore are also a relevant stakeholder to reduce it. Thus, it can contribute to **Scope 1: Impulsive purchases**. Furthermore, if the focus of fairs would shift from primarily selling animals to proactively distributing knowledge and promoting welfare, they could also positively impact **Scope 6: Science-based information acceptance and knowledge sharing on ball pythons**



Alternative stakeholders

Reptilica also organises reptile fairs in the Netherlands, but VHM-Events' larger audience offers greater potential for impact.

Animal Welfare Organisations

Organisations like World Animal Protection, IFAW, and Stichting AAP focus on safeguarding animal welfare and generally oppose keeping reptiles as pets, advocating for reptiles to remain in the wild.



Why it's of value to them

While the project does not fully align with the stance of the animal welfare organisations, **it does increase animal welfare and discourage irresponsible ownership and trade.**



How they can contribute

While many animal welfare organisations are unlikely to directly advocate for *responsible* reptile keeping, as they are against reptile keeping in general, they can still contribute to the project. Through initiatives such as campaigns or the WWF's Pet Suitability Check they will still have a positive impact on Scope 1: Impulsive Purchases and Scope 2: Collecting of reptiles by encouraging informed, sustainable decisions.



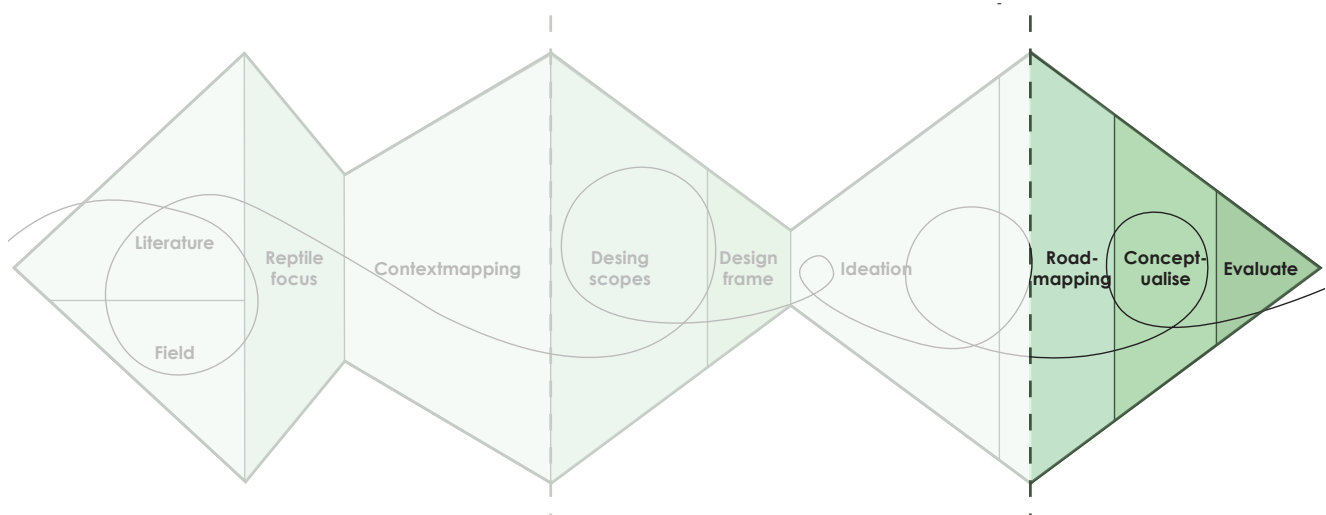
Alternative stakeholders

There are no direct alternatives, as this concerns a broader group of organisations with shared animal welfare objectives.

Deliver

The Deliver stage offers an overview of the roadmap and focuses on the conceptualisation of one of the ideas from this roadmap. The chosen concept, Royal: The Best You Can, is developed and positioned as an accessible first step towards responsible reptile keeping.

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8. The roadmap

As a reminder, the interventions and ideas on this roadmap are aimed towards improving responsible reptile keeping. These interventions are mainly derived from ideation on four design scopes which can improve responsible ball python keeping. These design scopes are '1. Impulsive purchases', '2. Collecting of reptiles and ball pythons', '5. The enjoyment of ball python care', and '6. Science-based information acceptance and knowledge sharing on ball pythons'. After combining the ideas with relevant stakeholders and including some additional or transitional ideas this roadmap emerged.

The roadmap is divided in three horizons. The first horizon (1-3 years) is about establishing the foundation. The basics have to be right before one can optimise. This horizon introduces some quickly implementable interventions to improve responsible reptile keeping and lay the foundation for further development. The second horizon (4-6 years) is about further expanding science-based keeping to enhance the mindset shift to optimisation. The final horizon (7+ years) focusses on stimulating a contributing reptile community, working together to optimise well-being.

Horizon 1: Establishing the foundation

Before optimisation is possible, the foundation must be strong. This phase prioritises accessibility, ensuring that all keepers can access reliable, understandable information and basic tools. Interventions in this stage focus on raising awareness, making care information more visually engaging, and empowering better entry-level decisions. Examples include the redesign of care sheets, introductory campaigns like "The pet right for you", improved reptile administration, and readiness tools provided by platforms such as Terrafile. Sellers begin to take more responsibility through simple checklists and buyer–seller dialogues. The goal is to move away from impulsive and poorly informed purchases, and to establish a proper standard in reptile keeping.



Horizon 2: Expand science-based keeping

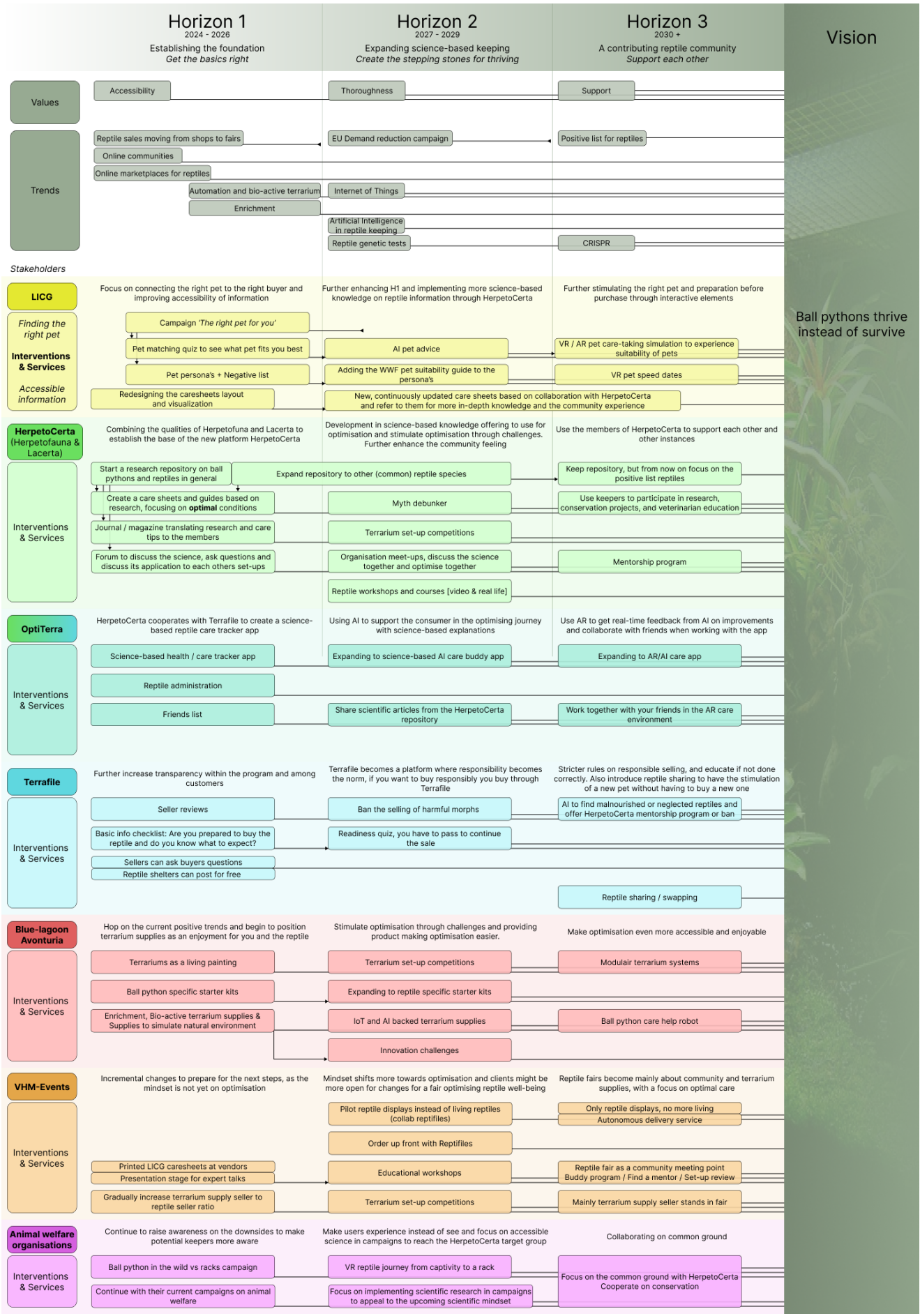
Once a reliable base is in place, Horizon 2 shifts focus towards depth and optimisation. This phase aims to deepen keepers' knowledge, encourage critical reflection, and embed science-based practices in daily reptile care. This includes myth debunking, expanding a science-based reptile care repository, optimal care/terrarium competitions, making fairs more education focused, and the launching adaptive, modular care platforms. New care sheets are continuously updated based on collaboration with experts. Tools like AI reptile buddy apps and digital track-and-trace systems support personalised care. At this stage, scientific nuance becomes accessible, and optimisation is seen as fun and rewarding, rather than difficult or elite.



Horizon 3: A contributing reptile community

The final horizon envisions a mature reptile-keeping community that is not only optimising care but actively contributing to wider knowledge-sharing, conservation, and ethical development of the hobby. Here, keepers support each other through mentorship, knowledge exchange, and peer-to-peer initiatives. Reptile care becomes integrated with broader goals such as biodiversity protection, responsible breeding, and the reduction of harmful morphs. Platforms like HerpetoCerta serve as hubs for research, community learning, and mutual support. Technologies like VR pet simulations and AI habitat assistants help potential keepers experience responsibilities before committing. At this point, reptile keeping transitions from a private hobby to a collective effort, where well-being and ethics are shared responsibilities.





Ball pythons thrive instead of survive

9. Conceptualisation

One idea from the roadmap is selected to further conceptualise. This idea will offer an accessible starting point for the TU Delft research team to stimulate responsible ball python keeping. The chosen concept is determined through several criteria, including potential impact, feasibility, and viability. Afterwards, the selected idea is conceptualised to develop a foundation for implementation and encourage its integration to facilitate responsible reptile keeping.

9.1 Idea selection

The idea is selected through its potential impact, feasibility, and viability. However, before applying these criteria, an initial selection is made to narrow down the broad collection of ideas.

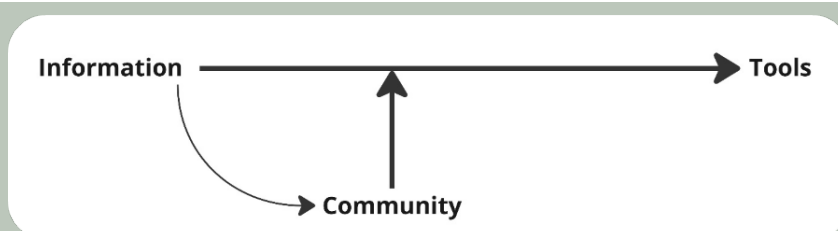
Information, tools, and community

To structure this initial selection, it is important to understand that the ideas of the roadmap fall into three categories: information, tools, and community. The first category, 'information', focuses on providing reliable information to the consumers to encourage responsible reptile keeping. The second category is 'tools'. These are ideas which the consumer can utilize to improve their responsible reptile keeping. This category often needs information from the first category to be functional, or for consumers to see its value. The third category is 'community'. This category focuses on community building within reptile keeping to support and encourage each other towards responsible reptile keeping.

This category can be seen as an amplifier between the first two categories. The right information is needed to fuel such a community, but then it can strengthen the relationship between the category 'information' and 'tools'. This is simplified and visualised in Figure 36.

This project will further conceptualise an idea from the first category, **information**. Wrong, mis-, or lack of information is a major issue according to the literature, field, and contextmapping research. The foundational information should first be reliable in order to support the tools and community on responsible reptile keeping. After filtering the ideas by category, they are evaluated through a Harris profile. This method is chosen to make a structured and comparative analysis of multiple criteria with a similar importance. The Harris profile creates a graphic representation of each concept's strengths and weaknesses on the requirements to facilitate the concept selection. The information ideas to further evaluate through the Harris profile are:

- *Ball python in the wild campaign*: A campaign highlighting the natural behaviour and habitat of ball pythons to counter misconceptions and encourage better husbandry practices.
- *Pet persona's*: A personification of ball pythons that helps keepers and buyers understand their needs and commitments in a more engaging and relatable way.
- *Caresheet redesign*: A science-backed, visually accessible care sheet that stands out from traditional guides by offering clear, easy-to-



Information serves as the foundation for responsible reptile keeping. It provides knowledge that influences consumer behaviour, making it the key starting point.

Tools support the practical application of responsible reptile keeping. Their use depends on the availability, acceptance, and understanding of information.

A strong **community** can amplify the impact of information, by improving its availability, acceptance, and understanding. Thereby encouraging others to responsible reptile keeping and resulting in more effective adoption and utilization of the tools.

Figure 36: The three idea categories explained, information, tools, and community.

understand, and scientifically validated husbandry information.

- *Myth debunker*: A platform addressing the common issue of misconceptions in ball python keeping, by highlighting the truth in controversial topics.

- *Ball python specific research repository*: A centralised collection of ball python research aimed at storing and making scientific sources more accessible to keepers.

- *Campaign 'The right pet for you'*: A campaign helping potential pet owners assess whether a ball python suits their lifestyle and capabilities before making a purchase.

- *Be aware of- lists*: A structured list outlining the challenges and responsibilities of ball python ownership to discourage unsuitable keepers and reduce impulsive purchases.

The roadmap also includes interventions such as workshops and courses, which might seem to fit the information category. However, they are classified as tools. They rely on information to be effective, but their main purpose is to facilitate learning through action rather than being a pure information source. Information influences consumer behaviour, guiding them to workshops, which then act as tools to facilitate responsible reptile keeping.

The scientific care journal also resides on the border of information and tool. This is a journal to update reptile keepers on scientific improvements on reptile knowledge. While it provides information, its function is distinct from the foundational knowledge offered by the ideas in the information category. It acts as a tool for individuals who are already informed and want to stay up to date with new developments in the field. It helps keep reptile keepers engaged with evolving knowledge and facilitates them to apply the latest research into their practices. It is not about laying the foundation for responsible reptile care (which would fall under the information category) but about providing support and updates to enhance existing practices.

There are also two ideas from the idea category excluded from the criteria assessment. First of all, the evaluation of the ideas 'Campaign 'The right pet for you'' is excluded. While it is an interesting campaign to minimize impulsive purchases, it tries to minimize all impulsive purchases in pet keeping. It is not tailored to ball pythons or reptiles, which

makes it less appealing for this project and the client. The idea focuses on 'how to improve pet purchases' rather than 'how to make ball pythons thrive'.

The second excluded idea is the 'Be aware of- list'. This is a list to raise awareness on the difficulties of ball python keeping before purchase. According to the literature and field research there are too many impulsive purchases in which buyers are not aware of the challenges of keeping a reptile or ball python. Such a list stimulates a reflection before purchase on whether the buyer can overcome these challenges. However, the main difficulty with this idea is reaching the right channels to target the impulsive buyers, as reptile sellers and fairs are not likely to demonstrate such a "negative" list that might hurt their sales. A potential executing stakeholder for this idea is LICG or Herpetofauna. But having such a list on their website does not reach the impulsive buyers, but buyers already doing prior research. Therefore, while being an interesting idea, the impactful channels for this idea are inaccessible. A method to reach these channels is through regulatory measures. Officially sellers are obliged by regulation to provide written care information to the buyer of their animal, and something similar could be done with a 'be aware of- list'. However, this is a regulatory intervention and the client aims for ideas beyond the legislative framework. Another method is masking the 'be aware of-' points using a more positive approach. Such a method is similar to how the pet persona idea is designed.

The criteria

The remaining ideas, 'Ball python in the wild campaign', 'Pet persona's', 'Caresheet redesign', 'Myth debunker', and 'Ball python specific research repository' are assessed on the following criteria:

1. Reduces impulsive purchases
2. Stimulates responsible breeding / breeders
3. Facilitates keepers to provide all basic husbandry needs and to go beyond
4. The idea can be implemented or scaled across Europe
5. The idea fosters unity among stakeholders
6. Executing stakeholder interest
7. Resource availability (financial / technological / operational)
8. Financial sustainability
9. Market demand

These criteria are determined to assess the impact and the feasibility and viability of the remaining ideas.

The impact is determined by analysing the impact on responsible ball python keeping and the impact it can make on the client's (TU Delft research team) wishes. Responsible reptile keeping is defined as: *“Responsible ball python keeping is making the contemplated decision to ensure life-long care for a legally sourced, captive-bred ball python, caring for it beyond the basic needs to survive, but making them thrive through enrichment while keeping the safety of the reptile, you, and the surrounding as a priority.”* This is divided throughout four phases, pre-purchase, purchase, care, and end-of-care. In Section 3.5: Responsible Ball Python Keeping it is argued that some aspects of responsible reptile keeping are more important for ball pythons than others. Therefore, the most important criteria to determine the impact on responsible ball python keeping is ‘Reduces impulsive purchases’, ‘Stimulates responsible breeding / breeders’, and ‘Facilitates keepers to provide all basic husbandry needs and to go beyond’.

