1. Introduction

Strava is a mobile app that records fitness activity and enables users, who they refer to as ‘athletes’, to share these activities with their social networks (Strava Inc., 2020). Since the start of the COVID-19 pandemic in 2020, the company has seen a rapid growth in its user base growing from 50 million users in February 2020 to more than 73 million on 16 December 2020 (Strava, 2020f; Noonan, 2020). A slightly similar spike in interest has been experienced by other activity tracking apps, also demonstrated by Figure 1.

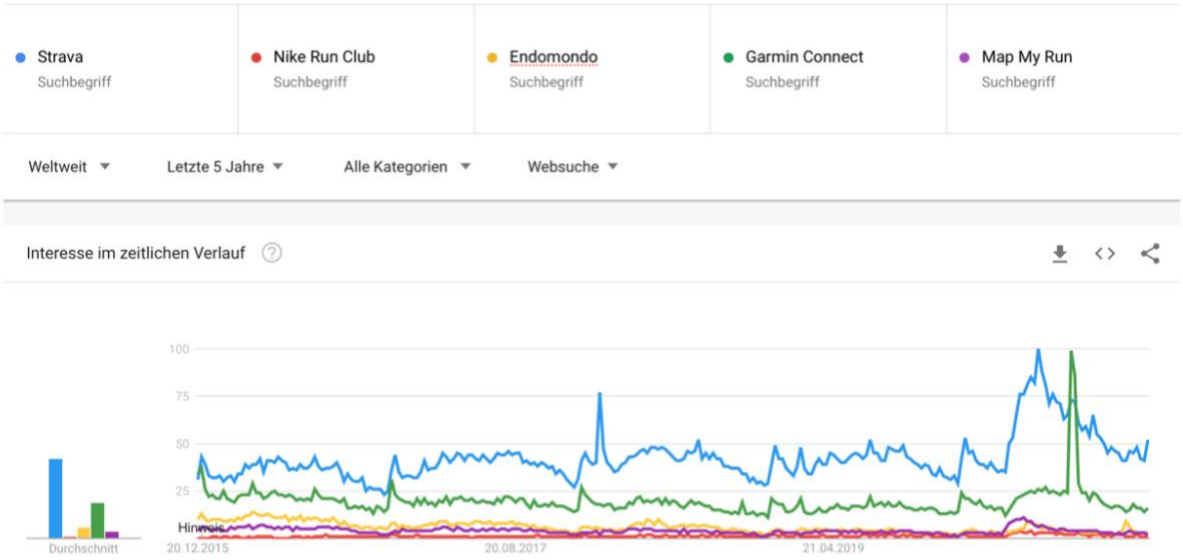

Figure 1. Interest of Google users in activity tracking apps measured in search volumes for brand keywords (Google Trends, n.d.)

The activity recordings are user generated big data and at the core of Strava’s business model (Rose, Jiang and Mangematin, 2017; Trabucchi, Buganza and Pellizzoni, 2017). Essentially, each user’s experience is based on their own activity recordings, which they upload to Strava, as well as their social networks uploads to the platform.

The company has been largely successful in leveraging user generated data for their own platform’s growth (Strava, 2020f). Yet, the company has not yet been on track to profitability in May 2020, when the founders shift from focussing on growth in user numbers to making the company profitable through a premium membership for additional features (Strava, n.d.; Wolff-Mann, 2020, Appendix 2). In contrast to many other organisations in the ecosystem of digital fitness, Strava is not associated with a larger parent company, nor does it offer its own hardware devices for activity tracking. These factors make Strava a particularly interesting case to analyse.

2. Conceptual Framework Analysis

Applying Porter's Five Forces allows for the identification of the various competitive factors Strava faces, thus ultimately determining its money generating ability (Porter, 1980). It is important to apply this model to Strava in order to highlight Strava's threats and opportunities, which it can use to strengthen its strategic positioning.

