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*Faculty of Computers and Artificial Intelligence,* 

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**Speed bump**

A senior project submitted in partial fulfillment of the requirements for the degree of Bachelor of Computers and Artificial Intelligence.

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**Acknowledgment**

Firstly, the success of our project happens when we believe in ourselves, believe in doing the right things to help other people, and the help of many people around us.

Secondly, we would like to acknowledge and give our warmest thanks to our supervisor **Dr. Mohammed Kayed** who made this project possible and for his guidance and advice that carried us through all the stages of the project.

**Purpose of documentation**

This document aims to describe the key elements of the project starting with the project idea, the software development life cycle of the project, discussing the design of the user interface, and outline the technical aspects of the project in detail what parts that will be implemented and which parts to be considered as future work.

With all of this information, this document becomes an absolute reference for the designers and developers during the implementation phase of this project

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**Abstract**

Speed bumps on the road are something that can be dangerous if the driver does not pay attention to them, as they can cause damage to vehicle parts and sometimes threaten the safety of passengers.

What made matters worse is the random bumps that hit Egypt a lot, which has become a disaster threatening the roads of Egypt and people. ' intead by: As unsafe routes like (the agricultural road of Upper Egypt), which has more than 180 random bumps, show, the random bumps are still growing nowadays. And statistics indicate that 40% of road accidents in Egypt are caused by random bumps that people make without conforming to any standard specifications, and that 50 people fall as victims of road accidents for every 100 kilometres that cars travel in Egypt.

For these reasons, a lot of money is spent to repair damaged car parts due to bumps, which amounts to 22 billion pounds, as car companies provide cars that will need repair after a lifespan of up to 10 years, but this age in Egypt reaches a maximum of 3 years.

Our project aims to preserve the safety of passengers and reduce this money wasted in car repair. Our project will try to identify these pitfalls and tell the driver about them before they fall into them. Our project will contain hardware for accurate identification, but our project aims to use mobile applications so that it is easy to use and becomes accessible to everyone.

Our project simply will be developing an application to detect the speed bumps and alert the person who is driving. The driver will use our camera and install it in a certain way under the vehicle so that the road is displayed on the camera and by using machine learning will detect if there is a speed bump or not, and the driver will be notified of the speed bump and the distance between it and the car within a predetermined range so that he can slow down and avoid any damage.

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**Chapter 1**

INTRODUCTION

**1.1 Introduction**

According to the definition of Society of Automotive Engineers (SAE) J3106, Autonomous vehicles are the vehicles that are equipped with technology for reducing vehicle crashes, congestion energy consumption and pollution meanwhile improving transport accessibility .So among the current challenges of the Smart City, traffic management and maintenance are of utmost importance. Road surface monitoring is currently performed by humans, but the road surface condition is one of the main indicators of road quality, and it may drastically affect fuel consumption and the safety of both drivers and pedestrians.

Speed bumps are obstacles that are installed on the roads to force the vehicle driver to reduce the speed of the vehicle in the critical road areas, such as hospitals and schools. For motorists, driving over a speed bump can be both unnerving and uncomfortable. An unexpected jolt, bump, or scrape may lead you to worry if you’ve damaged your car. Speed bumps may also damage your vehicles. If you cross a speed bump unnoticing, there can be wear and tear to your vehicle. Most commonly, it can lead to tire and suspension damage. It may compress the suspension from the adverse impact of the speed bumps.

To solve this problem , our project is about developing an application to detect the speed bumps and alert the person who is driving . The driver will use our camera and install it in a certain way under the vehicle so that the road is displayed on the camera and by using machine learning will detect if there is a speed bump or not, and the driver will be notified of the speed bump and the distance between it and the car within a predetermined range so that he can slow down and avoid any damage.

Each speed bump was detected and its location will be saved in the database of our application by using GPS. So any user of our application who does not have the hardware (camera) will be able to know where the speed bumps that are only pre in the database and will be alerted of them when he approaches them

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**1.2 Problem Statement**

**What is the importance of this problem?**

Imagine you wake up late for your work, and you start to rush through your schedule. You are accelerating your vehicle to its limit because you fear that you’ll be late for a meeting. Suddenly, you cross a certain hindrance on the road, and it causes a screeching sound in your vehicle. You look back through your rear-view mirror and realize that it’s a speed bump. Now, you regret speeding above the limit because it can potentially damage your vehicle.

New research by Comparison website Confused.com shows that over a fifth of drivers report vehicle damage from driving over speed bumps. They also discovered that, between 2013 and 2015, local authorities paid out around £35,000 in compensation to drivers whose vehicles had sustained damage from speed bumps.