The client works on an EU project focusing on demand reduction. Therefore a relevant criteria for the client is whether the chosen idea can be implemented or scaled across Europe. Demand reduction is also interesting for the client, however this strongly correlates with reduces of impulsive purchases and to mitigate overlap in the scores, this criteria is excluded. During the project it also arose that there is a lot of polarisation among stakeholders in the reptile pet market. It was discussed with the client that an idea which fosters unity and de-polarisation would be a valuable approach. As a result, the impact criteria ‘The idea can be implemented or scaled across Europe’ and ‘The idea fosters unity among stakeholders’ is added.

To ensure that the ideas are feasible, they will be evaluated on two major criteria. As this project does not work with an executing organisation, it is important that the ideas have a stakeholders which is willing and able to implement the ideas. Therefore, alignment between stakeholder and idea is crucial, adding the feasibility criteria ‘Executing stakeholder interest’.

Furthermore, the necessary resources to

implement the idea need to be available. Is it financially and technologically feasible for the organisation? And does it fit their current operations? This creates the second feasibility criteria ‘Resource availability (financial / technological / operational)’.

Lastly, is also important that the idea is sustainable long-term. Market demand is necessary to sustain the ideas. Does the idea have a strong foothold in the reptile market? And especially, does it relate to target demographic of beginner reptile keepers? Beginner keepers are a key demographic in the growing reptile pet market. Encouraging responsible keeping from the start helps prevent impulsive purchases, supports them through the riskiest phase, and promotes lifelong care. Addressing issues early is more sustainable than correcting them later. Trend research highlights urban millennials as the main drivers of market growth. Therefore, the first viability criteria is ‘Market demand’.

To assess the viability, the ideas are also evaluated on their financial sustainability. The idea must be financially viable in order to make its (long-term) impact. This concludes the criteria list with ‘Financial sustainability’.

Assessment

The Harris profile is used to systematically compare concepts across multiple important criteria. Figure 37 shows the results of the Harris profile assessment, with the rationale for the scores discussed in Appendix F. The care sheet redesign ranks highest with a score of 12, followed closely by the pet persona at 11.

As a result, these two ideas have been combined for further conceptualisation in this project. The selected concept merges the persona with the redesigned care sheet, integrating the stimulation of understanding and empathy through the personification of the ball python with a science-backed, accessible format. This fusion provides a template that both reduces impulsive purchases and enhances ball python care. The new sheet encapsulates the essence of the ‘information’ category by offering an accessible foundation for understanding the ball python and its needs.

| Criteria | Ball python in the wild campaign | | | | Pet persona's | | | | Caresheet redesign | | | | Myth debunker | | | | Ball python specific research repository | | | |
|--|----------------------------------|----|---|---|---------------|----|---|----|--------------------|----|---|----|---------------|----|---|---|--|----|---|---|
| | -2 | -1 | 1 | 2 | -2 | -1 | 1 | 2 | -2 | -1 | 1 | 2 | -2 | -1 | 1 | 2 | -2 | -1 | 1 | 2 |
| 1. Reduces impulsive purchases | | | 1 | | | | 1 | 1 | | | 1 | | | | 1 | | | | 1 | |
| 2. Stimulates responsible breeding / | | | 1 | | | | 1 | | | | 1 | | | | 1 | | | | 1 | |
| 3. Facilitates keepers to provide all ba | | | 1 | | | | 1 | | | | 1 | | | | 1 | | | | 1 | |
| 4. The idea can be implemented or sc | | | 1 | 1 | | | 1 | 1 | | | 1 | 1 | | | 1 | 1 | | | 1 | 1 |
| 5. The idea fosters unity among stake | 1 | | | | 1 | | | | 1 | | | | 1 | | | | 1 | | | |
| 6. Executing stakeholder interest | | | 1 | | | | 1 | | | | 1 | | | | 1 | | | | 1 | |
| 7. Resource availability (financial / te | | | 1 | | | | 1 | | | | 1 | | | | 1 | | | | 1 | |
| 8. Financial sustainability | 1 | | | | 1 | | | | 1 | | | | 1 | | | | 1 | | | |
| 9. Market demand | 1 | | | | 1 | | | | 1 | | | | 1 | | | | 1 | | | |
| | | | | 4 | | | | 11 | | | | 12 | | | | 8 | | | | 2 |

Figure 37: Harris profile evaluation

9.2 The concept: Royal - The Best You Can

The concept selected for further development is a fusion of two initial ideas: the persona and the caresheet redesign. This idea is referred to as *Royal: The Best You Can* (or simply *Royal*). This concept introduces a new type of “caresheet”, which is not merely a redesigned version of the conventional document, but a reimagined, science-based, visual resource grounded in empathy and an understanding of the reptile’s needs.

Caresheets are a common practice within reptile keeping, typically used to communicate a species’ minimal care requirements. However, despite their widespread availability, reliable information remains a major issue as indicated by the literature and contextmapping research. Many caresheets are outdated, inconsistent, or based on anecdotal information and myths. This issue is reflected in the findings of Azevedo et al. (2021), who reported that 85% of participants failed to meet all four basic husbandry needs: temperature, lighting, diet, and refuge. They attributed this to a lack of knowledge, widespread misinformation, and reliance on unreliable or outdated sources. These findings are supported by the contextmapping study, which highlights the amount of mis- or contradictory information in ball python keeping and the participants’ desire for clear and reliable information (Section 4.3: Results - Information). Furthermore, current caresheets often focus on the minimal requirements for reptiles, but the goal of this project is to make reptiles thrive rather than survive. This means going beyond the basic needs and striving for optimal conditions rather than minimal.

That’s where *Royal: The Best You Can* comes in, to empower keepers with reliable and engaging

information. However, rather than adding to the pile of existing caresheets, *Royal* reframes the format by introducing it as a reptile profile: a compact, visually structured document that combines a ball python persona with scientifically grounded care information. The persona creates a more accessible and empathetic entry point, helping both new and current keepers view the animal as an individual with specific needs and reflect on whether they can fulfil those needs. Alongside this, the document presents concise and up-to-date care guidance, organised in a way that reflects the keeper journey, from pre-purchase to long-term care. The goal is not only to provide factual information, but also to foster understanding of the animal to improve its care. The document focuses on a clear visual hierarchy and uses elements such as infographics and supportive illustrations. *Royal* introduces the reptile profile as a new benchmark for care information by making it visual, reliable, and engaging, encouraging empathy and self-reflection.

The main intended impact of *Royal* is to reduce impulsive purchases and improve care quality among ball python keepers. Impulsive purchases are a significant issue in reptile keeping. People may buy a reptile because they are intrigued by the animal, but then they do not understand the needs and requirements of the animal. Once these needs prove incompatible with their own, this can result in regret, abandonment, or improper care. The contextmapping study emphasised the importance of ensuring that the needs of a pet match those of the pet owner, and therefore *Royal* aims to reduce impulsive purchases by helping potential keepers assess whether a ball python truly fits their lifestyle, expectations, and capacity to provide care. The persona offers a low-threshold, empathetic way to understand the ball python’s needs early on, and to reflect on whether

those needs match the keeper’s situation before a purchase is made. In addition, the concept seeks to improve care among current keepers by offering structured, science-based guidance that is easy to use and visually engaging. By moving beyond a long text listing minimum requirements and instead highlighting what reptiles need to thrive, Royal supports a shift in mindset from doing “enough” to doing the best one can.

The concept aligns with three of the four selected design scopes:

Scope 1: Impulsive purchases – by encouraging early self-assessment through the persona and structured pre-purchase information, it helps prevent unconsidered decisions.

Scope 6: Science-based information acceptance and knowledge sharing – by translating reliable, referenced care information into an accessible and engaging format.

Scope 5: Enjoyment of ball python enclosure care – by offering a motivating framework that guides and inspires keepers to upgrade their setups and deepen their care routines.

By addressing these scopes, the concept contributes primarily to the pre-purchase and care phases of responsible ball python keeping. It supports reflection and informed decision-making before acquisition, and provides clear, practical guidance to raise care quality afterwards. The purchase phase is supported to a lesser extent, by offering information on how to buy a ball python responsibly.

Lastly, Royal offers a shared foundation for collaboration between diverse stakeholders in the reptile sector. As discussed in Section 2.3: Responsible Reptile Keeping, there is disagreement on what reptile keeping should look like. However, common ground exists in the shared value of reptile welfare in captivity. By taking a neutral stance, neither promoting nor discouraging reptile ownership, Royal focuses on what most parties agree on: if reptiles are kept, they should be kept right.

Concept development

So, *Royal: The Best You Can* is a concept with the main objective to reduce impulsive purchases and increase ball python care quality, to stimulate and

facilitate a future where ball pythons can thrive. This chapter will discuss the development of this concept in order to maximize its impact.

Stakeholders

Target group

The target group for Royal: The Best You Can can be divided into two categories: **impulsive ball python buyers**, who are prone to unconsidered reptile purchases, and current **ball python caregivers**, who already own a reptile but still have room to improve their husbandry practices.

Within these groups, the primary focus is on beginner ball python keepers, as encouraging responsible husbandry from the start helps prevent impulsive purchases, supports them through the riskiest phase of reptile keeping, and establishes lifelong responsible care. Addressing these challenges early is more sustainable than attempting to correct them later. Trend research



Above is Herpetofauna’s extensive network, connecting with universities such as Utrecht, Leiden, Ghent, and Arizona, reptile shops and fairs like Avonturia, Blue-Lagoon, and VHM-Events, reptile associations including the European Snake Society and RAVON, and other organisations such as Terrafile and the International Reptile Conservation Foundation. This highlights Herpetofauna’s prominent role in the reptile industry.

Figure 38: The sponsors and partners of Herpetofauna

indicates that the reptile market continues to grow, with urban millennials being the main drivers of this expansion. However, the concept should also appeal to intermediate ball python keepers due to the depth and reliability of the information provided.

Stakeholder map & channels

Reaching this primary focus of beginner ball python keepers requires the right channels. A knowledgeable executing stakeholder with a reliable position in the market is crucial to utilize these channels to engage with the target group, ideally before purchase.

The most suitable executing stakeholder is Herpetofauna Foundation. They state that their foundation is built on four pillars: education, conservation, research, and connecting. These are exactly the values the executing stakeholder of this concept should have. The foundation strives for reptile welfare and conservation and dedicates itself to (supporting) reptile research and education. They have organized symposia to discuss scientific findings and highlight the importance of collaboration between science and keepers to optimise research, conservation, and animal welfare. Herpetofauna educates on reptiles and reptile keeping, and thereby focuses on reaching optimal living conditions, just like *Royal* strives for optimal over minimum.

“We provide information and education to ensure that these animals experience the most optimal living conditions.” – Herpetofauna (n.d.)

And lastly, they are a great fit due to their reputable and connected position in the market. Herpetofauna is connected to pet shops, universities, fairs, researchers, and more. These connections and their reputation can support the adoption and distribution of *Royal: The Best You Can*. See Figure 38 for a full overview of their partners.

Alternative organisations that could serve as executing stakeholders include LICG, Lacerta, and the European Snake Society. While each has relevant strengths, Herpetofauna remains the most aligned choice. LICG has a broader focus on various pet species rather than specialising in reptiles, while Lacerta and the European Snake Society are less actively engaged in reptile research.

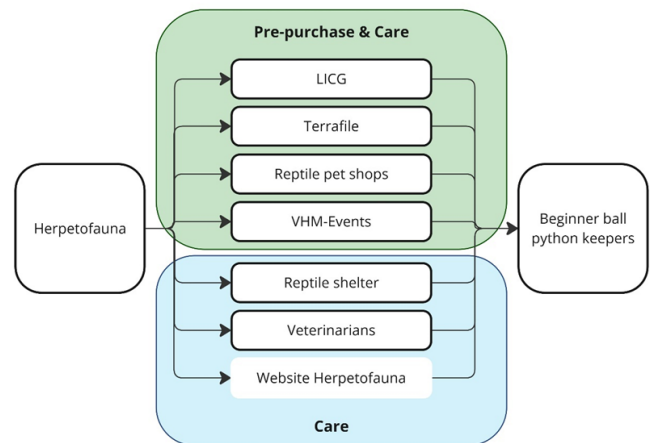


Figure 39: Relevant stakeholders and channels

Herpetofauna is the likely executing stakeholder. They can share *Royal* on their website to reach some reptile keepers, however, this alone is not the most effective way to engage beginner reptile keepers. To maximise impact, it is recommended to utilise additional channels through their network of partners. *Royal* provides valuable knowledge to discourage impulsive purchases and to improve ball python care once purchased. The partnered stakeholders functioning as channels should reflect this and reach both the target group of impulsive buyers as current ball python caregivers. Recommended stakeholders for this role include LICG, Terrafile, reptile pet shops, VHM-Events (reptile fairs), reptile shelters, and veterinarians. Some stakeholders can make an impact on the ‘Pre-purchase’ and ‘Care’ phase, while others only impact the ‘Care’ phase. This is shown Figure 39.

These stakeholders will likely be interested in contributing to the distribution of Herpetofauna’s *Royal: The Best You Can*.

LICG: This organisation would be valuable for the pre-purchase phase. *Royal: The Best You Can* is a strong fit with their mission to educate potential and current pet owners, and would offer a quality information source.

Terrafile: This organisation does share care information, but uses an external organisation to do so, they reference to the LICG materials. Sharing the document *Royal: The Best You Can* from their partner organisation Herpetofauna will offer new renewed care information

VHM-Events (Reptile Fairs): This organisation currently operates under external pressure to improve animal welfare. Therefore any initiative

that improves reptile care would be highly relevant. Furthermore, sellers are officially required to distribute caresheets at a sale. Standardizing one ball python care sheet at a fair would improve consistency and ensure clear, reliable information for to all fair visitors.

Reptile Shops: These are also obligated to provide care sheets, and *Royal* would be a valuable resource to give to customers after a purchase enhancing their credibility in the industry.

Reptile Shelters: These organisations are very committed to reptile welfare, and strongly supporting the reduction of impulsive purchases and improving care practices. Having such an accessible and reliable resource to offer to visitors and buyers would be valuable to them.

Veterinarians: Veterinarian frequently treat reptiles and ball pythons, often with improper care as the cause. Distributing *Royal's* materials could help educate these owners on what to improve and how to prevent common health issues.

Social Media: A powerful potential channel could be social media, although this would likely require a

dedicated campaign and associated funding.

The design

This project does not develop the complete document but focuses on providing the tools to create *Royal: The Best You Can*. This project will develop an example template to guide Herpetofauna to *Royal: The Best You Can*. However, will still need to be further developed by designers and Herpetofauna reptile care experts need to add the science-backed content of the document.

Other caresheets

Before developing *Royal: The Best You Can*, it is valuable to examine existing caresheets to identify best practices, areas for improvement, and opportunities for differentiation. One of the most commonly used resources for ball python keepers in the Netherlands is the LICG caresheet (Figure 40). This document provides useful, well-researched information, making it an important reference for reptile owners. However, analysing its structure and presentation offers insights into how *Royal* can further enhance the accessibility and engagement of reptile care information.

One notable characteristic of the LICG caresheet is its text-heavy format—it spans eight pages with minimal hierarchy beyond headings and no visual elements. While this ensures comprehensive coverage of information, it may be challenging for readers to navigate efficiently. A more user-friendly design with visual hierarchy and key takeaways emphasized could improve information retention and ease of use. Additionally, the LICG caresheet highlights the challenge of balancing depth with accessibility—it needs to be concise enough to remain approachable yet still include essential details. Despite its length, certain aspects, such as which ball python morphs carry genetic disorders, are not covered in detail. This underscores the need for a carefully structured document that remains informative while guiding readers to additional resources where necessary.

Another interesting finding is the lack of direct in-text citations for scientific sources. While the LICG is a trusted and reputable organization, it is not specialized in reptiles. Their use of external sources strengthens their credibility, but as these sources are only mentioned on their website rather than within the document itself, the reader may not immediately recognize the scientific foundation



Figure 40: An example ball python caresheet (LICG, 2024)

behind the information provided. However, the inclusion of a publication date on the caresheet is a strong practice, as reptile care guidelines evolve over time, and outdated information can become misleading.

For *Royal: The Best You Can*, these insights reinforce the need to create a concise yet information-rich document that is visually structured, easy to navigate, and engaging for keepers. Emphasizing user-friendly design, clear hierarchy, and visual support can help ensure better adoption among reptile owners. Additionally, transparently citing sources within the text and clearly displaying the publication date can further enhance trustworthiness and reliability. Finally, recognizing that not all essential information fits within a single document, *Royal* could benefit from integrating online resources that provide more in-depth coverage of specific topics while maintaining a clear and accessible core document.

Look & feel

A key aspect of the *Royal* template is the look and feel it conveys. It must strike a delicate balance between realism and encouragement—neither too judgemental or negative, nor overly positive or glorifying. The template should present the challenges of ball python keeping realistically while motivating owners to provide the best care. It must avoid being so critical that stakeholders disengage or so uplifting that it inadvertently increases demand for ball pythons.

An example of this is shown in the name. It should show that keeping ball pythons is not easy, but you should give it the best you've got. The name must give a feeling that it contains in-depth knowledge of the topic and will guide you to the best. Furthermore, the name should be able to be used as a “product line”, as the improved care guide can eventually be scaled to other reptile species as well, building on the reputation of this initial document. Therefore: *Royals: The best you can*. Ball pythons are also known as royal pythons, and this title should emphasize the importance of providing them with the highest level of care. The best you can shows that this document guide you to offer the best care you can give, but it won't be easy. This is the “product line” aspect of the title.

Other characteristics that *Royals* should reflect:

Reliable & scientific: One of the main

components of *Royals* is that it should be reliable. This document should be a confident truth within all the misconceptions.

Elements: Blue / grey, modern sans-serif, infographics, source references

Natural: A natural look and feel stimulates the awareness of ball pythons as wild animals. They are exotic pets and with that comes a great need to keep them responsible and sustainable.

Elements: Green / brown / beige, organic, nature elements

Motivating: *Royals* should motivate the readers to do the best they can, offering enthusiasm and a feeling they can and should strive for the best.

Elements: Yellow, bold, call-to-action

User-friendliness also greatly impacts the design of *Royals: The best you can*. The most important elements to stimulate this user-friendliness are:

Accessible: *Royals* should be an accessible resource. It should not overwhelm beginner keepers, but be easy to read and use.