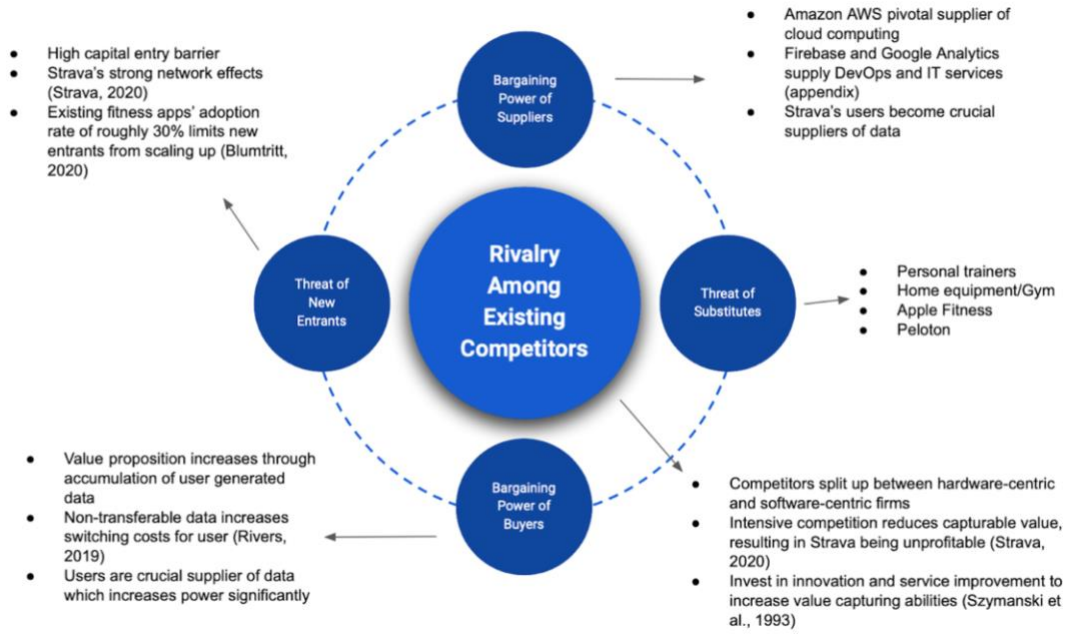

Figure 2. Porter's Five-Forces Application on Strava

1° Contrary to Porter's (2001) argument that the emergence of internet technologies reduces overall barriers to entry, the high-quality software required to enter the market is costly to produce initially and involves high fixed costs (Shapiro & Varian, 1999). Moreover, Strava benefits from network effects inherent in its large and loyal customer base, showcased by over 3 billion activity uploads and user interactions (Strava, 2020c). Furthermore, new entrants are unable to scale operations and compete on the innovation diffusion curve, as existing fitness apps already showcase high adoption rates of 30% (Blumtritt, 2020; Evans & Schmalensee, 2010).

2° For ensuring Strava's digital value chain efficiency, a cloud computing service is necessary to instantly enable access to all important IT capabilities (Cearley, 2010). This is delivered by the most prominent cloud provider, Amazon AWS, reflecting its importance as a pivotal supplier for Strava (Stack, 2020). In addition, Strava is effectively put in a constrained position opposite Amazon AWS, as the costs and difficulties arising from potentially migrating such

services are significant (Moura & Hutchison, 2016). Nonetheless, Strava regains some footing in its bargaining power considering the numerous substitutable cloud providers available.

3° Regarding buyer power, Strava's value proposition improves for users through accumulation of user generated data and adjacent network effects. Accordingly, users' switching costs increase, as activity data is non-transferable app-to-app (Rivers, 2019). Even though this somewhat reduces buyer power, Strava's development is heavily dependent on the continuous supply of such data. Consequently, the existing users account for both positions of buyer and supplier, blurring the lines separating the two forces and thereby, increasing their overall bargaining power.

4° Strava's current threat of substitution (Appendix 1) is very low, as no other type of differentiated product/service offers a similar price-to-performance ratio in satisfying the same activity-tracking need (Karagiannopoulos et al., 2005). This is further reinforced by the extensive amount and scope of data the company possesses (Rivers, 2019).

5° The existing firms currently contending with Strava can be split up into hardware-centric (e.g. Garmin, Fitbit) and software-centric (e.g. Runkeeper, Nike Run Club, Connected Fitness). The intensity with which these many similar sized firms compete results in the market's overall created value being difficult to capture, as is reflected by the market leader Strava's inability to generate profits (Bughin et al., 2018; Strava, 2020a). Therefore, it is increasingly important to reinvest in innovation and improvement of the service as value capture is key for profitability (Szymanski et al., 1993).

Based on the analysis, Strava's successful market position is explainable by its ability to fend off the above mentioned threats. Critically evaluating, Porter's Five Forces only illustrates *current* competitive factors and this static nature limits the ability to incorporate the impact of digitalisation and reflect digital industries' characteristics appropriately (Flower, 2004), as illustrated beforehand by the overlap of buyer and supplier power. Furthermore, the model showcases an exclusively external focus that neglects the internal characteristics of the firm, which should also be assessed for an overall analysis of Strava's success (Rivard, Raymond & Verreault, 2006).