Confused.com used the Freedom of Information Act to get data from various councils and also surveyed 2,000 motorists. Here’s what they discovered:

* 41% of motorists claim speed bumps cause ‘too much’ damage to cars
* 22% reported that driving over a speed bump caused damage to their car
* 48% of the incidents related to damaged tyres
* 33% of the incidents related to suspension damage

Therefore, detecting speed bumps is very important and helps reduce damages and costs

**What is the current solution?**

New research by Comparison website Confused.com shows that over a fifth of drivers report vehicle damage from driving over speed bumps. They also discovered that, between 2013 and 2015, local authorities paid out around £35,000 in compensation to drivers whose vehicles had sustained damage from speed bumps.

The UK has 29,000 speed bumps, humps and cushions—8,516 of those are in London—a bad place for speed bump damage. Between 2013 and 2015, £15,717 worth of compensation went to drivers to cover expenses incurred by damage from one of the capital’s many speed bumps.

**Way 1**:Speed Bump Detection Using Accelerometric Features: A Genetic Algorithm Approach

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While said obstacles ought to be signalized according to specific road regulation, they are not always correctly labeled. Therefore, this method for the detection of road abnormalities (i.e., speed bumps).

This method makes use of a gyro, an accelerometer, and a GPS sensor mounted in a car. After having the vehicle cruise through several streets, data is retrieved from the sensors. Then, using a cross-validation strategy, a genetic algorithm is used to find a logistic model that accurately detects road abnormalities.

**Way 2**:System for Speed Bumps Detection Using Smart Phone Accelerometer Sensor

The app works on reading data captured by smartphone sensors and analyzing them. Using a smartphone, we do not need vehicle-mounted sensors. GPS and accelerometer sensors are the main sensors used to capture data. Using those sensors, we obtain data of position, speed, and acceleration, which are needed for detecting bumps and their location and later the marked bump location

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**How will our solution solve the problem?**

The driver will use the application that attached with the camera under his vehicle and camera can detect road then each speed bump on the road can be detected ,It will be send a notification before each speed bump that is near and the estimated distance between vehicle and speed bump so the driver can notice it before passing by it and avoid any damage can be caused by the speed bump.

**1.3 Objectives**

Our project goal is to increase human safety and reduce damage that can be caused by passing by speed bumps without noticing there is a speed bump ,there can be heavy damage to the shock system of the vehicle. If it’s compromised, it can disturb the entire wheel alignment of the car, which can, in turn, affect the car’s steering.

**1.4 Impact in Business**

Business impact is used across the country to increase safety for the rider and reduce accidents, so the Speed bumps have been shown to reduce the frequency of several factors associated with collisions. A study by the Portland Bureau of Transportation found that annual crash frequency decreased by 39% on streets that had been treated with speed bumps. Moreover, the number of injuries sustained in the crashes on treated streets were reduced by 46%, making any crashes that did occur less severe than they may otherwise have been due to this percentage we have to take the bump carefully and see it before you take it.

Also, it's important for those who learn how to drive or those who don’t know the roads that if you don’t see the speed bump or don’t take notice of it the car trunk and spare parts can be damaged and you must fix it or change it and it will cost you a lot of time.

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**1.5 Ways of Marketing**

Marketing can be considered as food for the business rather than a medicine that helps it from going bankrupt. As it helps the customer to have a solid understanding of the services that the business offers. And engage the customers and build a better relationship between the business and the customer. Which in the end leads to more sales for the business.

And the ways of marketing for our product can be as following:

**Way 1:**

Social Media is a key element in marketing as research by Hubspot says that 38% of the US finds new products through Twitter, and Instagram 20% and Facebook by 10%. And this percentage can be higher if targeted sponsored abs were used. And if we hired influencers to promote the app and its services

**Way 2:**

A landing page for a business can play a big role in showing what a business can offer to the customers and it can also contain a user guide that helps the users during the use of the services .

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**1.6 Conclusion**

At the end of this chapter, the reader will be able to form a basic idea about what is the problem that our project aims to solve,

● what is the importance of the idea

● The problem other existed solutions

● what we will add to our project to make it better than the traditional or existing methods to solve the same problem.

**The reader will also understand:**

● impact of modern technologies

● how to use them to solve a worrying problem like the mentioned one.

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**Chapter 2**

RELATED WORKS

**2.1 Introduction**

It is expensive to restore a damaged car. When bumps are encountered at high speeds, the car may sustain damage. The most common reason for car part destruction is speed bumps. Tire, oil filter, disk brake, line shaft, muffler and transmission repairs cost drivers and automobile owners hundreds of dollars.

Through our project, which will enable them to spot speed bumps in advance of colliding with them, they will be spared these costs.

**2.2 Related Works**

Applications like these have tried to emulate this idea:

1. Street Bump: It makes use of the GPS and accelerometer on the phone. The city maps "bumps" that the sensors detect.
2. Real-Time Speed Bump Detection for Autonomous Vehicles Using Image Segmentation.
3. Real Time Detection of Speed Hump/Bump and Distance Estimation with Deep Learning using GPU and ZED Stereo Camera.