Elements: Simple language, visual hierarchy, bold headings & icons

Compact: If the document is too big, it will be less interesting to use. Not just for the keeper, but also for reptile shops and fairs. Sellers will likely be more interested in giving away small documents over booklets.

Elements: Direct language, bullet points, visualization

Easy to navigate: Keepers should find easily what they are looking for, otherwise it becomes a pain to use.

Elements: Table of contents, infographics, colour-coding

Engaging: The document should be engaging for the keepers, triggering their interest and curiosity in improving ball python welfare.

Elements: Contrast, QR codes, checklists or quizzes, illustrations and visual aids

Colour palette

Below is a recommended colour palette which can represent the values *Royal: The Best You Can* aims to convey:



Deep forest green (2f6a4f): Nature & balance

Teal blue (29657c): Reliable & science

Yellow ochre (d4a017): Motivation & royalty

Beige (eae0c8): Warm and natural accents

White

Black

Typography

The typography should also reflect the values of *Royal: The Best You Can*, but most importantly so, it should be readable and accessible, utilising visual hierarchy. It should be easily readable both printed and digital. Example typography settings can be:

Header, Playfair Display: Serif, classic yet modern feel makes it feel elegant and engaging, standing out as headers)

Body, Open Sans: Sans-serif, good readability for print and digital, professional and neutral, contrasting with Playfair Display)

Highlight or Accent Font, Montserrat: Geometric, motivating, engaging

Visual communication and engagement

Perhaps one of the most important aspects of the reptile profile *Royal: The Best You Can* is the visual communication and engagement. The document should be visually appealing to the user, easy to understand, trustworthy, and clearly structured. Additionally, the document should actively engage readers, maintaining their interest and encouraging them to explore topics in greater depth.

Many of these aspects will be demonstrated in the following section, 9.3: The Template. However, the most important considerations are briefly outlined here:

Visuals and Infographics: The use of visuals and infographics within the document is crucial for clearly conveying complex information. Visual elements support comprehension and memory retention, making the document more accessible, especially for new reptile keepers.

Imagery (Realistic & Illustrated): The document should incorporate a balance between realistic photographs and clear illustrations. Realistic images demonstrate authentic conditions and practices, stimulating transparency and reliability. Illustrations, on the other hand, allow for simplification and clarification of complex topics, providing greater visual clarity where realistic photographs may appear overwhelming or chaotic.

In-Text Referencing through Superscript:

To maintain trustworthiness and demonstrate scientific credibility, in-text references should be included in superscript format, like this ¹. This referencing style enables readers to easily identify evidence-based claims, allowing quick verification without disrupting the flow or readability of the main text.

Bullet Points and Quick-Reference Icons:

Utilizing bullet points together with quick-reference icons significantly enhances the document's readability and accessibility. Bullet points concisely communicate important guidelines and care instructions, enabling readers to efficiently retrieve information. Quick-reference icons offer a similar value, but with these icons the document more highly intuitive and scannable, allowing users to quickly grasp and find their necessary care information.

QR Codes: These are essential for the engagement. Where the *Royal: The Best You Can* should be concise and straight to the point, it is important to have the possibility for more in-depth resources online, to stimulate curiosity and preparing people for the second the horizon of the roadmap, expanding science-based keeping. QR codes are an important feature to connecting readers to more detailed digital resources. While the document is designed to be short and concise, QR codes allow readers to easily access supplementary information, such as videos, scientific studies, interactive tools, or more detailed explanations online, thus enriching the overall user experience and depth of information provided.

Digital & Print: Lastly, the document should be carefully designed for both digital and printed formats. Layouts and typography should maintain clarity and readability across these mediums, ensuring accessibility in various contexts, such as online distribution, reptile fairs, pet stores, or personal printing. With the digital version is recommended to also include in-document links in for example the table of contents, but also links to external resources such as the function of the QR code.

Structure

This template has a fixed structure. Its structure is likely applicable for other reptile species as well, however, reptile experts should still reflect whether with a different species certain chapters should be re-ordered or whether new, species specific chapters should be added. The structure starts with a persona, to trigger interest in both potential and current ball python keepers. The function of the persona is to both attract and inform the reader, as they can see their animal through a perspective that a regular caresheet does not offer. After the persona the animal profile offers a care information in a chronological order of reptile keeping.

9.3 The template

Figma is used as the design tool for this template. It is a free program that allows both designers and reptile experts to work collaboratively. It offers creative flexibility to the designers and the template can be easily adapted and scaled to other reptile species. Herpetofauna is perhaps not familiar with Figma, but the learning curve is relatively small for the organisation to add or update content, provided that the design of the template is done by designers.

The template is designed for ball pythons, but the goal is to eventually expand 'The best you can' to various reptile species. Figure 41 provides an overview of the structure, and each page will be discussed in the following section. The template highlights key design choices and their relevance to ball python keeping.

The outline of this template is applicable to other species, but may require species-specific adjustments when expanding to other reptiles. This template serves as a foundational example and must still be further developed by interaction designers and completed with scientific content from herpetologists. The components of this template are developed from the research, but the content to fill these components is generated by AI give the template body (OpenAI, 2025).

The template is deliberately condensed to increase its usability in real-life settings, such as reptile shops and fairs, where long documents are less likely to be read or distributed. It is even more compact at this stage, as the final content has not yet been added. This encourages future

Document structure

1. Persona = Front page

The goal of the front page is to capture interest and create empathy by presenting the ball python as an individual with specific needs, setting the tone for responsible care.

2. Introduction + Table of contents

This section provides an overview of the document, outlining its purpose and structure to ensure readers can easily navigate through it.

3. Reflect before you commit

Positioned at the beginning to encourage informed decision-making. This section highlights key considerations, preparations, and a checklist before acquiring a ball python, mitigating impulsive purchases.

4. The ideal set up

The 'Reflect before you commit' will explain that a running set-up is needed before buying a reptile and will flow into 'The ideal set-up'. This section ensures readers understand the importance of a proper environment as the foundation for a healthy, stress-free snake.

5. Handling & behaviour

It is necessary to understand how to properly handle a ball python before you can feed it, as improper handling can lead to stress-related feeding issues. This section educates keepers on proper interaction and understanding ball python behaviour.

6. Feeding

This section explains how to feed a ball python and what can influence their eating habits.

7. Health issues

The last section are health issues, to give an understanding on what to look out for when caring for a reptile and how to recognise certain issues.

8. FAQ & Problem Solving

Positioned after the summary, this section offers guidance for common questions and challenges that keepers may face.

9. References

Closing the document, this section ensures credibility by listing scientific sources, allowing keepers to further explore reliable information.

Figure 41: The structure of Royal: The Best You Can

contributors to keep the final document as concise as possible. By keeping the content short and focused, Royal ensures that both prospective and current keepers engage with the material, while linking to more detailed resources through QR codes where needed.

1. Persona

Goal: Attract (potential) ball python keepers and spark interest in the document, create empathy for the ball python and understanding of their needs, reduce impulsive purchases

The persona should intrigue and attract both potential and existing keepers. This is achieved by offering something traditional caresheets or guides do not: insight into the perspective of a ball python. The persona should create empathy and understanding towards the reptile and thereby raise awareness on the reptile's needs. Potential keepers need to be able to reflect on whether these needs are what they are looking for in a pet (as mentioned in the contextmapping study, Section 4.2 Results; Considerations to get a ball python). Caring for a reptile is a responsibility, not just a hobby, and the persona is the first step in highlighting this.

To help prevent impulsive purchases, the front page should emphasise key reasons why impulsive buyers eventually regret their decision, to raise awareness before it is too late. Important reasons cited by the reptile shelter and veterinarian during the field research include the long lifespan of the reptile, ball pythons not being cuddly animals, stress-sensitive and often hidden, their nocturnal nature, their rodent diet and difficult eating habits, their complexity of care, difficulty finding pet sitters, and costs of keeping. However, this section is a persona, not list of ball python difficulties. Otherwise, channels such as reptile shops may avoid using *Royal: The Best You Can*.

Therefore, the persona should strike a balance between raising awareness and maintaining engagement. It should encourage responsible ownership by presenting these challenges through the perspective of a ball python, making potential keepers reflect on their commitment without discouraging well-informed and dedicated owners. By doing so, *Royal: The Best You Can* remains a valuable resource for both educational and commercial channels, promoting ethical reptile care without alienating key stakeholders.

The topic of cost is not addressed within the persona, as this section aims to represent the ball python's perspective and experiences rather than practical ownership concerns. Information about financial aspects is provided in the *Reflect before you commit* section.

Components

Royal in nature

This describes the needs and personality of a ball python, clarifying how it experiences the world and what its needs are. Ball pythons are animals from the wild, more complex than just a pet. The component is written from the perspective of the ball python to create a captivating story that lets the reader empathize with the reptile and encourages interest in the document.

Who am I in captivity?

This section highlights that a ball python in captivity is the same animal as a ball python in the wild. It has the same needs and instincts. It continues the empathetic narrative started in the 'Royal in nature' section, reflecting on how those needs translate to life in captivity.

Am I what you are looking for?

The final section is less nuanced and presents the key message of the persona directly. Is this the animal you are looking for? The heading also hints at contemplative decision-making, asking whether a ball python is what the reader is looking for, rather than asking whether the keeper meets the animal's needs or is capable of its care. This makes the reader reflect on what they want rather than on what they could have.

Tensions and dilemmas

In the design there are certain tensions and dilemmas that need to be considered. For the Persona these considerations are:

Empathy – Attraction

The persona is designed to empathise with the ball python, presenting the reptile through its perspective, and expressing their needs and instincts through captivating storytelling. This narrative perspective should attract (potential) keepers to read and use the document. However, this attraction also comes with a risk. The storytelling should not be so captivating that the reader empathises in a way that stimulates the demand for ball pythons. The goal of the persona is to stimulate a deeper understanding of the ball

python and a reflection on ball python keeping, while being so captivating it attracts readers, but not captivating in a way that encourages purchases. The example persona aims to mitigate this risk by using a captivating writing style, but avoiding a romanticized story. The content is factual, focusing on the ball python's needs, warning that they live long, hide often, and need a complex environment.

Tone of voice: Not too negative nor too positive

The persona must raise awareness of the realities of reptile keeping, but without becoming discouraging or judgemental. If the tone is too negative, commercial channels such as reptile shops and fairs may choose not to distribute the resource. Conversely, if it becomes too light or positive, it may fail to provoke the necessary reflection and maybe even stimulate purchases. Therefore, the document must be realistic, as demonstrated in the component 'Am I what you are looking for?' presents the core message in a direct but neutral tone. It asks whether the reader is truly looking for a reptile like this, without implying that reptile keeping is good or bad—only that it requires alignment between animal and keeper.

Exclusion of practical considerations in the persona

The persona deliberately avoids practical topics such as costs. This is a stylistic decision to maintain the integrity of the snake's perspective, focusing on its needs, instincts, and lifestyle. However, cost is a relevant factor in reducing impulsive purchases. Its exclusion here introduces a tension: prioritising narrative clarity over early practical awareness. To still prompt readers to consider practical aspects, the 'Am I what you are looking for?' component refers to the page 'Reflect before you commit', which does address topics such as costs.

Reptile profile or caresheet

The document is introduced as a reptile profile to distinguish it from traditional caresheets and shift the focus from survival to thriving. However, the term may cause confusion, as 'caresheet' is more commonly recognised within the reptile community. This creates a tension between clarity and innovation. Nonetheless, reptile profile truly is the necessary title in order to differentiate itself from the other documents.

The variable part of the title, depending on the reptile species

The fixed part of the title, the product line is called 'The best you can'

Adding the date visible is a must, so readers understand whether this document could be outdated

Herpetofauna Logo

Call it a reptile profile instead of caresheet or guide. It is a new type of product. It doesn't make reptile keeping easy or accessible, but helps to understand how to do it in the best way possible.

Section headings to improve readability, guide the reader, and highlight themes

QR codes to encourage further exploration, while keeping the layout clean

Highlight the similarities between a wild and captive ball python

Use real images in a similar setting to emphasize the similarity of the ball python in the wild and captivity

Release date: 13-3-2025

Royal: The best you can
A reptile profile of the ball python by Herpetofauna, offering scientific backed understanding on their behaviour and care. This profile will help you do the best you can to make ball pythons thrive!

Royal in the wild | I am Royal, the ball python. You might have heard of my species, but do you also understand what we are?
A World Felt, Not Seen — The world speaks to me in ways you cannot comprehend. I do not see far, nor do I need to—I feel the warmth of the earth, the shifting air, the faintest tremors of life moving unseen! This is how I know where to go, where to hide, where to wait.
A Long Life of Shelter and Safety — I move carefully through my world, not for days or years, but for decades. I live in the landscapes of West and Central Africa, where the sun bakes the ground by day, and the night cools the air, inviting me to roam unseen. I do not like the open. The world is safest when it holds me close, when I am pressed inside burrows, nestled between roots, or hidden in the trees. My shelter is more than a resting place—it is my warmth, my security. The open exposes me to danger, but when the earth surrounds me, I am unseen, protected. Too much disturbance unsettles me. When I feel unsafe, I become stressed, cautious, hesitant—I do not move, I do not eat.
The Hunt in the Dark — When darkness falls, my world awakens. I taste the wind, searching for the scent of prey, sensing the warmth of life around me. I do not chase—but I ambush, striking only when the moment is right. My hunt is careful, calculated. A single meal may last me weeks, even months, but I must be patient. If food is scarce, I conserve, surviving on the energy stored within me.
Striving for Balance — I do not create my own warmth. I follow it, moving between sunlit rocks and the cool, damp shade, balancing what my body needs. I seek places where the air is thick and rich with moisture, where my body stays strong, my senses sharp. And when the world disturbs me, when danger lingers too close, I do not fight or flee—I fold into myself into a coil, becoming a ball, waiting for the moment to pass.

 Do you want to learn more about ball pythons in the wild? Scan the QR!

Who am I in captivity?
In captivity, I am... exactly the same. I roam for decades, seeking shelter in tight spaces where I feel secure. Taking me out of the enclosure exposes me and exposure unsettles me. I am royal—meant to be admired, not cuddled. I awaken when the lights go out, moving in the quiet of the night. I strive for balance. Without balance I won't eat my rodents. I need heat, I need humidity, I need enrichment—places to climb, textures to explore, a world that still makes sense to me, a world created by someone who respects what I am. I am a fascinating creature, but some people are needlessly afraid of me. You're reading this, so you probably aren't... but when you leave, who will care for me?

Am I what you are looking for?
 I am a quiet, independent animal which can be with you for decades.
 As a royal you can admire me, but I don't need any cuddles.
 I do need my African climate, its temperature and humidity.
 During the day I hide and at night I explore.
 You can feed me rodents, if I am not too stressed.
 I am a unique animal with unique needs, can you handle me?
Find out on page 2!

Short introduction mentioning Herpetofauna and the value of the document

This section is structured like a checklist, allowing readers to quickly assess whether a ball python aligns with their expectations. However, it avoids a traditional checklist format to prevent reinforcing a box-ticking mentality that could unintentionally encourage purchases.

A reference to the 'Before You Buy' section, encouraging readers to review it first if they are seriously considering a ball python.

While this is a good spot to highlight the presence of ball pythons in shelters open for adoption, it's intentionally left out. Reptile sellers are unlikely to endorse this document if the first page mentions readers should buy the animal somewhere else.

2. Table of contents

Goal: Explaining the purpose of this document, providing the structure of the document for easy navigation.

This page gives a short introduction to the document, introducing the purpose, its value, and the executing stakeholder. The table of contents offers a structured outline of all sections for easy navigation.

Components

Introduction

Table of contents

Tensions and dilemmas

No note-worthy tensions on this page.

3. Reflect before you commit

Goal: Create awareness on the commitment owners are getting into, preparing the reader to find a responsibly sourced ball python, prepare for caretaking, and deter ill-considered purchases.

This section will create awareness on the commitment that comes with a ball python. The persona already discussed the needs of a ball python, so these commitments will focus more on the practicalities, like time, money, and effort. Be aware that this document needs to be objective, therefore the commitments should be informative and not negative nor downplayed.

Components:

Did you know.: These are some interesting facts to quickly highlight some aspects of the

The image shows a screenshot of a document page titled "Introduction" with a dark blue header. The page content includes a short introduction paragraph and a table of contents. Three callout boxes with arrows point to specific parts of the page: one to the introduction paragraph, one to the table of contents, and one to the "Release date" in the top right corner.

Short introduction on the purpose of this document and the executing stakeholder

Table of contents for easy navigation. With the digital version you can click on the section to get directed to the page

Date reminder

Introduction
Release date: 13-3-2025

Whether you are a potential new keeper or a more experienced ball python owner, Royal The Best You Can will support you in understanding and caring for the ball python. This document is developed by Herpetofauna, an organization dedicated to reptile education, research, conservation, and fostering connections within the reptile industry. This reptile profile is grounded in scientific knowledge and goes beyond the basics, showing how to provide optimal care that respects the python's natural behaviour. With this document, Herpetofauna aims to help you create an environment where ball pythons don't just survive, but thrive.

| | |
|----------------------------------|-----------|
| Before you buy | 3 |
| The ideal set-up | 4 |
| Handling & behaviour | 5 |
| Feeding | 6 |
| Health check | 7 |
| Health issues | 8 |
| Summary | 9 |
| FAQ & Problem solving | 10 |
| References | 11 |

commitment and considerations before buying a ball python. It aims to spark interest in learning why preparation is necessary before buying and to provide engaging information.

Prepare for care: This section focuses on preparing both mentally and physically for getting a ball python. It discusses the necessary commitment, such as the time and finances. But it also mentions practicalities such as that the terrarium should be prepared before you buy the ball python, or what morphs are harmful.

How to find your ball python?: This part is first of all discusses the legal considerations. Mentioning that a CITES transfer declaration emphasizes the fact that this reptile is not just a regular pet. This section also explains how to find a responsible seller, and lastly, mentions the importance of captive-bred. While captive-bred ball pythons are more in demand than wild-caught, it is still important to highlight the importance.