Hence, the paper will next apply the Strategic Application Portfolio (SAP, Figure 3) to critically evaluate Strava's internal resources and capabilities that contribute to overall digital strategy

(Peppard and Ward, 2016). It will go on to analyse the most important applications, classified as “Strategic”, “High Potential” and “Key Operational”, while the rest can be found in Appendix 3.

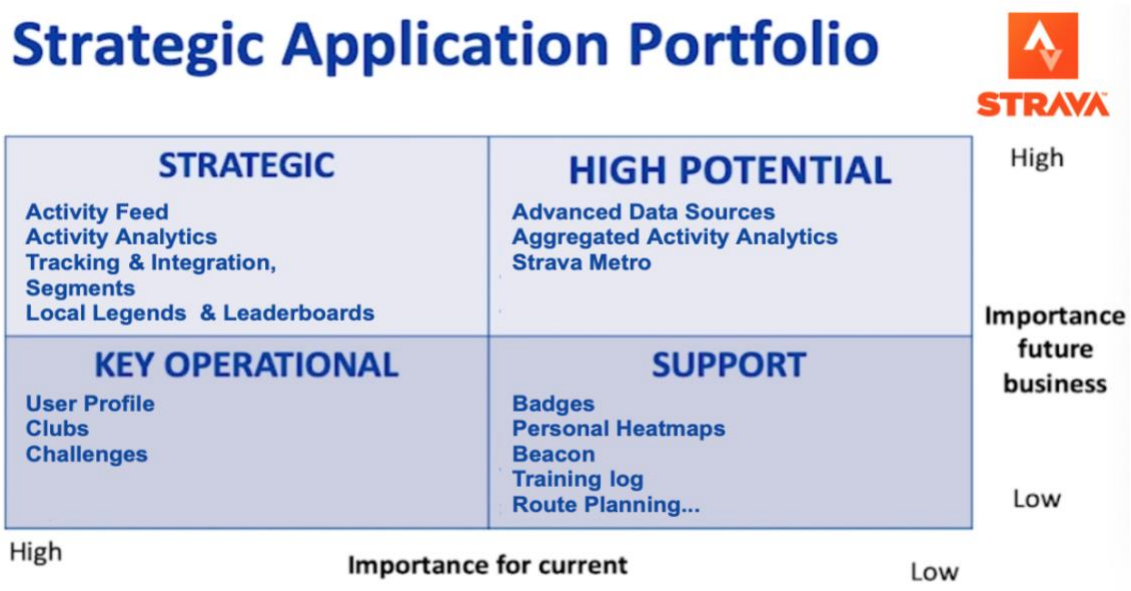

Figure 3. Peppard and Ward’s Strategic Application Portfolio analysis on Strava.

Strategic

Application / Feature	Description & Justification
Activity feed	Shows the activities of an athlete, their social network,activities from their clubs. Also suggests other athletes, clubs and challenges. Pivotal point of the app, since the user starts its user journey here and navigates most of the social / community features of the app from here. The feed offers the possibility for valuable engagement in terms of quantity (i.e. number of activity uploads) and quality (e.g. analytics, pictures, kudos, comments, etc.), as indicated by recent statistics about user generated content (Strava, 2020c). Therefore, the activity feed is important for the current and future business.
Activity Analytics	Enables users to retrieve the most important performance indicators (e.g. distance, time, pace, heart rate, etc.) about their individual activities. These activity analytics are likely to be the major reason why athletes decide to utilise digital activity tracking. Hence, they are very important for the current and future business.
Tracking and integration	Includes tracking through Strava’s app which can be installed on devices or through the devices of other hardware-centric companies. Integrating a variety of data sources is vital as the entire business would not work without the user’s data from these devices. More recently, this also

Segments, Local Legends & Leaderboards	Introduce a competitive element to activity sharing. According to Strava some of the most popular features, with the highest user-engagement times (Strava, 2020a). The competitive nature of many athletes combined with the transparency of these features, encourages higher engagement in real-world (e.g. runs, rides) and virtual activities (e.g. comparing leaderboards). Highly important for current and future business.