Everything that was mentioned, however, has flaws, such as an application that doesn't function and a research paper that isn't exact enough. We'll fix these issues, though..

**2.3 Benefits**

The number of existing bumps increases and the number of people who do not see them grows, and therefore this may lead to accidents and injuries in cars, which we hope to reduce this through our project.

1. help drivers in circumstances where visibility, illumination, and vision are poor."
2. detect the bumps before hitting it , and notify the user with the remaining distance.
3. Affordably priced for the user because fixing the car after hitting a bump will be expensive.
4. app can be used by the user offline.

**2.4 Features**

The application recognizes every bumps in the road, aiding the driver in avoiding them and completing his journey securely.

1. **Speed bump recognition and detection :**

identifying whether the speed bump exists is the first stage in the application process.

**2. Calculate the distance :**

The second stage of the application is to calculate the distance between the car and the bump

**3. Voice alert :**

Making a voice to notify the driver that a speed bump is located at a specific distance is the final phase of the application.

**2.5 Risk management**

First, we would like to explain the concept of risk: Risk is any unexpected event that can affect your project — for better or for worse. Risk can affect anything: people, processes, technology, and resources. An important distinction to remember is that risks are not the same as issues. So, risk management is known as the practices of identifying, evaluating, and preventing or mitigating risks to a project that have the potential to impact the desired outcomes.

To effectively manage risk, you must have a clear understanding of your objectives so you can identify any possible barriers that could impact the team’s ability to produce results.

“Risk management is really about looking at your project objectives and figuring out what the threats to those objectives are, and what you can do to address them from the beginning,” says Connie Emerson.[4]

The types of events or scenarios that fall under the category of “risk” can be broad and sometimes misinterpreted. While project managers or those tasked with overseeing a project may be inclined to view risks exclusively as threats, this is not always the case.

To clarify this common misconception, Emerson defines project risk as “a future event that may or may not happen that, if it does happen, will have some impact on the objectives of the “project”. It could be positive\_an opportunity\_ or negative\_a threat.

**Types of Project Risk**

There are several types of risks that occur frequently, regardless of the specifics of the project. These common types of risk include:

* Cost: The risk of events that impact the budget, especially those that cause the project to be completed over budget.
* Schedule: The risk of unplanned scheduling conflicts, such as events that cause the project to be delayed.
* Performance: The risk of events that cause the project to produce results that are inconsistent with the project specifications.
* Security: The risk of events that cause loss of control over personal information. So now let’s look at some of our project risk:

|  |  |
| --- | --- |
| **project\_area** | Project Scope Management |
| **Project\_risk** | Lack of clarity in terms of expected deliverables |
| **Risk\_Type** | Project Scope |
| **sol.** | We made a CR document to clarity expected Customer Requirements and SRS document to clarity expected System Requirement |

|  |  |
| --- | --- |
| **project\_area** | Project Scheduling/ Project Timeline |
| **Project\_risk** | Inaccurate project schedule estimation leading to disproportionate project work allocation |
| **Risk\_Type** | Project Schedule |

*sol.We have set a clear schedule that specifies the sufficient time to implement each part of the project with increased time to avoid any negligence in the time frame required to complete the project*

|  |  |
| --- | --- |
| **project\_area** | Resource Management |
| **Project\_risk** | Lack of rightly skilled or experienced resources |
| **Risk\_Type** | Skills |
| **sol.** | In the beginning, we had to choose the skills we needed to implement our project, the person who would be responsible for each part, and each person started to develop their skills so that they could implement what was required of them. |

|  |  |
| --- | --- |
| **project\_area** | Project security |
| **Project\_risk** | the potential loss of control over personal information |
| **Risk\_Type** | security |

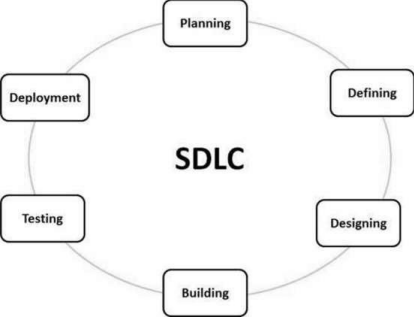
**sol.** Our project has gone through different stages of testing in order to be safe for users

**Chapter 3**

PROJECT METHODOLOGY

**3.1 Software Development Life Cycle**

In this section, we are going to talk about the life cycle of our project. First of all, what is SDLC? SDLC is a methodology for producing software projects, within any software project. It must have a detailed plan describing how to develop, maintain, replace and alter or enhance specific software. The life cycle helps us to improve the quality of software and the overall development process.The following figure is a graphical representation of the various stages of a typical SDLC. A typical Software Development Life Cycle consists of the following stages as shown in figure 3.1

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**Stage 1: Planning and Requirement Analysis**

Requirement analysis is the most important and fundamental stage in SDLC. It is performed by the senior members of the team with inputs from the customer, the sales department, market surveys, and domain experts in the industry. This information is then used to plan the basic project approach and to conduct product feasibility studies in the economical, operational, and technical areas.