Checklist: The final component is the checklist. Potential buyers can take a look on whether they are ready for a ball python, on the commitment and practical preparations.

Tensions and dilemmas

Tone of voice: Downplaying vs Warning

This tension is similar to a tension in the persona. It should encourage awareness and reflection, without being judgemental. Talking negatively about ball python keeping will lose the reptile profile important distributors such as sellers and fairs, but it should also not downplay the consideration on buying a ball pything. Therefore the tone must be factual.

Reptile Shelter Placement

Reptile shelters are a responsible place to acquire ball pythons, especially for those looking to rehome older animals. However, highlighting shelters too prominently may deter certain distribution channels, such as breeders or shops. To balance this, shelters are included under the tip suggesting older snakes, while all relevant sales channels are neutrally listed under 'How to Find Your Ball Python'.

Checklist Simplification vs Depth

The checklist offers a quick way to reflect on readiness, but it risks being used as a stand-alone test. Responsible reptile keeping requires a

level of nuance that is difficult to capture in a few tick-boxes. Nonetheless, the checklist remains a useful tool: if all boxes are ticked, even without reading the document, the reader is likely well-prepared.

Using Seller Red & Green Flags

The use of red and green flags is intended to help future keepers assess sellers. However, there is a risk that sellers who recognise themselves in the red flags may choose not to share or distribute the document. At the same time, this component can also function as a motivator: encouraging sellers to meet the green flag standards. If embraced, Royal: The Best You Can can become a symbol of responsible selling, where providing this resource becomes a sign that a seller is committed to transparency and reptile welfare.

Chapter introduction for easy navigation

Reflect before you commit

Thinking about getting a ball python? Lets discuss what you need to know beforehand!

Making the reader reflect on their life to think about whether a ball python fits

Did you know..

- a young ball python can stay with you for over 10th of your life!
Lifespan: 20-40 years
What does your life look like in 10 years?
- there are over **7000** morphs! Not all are healthy. Do your research!
- this royal python has a **Near Threatened** status on the IUCN Red List, mainly due to poaching.
Make sure your royal is responsibly sourced!

Emphasizing the importance of responsible sourcing of ball pythons

Prepare for care

Getting a ball python is a commitment, and it will be your responsibility to meet their needs. Are you ready?

Getting a ball python from a reptile shelter is a good option. This highlights the possibility in a way that does not directly compete with most reptile sellers, to minimize friction with sellers endorsing this reptile profile.

- Time** (clock icon): Where do you see yourself in 5/10/20 years? Does a ball python still fit in your life?
Tip: You can also adopt an older python at a reptile shelter!
- Money** (dollar icon): Initial costs: Snake, Enclosure, ...
Monthly costs: Energy, Food, ...
- Morphs** (X icon): These are some common but harmful morphs: * ... * ...
QR code: Scan the QR to check for morphs.
- Terrarium** (X icon): Your terrarium needs to be ready and running before you buy a ball python. **Learn in section 4 'The ideal set-up' how!**

The document should emphasize that getting a ball python is not just for fun, but also a responsibility

It is best to have the terrarium already running before buying a ball python. Use this to reference to the set-up page

How to find your ball python?

You can get a ball python through ... always get a **CITES transfer declaration** this ... You can get a ball python at reptile shops, fairs, online marketplaces, but also at breeders directly or at a reptile shelter...

Seller green and red flags

- | | |
|---|---|
| <ul style="list-style-type: none"> Only captive-bred reptiles Doesn't sell harmful morphs | <ul style="list-style-type: none"> No background information Dirty enclosures |
|---|---|

Go for captive-bred

- Think about the biodiversity and Royal in the wild
- Don't support illegal trafficking
- ...

Checklist

- I can care for a ball python for as long as it lives
- I don't need an interactive animal
- I can afford the set-up
- And the ongoing costs
- I know a potential reptile seller
- I know how to care for it
- I am comfortable to feed rodents
- I know a responsible breeder
- The enclosure is prepared
- I know a nearby reptile vet
- I will take the responsibility to care for my reptile and fulfil their needs

A QR-code to direct to a website where you can fill in your (preferred) morph and see whether there are any known issues

A checklist for a proper reflection on readiness for a ball python. Reflecting on the commitment such as care-time and costs, practicalities such as feeding rodents and enclosure set-up, and a reflection on taking responsibility for your purchase.

Highlighting the transfer declarations and explain the different type of sellers.

Creating green and red flags for sellers, also stimulates the sellers to adhere to these expectations. These flags should be objective and attainable for sellers.

Despite the relative low demand for wild-caught ball pythons, it is still an impact topic to mention

4. The ideal set-up

Goal: Accessible up-to-date knowledge on ball python enclosures, create awareness on the costs of a ball python set-up, stimulating enrichment and terrariums over racks

The enclosure set-up place a major role in ball python care, but also in the enjoyment of ball python care as highlighted in design scope 5. Enjoyment of ball python enclosure care. Organizing and improving the enclosure is fun and has a calming effect on keepers according to the contextmapping. A 'living painting' can be created in home. However, keepers sometimes have difficulty in understanding how to properly set-up this enclosure and don't know what information they find is true or false. This page will offer the latest information, with sources, on what a ball python enclosure needs, what it costs, and highlight some important bottlenecks in reptile keeping. This document should focus on the *optimal* ball python enclosure, not the minimum needs.

Components:

A rack or terrarium?: One of the main controversies in ball python keeping is the use of racks. They are widely used in the hobby, yet recent research indicates that these enclosures do not meet the needs of ball pythons, let alone contribute to the goal of making them thrive rather than merely survive.

Enclosure set-up: This component should discuss what an ideal set-up looks like, focusing on key elements such as the enclosure type, climate control, monitoring, and the environment. This should give clearly and concisely the important information, with possibility to go more in-depth online. As this document focuses on going beyond the basic needs, important but not always common elements need to be clearly stated, such as multiple hiding spots and thermogradient.

What does the set-up cost: Necessary practical information that is crucial to new ball python keepers. This does not focus on the monthly costs as the 'Reflect before you commit' section, but solely on the costs of the set-up and its accessories.

Natural and enriched?: This is another topic which is currently overlooked in the reptile and especially ball python sector. This needs to be its

own component as this is the core to creating an environment in which ball pythons thrive rather than survive. While this section will mention bioactive terrarium, it is not the goal to stimulate people to immediately start this type of terrarium. Such a terrarium is feasible, but difficult to create and maintain. This might result in people starting, but eventually neglecting the enclosure due its complexity. However, it is a great topic to reference to and inspire readers to go more in-depth, but is not crucial information to be explained on the document itself.

Tensions and dilemmas

Optimal Care vs Feasibility and Overcommitment

This section encourages keepers to go beyond minimal standards and aim for enriched, naturalistic enclosures. While this can improve welfare and keeper satisfaction, it also creates a tension: for beginners, these recommendations may feel overwhelming. Introducing concepts like bioactive enclosures can inspire improvement, but also risk leading to overcommitment if keepers attempt complex setups without the required knowledge or resources. This can lead to frustration or enclosure neglect, eventually negatively impacting the reptile's wellbeing. The document mitigates this by framing bioactive setups as aspirational, not essential.

Simplicity vs Scientific Credibility

To remain accessible, the page simplifies topics like thermogadients, humidity control, and enclosure layout. However, responsible reptile keeping is rooted in scientific knowledge, and oversimplification could risk losing important nuance. The tension lies in presenting scientifically accurate care guidance in a way that remains easy to understand, especially for beginners, without compromising credibility. In this document the information is given direct and simplified, but the QR codes offer the opportunity for readers to go more in-depth.

What costs to show

The section includes a rough estimate of one-time setup costs to raise awareness of the financial commitment. This is important information for the reader and also to reduce impulsive purchases. However, costs vary significantly depending on the type of equipment, supplier, and desired enclosure type. This creates a tension around how to present a representative cost estimate. It is important to create a realistic image of reptile

keeping, and reptile care experts should strive for a realistic number—neither lowballing nor overselling it.

5. Handling and behaviour

Goal: Create awareness on the risks of handling, help keepers understand the behaviour of their ball python, and give examples of when handling is necessary

To properly care for a ball python, it is important to understand their behaviour and how to handle them. Ball pythons are highly stress sensitive animals, and wrong or too much handling can

heavily impact their well-being. Stressed ball pythons do not eat and are more susceptible to diseases. However, at the same time handling is important to monitor the health of your ball python, or to complete other functionalities such as cleaning the enclosure. Therefore this section explains how to handle responsibly.

Components

The language of your ball python: This is the first component, to make sure readers first understand what to look out for when handling their ball python. The most common behaviours of the ball python are shown and it is discussed how to

The ideal set-up

When getting a ball python, it is important that you can properly house the animal. Learn here how to set-up the enclosure!

A rack or terrarium?
Recent research...^{1,2} because...
An example of thriving over surviving.

Enclosure

- Optimal size^{1,2} ... X... X...
- Materials^{1,2}: PVC or ... because ...
- Front-opening doors ...
- You need a lock, as ball pythons are escape artists^{1,2}

Climate

- Lighting: Day-night cycle^{1,2} for circadian rhythm
- UVB^{1,2} the latest research shows ...
- Temperature: Temperature gradient^{1,2}
- Warm side: 31-32°C
- Cool side: 24-27°C
- Heat source: **Basking:**
- Humidity: Base humidity: ...
- During shedding: ...

Monitoring

- Temperature: Two thermometers: On the cool and warm side to monitor the thermogradient.
- Hygrometer

Environment and behaviour

- Making space: ball pythons love to hide and feel secure, how many hiding spots on different locations.
- Substrate and burrowing / climbing and exploration / water & soaking / ...

Scan the QR for detailed enclosure insights and an example video.

What does the set-up cost?
~ € ... - € ...

| | |
|-------------|-----|
| Terrarium | ... |
| Heat lamp | ... |
| Decorations | ... |

Natural and enriched?
Natural and enriched environment is becoming more and more important as the research ...

How to enrich? Simulate choice!

- Multiple hides and burrowing
- Different enclosures
- Climbing
- Bio-active
- ...

Bioactive is taking it to the next level! Want to learn more?

While bioactive is a promising and interesting concept, it might be too complicated to new keepers. Mention it for the really enthusiastic keepers, more experienced keepers, or to plant a seed for later in their care journey, but don't market it as essential.

Highlight the recent research on racks vs terrariums and reference to the scientific sources

Focus on optimal conditions, not minimum

Mention highly beneficial supplies as essential, rather than optional

Deepening information on enclosure set-up and an example enclosure

Show very clearly the costs of such a set-up, as this is sometimes underestimated by buyers

Explain where these costs come from. These costs are only for the set-up, not monthly costs, these are discussed in 'Before you buy'

Emphasizing the importance of responsible sourcing of ball pythons

Keep referencing to the sources of information

Use an illustration for the terrariums, as an image would likely be too complex and chaotic to understand, and the terrarium can look different, as long as it fulfils the needs

Mention necessary changes during shedding as well so the keeper won't forget

This section should mention enrichment topics not as optional, but as essential. Furthermore, the hiding spots should be emphasized

Emphasize the importance of enrichment and natural behaviour through the scientific sources. This is a necessary factor to thrive in captivity

recognise and deal with them.

Do not handle..: As mentioned before, ball pythons are stress sensitive and there are times when they should NOT be handled, as this would lead to excessive stress or they might react more aggressive.

How to handle: When the reader understands the behaviour of the ball python and when not to handle, they will need to know how to handle. This is shown through realistic images or with clear illustrations. Use subscript explain the actions and risks, so readers understand what handling a ball python looks like and what steps are necessary.

Do's & Don'ts: The final component is the do's

and don't section. This is a very clear overview on what is important when handling a ball python and what to look out for. It should be able to function as a cheat sheet for ball python handling.

Tensions and dilemmas

Handling vs stress-sensitivity

This is not necessarily a tension in the document, but more rather a tension in reptile keeping. Handling is necessary for enclosure maintenance, health checks, and even to keep the reptile used to being handled. Yet it also stresses Yet it also causes stress to the animal, and incorrect or excessive handling can negatively affect their welfare. Therefore, the document must clearly explain handling, but also ensure that keepers do not do it approach it too casually.

Handling & behaviour | Understand your ball python and handle with confidence & care to keep it stress-free and safe

The language of your royal
Before you can handle your ball python, you should understand what he's trying to tell you.

- Relax**
 - Frequent tongue flicking
 - Gentle contact
 - Calm movements
 - ...
- Stressed**
 - Curled into a ball
 - Trying to hide
 - ...
- Curious / explorative**
 - Loose body posture
 - Calm movements
 - ...
- Defensive**
 - S-shape
 - Hissing
 - ...

Scan the QR to see videos of ball pythons expressing their behaviour and for handling instructions!

DO NOT handle..
Stress from handling can cause issues, so ...

- Right after feeding (risk of regurgitation)
- During shedding (reduced vision, irritation)
- If newly acquired (needs time to adjust)
- If sick or showing extreme stress
- ...

How to handle
Ball pythons are very stress sensitive, and therefore it is important to handle with patience and good hygiene, ...

Do's

- Hygiene
- ...
- ...

Dont's

- ...
- ...
- ...

Callouts:

- By calling it language rather than behaviour it becomes more engaging to learn
- Us realistic imagery to make sure the reader can recognise it in a realistic scenario
- Provide deepening information on ball python behaviour and on handling
- Mention the stress sensitivity of ball pythons, also during handling
- Both real images as well illustrated images are feasible. Real images translate better to real life implementation, but with illustrations it might be easier to understand the actions
- Offer a cheat sheet on what the keeper should do and focus on when handling
- As with all chapters, shortly introduce its value for easy navigation
- Make sure to also mention behavioural cues which might not be visible on the image, like hissing or hiding.
- Mention when not to handle a ball python and repeat the stress sensitivity
- Explain each action and its risks
- And a cheat sheet on what the keeper should avoid and watch out for

6. Feeding

Goal: Stimulate proper feeding, prevent common issues on feeding

After the owner knows how to handle and recognise ball python behaviour, they can try feeding their ball python (when the time is right). Ball pythons are known to be difficult eaters. They can go weeks or months refusing to eat, which can stress the keepers. While a short refusal of food is common for ball pythons, when they noticeable start to lose weight it becomes problematic. Therefore, good feeding practices are important to have healthy ball pythons.

Components:

Eating habits: The first component explains the eating habits of the ball python. It is important to understand their nature and how they eat, in order to feed them right. They are for example nocturnal ambush predators, so feeding in the evening would be better than during the day.

The food: The food is of course also a crucial aspect of feeding. Owners need to understand what to give and how much to give. Furthermore, feeding living mice is still quite common, with multiple contextmapping participants doing so. However, it is actually illegal feed living prey in the Netherlands, and therefore this document should endorse frozen rodents as food.

Feeding
 Lorem ipsum dolor sit amet consectetur. Diam volutpat habitant tempus etiam eleifend dui. In cursus dui euismod proin mi ornare sit in amet. Sapien a sed dignissim quam dictum in ut turpis quiaque sit.

Eating habits
 Ball pythons are **nocturnal ambush predators**, meaning they hunt at night and strike when prey comes close. Unlike mammals, they have a slow metabolism, so **they eat less frequently—sometimes refusing food for weeks!** Patience is key. Provide the right-sized rodent and let your snake follow its natural feeding instincts.

The food
 Store in a sealed bag, in a dedicated freezer. Separate from human food to maintain hygiene and freshness!

| Snake size | Prey Type | Frequency |
|-------------------|----------------------|----------------|
| Hatchling (<100g) | Pinky / fuzzy (3-7g) | Every 4-7 days |
| Juvenile (<2g) | ... | ... |
| Sub-Adult (<2g) | ... | ... |
| Adult (>2g) | ... | ... |

Rule of thumb: The prey should be about as wide as the snake's thickest part.

How to feed
 Lorem ipsum dolor sit amet consectetur. Conditimentum turpis nisi ornare non. Eu pharellus leo nibh tempor.

Equipment needed:

- Feeding tongs
- ...
- ...

Refusing food?
 Don't worry, ball python can be picky eaters and can handle long periods of time without food. However, refusing food is often a result from something else. See problem solving on how to find a solution!

Post-feeding care
 #6/ See #40

- ✔ Keep the enclosure peaceful
- ✔ Monitor digestion and behaviour
- ✔ ...
- ❌ Don't handle for 48 hours
- ❌ ...

How to feed: The obvious component of this section is explaining how to feed. This will discuss the equipment needed, and similarly to the 'How to handle' section have realistic images with subtext describing the necessary steps.

Refusing food: As mentioned, ball pythons can be difficult eaters. There should be a section further highlighting this and referencing to solution on what to do when your ball python refrains from eating.

Post-feeding care: Lastly, there is the sections post feeding care. Ball pythons need to be monitored and be left alone after their dinner. If they become stressed, they might regurgitate.

Tensions and dilemmas

Live Feeding: Illegal but Normalised

Feeding live rodents is illegal in the Netherlands and poses serious welfare concerns for both the snake and the prey animal. Despite this, the contextmapping study revealed that it is still common practice among hobbyists, due to convenience and costs, because their reptile prefers living prey, or to stimulate natural hunting behaviour. Fully focusing on frozen-thawed rodents might alienate this part of the audience. However, the decision is necessary: feeding live prey is illegal, and the reptile profile should not stimulate illegal practices, as this conflicts with responsible reptile keeping. The document therefore promotes frozen-thawed feeding as the responsible standard, and it encourages keepers to create behavioural enrichment through alternative measures.

Feeding Refusal

Feeding problems, particularly refusal to eat, are one of the most common and stressful challenges for ball python owners, especially beginners. This is mentioned, but what to do when it happens is not thoroughly discussed. This was a decision to keep the feeding section compact and focus on the feeding process itself. Although this keeps the layout clean and focused, it creates a gap in the support offered to users. The document currently mitigates this by mentioning the issue briefly on the feeding page, but referring to the FAQ & Problem Solving section to address it in more detail.