Table 1. Analysis of Strategic Applications of Strava

Our analysis of the strategic applications of Strava found that the company successfully leverages elements of an open data integration from a variety of sources and activity analytics combined with social media features, that address the competitive nature of their athletes. This creates the type of 'community' of athletes that Strava is renowned for (see Figure 5). While the activity analytics is what people tend to look for in an activity tracking app, this is highly important as it gets users to first download the app, but it is not a key differentiating factor for Strava. However, according to their most recent focus on developing their products further, stronger analytics features can be expected (Strava, n.d.).

High Potential

Application / Feature	Description & Justification
Advanced Data Sources	(1) Collect more user-related data: hydration levels, blood oxygen and glucose, VO2 max, recovery time. (2) Collect more environmental data: trail, light and weather conditions for different sports (skiing, surfing, sailing). Enhanced features and analytical capabilities for users -> Monetized with subscription offering.
Aggregated Activity Analytics	Yearly analysis of individual performance data (similar to Spotify Wrapped). Allows to recognise trends and patterns, gain relevant insights -> 'Shareability' of these insights can be seen as an element associated with generativity (Zittrain, 2006).
Strava Metro	Utilises anonymised data to help cities improve cycle and pedestrian infrastructure (Staton, 2019). Increased scope of operations -> More value capture and a diversified offering. Utilising big data for public development increases trustworthiness -> Value driver in light of privacy issues with big data (Rivers, 2019).

Table 2. Analysis of High Potential Applications of Strava

Expanding the scope of activities to include advanced data sources as well as aggregated activity analytics creates increased value (enhanced features) that can be captured by monetization via subscription. Furthermore, Strava Metro can utilise its first-mover advantage

regarding city infrastructure development as no competitors are offering a similar service (Staton, 2019).

Key Operational

Application / Feature	Description & Justification
User profile	Visual display of personal fitness data. User-friendly and useful -> spike in activity uploads (Strava, 2020c). Hence, pivotal for the app's current success.
Challenges	Brand-specific competitions. Marketing revenue + incentivises athletes to upload activities more frequently. This feature was increasingly popular in May, as one million athletes participated in Strava's monthly 5K challenge (Strava, 2020c). As they ensure frequent engagement with the app -> part of key operational features.
Clubs	Clubs is a medium created by both athletes and brands through which users can compete, share content and organise events. I Further encourages athletes to upload activities. 250K athletes joining clubs in April alone (Strava, 2020c) showcases their detrimental impact on Strava's success.

Table 3. Analysis of Key Operational Applications of Strava

Strava's key operational features enable maximising user engagement through different mediums, primarily focused on the community aspect and ultimately creating an ecosystem where people engage, interact and compete.

The SAP model allows analyzing internal resources and mapping current and future IT/IS investments. It is important to note that no features are fixed and as the app continues to grow, they may serve a more/less prominent role in digital strategy. In terms of limitations, the SAP does not account for external factors and integrated ecosystem value creation as technology merges between internal and external aspects (Peppard & Ward, 2016). Accordingly, this paper proposes a new conceptual model to account for aforementioned constraints.

3. Improved Conceptual Model

In the age of rapid digitalisation and digital innovation a good conceptual model needs to account for the fact that "traditional business strategy [is being reshaped] as modular,

distributed, cross functional" (Bharadwaj et al., 2013:472). Furthermore, modularity implies that modules of complex products can be built independently (i.e. by different firms), but work well together (Baldwin and Clark, 1997). This requires a multi-sided perspective considering various players in the ecosystem for value creation across the different layers of a product's modular architecture (Trabucchi et al., 2017; Yoo, Henfridsson and Lyytinen, 2010). Therefore, a good conceptual model needs to be a reflection of the modularity, the layered modular architecture and the cross-organisational distributed value creation.

As discussed before, Porter's Five Forces hardly accounts for the complexity of digital technologies. The framework's assumptions for assessing an entire industry from an external view are being eroded, as industry boundaries become increasingly blurry through digital technologies (Frøslev Christensen and Maskell, 2003). Moreover, it assumes that the different roles in the framework are fixed and separated from each other, which is not the case anymore (Bughin et al., 2018). Buyers can be suppliers; competitors can be collaborators in a coopetition-based business model (Ritala, Golnam and Wegmann, 2014). The SAP does not account for value creation between ecosystem players and therefore does not explain a large part of the value creation when these companies collaborate and compete.