Planning for the quality assurance requirements and identification of the risks associated with the project is also done in the planning stage. The outcome of the technical feasibility study is to define the various technical approaches that can be followed to implement the project successfully with minimum risks.

**Stage 2: Defining Requirements**

Once the requirement analysis is done the next step is to clearly define and document the product requirements and get them approved by the customer or the market analysts. This is done through an SRS (Software Requirement Specification) document which consists of all the product requirements to be designed and developed during the project life cycle.

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**Stage 3: Designing the Product Architecture**

SRS is the reference for product masterminds to come out with the trim framework for the product to be developed. Predicated on the necessities specified in SRS, normally, farther than one design approach for the product framework is proposed and proved in a GDD- Design Document Specification. This GDD is reviewed by all the important stakeholders and predicated on polychrome parameters as peril assessment, product robustness, design modularity, budget, and time constraints, the trim design approach is named for the product. A design approach defines all the architectural modules of the product along with its communication and data exodus representation with the external and third- party modules (if any). The internal design of all the modules of the proposed structure should be definitely defined with the tiniest of the details in GDD.

**Stage 4: Building or Developing the Product**

In this stage of SDLC, the actual development starts, and the product is built. The programming code is generated as per GDD during this stage. If the design is performed in a detailed and organized manner, code generation can be accomplished without much hassle. Developers must follow the coding guidelines defined by their organization and programming tools like compilers, interpreters, debuggers, etc. are used to generate the code. Different high-level programming languages such as C, C++, Pascal, Java, and PHP are used for coding. The programming language is chosen with respect to the type of software being developed.

**Stage 5: Testing the Product**

This stage is usually a subset of all the stages as in the modern SDLC models, the testing activities are mostly involved in all the stages of SDLC. However, this stage refers to the testing only stage of the product where product defects are reported, tracked, fixed and retested, until the product reaches the quality standards defined in the SRS.

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**Stage 6: Deployment in the Market and Maintenance**

Once the product is tested and ready to be deployed it is released formally in the appropriate market. Sometimes product deployment happens in stages as per the business strategy of that organization. The product may first be released in a limited segment and tested in the real business environment (UAT- User acceptance testing).Then based on the feedback, the product may be released as it is or with suggested enhancements in the targeting market segment. After the product is released in the market, its maintenance is done for the existing customer base.

**3.2 Selecting Methodology**

Selecting a Software Development Life Cycle (SDLC) methodology is a challenging task for many of us. What tends to make it challenging is the fact that few of us know what are the criteria to use in selecting a methodology to add value to our project **[6].**

So to select the right SDLC methodology, you have to follow some steps to get it.

**1. Learn the about SDLC Methodologies:**

In order to select the right SDLC methodology, you must have sufficient experience and properly understand and be familiar with the SDLCs to be selected.

**2. Understanding the needs of Stakeholders:**

We have to know about the business area, stakeholder concerns and requirements, business priorities, our technical capacity and capability, and technological limitations so that we can select the appropriate SDLC according to their selection criteria.

**3. Select the Criteria:**

In this step, you have to select some of the criteria or arguments that you may use to compare between different methodologies and select an SDLC.

**4. Decide:**

In this step, after completing the comparison process, you start a discussion with your team to decide your choice

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**For example of Chosen Methodology:**

When we come to select the SDLC methodology that we will use in our project. First, we started with knowing about different methodologies of SDLC**[7]**. And on the other side, we wrote documents to be clear requirements, business priorities, our technical capacity and capability, and technological limitations. Then, we started a comparison between different methodologies of SDLC.And this is the Factors we use to compare between different methodologies: Unclear User Requirement, Unfamiliar Technology, Complex System**,** Reliable system, Short Time Schedule, Strong Project Management, Cost limitation, Visibility of Stakeholders, Skills limitation, Documentation, Component reusability**.**