7. Health issues

Goal: Understand how to recognise a healthy or unhealthy ball python, recognise health issues on time, explain shedding, underline the importance of good care to prevent health issues, highlight the challenge of finding a reptile vet

A healthy and happy reptile is of course the goal of responsible reptile keeping. Therefore, it is necessary to understand what a healthy ball python looks like, and how to recognise issues. Especially the latter might be difficult for ball pythons as they tend to hide their illness well. Furthermore, shedding an important period for ball pythons where they needs slightly alter, this should also be addressed in this section. Furthermore, reptile and ball python health issues are often related to improper husbandry and therefore it should be emphasized that prevention is better than treatment.

A healthy royal: This should explain what a healthy ball python looks like and how they behave. It highlights what the owner strive for in their ball python, a healthy weight, shiny scales, clear eyes, etc.

Shedding: Ball python needs and behaviour change during shedding, and therefore it is important to devote a section to this topic. It should explain how to recognise shedding early on, and what to do during shedding, such as increasing humidity and less handling. This section must be before health issues, as this is likely the most common issue ball python behaviour or looks change.

Health issues: After the shedding, health issues are explained. Realistic imagery makes the issues easy to recognise, and for the common issues it should be discussed what causes it, what might mitigate the issue, and whether a vet visit is necessary.

Prevention is better than treatment: Reflecting on the fact that most health issues arise from improper husbandry. Therefore, keep your care the best you can, and when there are issues with your ball python, make sure to reflect on your husbandry.

Finding a veterinarian: The final section explains the difficulty of finding a reptile vet and gives

A warning beforehand on the challenge of detecting illnesses, to highlight the importance of keepers paying attention

Health check

Lorem ipsum dolor sit amet consectetur. Tempor in feugiat sed sit facilisi. Posuere volutpat ac lacus interdum nibh du. Volutpat diam amet consequat nisi.

Ball pythons hide illness well so early detection is crucial. Therefore you should:

- Regularly do a health check (each ...)
- Observe changes in behaviour and appetite

Better safe than sorry, visit the vet!

Some keepers tend to visit the vet too late, therefore remind that you are better safe than sorry

Besides what a healthy ball python looks like, it is also important to recognise how it behaves

A healthy royal

Let's recognise what a healthy ball python looks like

Behavioural cues

- Normal feeding habits
- Normal breathing
- Active at night
- ...

Healthy skin

- Smooth shiny scales
- ...

Spurs

There are around four legs!

- Clean

Eyes

- Clear
- ...

Body

- No visible spine
- No fat rolls
- ...

Underweight

Overweight

Also mention spurs. Beginner keepers can become worried when they spot them for the first time, not understanding what they are

Use realistic imagery to make it easy for keepers to recognise

Zoom in and explain key areas to recognise ball python health

While realistic imagery was recommended, for the body additional illustrations might be useful to better understand the differences

Shedding

Shedding is a natural thing for ball pythons, but ...

Recognise shedding

Eyes

- Blue
- ...

Loose skin

- Dull scale
- ...

To-do during shedding:

During shedding ball pythons ... so ...

- Increase humidity
- ...
- ...

Use a similar set-up as the healthy ball python to recognise a shedding ball python

Give a short explanation about shedding

Explain how shedding impacts caregiving

resources on how the keeper can find a vet nearby. Furthermore, it will emphasize when a vet visit is necessary, as sometimes reptile keepers tend to postpone going to the vet.

Simplicity vs Diagnostic Responsibility

While it is important to show common issues and what to look for, there's a limit to how much medical detail should be provided. The document is not meant to replace veterinary expertise. The tension lies in offering enough visual and written guidance to support early detection, without implying readers that keepers can or should diagnose their snake themselves. This is why referral to veterinary help is clearly stated whenever necessary.

8. FAQ & Problem solving

Goals: Discuss common misconceptions and questions, discuss important topics which to not fall in the normal care requirements such as end-of-care



This section will provide information on common misconceptions and questions. It will also focus more on solving problems which keepers might experience. Furthermore, topics which are relevant, but not normal to include in care information are also discussed in this section, such as the end-of-care, what to when you can't care for your ball python anymore?

9. References

Goal: Highlight the science-based reliability of this document

This is not a new chapter, just a second page, so a short summary is not necessary

Health issues

| Issue | Cause | Solution | Visit vet? |
|---|--|--|--|
|  Mites Small black dots moving on snake, soaking in water bowl | Infestation from other reptiles or substrate | Clean enclosure, use mite treatment solutions | ⚠️ Not necessary, unless the infestation is severe |
|  Scale rot Blisters, red or rotting scales | Unsanitary enclosure or damp substrate | Keep dry, sterilise the enclosure, diluted betadine bath | 🚑 Yes, you can treat mild cases yourself, but vet is recommended |
| --- | --- | --- | --- |
| --- | --- | --- | --- |

Use realistic images so keepers would recognise the issues in real life

Use quick reference icons to intuitively understand whether a vet visit is necessary

Finding a reptile vet is not always easy, but there are websites like dierenarts-info.nl which give an overview. This QR brings you to that site.

Highlight the importance of proper husbandry on health issues

Prevention is better than treatment

Most health issues can be prevented through husbandry, ...

Therefore, keep your care the best you can, ...

Give a small reference to the reptile profile name, do the best you can

When there are issues with your ball python, make sure to reflect on the husbandry, ...

Finding a veterinarian

Finding the right vet can be difficult, as not all vets care for reptiles. Use this tool to find a reptile vet near you:



! Emergency vet signs

When in doubt, always go to the vet! Ball pythons hide their illness well, so if you are not sure, let the vet take a look. Signs to visit a vet:

- ! Rapid weight loss or refusing food for months (not seasonal fasting).
- ! Lethargy, weakness, or lack of response to handling.
- ! Swollen mouth, infected scales, or pus.
- ! Open-mouth breathing, wheezing, or prolonged soaking.
- ! Sudden changes in behaviour.

Highlight that sometimes vet visits are necessary. Ball pythons hide their illness well, and therefore keepers sometimes visit the vet too late

Use quick reference icons highlight critical situations

This page will show the scientific resources used for the creation of this document. It is mainly to demonstrate the reliability of the document, but also an opportunity for reptile keepers to dive into the scientific rabbit hole.

9.4 Reptile demand

The client's primary focus is on reducing demand for reptile pets, not responsible reptile keeping. This created a fundamental tension within the project. Stimulating responsible reptile keeping through information may also make reptile keeping more accessible and appealing, potentially lowering the threshold for new keepers.

This stimulation of responsible reptile keeping through information is what the concept Royal:

The Best You Can encourages. It mitigates impulsive purchases in the pre-purchase phase, promotes ethical decision-making in the purchase phase, and improves care quality beyond its basic needs in the care phase of responsible reptile keeping. Presenting this information in a clear and engaging way may unintentionally make reptile keeping seem more manageable, or even inviting. The market for reptiles is growing, and introducing a polished, accessible reptile profile could further reduce perceived barriers to entry.

However, the reptile profile does not simplify care toward minimum standards, it sets a higher bar. The concept frames optimal care as the baseline, showing that responsible keeping is more complex and effortful than often presented.

As a result, Royal may in fact raise the barrier to entry for new keepers by making clear what true commitment entails. It highlights that reptile keeping is a responsibility, not just a hobby.

Framing Ownership as Effortful, Not Effortless

To counteract the risk of stimulating demand, the document carefully avoids glorifying ball python keeping. The name Royal: The Best You Can explicitly reflects that ownership is not easy, but requires ongoing effort and reflection. The persona section highlights less attractive characteristics (e.g. hiding, nocturnal behaviour), and practical challenges such as feeding, enclosure setup, and lifespan are introduced early in the document. The tone is motivating but grounded in realism. The Reflect Before You Commit section and persona are designed specifically to prompt self-assessment and reduce impulsive purchases, which is the most harmful type of demand.

Nonetheless, this is a critical tension that requires ongoing attention. Making high-quality information accessible can improve welfare, but also make keeping reptiles seem more attainable. This risk is mitigated by maintaining a factual, grounded tone of voice and focusing on the demands of optimal care. This emphasis on optimal care raises the bar for starting with reptile keeping compared to traditional caresheets, as it highlights the complexity of responsible ownership rather than the minimum requirements. The reptile profile does not advertise a pet, it presents a commitment. As shown in the persona dilemma, the goal is to engage the reader, not spark desire.

Feasibility

The project is achievable due to Herpetofauna's connections and expertise. The organisation already possesses the knowledge and scientific foundation needed to develop the care sheets. However, Herpetofauna would need to collaborate with interaction designers to further refine the template. While this would incur initial costs, it is likely that Herpetofauna could allocate resources for this as a foundation. The design itself is feasible, and distribution through partner channels, as outlined in Section 9.1: Royal - The Best You Can - Stakeholder Map & Channels, ensures effective outreach to the target audience.

Viability

The long-term viability of the concept presents a greater challenge. While ongoing maintenance costs for the care sheet would be minimal after the initial development, expanding the concept to other reptile species would require additional funding. One potential solution is to discuss a small fee with partner organisations using the reptile profile. However, to ensure accessibility for all, this would be very profitable.

To maintain accessibility, Herpetofauna could leverage its sponsorship network for continued support. In addition to existing sponsors and partners, it would be valuable to approach LICG and its supporting organisations for potential sponsorships or partnerships. These organisations include the Ministry of Agriculture, Nature and Food Quality, Dierenbescherming (Animal Protection), Dactari (a cooperative association for veterinarians), and Dibevo (an independent trade association for the pet industry), as referenced in LICG's 2023 annual report.

10. Validation

10.1 Royal in action: Keeper journey evaluation with Royal

To evaluate the potential impact of *Royal: The Best You Can*, this section revisits three keeper journeys from the contextmapping study: a beginner, an experienced keeper, and a hobby breeder. Each example is annotated with intervention points where the concept could have influenced decision-making, knowledge, or care practices. Each journey is analysed across the four phases of responsible reptile keeping: pre-purchase, purchase, care, and end-of-care. The main objective, however, is to assess whether *Royal* could meaningfully reduce impulsive purchases and improve ball python welfare in captivity, which are the two key goals of the concept.

Lotte - Beginner keeper

The first evaluation is with the reptile journey of Lotte (fictional name). She is a beginner ball python keeper with currently one in possession. Figure 42 demonstrates her journey, annotated with moments where *Royal: The Best You Can* could have made a difference.

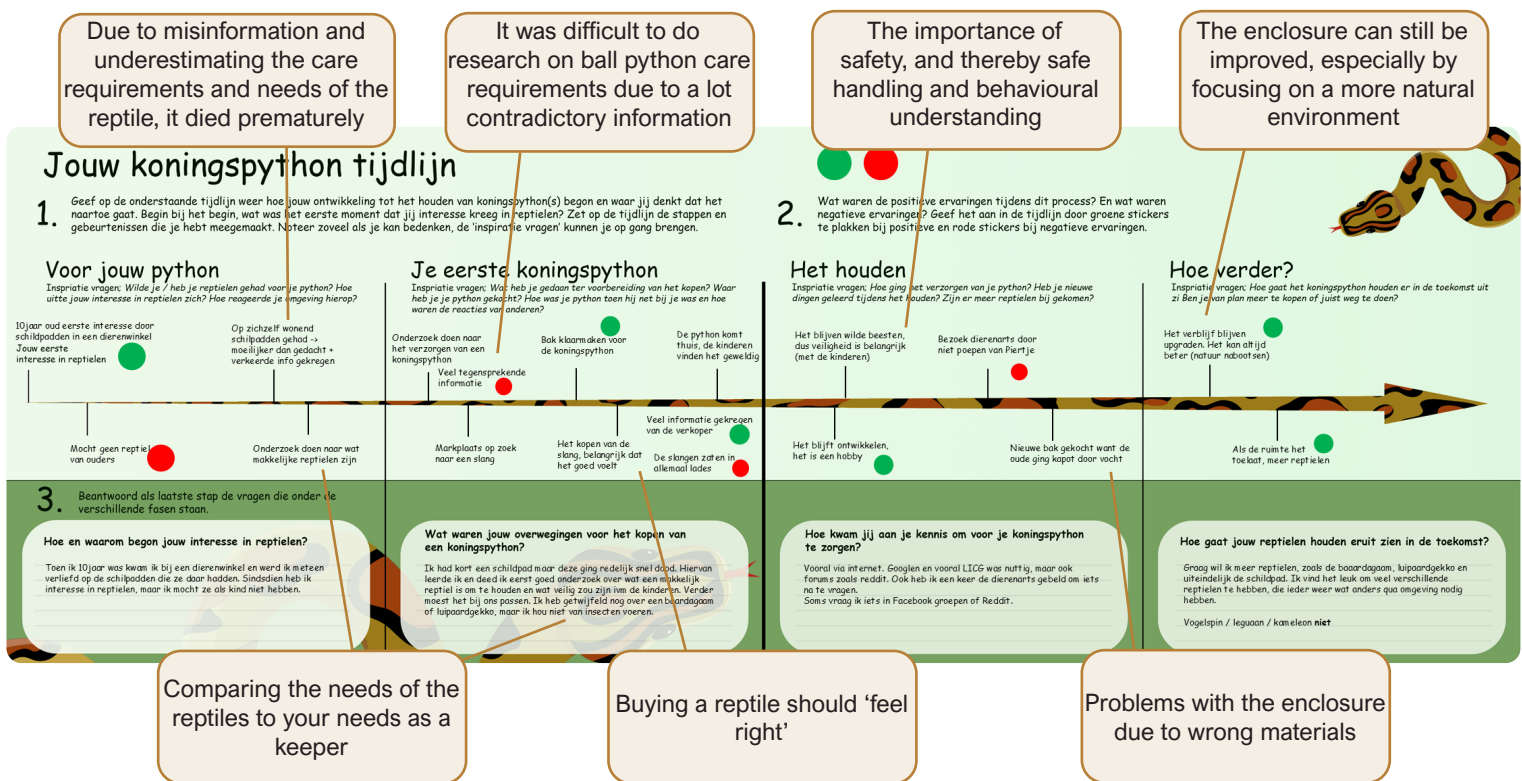


Figure 42: Lotte's reptile journey annotated with moments where *Royal: The Best You Can* could have made an impact

Pre-purchase – Contemplated decision-making

Lotte experienced several difficulties when starting her reptile journey, most of them due to misleading information, a lack of knowledge, and the challenge of finding trustworthy sources. The reptile profile could have made an impact at this time, and prepare her on how to find and care for a reptile responsibly, using science-based and therefore reliable information.

“It's also difficult to find good information on the internet. There are so many different options.” - Lotte

Lotte's first reptile, a turtle, died prematurely, as she underestimated the care requirements and needs of the reptile. Besides information about good reptile care, the animal profile provides a persona which could have helped her understand these needs, and the 'Reflect before you commit' section could have indicated her capability of handling the practicalities and responsibilities of owning such an animal. Perhaps animal profiles such as *Royal: The Best You Can*, could have prevented Lotte to buy the turtle, or could have made sure that it still got the care it needed after purchase.

"We were going to live together and then we thought, well, let's get a turtle. But we really didn't do enough research into what that actually involved. It turned out to be much more than we expected." - Lotte

Purchase – Ethical, legal, captive-bred sourcing

When buying her ball python, Lotte expressed that she doesn't want to support harmful breeding practices. To her it is important that it should "feel right". While this shows a sense of moral awareness, *Royal: The Best You Can* provides practical tools and criteria to assess sellers and find responsibly bred, legally sourced animals. This would have offered Lotte more concrete guidance to support a responsible choice, going beyond intuition alone.

"So I did go there with the idea of getting a snake, but if I'd felt something wasn't right, I wouldn't have done it." - Lotte

Care – Caring beyond the basic needs to survive

After learning from the previous struggles with the turtle, Lotte was determined to improve her preparation for the ball python. She did research on how to house them properly, but despite all her research it was still not perfect and experience learned that the enclosure still contained beginner mistakes, with for example the heating lamps, which could have burned the snake.

"Then we started looking at what we needed to make the enclosure as comfortable as possible. How will we set it up? What fits in the house? You know, that sort of thing. That's how we started. But there are definitely beginner mistakes in that setup, with for example the lights." - Lotte

She also experienced issues with humidity in the enclosure, having to replace it when the original terrarium began to rot due to the moisture. She followed anecdotal care tips and used a material used had not been suitable for the required climate. The 'Ideal Setup' section in *Royal* discusses these enclosure necessities and could have helped her make better material choices from the start.

"And then I read somewhere that if you wanted to keep the humidity high without a humidifier, you should pour water into the corners of your terrarium. So that's what I did. And then the cork background absorbed all the water. It ran all along the sides of the tank, and it ended up leaking everywhere." - Lotte

Lotte is now caring for a ball python and is aware of the importance of safety, particularly because she has children. The 'Handling & Behaviour' section of *Royal* could support her in learning how to handle the animal safely and interpret its behavioural cues, helping to ensure safety for both the reptile and her family.

"What is safe? Again, you have to think about your children." - Lotte

End-of-care – Ensuring life-long care

In the future Lotte wants to optimize the enclosure by establishing a more natural environment. Royal focusses on optimal care over minimal care, supporting such improvements and providing information and advice on this subject.

“I hope, above all, to give him [the ball python] the time of his life here, and that it stays that way for the rest of its life. Definitely.” - Lotte

“Yes, because I do want him to feel comfortable. And I do think it’s going well, apart from that cactus, haha. Of course, he grew up in a drawer, but he still has natural instincts and needs. So yes, it would be great if you could provide a naturalistic environment for him.” - Lotte

Rik - Experienced keeper

The second evaluation focuses on the reptile journey of Rik (fictional name). He is an experienced keeper who currently owns eight ball pythons and might eventually start to breed with them. However, his journey to become an experienced keeper was not without his challenges. *Royal: The Best You Can* could have mitigated several of the issues he encountered along the way, as shown in Figure 43.