For these reasons, we decided to map the main value creating applications (strategic/high potential/key operational) from the SAP onto the layered architecture model (Yoo, Henfridsson and Lyytinen, 2010). At the same time our model leverages ideas from the Open Innovation Paradigm, which advocates idea, data and technology sharing beyond firm boundaries (Chesbrough and Bogers, 2014), which enables the model to help identify opportunities and threats for collaboration and competition. It is a distributed innovation and value creation process that consists of inbound and outbound flows of idea, data and technology (Chesbrough, 2003; Trabucchi et al., 2017). In contrast to the SAP, this model is able to highlight how the value is being created on different layers of the modular architecture through the interaction of players in the ecosystem.

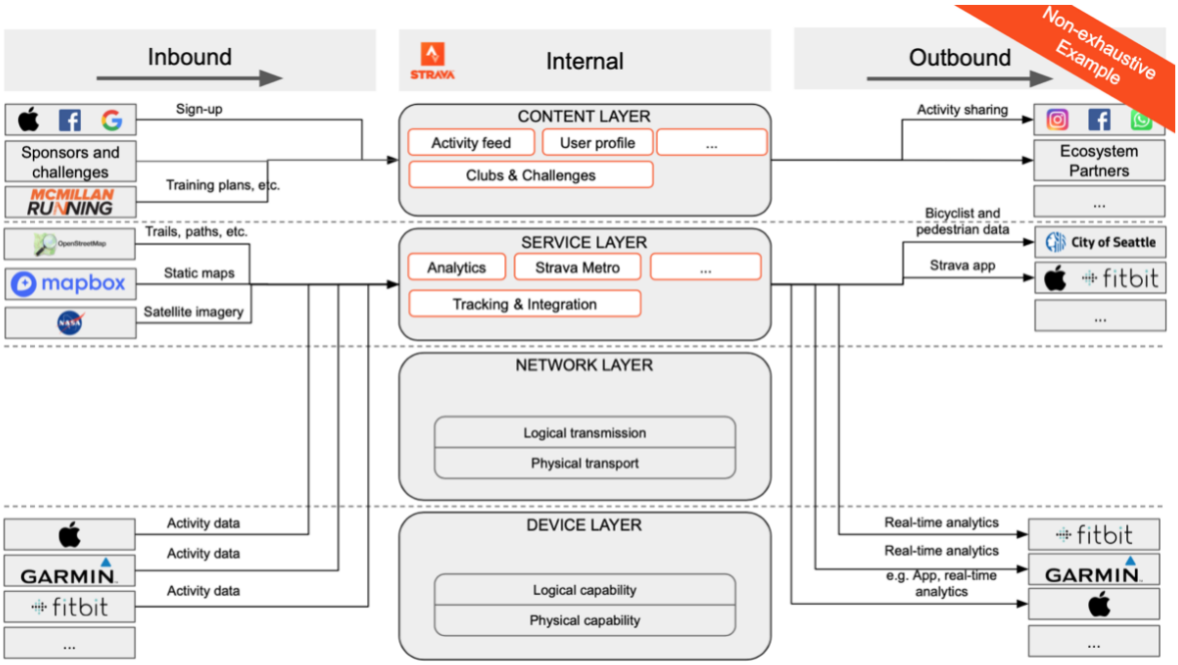

Figure 4: Non-exhaustive applied example of our model, which includes elements from Yoo, Henfridsson and Lyytinen (2010); Trabucchi et al. (2017) and Peppard and Ward (2016)

The model has an explanatory power to explain the successful value creation of Strava by leveraging co-opetition with other ecosystem players. In addition, it has managerial implications as it helps managers identify opportunities and threats from inbound and outbound value creation.

4. Competitive Analysis with Nike Run Club

According to Barney (1991), the concept of sustained competitive advantage relates to a firm implementing a distinctive value creation strategy not replicable by current or potential competitors over time. Furthermore, Peppard and Ward (2016) argue that sustained competitive advantages result primarily from internal company resources being simultaneously valuable, rare, inimitable and non-substitutable. Consequently, this paper assesses the fundamental differences in value creation strategies of Strava and Nike Run Club (NRC) that are enabled by the resource of user generated big data (UGBD). NRC has been chosen as the subject of interest as another software-centric fitness app with a different focus of operation, concentrated primarily on the internal Nike brand ecosystem. In order to evaluate competitive advantage and its sustainability, three key aspects are considered: value creation for (1) end-users, (2) partners within the ecosystem and (3) external parties (Trabucchi *et al.*, 2017).