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**And this is the comparison between different methodologies of SDLC:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Factors** | **Waterfall** | **V-model Evolutionary**  **Prototyping Spiral Iterative and**  **Incremental** | **Agile** |
| **Unclear User**  **Requirement** | Poor | Poor Good Excellent Good | Excellent |
| **Unfamiliar**  **Technology** | Poor | Poor Excellent Excellent Good | Poor |
| **Complex System** | Good | Good Excellent Excellent Good | Poor |
| **Reliable system**  **Short Time**  **Schedule**  **Strong Project**  **Management**  **Cost limitation** | Good  Poor  Excellent  Poor | Good Poor Excellent Good Poor Good Poor Excellent  Excellent Excellent Excellent Excellent Poor Poor Poor Excellent | Good  Excellent  Excellent Excellent |
| **Visibility of**  **Stakeholders** | Good | Good Excellent Excellent Good | Excellent |
| **Skills limitation** | Good | Good Poor Poor Good | Poor |
| **Documentation** | Excellent | Excellent Good Good Excellent | Poor |
| **Component**  **reusability** | Excellent | Excellent Poor Poor Excellent | Poor |

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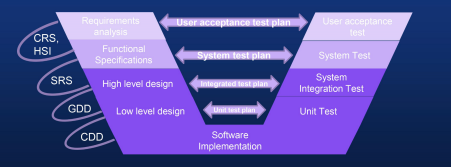
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After this comparison, we start a discussion to decide what we will choose. In the end, we decided to choose a V-model.

**3.3 V-model**

It is a type of SDLC model where the process is executed in a sequential manner in the form of a V. It is known as the validation and verification model. Because it depends on the association of a testing phase for each corresponding development stage **[8]**.



Now we will explain the different stages of the v model.

**Design Phase:**

o **Requirements Analysis:**

This phase contains detailed communication with the patron to understand their requirements and expectancies. This stage is referred to as Requirement Gathering.

o **functional Specifications:**

System design is divided into modules that take on different functions. The data transfer and communication among the inner modules and with the outdoor international (other systems) is clearly understood.

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o **High -Level Design(HLD):**

This stage contains the system design and the complete hardware and communication setup for developing the product.

o **Low-Level Design(LLD):**

At this point, the system is divided into small modules. The detailed Module Design, also known as Module Design .

**Testing Phases:**

o **User Acceptance Testing (UAT):**

UAT is implemented in a user environment similar to a production environment. UAT verifies that the delivered system meets the user’s requirements and the system is ready for use in the real world.

o **System Testing:**

System Testing test the complete application with its functionality, interdependence, and communication. Tests the functional and non-functional requirements of the developed application.

o **Unit Testing**:

Unit test plans are developed during the unit design phase. These unit test plans are implemented to eliminate errors at the code or unit level.

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o **System Integration testing:**

After completing the unit test, the integration test is performed. In integration testing, the modules are integrated and the system is tested. Integration testing is performed at the architectural design stage. This test checks whether the modules are connected to each other.

**Software Implementation:**

The verification and verification phases are linked through the Software Implementation phase.

**Advantages of V-model:**

o This is a highly disciplined model and the stages are completed one by one.

o V-Model is used for small projects where project requirements are clear.

o It is simple and easy to understand and use.

o This model focuses on validation and verification activities early in the life cycle thereby enhancing the probability of building an error-free and good quality product.

o It enables project management to track progress accurately. **Disadvantages Of V-model:**

o High risk and uncertainty.

o It is not good for complex and object-oriented projects o It is not suitable for projects where requirements are not clear and contains high risk of changing.

o This model does not support iteration of phases.

o It does not easily handle concurrent events.

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**3.4 Application of chosen methodology v-model:**

V-model means Verification and Validation model. Just like the waterfall model, the V-Shaped life cycle is a sequential path of execution of processes. Each phase must be completed before the next phase begins**.** V-Model is one of the many software development models. It has typically been used to describe the development of the system and its subsystems. The test environments or beds and test laboratories and facilities are also systems, however, and must be tested and otherwise verified. Thus, these test-oriented V models are applicable to them as well.

It can be applied to electronic or mechanical systems in research and science.

1. Axiomatic Design: The ideas of Axiomatic Design (AD) originate from industrial production and industrial systems, but they are relevant for software and hardware systems. The design method bridges different domains when describing the design of a suitable system. AD assumes that designing systems requires input from different domains. The domains that are introduced are: the customer domain, where customer needs are elicited, the functional domain, in which functional requirements are positioned, the physical domain for describing the design parameters of the system and the process domain that complements the foregoing domains with information for the process of manufacturing the system. The first axiom states that when a design is made all Functional Requirements (FRs) must be formulated on a fundamental level, in such a way that they are independent from each other. The FRs are later mapped to its corresponding Design Parameters (DPs). A DP describes a property or characteristic of the system. It is expected to fulfill the related FR. **[9][10][11][12]**

2. Update a Digital Pathology system: it used to diagnose cancer was a Class 2 FDA-approved device. The V-model was the way to develop this diagnostic software, with documented customer and system requirements going in, traceable system and acceptance tests going out, all docs

configuration managed, and all requirements verified, validated and auditable. **[13]**

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3. Systems Engineering with SysML/UML : The ‘Das V Modell’ is the official project management method used by the German Government and provides guidance for planning and executing projects. A key feature of the V Model is definition of who has to do what and when in a project, and the use of decision gates to indicate a milestone in the progress of a project In the V Model, an emphasis is placed on verification on the left hand side of the V and validation on the right hand side with the use of test cases to ensure adherence between equivalent activities on either side of the V. The key elements of the V Model have been widely translated and adapted resulting in many variations. The Das V Modell has some equivalence with PRINCE2. [14]

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**Chapter 4**

INTERFACE DESIGN

**4.1 Introduction**

**What is user experience (UX)?**

User experience, or UX, is a term used to describe the overall experience a user has when interacting with a product or service in a given context. Depending on how the product or service is designed, the experience can range from delightful to downright frustrating!