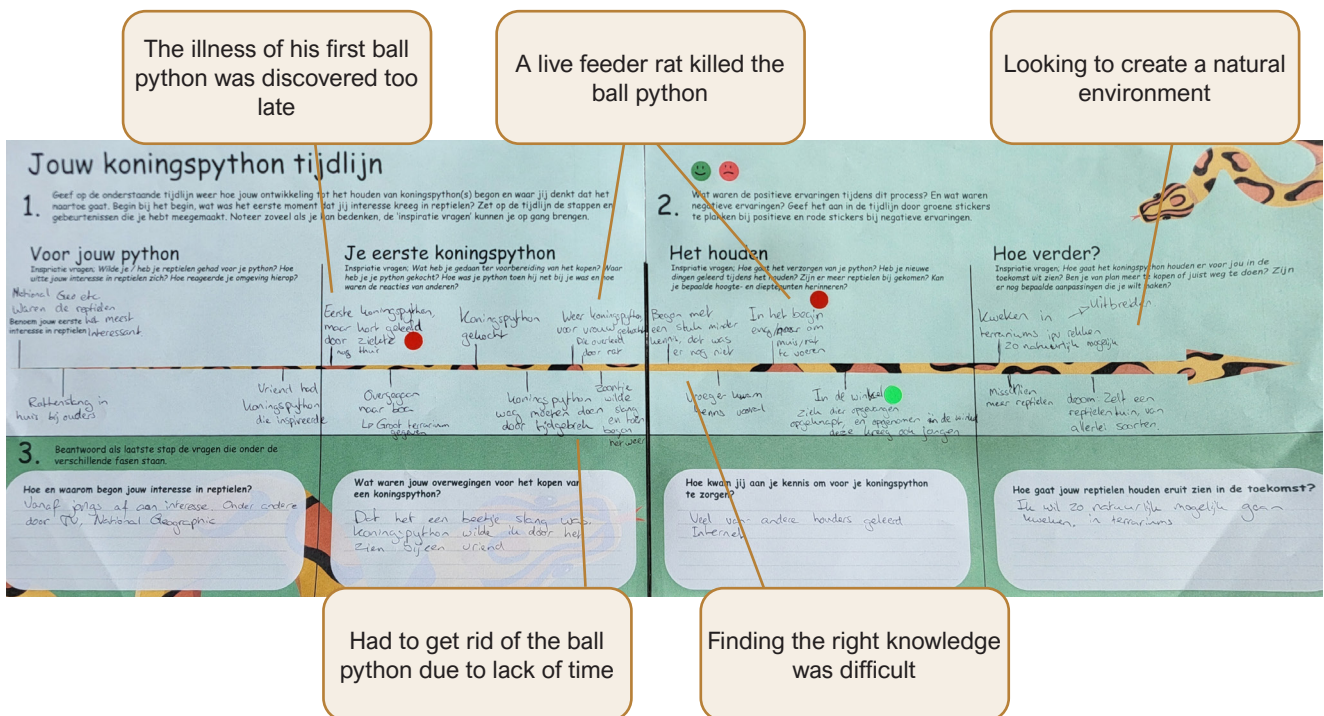


Figure 43: Rik’s reptile journey annotated with moments where *Royal: The Best You Can* could have made an impact

Pre-purchase – Contemplated decision-making

Rik purchased a ball python, which he later had to rehome it due to a lack of time. The ‘Reflect before you commit’ section and the persona could have supported him in understanding the long-term responsibility of owning a ball python. He might have come to the conclusion that it was not the right pet for him at the time, particularly when reflecting on whether he could meet its needs in the near future.

“I just didn’t have the time anymore.” - Rik

Purchase – Ethical, legal, captive-bred sourcing

Rick did not explicitly mention any challenges or relevant choices related to the purchase phase.

Care – Caring beyond the basic needs to survive

Rik's first ball python suffered an illness that went undetected for too long and eventually died. As mentioned in the 'Health check' section, ball pythons are known to hide signs of illness. A structured health guide could have helped him recognise early warning signs and possibly prevented the outcome.

"It turned out that he was actually ill, and he didn't survive. In the end, he only lived for a short time." - Rik

Another of Rik's snakes died due to a bite from a live feeder rat—a riskier method compared to frozen-thawed feeding and one that is also illegal in the Netherlands. Rik mentioned that both of these deaths were largely due to the difficulty of finding reliable care information. *Royal: The Best You Can* could have supported him by offering science-based care guidelines, including information on feeding risks, legal practices, and recognising signs of discomfort or illness in ball pythons. However, it should also be mentioned that these issues happened quite some years ago, in a time-period where there was less knowledge on reptile keeping in general.

"But that one died because of a rat. Back then, I didn't yet know that you shouldn't leave rats alone with ball pythons. And that rat ended up gnawing on the ball python, it actually chewed him down to the bone." - Rik

Currently, Rik owns eight ball pythons and is preparing to breed them. His intent is to do this in a responsible and welfare-oriented way, including keeping the snakes in naturalistic enclosures. *Royal* presents trustworthy information about the ball python's natural habitat and how to mimic these conditions in captivity. Even for experienced keepers like Rik, such resources can support ongoing improvements and more responsible long-term care practices. However, *Royal: The Best You Can* focuses on ball python keeping and not breeding. Therefore, Rik would also need to find other reliable sources for his future endeavour of reptile breeding.

"So I'm like, I want to start breeding ball pythons, but I'd like to try doing it in the most natural way possible." - Rik

End-of-care – Ensuring life-long care

Rik expects to give life-long care to his ball pythons, with a future dream that focuses more on expansion than reduction. As a likely future breeder, he will sell any snakes that he does not keep himself. *Royal: The Best You Can* is unlikely to influence any of Rik's decisions in this phase. He wants to give life-long care to its reptiles, or sell the specimens from breeding.

"My biggest dream is to one day have my own large reptile park, something like a zoo. It might be very ambitious, but that's really what I'd love most." - Rik

Emily - Hobby breeder

The third and final evaluation examines the reptile keeping journey of Emily (fictional name). She has not owned ball pythons for long, approximately two years, but has rapidly expanded her collection and now keeps 17 of them. She has begun to breed with these ball pythons. Figure 44 shows her journey with annotated intervention points.

This evaluation differs from the previous two. Lotte and Rik demonstrated how *Royal: The Best You Can* could have supported and stimulated their transition toward responsible reptile keeping. Emily's case, however, illustrates how the concept might have influenced her decision-making and potentially changed certain directions in her journey altogether.

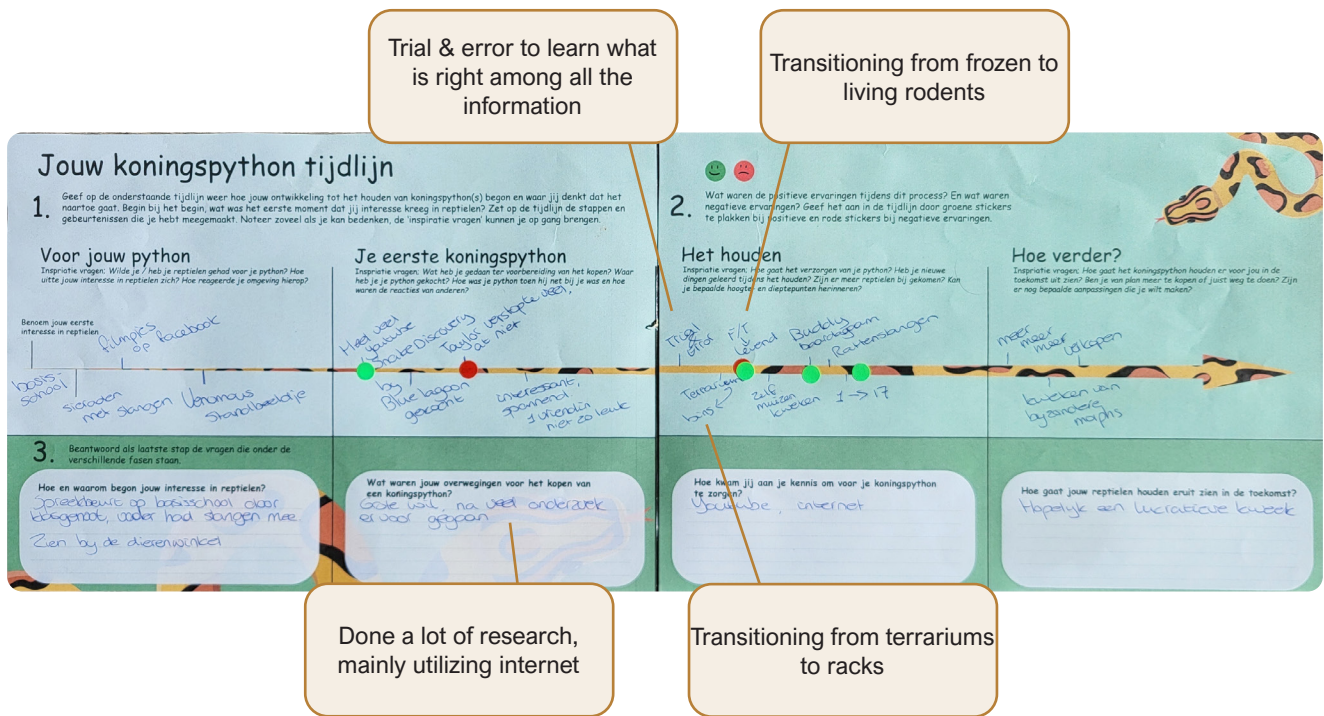


Figure 44: Emily's reptile journey annotated with moments where *Royal: The Best You Can* could have made an impact

Pre-purchase – Contemplated decision-making

Emily started her reptile journey by doing a significant amount of research, primarily through online platforms such as YouTube. Eventually, Emily decided to get a ball python due to their reputation as a beginner reptile. However, while Emily does love the ball python, she did not fully understand the species before she bought one, which led to a little disappointed when she just bought the snake due to their nocturnal nature. This resulted in her buying another species as well. While she did eventually grow past this disappointment, it does highlight the importance of understanding the species you want to care for. The persona in *Royal: The Best You Can* would have warned about this nocturnal behaviour.

“And then you realise that when you have a ball python in a terrarium, it’s mainly the terrarium and everything inside it you’re looking at, not the snake itself. He would only ever come out once the lights were off. That’s why we ended up getting the corn snake as well.” - Emily

Purchase – Ethical, legal, captive-bred sourcing

Emily herself did not have any issues finding an ethical breeder, but she does sometimes feel tempted to buy from unethical sellers. Not because she likes their supply, but because she wants to rescue the snakes from poor conditions. However, she is aware that doing so would support the breeder’s unethical practices. Nonetheless, she recognises that other keepers also struggle with this dilemma and sometimes give in to the temptation. *Royal: The Best You Can* does address this issue, but as Emily was already aware of the impact it would not have changed her behaviour. It could have contributed to awareness and more responsible behaviour among other keepers facing the same challenge.

“Of course, you also see photos of some unhealthy snakes which for example still have a layer of old skin stuck to them. Then there have been a few times where I felt like ‘I’ll make a good deal with the guy’, even if it’s just to help those snakes out a bit.” - Emily

“It’s always called a rescue, but most of the time, it’s just been bought off someone, you know? So it’s not really a rescue at all. ... It’s a bit like the fur trade, really: demand creates supply. If you buy one, it only keeps the cycle going.” - Emily

Care – Caring beyond the basic needs to survive

To understand how to care for a ball python, Emily did online research. However, despite this effort, not everything was clear from the start. Therefore, much of her learning was also done through trial and error. What makes Emily's journey particularly interesting is that she gradually shifted from using frozen-thawed rodents to live feeding, and from housing her snakes in terrariums to a rack system. These changes were largely influenced by her ongoing trial-and-error approach and by anecdotal information she found on YouTube. Over time, this became her preferred method of keeping.

“And that really is a bit of trial and error, like I wrote down. You try something, it doesn't work. You try something else, and it does. And then there are all the tips people give me, try this, try that, try that, and see what works.” - Emily

“Well, yeah, a lot of them, almost everyone in those videos, had their snakes in tubs too. Rack systems, yeah. Brian Barczyk and Futuremorphs, they had those setups with racks. So yeah, I think we did talk about it back then, like... well, it probably can't be that bad then, right?” - Emily

However, these practices conflict with the care philosophy presented in *Royal: The Best You Can*, which promotes frozen-thawed feeding (as required by law in the Netherlands) and prioritises enriched, naturalistic enclosures instead of space-efficient rack systems. The concept could have intervened at this stage by offering structured, science-backed guidance on enclosure quality, animal behaviour, and welfare implications. The visual design and care sections may have provided her with an understanding of why certain practices, such as using terrariums instead of racks, are recommended and could have helped her critically reflect on the anecdotal content she encountered online.

End-of-care – Ensuring life-long care

Emily expanded within two years to 17 ball pythons. She acknowledged that while her snakes are currently still her pets, when the amount of reptiles grow and the purpose shifts to breeding rather than keeping, an emotional distance may grow over time. *Royal* and its persona can help keepers stay aware of the needs and perspective of the ball python to ensure that the animals continue to receive appropriate care. However, at the same time it is debatable whether an experience breeder with over 20 ball pythons will continue to look at the document *Royal* if their goal is financial efficiency in breeding rather than responsible reptile keeping.

“But maybe at a later stage, if we really end up having that many. And then more as proper breeding projects... They're still a bit like your pets, but I can imagine that at some point I'll start seeing it differently, like, we've already used this one so often for that project with those other pythons. Maybe I'd want something different, and then we'd switch things up, you know?” - Emily

Conclusion

Evaluating these journeys from the contextmapping participants demonstrates the impact *Royal: The Best You Can* and similar reptile profiles of other species can have on reptile care. It contributes to the *pre-purchase* phase of responsible reptile keeping and reduces impulsive purchases by reflecting on whether the needs and commitment of the buyer and reptile match. Furthermore, it can greatly improve preparation and mitigate challenges for first-time owners, reducing the risk of premature death among new keepers. It also helps during the *purchase* phase, educating potential buyers what to look for in a seller. *Royal: The Best You Can* will be a safe haven among all the misinformation and anecdotal knowledge in the reptile industry by offering science-backed information. This will greatly support the *care* phase of responsible reptile keeping.

This evaluation demonstrates that *Royal: The Best You Can* could accelerate owner's their journey towards responsible reptile keeping. Lotte and Rik both had the best intentions when buying their

reptiles but still had much to figure out. Royal could have guided them in the right direction, ensuring their ball python thrived as quickly as possible with fewer risks and less trial and error. The evaluation shows that they might still benefit from the knowledge in the reptile profile as more experienced keepers.

Emily took a different path than Lotte and Rik, instead of focusing on creating a more natural enclosure she swayed to racks. Having *Royal: The Best You Can* at the start of their journey might have changed these decisions as she would have a scientific source, rather than anecdotal information from YouTube.

As mentioned in the contextmapping discussion (Chapter 4: Contextmapping - Limitations), there was likely a bias within the participant pool towards the 'better' reptile keepers, as these are more likely to respond to a voluntary response sampling. That such an impact can still be made despite evaluating on a sample group of 'better' reptile keepers only further emphasizes the impact it could have on other reptile keepers.

However, this evaluation also offers insight into missing knowledge in this reptile profile, the breeding. Two out of three evaluated participants mentioned in their future goals breeding, and this topic is not discussed in the reptile profile. This is deliberate, as the document mainly focuses on beginner reptile keepers who should not be stimulated towards breeding. Yet, accessible, scientific knowledge on breeding is still necessary to make ball pythons thrive and this highlights the need for other, more in-depth resources on this topic.

10.2 Stakeholders

To validate the proposed stakeholder roles in the roadmap and concept, a meeting was held with a stakeholder expert from the EU-consortium on exotic pets. the consortium of which the TU Delft research team is also a member. Although the expert noted that her perspective is primarily shaped by work on a European level, meaning she may not be familiar with all Dutch stakeholders, she was well-acquainted with most organisations featured in the roadmap and offered valuable insights.

The expert confirmed that the stakeholder and intervention combinations presented in the roadmap are realistic. This validation reinforces the strategic potential of the roadmap and its alignment with how organisations may act or collaborate in practice. Nonetheless, this validation was conducted through an external party, and for future interventions it is necessary to contact these organisation to determine their willingness to contribute to this journey towards responsible reptile keeping. This meeting confirms the conceptual logic of the stakeholder–intervention combinations, but does not validate whether these organisations are truly willing to participate.

A key insight from the interview was the value of framing the project in terms of responsible reptile keeping. This framing, rather than one focused purely on demand reduction, is more likely to bring together a broader coalition of stakeholders. It opens up opportunities to involve actors that might otherwise remain distant, particularly those who are typically cautious about working with organisations such as animal welfare groups. The expert confirmed that Herpetofauna is a strong potential stakeholder for this reason, as they maintain a broad and respected presence in the reptile community and can act as a neutral connector.

Furthermore, the expert pointed out that this framing could enable collaboration with international organisations such as Responsible Reptile Keeping and Repta, especially if the concept were to be expanded into other countries like the United Kingdom. These actors, who may not be receptive to narratives around demand reduction, could be more willing to engage under the shared goal of improving reptile welfare through responsibility rather than restriction.

Terrafile, the online selling platform, and VHM Events, organiser of the Houten Reptile Fair, were also highlighted as relevant stakeholders within the industry of responsible reptile keeping. This confirms them as crucial distribution and communication channels for the concept *Royal: The Best You Can*,

particularly in reaching hobbyists directly.

Finally, the expert offered strategic advice regarding potential funding models for responsible reptile keeping initiatives. Rather than relying solely on internal funding from the reptile sector, the initiative could also be positioned as a charitable effort. If set up as an official “Algemeen Nut Beogende Instelling” (ANBI), the organisation could receive donations and gifts under favourable tax conditions. Additionally, funding could be sought from other types of organisations, such as the VriendenLoterij, which supports projects with a social or public benefit.

To conclude, the conceptual logic of the stakeholder–intervention combinations is validated, but contact with the stakeholders themselves is necessary to determine the willingness of these organisations to contribute to responsible reptile keeping interventions. Furthermore, the framing of responsible reptile keeping rather than demand reduction opens the door to organisations that might otherwise have been less approachable—a particularly relevant advantage when expanding beyond the Netherlands. Additionally, it is worth exploring funding opportunities outside the reptile industry to support responsible reptile keeping, such as the VriendenLoterij or through the ANBI status.