To begin with, companies can leverage user generated big data to increase value delivered to the final users, as they receive enhanced services and features (*ibid*). In order to examine the main value creating characteristics of Strava and NRC, a keyword analysis of respective company websites is summarised below.

Figure 5. Strava's keyword analysis

Figure 6. NRC's keyword analysis

Based on the analysis, a key difference can be observed regarding the target market, as Strava is catered towards a community of athletes while NRC offers guided runs and coaching to casual runners. This indicates a dissimilar strategic information application, as Strava highlights comprehensive activity and performance analysis as their main value-creating activity (Strava, 2020a). Conversely, NRC derives value from understanding user preferences and consequently recommending workout plans and cross-selling other Nike products and services (Alger, 2019).

Building on the last point, UGBD can foster value creation with ecosystem partners in adjacent activity chains (Trabucchi *et al*., 2017). Strava's and NRC's primary partners are summarised below.

Figure 7. Strava's ecosystem analysis

Figure 8. NRC's ecosystem analysis

Strava offers business solutions (clubs and challenges) that foster mutually beneficial value creation with brands from different areas of health, fitness and sports (Rivers, 2019). In comparison, NRC's ecosystem partners are mainly limited to Nike, itself (Nike Training Club, online/physical stores), implying a less multi-sided perspective (Trabucchi *et al.*, 2017). Hence, it can be argued that Strava's scope of operations is larger and more differentiated, leading to greater long-term scalability prospects and sustained competitive advantage. However, it is important to note Nike's partnership with Apple Watch as a unique strategic asset.

As seen from Figure 7, Strava utilises a third value creation strategy with Strava Metro by selling anonymised data to municipalities and departments of transportation, subsequently, helping cities improve cycle and pedestrian infrastructure (Staton, 2019). NRC does not possess an analogous resource.

The aforementioned points regarding Strava's sustained competitive advantage are reviewed below in the comprehensive VRIN analysis regarding the resource of UGBD.

Figure 9. Strava's VRIN analysis of UGBD

In conclusion, UGBD possesses the necessary characteristics of a value driver underlying sustained competitive advantage. However, McKinsey highlights conversion of such digital assets into economic advantage as critical for long-term business success (Bughin *et al.*, 2018). Therefore, Strava must also capture value from its strategic information, utilising methods discussed in Section 5.

5. Action Plan for Sustained Competitive Advantage

Extending the analysis from Section 4, Strava's main value creation mechanisms are tracking and analysing athlete performance to give workout insights. In order to sustain competitive advantage, Strava has to (1) increase the scope of data sources and (2) augment data analytics capabilities (Trabucchi *et al.*, 2017). Consequently, Strava's envisioned action plan is displayed in a feature roadmap below.