You’ll often hear about UX in relation to digital products, such as websites and apps—but UX isn’t limited to the digital space. Anything that can be experienced can be designed, from the packaging of a toothbrush to the wheels of an orthopedic chair.

The impact of good (and bad!) UX is everywhere. That’s one of the reasons it’s such an exciting field, and also explains why you already know a lot more about UX than you realize. Every time you curse a push door that has a pull bar, or close a confusing website in frustration, you’re making a judgment on the quality of its UX design.

So: UX is all about the user’s interaction or experience with a product or service. With that in mind, let’s move on to part two…

**What is user experience design (UXD)?**

User experience design, or UXD, considers each and every element that shapes the user experience. It’s all about designing specifically for the needs of the user or customer, looking at things like ease of use, quality, and efficiency.

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If you think about it, humans can only benefit from complex systems like websites and computer programs (or any product, really) if these systems are somewhat user-friendly. UX designers look to bridge the gap between the product and the human user. They think about how people interact with a given product, and look for ways to make these interactions as intuitive and straightforward as possible.

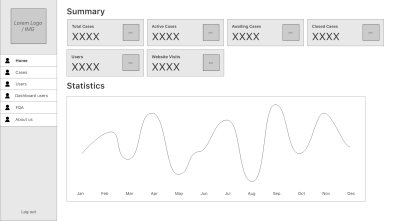
UX designers have to wear many different hats, finding just the right balance between scientist, psychologist, sociologist, and artist (among others!). In order to come up with viable, creative, and user-friendly design solutions, you need to analyze past experiences, research new practices, interview real or potential users, and test your designs.

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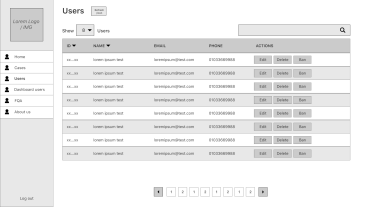
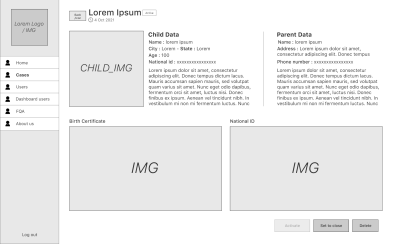
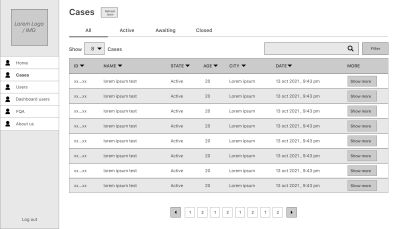
**4.2 System Web Dashboard (Angular)**

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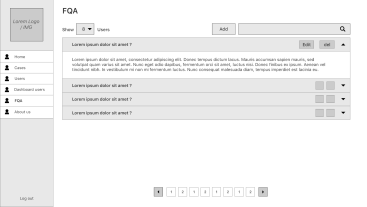
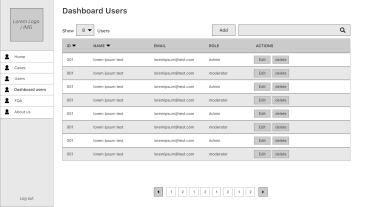
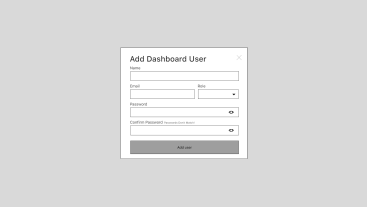
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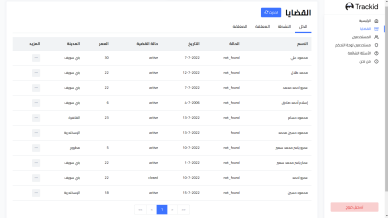
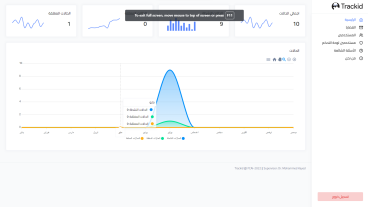
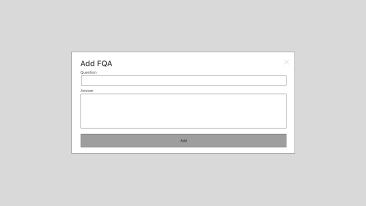
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**4.3 Client Mobile Application (Android)**