11. Discussion

This report is intended for the TU Delft exotic pet research team, which is currently collaborating with a European consortium to focus on demand reduction for exotic pets. While the client's goal of demand reduction has been considered in certain stages of this project, the primary focus is on responsible reptile keeping to mitigate the negative impacts of reptile ownership while appealing to a broader range of stakeholders compared to reduction-based strategies. Reptile keeping can provide psychological, physiological, and social benefits, but it also has significant drawbacks. The trade and keeping of reptiles raise concerns about wildlife crime, biodiversity loss, reptile welfare, public health, and invasive species. These issues highlight the need for a more sustainable and responsible approach, prompting the central question of this project: How to stimulate and facilitate responsible reptile keeping in the Netherlands?

Responsible reptile keeping was defined in this project as making the contemplated decision to ensure life-long care for a legally sourced, captive-bred reptile, caring for it beyond the basic needs to survive, but making them thrive through enrichment while keeping the safety of the reptile, you, and the surrounding as a priority. This definition is structured around four phases: pre-purchase, purchase, care, and end-of-care. It can be summarised in the mission: making reptiles thrive instead of survive. The key stakeholder of this project is the reptile pet owner, as the consumer demand dictates the supply in reptile pet industry (Heijligenberg, 2021; Hausmann et al., 2023) and consumer demand influences market dynamics and innovation within industries (Malerba et al., 2007). Ball pythons were selected as the focus of this project due to their popularity, role in the pet trade, and suitability as a representative case to address broader challenges in reptile keeping.

To stimulate and facilitate responsible reptile keeping this project offers three tools to the TU Delft research team. The design scopes, a roadmap, and the concept *Royal: The Best You Can*. These tools carry relevant implications for the integration and further development of responsible reptile keeping.

The design scopes are an overview of the quantitative and qualitative research findings to define key areas where design interventions can contribute to responsible ball python keeping. It provides insight into the context of reptile ownership, while also serving as a structured and research-backed framework to stimulate ideation on responsible keeping. Its effectiveness as an ideation tool was already demonstrated during the first ideation session with TU Delft Industrial Design students, who generated a wide range of ideas to reduce impulsive reptile purchases within just 45 minutes, showcasing its potential value for the TU Delft research team's own ideation process. While four design scopes were used for this project, the other five are also of value to the client, especially scope 4. Responsible breeding and 9. Expressing ball python enthusiasm without stimulating purchase by others. Scope 4 highlights an important topic for the future of reptile keeping, but fell outside the scope of this project due to its focus on private keepers and hobby breeders rather than large-scale commercial breeders. Furthermore, scope 9 can have an impact on demand reduction, which was not the goal of this project, but is very relevant to the goal of the client.

Design scopes

While the design scopes were valuable in guiding ideation, their development also came with challenges. One key difficulty was maintaining depth while keeping the scopes concise. Each scope had to distil insights from literature, fieldwork, and the contextmapping study into a format that was accessible and actionable. This created a risk of oversimplification, where complex or nuanced findings might be condensed too heavily. To mitigate this risk, each design scope was composed of both rich, raw data, such as quotes from the contextmapping study, and interpreted insights, such as the design directions. This structure aimed to preserve the original complexity and richness while also enabling it to fit in a condensed package.

Additionally, while the four prioritised scopes were selected based on their potential impact on reptile well-being and demand reduction, the scope '2. Collecting reptiles and ball pythons'

became relatively underemphasised, especially as the project progressed and got to the proposed concept, *Royal: The Best You Can*. This is partly due to the concept's strong focus on pre-purchase reflection and care improvement, which aligns more closely with scopes 1, 5, and 6. *Royal: The Best You Can* focuses primarily on beginner keepers and thereby emphasises the purchase of the first reptile. However, the contextmapping study showed that beginner keepers could quickly expand their collections and expressed a strong interest in doing so. While focusing on optimal care through the reptile profile would likely still slow down this expansion, as it strives for quality over quantity and therefore becomes more effortful by requiring more time, money, and space (all factors influencing reptile keeping expansion, as identified in the contextmapping study, Section 4.3: Results - Influence on expansion), it does not decrease the desire for reptile pet collecting. This highlights a deeper dilemma within the project: does that desire need to be decreased? Reptile keeping can become like an addiction, enticing keepers to rapidly expand and therefore one could argue that this desire needs to be restrained. However, if the expansion is done while adhering to the responsible reptile keeping definition, that is, being a contemplated decision, ethically sourced, cared for beyond the basic needs, and with life-long care ensured, then the expansion can remain sustainable. Thus, desire itself is not necessarily the problem, but rather the risk that desire leads to an unsustainable "addiction" is. So, while the proposed concept does impact scope '2. Collecting reptiles and ball pythons', it is underrepresented compared to the other design scopes. Nonetheless, it remains a relevant scope and presents an interesting area of focus for a potential follow-up intervention after the concept *Royal: The Best You Can*.

Roadmap

The second tool to stimulate and facilitate responsible reptile keeping is a roadmap. This explorative overview of interventions and interesting stakeholders can inspire the TU Delft Research team in their own intervention development. Besides the inspiration the many interventions can provide, the roadmap also offers inspiration through its horizons. It emphasizes the importance of first establishing a solid foundation for responsible reptile keeping. Currently the needs of reptiles are not always met, as demonstrated by the study from Azevedo

et al. (2021) finding that 85% of its participants did not meet the four basic husbandry needs for reptiles. The first horizon focuses making reliable information accessible and widely available. The second horizon expands this by further focusing on science-based keeping, using proven methods to optimize ball python keeping rather than relying on outdated, anecdotal, or misinformation. This horizon strongly emphasises optimal care rather than minimal care. The final horizon is used to stimulate a contributing reptile community, a community that supports optimising husbandry practices, scientific advancements, and collaborating to improve reptile well-being at a larger scale. By this stage, reptile keepers are not only well-informed but also actively engaging shape an industry focusing on reptile welfare and conservation. As mentioned in the trend research, online communities are becoming an important aspect in reptile keeping, and can be a great channel to stimulate responsible reptile keeping.

The roadmap is currently an explorative overview of interventions and stakeholders, and while valuable, it is a tool for inspiration and not yet a tangible tool for implementation. The stakeholders listed are interesting potential collaborators, but there is no guarantee that they are willing to contribute to the journey towards responsible reptile keeping. It remains a speculative and inspirational roadmap, primarily intended to support the TU Delft research team in their own process. However, there is also potential to develop the roadmap further as a communication tool, one that not only inspires, but actively aligns and convinces stakeholders to engage. There are connections between the interventions among the involved stakeholders, and a more structured or co-created version of the roadmap could facilitate collaboration rather than individual action. Establishing such a collaborative environment will be most efficient to achieve a future where reptiles can thrive.

The concept - Royal: The Best You Can

The final tool to stimulate and facilitate responsible reptile keeping is the concept *Royal: The Best You Can*. This concept is a science-based, visually engaging reptile profile, combining a ball python persona with a care guide to reduce impulsive purchases and improve welfare, with a scalable design adaptable to other reptile species. This concept targets both beginner and intermediate keepers, with a stronger focus on beginners.

Beginner keepers are a key demographic in the growing reptile pet market, and targeting them for responsible reptile keeping interventions promotes lifelong responsible reptile keeping, supports them through the riskiest phase of reptile keeping and prevents impulsive purchases. Stimulating responsible reptile keeping from the start is more sustainable than correcting the behaviour in a later stage. Royal: The Best You Can has an emphasis on the pre-purchase and care phase of responsible reptile keeping, targeting the phases with the greatest potential for improvement in ball python keeping. However, the purchase and end-of-care phase are still present as while, by explaining how to find legal and ethical sourced ball pythons in the 'Reflect before you commit' section and what to when you can't care for your ball python anymore in the 'FAQ and problem solving' section of the concept. When this concept was evaluated on the reptile journeys of the contextmapping participants, it validated its potential impact. The concept can counterbalance misinformation and accelerate keepers towards responsible reptile keeping, reducing impulsive purchases and mitigating harmful risks and challenges in the process. It also validated its continued value to more experienced keepers.

Royal: The Best You Can is a great concept to kickstart the journey towards responsible reptile keeping, as it is an 'information' intervention from the first horizon of the roadmap. This concept contributes greatly to lay the foundation for responsible reptile keeping, and paves the way for more interventions towards expanding science-based reptile keeping an a contributing reptile community.

One of the core challenges in developing Royal: The Best You Can was finding the right balance in tone. The concept is intended to prevent impulsive reptile purchases by promoting realism and critical reflection. However, it also needs to remain engaging and usable, particularly by commercial stakeholders such as reptile fairs and shops. If the tone becomes too negative or judgemental, these important distribution channels may disengage. Therefore, the design had to carefully walk the line between being realistic and warning, while still maintaining a tone that encourages rather than discourages responsible ownership. The concept aims to give guidance with the example template, but in the end it is to the reptile care

experts to complete this challenge when adding the final content to the document.

Furthermore, the goal of the concept is to be scalable, with the Best You Can reptile profiles becoming new term in the industry. The ball python was a strategic choice for the first species-specific profile, given its popularity, captive-bred status, and relatively well-established husbandry knowledge. However, this same strength reveals a challenge to many other reptile species, as they have a less robust scientific foundation compared to the ball python. This raises the question of how to maintain scientific credibility when applying the template to lesser-known species. Nonetheless, even for species with limited data, a structured reptile profile could still provide value. It could even help to stimulate further research by clearly indicating where current knowledge falls short and by framing what information is still needed to meet responsible keeping standards. Moreover, if positive lists become more common within the industry, the number of reptile species kept as pets will likely decrease. As a result, welfare research and improvement efforts could become more focused, enabling deeper development of species-specific care knowledge and more tailored profiles.

Another key tension lies in reducing impulsivity while unintentionally stimulating demand, as also discussed in Section 9.3: Reptile Demand. Royal: The Best You Can aims to prevent rash decisions through empathy and reflection, yet its accessible and visually appealing design may lower the perceived barrier to reptile keeping. This creates a dilemma: making responsible care clearer may also make reptile keeping more attractive. To mitigate this, the concept deliberately avoids glorification. The name implies effort, and the persona highlights less appealing traits and practical challenges. Rather than simplifying care, Royal sets a higher bar by framing optimal care as the baseline. While this may actually raise the entry threshold, the risk of unintentionally broadening appeal through accessibility is a tension that must stay relevant when scaling the concept and even when implementing new interventions.

Lastly, a reflection lies in the dilemma of encouraging responsible care while potentially causing lock-in through investment. Royal promotes optimal care and naturalistic setups, which benefit welfare, but may also increase

financial and emotional investment. This could lead to situations where owners feel unable to rehome or stop, even when their circumstances no longer support good care. While emotional investment can enhance commitment and care quality, if circumstances change due to unforeseen reasons a lock-in may result in keepers holding on to reptiles under suboptimal conditions. The concept encourages reflection before purchase to reduce this risk, but it remains important to acknowledge that promoting effortful care may, paradoxically, make disengaging more difficult. The persona and Reflect Before You Commit sections are designed to counter this by setting realistic expectations early on. This helps prevent keepers from becoming attached to an idealised version of ownership and later feeling “trapped” when the reality proves more demanding. However, this does not include unexpected, drastic changes such as an illness for the keeper. Thus, while this project primarily focused on the pre-purchase and care phases, the end-of-care phase may become increasingly relevant if emotional or financial investment leads to a lock-in mentality.

Together, the design scopes, roadmap, and concept Royal: The Best You Can form a strong foundation for stimulating and facilitating responsible reptile keeping—and offer the TU Delft research team valuable starting points to further shape the future of this field.

Limitations

While this project provides valuable insights into responsible reptile keeping, certain limitations should be considered when interpreting the findings. First of all, the sampling for the contextmapping study was mainly based voluntary response. This likely creates a bias towards the more motivated and better keepers. Therefore, the contextmapping study could underrepresent ball python keepers providing inadequate care, despite their relevance to responsible reptile keeping. However, this bias also emphasizes the value of the concept Royal: The Best You Can, as evaluating this concept on the reptile journeys of ‘better’ keepers still highlighted the many benefits they could have had through the concept. This suggests that its impact could be even greater for keepers providing inadequate care, as they would likely benefit even more from structured guidance and science-backed information.

Another limitation is generalisability. The project focuses on ball pythons in the Netherlands, limiting the scope to allow a deep-dive into the context of reptile keeping. However, as there are little to none stakeholders solely focusing on responsible ball python keeping and since stakeholders and resources primarily address reptile keeping as a whole, aligning the findings with this broader context ensures greater practical relevance, stakeholder engagement, and potential for implementation. Therefore many of the findings and interventions were generalised to reptile keeping. However, these findings might not fully extend to other reptile species which could need different priorities. Nonetheless, by first doing the literature and field research on reptile keeping in general, the project ensured a solid foundational understanding of broader responsible reptile keeping challenges. Therefore the ball python findings and interventions could remain adaptable to broader reptile-keeping practices. Furthermore, the ball python was deliberately chosen due to its leading position in the reptile industry and improvements made for this species can serve as an influential benchmark to positively affect broader reptile keeping practices.

Another limitation due to the scope of the project is excluding large scale breeding facilities. This project uses a bottom up approach by having the end-consumer (the reptile keepers and small scale breeders) as the target group for interventions to drive industry supply, market dynamics and innovation. However, during the project it became clear that responsible breeding is an important factor in responsible reptile keeping. By focusing on reptile keepers and small scale owners responsible breeding can still be stimulated, as consumer demand drives the supply. However, including the larger scale breeders into this project could have been another valuable approach towards responsible reptile keeping. It was not feasible to later on include these large scale breeder in order to keep the project manageable, but it would have been valuable to have deeper insight into how interventions for this stakeholder could contribute to responsible reptile keeping.

The final limitation of this project is that it is still in the proof-of-concept stage, missing certain validation through pilot, user, and stakeholder testing. While Royal: The Best You Can is assessed using the reptile journeys from the

contextmapping participants, additional practical evaluation would have further proven the effectiveness and applicability.

Recommendations

While this project has developed a strong foundation towards responsible reptile keeping, the following recommendations could further contribute to stimulating and facilitating to responsible reptile keeping.

First of all, more research on reptile care is crucial to stimulate responsible reptile keeping. Currently there are still gaps in husbandry knowledge, especially for the lesser known species. While this knowledge is already rapidly improving, it is an absolute necessity to understand what a reptile needs in order to stimulate and facilitate responsible reptile keeping.

Second, is the further development of the Royal: The Best You Can by Herpetofauna and the roadmap by the TU Delft research team. For this further development real-world testing is crucial, as mentioned in the limitations. The concept should be evaluated in real use by keepers, including tests on perceived trustworthiness, clarity and usability, and behavioural impact. Furthermore its impact on impulsive purchases and care quality should be monitored. Eventually, the concept should be further scaled to other reptile species, creating a product line to ensure that all reptiles in captivity receive the best they can. Besides user testing, it is also important to test stakeholder willingness to adopt and distribute the reptile profile, through interviews, co-creation sessions, and/or pilot distribution.

For the TU Delft research team the further development of the roadmap is recommended to create a clear vision consisting of feasible steps on how to achieve their goal. While the roadmap in this project does not completely align with the mission of the TU Delft research team and the European consortium, it can still be utilised as a source of inspiration. The TU Delft research team could alter it to design their own roadmap, highlighting interventions and relevant stakeholders needed to achieve their goal of demand reduction. Developing a roadmap focused on alignment and convincing interesting stakeholders could establish a collaborative environment to stimulate responsible reptile keeping.

Lastly, it is recommended to further focus on collaboration within the reptile industry. The viability of concepts such as Royal: The Best You Can depend on stakeholder engagement, industry adoption, and the integration of science-based practices. By fostering partnerships with breeders, retailers, educational platforms, and reptile welfare organisations, the project can ensure broader accessibility, long-term sustainability, and greater impact in promoting responsible reptile keeping. There is a lot of knowledge among stakeholders, and most stakeholders highly value the reptile wellbeing. A shared commitment to responsible reptile keeping should serve as a foundation for collaboration, to counter the polarisation that can sometimes be present within the industry.

12. Conclusion

This project aimed to stimulate and facilitate responsible reptile keeping, conducted as an assignment for the TU Delft research team, which collaborates with a European consortium working on reducing demand for exotic pets. Rather than focusing on restrictive measures, this project reframes it into using design to encourage responsible reptile keeping, thereby mitigating negative impacts, such as animal welfare concerns, biodiversity loss, illegal wildlife trade, risks of invasive species, and public health risks, while appealing to a broader set of stakeholder compared to reduction-based strategies.

How to stimulate and facilitate responsible ball python keeping in the Netherlands?

It is essential to have a clear definition of responsible reptile keeping in order to simulate and facilitate it. Therefore, based on literature review, stakeholder input, and field research, responsible reptile keeping was defined across four critical phases: pre-purchase, purchase, care, and end-of-care. The core message distilled from this definition is “making reptiles thrive instead of survive”, emphasising informed decisions, legal and ethical sourcing, enriched husbandry practices which go beyond their basic needs, and ensuring lifelong care for reptiles in captivity.

To explore the context in-depth, this project specifically selected ball pythons as a target species due to their significant popularity, prominence in the reptile trade, and suitability for beginners, presenting opportunities to influence market dynamics towards responsible reptile keeping. This choice allowed for targeted, impactful interventions and provided a model potentially applicable to broader reptile species.

Through literature review, field research, and a contextmapping study, multiple design scopes were identified. These are areas where design could meaningfully stimulate and facilitate responsible reptile keeping. The most relevant design scopes were selected for their potential impact on reptile well-being and alignment with the client’s goal of demand reduction. These design scopes are ‘1. Impulsive purchases’, ‘2. Collecting reptiles and ball pythons’, ‘5. Enjoyment

of ball python enclosure care’, and ‘6. Science-based information acceptance and knowledge sharing on ball pythons’.