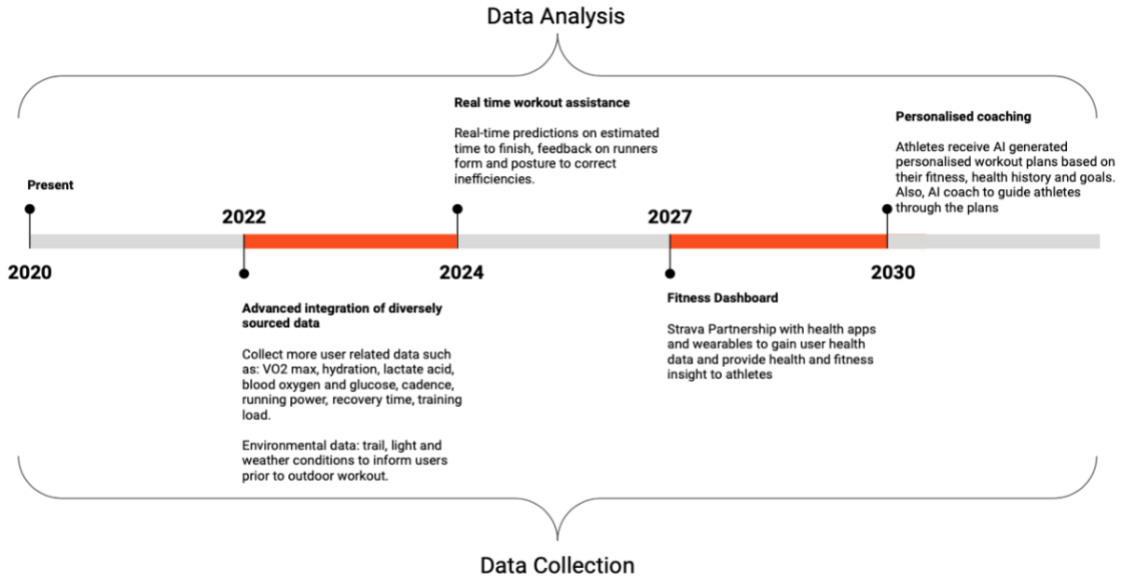

Figure 10: Strava's 10 Year Action Plan Proposal

In order to capture value by monetization, Strava should increase their value proposition for premium plans with measures summarised in Figure 10. The strategy is based on an iterative approach to development of new features with alternation of data collection (value creation) and data analysis features (value capture). It is supported by increasing growth prospects in the fitness technology industry (Blumtritt, 2020) and algorithmic advances in data analysis (Rivers, 2019). From another perspective, Strava could partner with wearable fitness companies to make customised products, as seen with NRC and Apple Watch. This is a feasible option as wearables have shown to amass greater revenue than fitness apps (Blumtritt, 2020). The major drawback is the opportunity cost diverging from soft- to hardware and the heavy competition in the wearables market (*ibid*).

In terms of modelling Strava's strategic information systems strategy, the model discussed in section 3 is deemed most appropriate due to its digitised and data-driven nature that incorporates an internal and external view. Porter's Five Forces only considers the external view, not recognising value generated within the company. Whilst the SAP is able to reflect on the internal resources and capabilities, it lacks the ability to perceive and leverage external stimulus which is crucial in a Open Innovation Paradigm (Chesbrough and Bogers, 2014). Consequently, our model identifies how Strava achieves sustained competitive advantage by assimilating diverse data sources to generate value and identify opportunities for innovation through the examination of inbound and outbound strategies established in a coopetition-based ecosystem. Figure 11 applies the features mentioned in the action plan to the model.

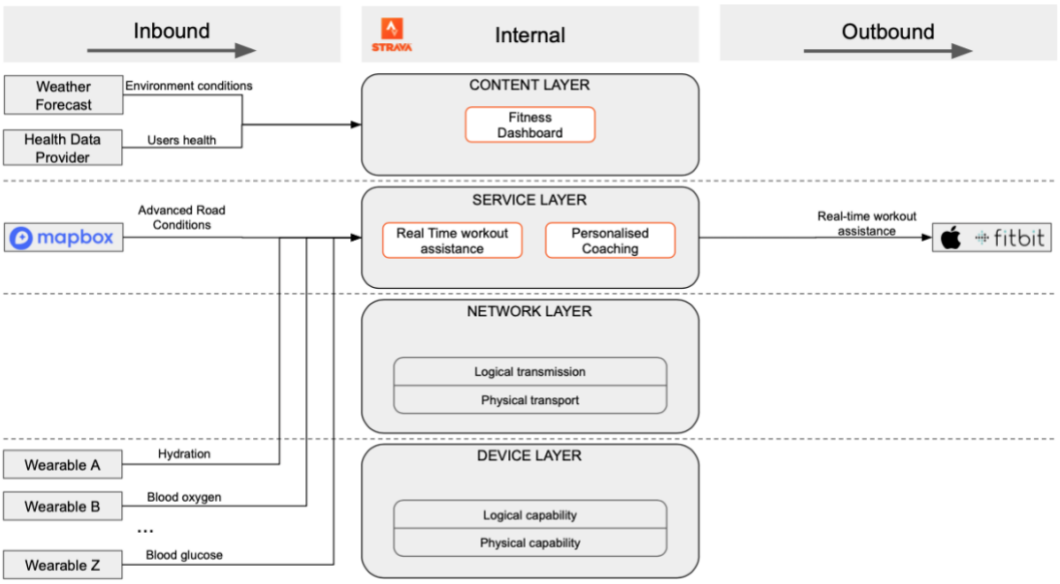

Figure 11: Visualisation of the 10 Year Action Plan Features using section 3's model.