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**Chapter 5**

SOFTWARE ANALYSIS AND DESIGN

**5.1 Project Requirement Analysis**

**1.Customer Value :-**

**What are the customer's needs ?**

**First,** there are a lot of pictures of kidnapped children on the social media pages, so the customer suffers from many of these phenomena and it is difficult for him to remember them while he is on the street to identify them, and he may suspect one of them, but he does not remember his picture on the social media

**Secondly,** the unity of many kidnapped or lost children in the streets or the hands of the wicked in front of the eyes of the people, but the people have nothing to assure them that they are kidnapped or lost.

**What is the compliant solution ?**

An application through which the user can identify the child, whether he was kidnapped or not, and identify the kidnapped children in the area in which he lives by recognizing his face print and can predict his face

**2.Marketing Value :-**

**Is there a sustainable advantage ?**

Recognizing and predicting the face print in the long term, making it easier for the customer to identify it through the application

**What is the addressable market size ?**

All regions of Egypt

**What is the future market growth ?**

Using it in government street cameras to identify many faces at the same time, which increases the identification of many children quickly and with a higher density

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**What is the unique value ?**

Face recognition and long-term prediction

**3.SWOT Analysis :-**

**What are the strengths and weaknesses of your idea?**

Strengths: Identifying children abducted by artificial intelligence

Weaknesses are the distance of the person from the application camera, which is difficult to verify

**What is your competitive advantage over your competitors?** AI face recognition and long-term prediction

**4.Technologies And Team Skills:-**

**What are the Technical Certainty of the idea?**

It will require building the idea programmatically

● UI UX Design

● Frontend Development

● Backend Development

● Mobile Development

● Machine Learning Development

**What are technologies that will need time to learn?**

● Angular for the Frontend

● Django for the Backend

● Some Kotlin Android Features

● Machine Learning

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**What are technologies that match your team skills?**

● UI UX Design

● Frontend Development

● Backend Development

● Mobile Development

● Machine Learning Development

**Based on the category of people who will use this app?**

Any citizen of the country and any policeman

**What is the Market Certainty of the idea?**

The idea will help the customer as it collect all the kidnapped children and the customer does not need to remember their faces, which makes it easier for the policeman and the customer to identify the kidnapped child

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**5.2 Project Customer Requirements**

Customer Requirements (**CR**) term refers to the needs, features of the customer to put in the software application, and issues to be handled by the application. **CR** is considered the least detailed analysis; it’s the primary information about the software which determines the whole future working plan and the upcoming documents such as (**CRS** and **SRS** -will be discussed in detail in the following pages-).

Definition:

An application through which the user can identify the child, whether he was kidnapped or not, and identify the kidnapped children in the area in which he lives and upload any new kidnapped children

Features:

● The User/Parents can upload their kidnapped child Data

● Recognizing and predicting the face print in the long term

● Making it easier for the customer to identify a kidnapped child through the application

● A dashboard to manage the app data

Key Elements:

● User have an account to use the app

● Main screen shows the kidnapped children

● Search for lost Children by name

● Filter search result

● Upload kidnapped child data

● Upload parent’s data

● Get child face print

● Store child faceprint in remote data source

● Detect child faceprint through camera

● After successful detection, the parent data of the detected kidnapped child appear

● After Failed Detection, enable user to repeat the process

● Alert child parent that his child found

● Parent can change the status of his child to found

● Parent can Delete kidnapped Child response

● Dashboard users have an account to access the dashboard

● Dashboard users can statistics and summary about the app

● Admin can manage app users

● Admin can manage dashboard users

● Dashboard users can manage cases

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● Dashboard users can manage FAQ content

● Dashboard users can manage about-us content

**Mapping between the customer requirements and the requirements ID’s:**

**Req\_ID** PO\_TK\_CR\_001-V1.1 **Covers** User have an account to use the app

**Req\_ID** PO\_TK\_CR\_002-V1.0 **Covers** Main screen shows the kidnapped children

**Req\_ID** PO\_TK\_CR\_003-V1.0 **Covers** Search for lost Children by name

**Req\_ID** PO\_TK\_CR\_004-V1.1 **Covers** Filter search result **Req\_ID** PO\_TK\_CR\_005-V1.0 **Covers** Upload kidnapped child data **Req\_ID** PO\_TK\_CR\_006-V1.0 **Covers** Upload parent’s data **Req\_ID** PO\_TK\_CR\_007-V1.0 **Covers** Get child face print

