

Background

AIK9 Limited is an Auckland-based start-up company that has developed an advanced and realistically trainable robotic dog, the AIK9-C.

The AIK9-C is the size and weight of an average adult female border collie, and was initially intended as a personal companion for families living in urban environments where “real” pets are not practical or allowed. However, the company intends to eventually promote the AIK9-C as a herding dog for the agricultural sector. The company is also developing a larger model, the AIK9-G, that will be targeted at emergency response, police, and military applications.

The company has already sold several hand-made AIK9-C dogs to research labs at New Zealand and Australian universities. Other dogs have been sold (at cost price) to friends and family of AIK9’s staff for the purpose of in-home testing.

The Problem

Every AIK9-C owner already has an account for the AIK9 website and mobile app. Owners use those services to access a dog’s features and diagnostics. However, all technical support and service cases are currently handled via email.

An email support system worked well when there were just a few AIK9-C dogs in the market, and one employee was responsible for supporting all of them. However, the support system has not scaled well. **Now there are more than fifty AIK9-C dogs deployed across two countries, and support is handled by three employees (called “vets” or veterinarians)** and a team leader (called a “senior vet”). The senior vet also handles support cases like any other vet. The support system will eventually need to handle thousands of dogs and tens or even hundreds of vets worldwide. This support network is called the “AIK9 Clinic”.

Technical support is a key part of AIK9’s business, and the company’s founders wish to implement a custom support system that will allow vets to handle support cases in a way that fits with the company’s business rules and policies.

Creating a Support Case

All support cases are created by a dog’s owner. A single AIK9 dog may have multiple owners (e.g. several members of the same family may be registered as owners for one dog). One owner can also have multiple dogs.

Owners are already registered in AIK9 Limited’s system as part of their dog’s set-up process, and will always be logged in to the AIK9 website when creating a new case. There is no need to collect or store any owner information apart from their “owner name”, which is unique throughout the existing AIK9 system.

Each support case is associated with a single AIK9 dog. The company already has a complete record of each owner’s dogs; the only thing the support system needs to collect and store for each case is the dog’s model name (e.g. “AIK9-C”) and serial number. Serial numbers are only unique *to a specific model*: for example, in future there could be AIK9-C and AIK9-G dogs, each with the serial number “27”.

However, no two AIK9-C dogs (or no two AIK9-G dogs) will ever have the same serial number.

When an owner creates a case they must provide an initial comment consisting of a short description (e.g. *"Dog won't get up when charged."*) and a long description of the problem (e.g. *"Our AIK9-C won't stand up from her charging mat, even though the battery meter in the app and the lights on her collar show she's fully charged – photo of collar attached."*) An owner may also include one or more attachments to that comment such as images, videos, or other files to illustrate the problem. There are no limitations on the number, type, or size of files attached.

When a case is created, it must enter the AIK9 clinic queue as "New", the company's term for a case that hasn't been taken on by a vet. Owners can see the status of case(s) for the dog(s) they own via the AIK9 website.

Taking on a Case

When a vet starts work for the day, they need to see a list of all the "Open" and "Stalled" cases in their personal queue. They're most interested in the "Open" cases, things they're currently working on. If they have no "Open" cases, then it's time to take on a new case from the clinic queue.

A vet can scroll through and read all the "New" cases, looking for particularly urgent issues or for things they specialise in. Viewing a case doesn't change its status. When a vet finds a case they can help with, they can choose to take that case on – that means the "New" case becomes "Open" and moves from the clinic queue to the vet's personal queue. There is no way for a vet to "un-open" a case and put it back into the clinic queue. However, one vet can give any "Open" case from their personal queue to another vet; for example, if they're unable to solve the issue or they're going on holiday and handing over their cases. A senior vet can also transfer cases from one vet to another; for example, if a vet is away on unscheduled leave, or suddenly leaves the company, any senior vet can transfer that absent vet's cases to any other vet. When a case is transferred from vet-to-vet, it always becomes "Open" regardless of its previous status: there's work to be done, because the new vet needs to review the case.

Working on a Case

When a vet works on a case, they may need to keep notes or communicate with the owner. Like an owner does when they create a new case, a vet can also add comments with a short description, long description, and optionally one or more attachments. Vets can only add comments to an "Open" case.

AIK9 Limited has a strict policy that all support actions are visible to the owner, including a vet's personal case notes. Market research has shown that people can be extremely attached to pet and service robots, and can be distrustful of technical support if they feel their robot might be replaced or otherwise modified without their permission. Therefore, the company intends to create an open culture where owners are never "out of the loop".