6. Email Intended for CEO of Strava

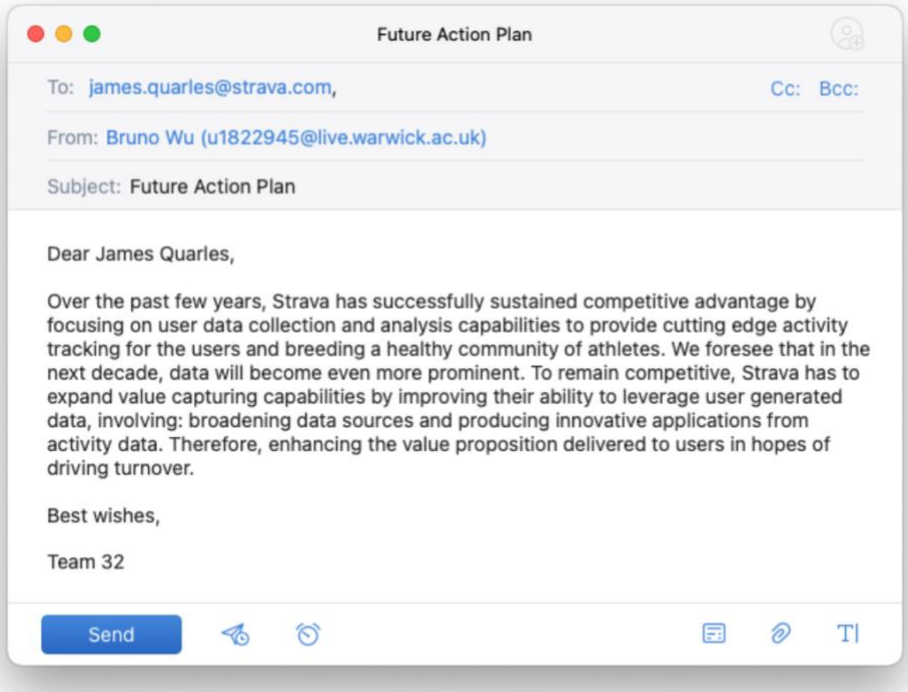

Figure 12: Email draft to the CEO of Strava

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Appendix

Appendix 1: Porter's Five Forces

1° Threat of New Entrants – Although start-up capital required for the production of an app is low, it requires significant recurring investments in R&D to reach a level of quality considered a threat to Strava. Therefore, unless a potential new entrant is able to raise sufficient funds, its entry to the market will be deterred by the high capital barrier.

2° Bargaining Power of Supplier – cloud computing was identified as the most essential service supplied to Strava, as it is detrimental to its digital value chain operating efficiently. However, there are numerous other companies with supplying roles in Strava's ecosystem, whose significance might result in a considerable bargaining power. These are, according to Stack (2020):

Developers:

- Firebase
- Algolia
- Bootstrap

Product and Design:

- Zeplin
- Weebly

Analytics:

- Google Analytics
- Yahoo! Analytics
- Apptimize

DevOps:

- Amazon AWS
- Disqus
- Guru

3° Bargaining Power of Buyer – contrary to existing users, new users incur low switching costs as they can choose from various competitors offering similar services.

4° Threat of Substitutes – although pretty insignificant for Strava, some are still worth mentioning as their threatening abilities might increase as the industry constantly changes. These are:

- Simple use of notebook and analogue watch to track sporting activities
- Home equipment and/or gym facilities
- Employing a personal trainer
- Apple Fitness
- Peloton

In addition, these might also be considered indirect suppliers of data to Strava, as these activities could still be recorded through Strava's app or simply inputted post-activity.

5° Although hardware-centric competitors employ their own software, Strava's app is still compatible with Garmin, Fitbit and Apple Watch. Hence, these competitors can also work with Strava as collaborators as their devices facilitate Strava's acquiring of data.

Appendix 2: Strava's most recent funding round

While Strava argues that its November 2020 funding round of $110 million (USD) will be used for the development of new features and growing the user base, it remains questionable whether these funds are not used instead to sustain an unprofitable company (Crunchbase, n.d.; Etherington, 2020).

Appendix 3: Strategic Application Portfolio - Support

Feature / Application	**Description & Justification**
Log-in with social media	Part of social network and community aspect
Personal Heatmaps	Aggregated activity per user for running/cycling
Badges	Shows achievements, adding to the overall user experience
Strava stories (Blog)	Allows users to share stories and connect with broader community
Beacon	Enables tracking of other users in real time
Training log	Support feature which can only be accessed by premium users
Route Planning	Additional feature aiding in the planning of activities and training

Strava also has support features like badge achievements, Strava Stories or its blogs, and Beacon, a premium feature which allows you to track your friend's safety. We believe these support functions are not currently contributing to the success of the app but could be areas that may be developed further, for example with growing privacy concerns, star athletes who go on extreme challenges could give growing importance to Beacon. This illustrates how features we analyse are in fact dynamic and cannot be constricted to one particular category.