This project envisions a future where ball python keeping is responsible, where ball pythons thrive. To realise this vision, a roadmap was developed based on interventions developed for the prior mentioned design scopes. These interventions were combined with relevant stakeholders and phased across three distinct horizons. Initially, interventions focus on laying the essential foundation of responsible reptile care. In the second horizon, interventions expand the science-based reptile keeping movement. The final horizon aims to foster a supportive and contributing reptile community which strives to make ball pythons thrive.

From this roadmap, the most valuable and concept chosen was *Royal: The Best You Can*, fitting within the category of ‘information’. This concept is part of the first horizon, and contributes strongly to its goal to lay the foundation for responsible reptile keeping and stimulating the next horizons. *Royal: The Best You Can* specifically targets significant challenges such as impulsive purchases and information reliability. This design aims to ensure potential and current owners clearly understand the demands and responsibilities involved in reptile keeping by providing reptile profiles including a persona and science-backed care information. Evaluating this concept on the reptile journey of the contextmapping participants highlighted the impact it can have on reptile wellbeing. *Royal: The Best You Can* serves as a key starting point for mission to make ball pythons thrive.

This project demonstrates how responsible reptile keeping can be stimulated and facilitated by identifying relevant areas of improvement through the design scopes, inspiring with interventions on a roadmap towards thriving, and introducing a concept that can lay the foundation for this development towards responsible reptile keeping.

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IDE Master Graduation Project

Project team, procedural checks and Personal Project Brief

In this document the agreements made between student and supervisory team about the student's IDE Master Graduation Project are set out. This document may also include involvement of an external client, however does not cover any legal matters student and client (might) agree upon. Next to that, this document facilitates the required procedural checks:

- Student defines the team, what the student is going to do/deliver and how that will come about
- Chair of the supervisory team signs, to formally approve the project's setup / Project brief
- SSC E&SA (Shared Service Centre, Education & Student Affairs) report on the student's registration and study progress
- IDE's Board of Examiners confirms the proposed supervisory team on their eligibility, and whether the student is allowed to start the Graduation Project

STUDENT DATA & MASTER PROGRAMME

Complete all fields and indicate which master(s) you are in

| | | | | | |
|----------------|----------------------|--|----------------------|-----|-----|
| Family name | <input type="text"/> | IDE master(s) | IPD | Dfl | SPD |
| Initials | <input type="text"/> | 2 nd non-IDE master | <input type="text"/> | | |
| Given name | <input type="text"/> | Individual programme (date of approval) | <input type="text"/> | | |
| Student number | <input type="text"/> | Medisign | | | |
| | | HPM | | | |

SUPERVISORY TEAM

Fill in the required information of supervisory team members. If applicable, company mentor is added as 2nd mentor

| | | | |
|------------------------|----------------------|---------------|----------------------|
| Chair | <input type="text"/> | dept./section | <input type="text"/> |
| mentor | <input type="text"/> | dept./section | <input type="text"/> |
| 2 nd mentor | <input type="text"/> | | |
| client: | <input type="text"/> | | |
| city: | <input type="text"/> | country: | <input type="text"/> |
| optional comments | <input type="text"/> | | |

- ! Ensure a heterogeneous team. In case you wish to include team members from the same section, explain why.
- ! Chair should request the IDE Board of Examiners for approval when a non-IDE mentor is proposed. Include CV and motivation letter.
- ! 2nd mentor only applies when a client is involved.

APPROVAL OF CHAIR on PROJECT PROPOSAL / PROJECT BRIEF -> to be filled in by the Chair of the supervisory team

Sign for approval (Chair)

Name _____ Date _____ Signature _____

CHECK ON STUDY PROGRESS

To be filled in by **SSC E&SA** (Shared Service Centre, Education & Student Affairs), after approval of the project brief by the chair. The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total _____ EC

Of which, taking conditional requirements into account, can be part of the exam programme _____ EC

| | | |
|--------------------------|------------|--|
| <input type="checkbox"/> | YES | all 1 st year master courses passed |
| <input type="checkbox"/> | NO | missing 1 st year courses |

Comments:

Sign for approval (SSC E&SA)

Name _____ Date _____ Signature _____

APPROVAL OF BOARD OF EXAMINERS IDE on SUPERVISORY TEAM -> to be checked and filled in by IDE's Board of Examiners

Does the composition of the Supervisory Team comply with regulations?

| | | |
|--------------------------|------------|-------------------------------|
| <input type="checkbox"/> | YES | Supervisory Team approved |
| <input type="checkbox"/> | NO | Supervisory Team not approved |

Comments:

Based on study progress, students is ...

| | |
|--------------------------|--|
| <input type="checkbox"/> | ALLOWED to start the graduation project |
| <input type="checkbox"/> | NOT allowed to start the graduation project |

Comments:

Sign for approval (BoEx)

Name _____ Date _____ Signature _____



Personal Project Brief – IDE Master Graduation Project

Name student _____ Student number _____

PROJECT TITLE, INTRODUCTION, PROBLEM DEFINITION and ASSIGNMENT

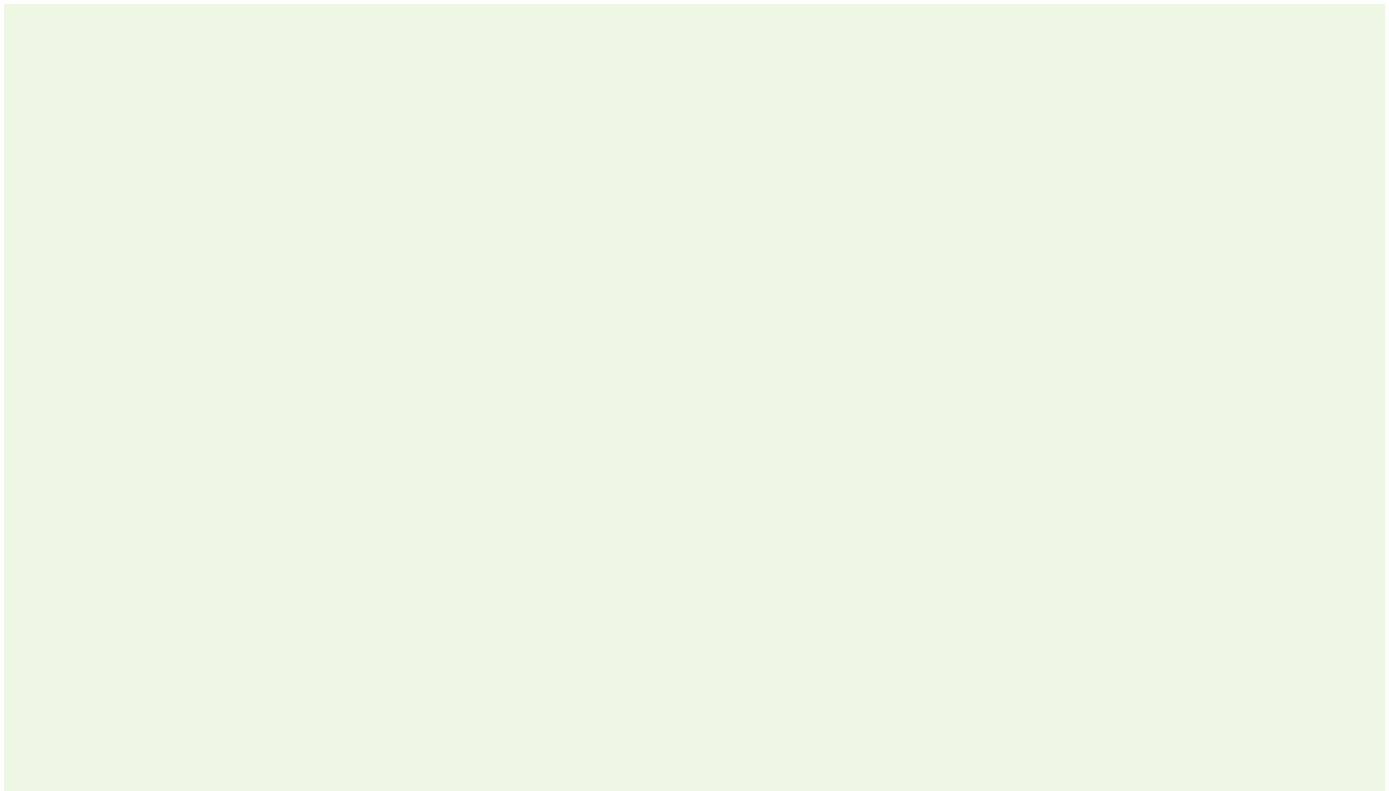
Complete all fields, keep information clear, specific and concise

Project title _____

Please state the title of your graduation project (above). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

Introduction

Describe the context of your project here; What is the domain in which your project takes place? Who are the main stakeholders and what interests are at stake? Describe the opportunities (and limitations) in this domain to better serve the stakeholder interests. (max 250 words)



→ space available for images / figures on next page

introduction (continued): space for images

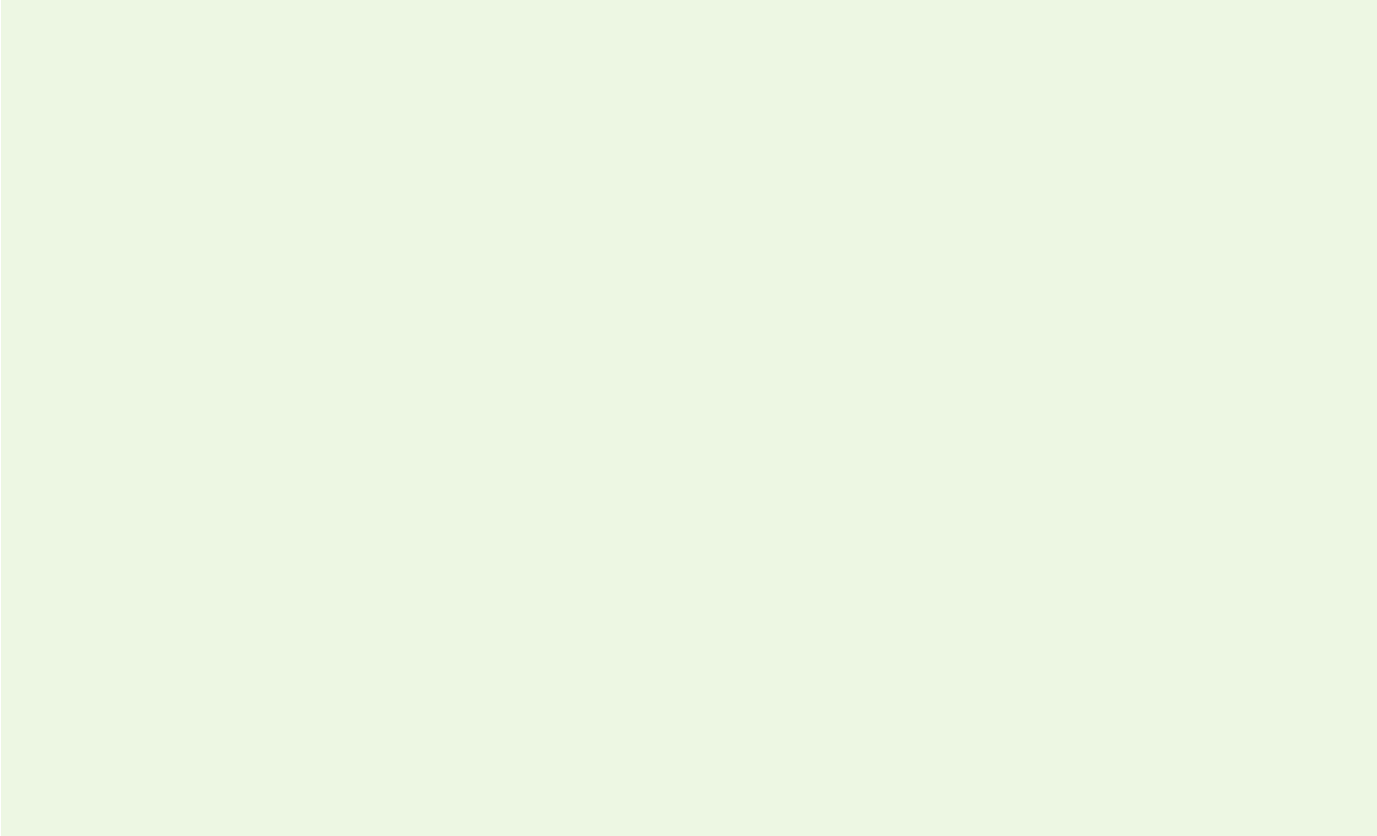


image / figure 1

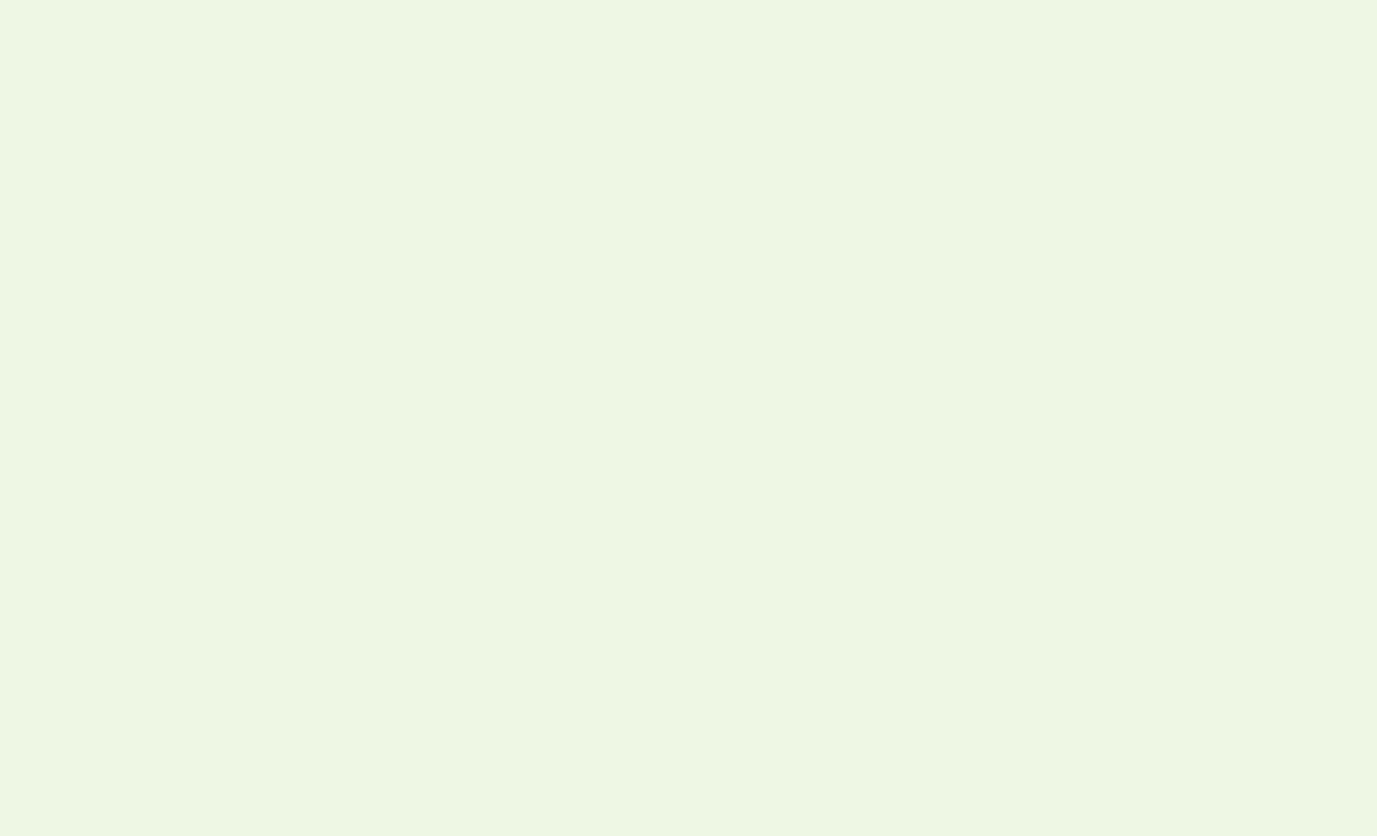


image / figure 2

Personal Project Brief – IDE Master Graduation Project

Problem Definition

What problem do you want to solve in the context described in the introduction, and within the available time frame of 100 working days? (= Master Graduation Project of 30 EC). What opportunities do you see to create added value for the described stakeholders? Substantiate your choice.

(max 200 words)

Assignment

This is the most important part of the project brief because it will give a clear direction of what you are heading for.

Formulate an assignment to yourself regarding what you expect to deliver as result at the end of your project. (1 sentence)

As you graduate as an industrial design engineer, your assignment will start with a verb (Design/Investigate/Validate/Create), and you may use the green text format:

Then explain your project approach to carrying out your graduation project and what research and design methods you plan to use to generate your design solution (max 150 words)

Project planning and key moments

To make visible how you plan to spend your time, you must make a planning for the full project. You are advised to use a Gantt chart format to show the different phases of your project, deliverables you have in mind, meetings and in-between deadlines. Keep in mind that all activities should fit within the given run time of 100 working days. Your planning should include a **kick-off meeting, mid-term evaluation meeting, green light meeting and graduation ceremony**. Please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any (for instance because of holidays or parallel course activities).

Make sure to attach the full plan to this project brief.
The four key moment dates must be filled in below

| |
|----------------------------------|
| Kick off meeting _____ |
| Mid-term evaluation _____ |
| Green light meeting _____ |
| Graduation ceremony _____ |

In exceptional cases (part of) the Graduation Project may need to be scheduled part-time. Indicate here if such applies to your project

| | |
|-------------------------------------|--|
| Part of project scheduled part-time | |
| For how many project weeks | |
| Number of project days per week | |

Comments:

Motivation and personal ambitions

Explain why you wish to start this project, what competencies you want to prove or develop (e.g. competencies acquired in your MSc programme, electives, extra-curricular activities or other).

Optionally, describe whether you have some personal learning ambitions which you explicitly want to address in this project, on top of the learning objectives of the Graduation Project itself. You might think of e.g. acquiring in depth knowledge on a specific subject, broadening your competencies or experimenting with a specific tool or methodology. Personal learning ambitions are limited to a maximum number of five.

(200 words max)

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