Due to this policy, all vet comments are visible to the owner. All of a dog's owners are notified by email when a new comment is available. There is no need for the support system to know the owners' email addresses: the existing AIK9 system can contact any owner with just their unique "owner name".

Sometimes, a vet may not be able to progress a case; for example, while they're waiting on further information from the owner, or a new part from a supplier. In such situations, a vet can set one of their "Open" cases to "Stalled". Any change to a "Stalled" case, such as adding a comment, sets it back to the "Open" status.

Owner Interaction

Owners may want to add their own comments to a support case because they have discovered or thought of something new, or in response to a comment made by a vet. At any time, owners can comment on a "New", "Open", "Stalled", "Resolved", or "Closed" case. An owner's comment is like a vet's comment: it must include a short description, long description, and can optionally include attachments.

When an owner comments on a "New" case, it remains "New": it is still in the clinic queue and has not been taken by a vet. When an owner comments on an "Open" case it remains "Open", and the vet that has the case is notified by email (any vet can be contacted through the existing AIK9 company system using their unique employee number; it is not necessary to maintain vet email addresses within the support system). When an owner comments on a "Stalled" case, the vet that has the case is notified by email and the case is automatically moved into "Open" status, as there's now work for the vet to do (i.e. read and possibly respond to the owner's comment).

Owners can comment on a previously "Closed" or "Resolved" case, which could be recent or from years in the past. If the vet that closed or resolved the case is still employed by AIK9 Limited as a vet, they are notified by email and the case remains in their personal queue with the new status "Open". However, if that vet is no longer with the company, the case is set back to "New" and placed in the main clinic queue. This is the *only* way a case can ever become "New" again.

Case History

Any vet should be able to view and full-text search through all cases overall, all cases for a specific model (e.g. "AIK9-C"), or all cases for a specific dog (e.g. "AIK9-C, serial #27"). Reviewing other potentially relevant cases and how they were resolved is one of the key strategies used by vets, and currently relies on shared email folders and a manual tagging system that's subject to user-error.

Senior vets should also be able to view all cases owned by any specific vet. This enables senior vets to monitor workload and reallocate cases as necessary.

Completing a Case

When a case has been solved, either by the vet or if the owner reports they've solved the problem themselves, the case must be classified as "Resolved" by the vet. A case can also be completed as "Closed" if it doesn't appear to be an actual

problem requiring resolution. For example, if an owner reports normal AIK9 behaviour as faulty, and the vet explains the situation to the owner's satisfaction. "Closed" cases are classified separately because they often represent common issues that AIK9 Limited could avoid by improving its product manuals or the Frequently Asked Questions section of its website. These "Closed" cases used to be called "Rejected" within the company, but some vets didn't think owners would respond well to the term when it became visible in the new system.

The vet will no longer see "Resolved" and "Closed" (completed) cases in their personal queue, but any vet can see Resolved cases when searching or reviewing case histories. Owners can see completed cases for their dogs.

Vets can re-"Open" their own "Resolved" or "Closed" cases, for example if they decide they have closed a case in error. Senior vets can explicitly "Open" any vet's "Resolved" or "Closed" case (leaving it in the original vet's personal queue), or implicitly "Open" a case by transferring it from one vet to another (any transferred case becomes "Open" as it must be reviewed by the new vet).

Deleting a Case

Owners may accidentally submit duplicate cases, or submit a case without an attachment and then re-submit the entire case again with the attachment included. In these and similar situations it may not be useful to store duplicate or incomplete case records in the system. At a senior vet's discretion, any "New" case can be deleted from the system entirely. Once the case has been taken on by a vet, it can no longer be deleted and must be "Closed" or "Resolved". Deleted cases should not be visible in any search results or case history views, as they do not contain useful information. In the current email-based support system, "Deleted" cases are permanently deleted from the support system while all other emails are archived for later retrieval.

Managing Workload

Senior vets need to be able to view the current "Open" and "Stalled" cases of all other currently employed vets. They should also be able to view the number of cases "Resolved" or "Closed" by each vet in total, in the last and current calendar months, and in the last and current calendar weeks. Other metrics may be required in future, but these are the metrics currently compiled and used by the existing senior vet for each of the three vets. As the team grows, manually compiling this information is likely to become too time-consuming.

In future, the system may need to support multiple teams of vets, each supervised by one or more senior vets. However, *teams should not be part of the initial solution*. The company will not need this functionality for a year or more, and wishes to keep the system simple until team management is truly necessary.