**Req\_ID** PO\_TK\_CR\_008-V1.0 **Covers** Store child faceprint in remote data source

**Req\_ID** PO\_TK\_CR\_009-V1.0 **Covers** Detect child faceprint through camera

**Req\_ID** PO\_TK\_CR\_010-V1.0 **Covers** After successful detection, the parent data of the detected

kidnapped child appear

**Req\_ID** PO\_TK\_CR\_011-V1.0 **Covers** After Failed Detection, enable user to repeat the process

**Req\_ID** PO\_TK\_CR\_012-V1.0 **Covers** Alert child parent that his child found

**Req\_ID** PO\_TK\_CR\_013-V1.0 **Covers** Parent can change the status of his child to found

**Req\_ID** PO\_TK\_CR\_014-V1.1 **Covers** Parent can Delete kidnapped Child data

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**Req\_ID** PO\_TK\_CR\_015-V1.0 **Covers** Dashboard users have an account to access the

dashboard

**Req\_ID** PO\_TK\_CR\_016-V1.0 **Covers** Dashboard users can statistics and summary about the app

**Req\_ID** PO\_TK\_CR\_017-V1.0 **Covers** Admin can manage app users

**Req\_ID** PO\_TK\_CR\_018-V1.0 **Covers** Admin can manage dashboard users

**Req\_ID** PO\_TK\_CR\_019-V1.0 **Covers** Dashboard users can manage cases

**Req\_ID** PO\_TK\_CR\_020-V1.0 **Covers** Dashboard users can manage FAQ content

**Req\_ID** PO\_TK\_CR\_021-V1.0 **Covers** Dashboard users can manage about-us content

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**5.3 Project Customer Requirement Specifications**

Customer Requirement Specifications (**CRS**) identifies in some depth issues the customers have now and foresee for the next period, issues the computing support group fore- sees, and any potential business climate changes in the works. We can say it’s shallow vision from a software perspective; it’s just detailed Customer Requirements to prepare the software specifications to start the implementation of the software.

System Context:

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CRS Requirements:

**Req\_ID** Req\_PO\_TK\_CRS\_***001***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***001***-V1.1 **Description** User can create account using email

**Req\_ID** Req\_PO\_TK\_CRS\_***002***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***001***-V1.1 **Description** User can login to a pre-existing account

**Req\_ID** Req\_PO\_TK\_CRS\_***003***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***001***-V1.1 **Description** User can sign in using google authentication

**Req\_ID** Req\_PO\_TK\_CRS\_***004***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***001***-V1.1 **Description** User can reset password using email

**Req\_ID** Req\_PO\_TK\_CRS\_***005***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***002***-V1.1 **Description** The user able to see the brief data about kidnapped children

**Req\_ID** Req\_PO\_TK\_CRS\_***006***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***002***-V1.0

**Description** The user redirected to details screen to preview detailed data about the chosen children in the main screen

**Req\_ID** Req\_PO\_TK\_CRS\_***007***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***002***-V1.0 **Description** The user able to filter the list of kidnapped children by city

**Req\_ID** Req\_PO\_TK\_CRS\_***008***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***003***-V1.0

**Description** The user able to search for kidnapped children by name and the system will show the possible results

**Req\_ID** Req\_PO\_TK\_CRS\_***09***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***004***-V1.1 **Description** The user able to filter search result by age

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**Req\_ID** Req\_PO\_TK\_CRS\_***010***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***004***-V1.1 **Description** The user able to filter search result by city & state

**Req\_ID** Req\_PO\_TK\_CRS\_***011***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***005***-V1.0 **Description** The parent uploads the child photos

**Req\_ID** Req\_PO\_TK\_CRS\_***012***-V1.1 **Covers** Covers\_PO\_TK\_CR\_***005***-V1.0 **Description** The parent selects the child age

**Req\_ID** Req\_PO\_TK\_CRS\_***013***-V1.1 **Covers** Covers\_PO\_TK\_CR\_***005***-V1.0 **Description** The parent write the child’s name

**Req\_ID** Req\_PO\_TK\_CRS\_***014***-V1.1 **Covers** Covers\_PO\_TK\_CR\_***005***-V1.0 **Description** The parent select the child Kidnapped Date

**Req\_ID** Req\_PO\_TK\_CRS\_***015***-V1.1 **Covers** Covers\_PO\_TK\_CR\_***005***-V1.0 **Description** The parent can write any additional notes

**Req\_ID** Req\_PO\_TK\_CRS\_***016***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***005***-V1.0 **Description** The parent selects the date that the child was kidnapped in

**Req\_ID** Req\_PO\_TK\_CRS\_***017***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***006***-V1.0 **Description** The parent will write his national ID

**Req\_ID** Req\_PO\_TK\_CRS\_***018***-V1.1 **Covers** Covers\_PO\_TK\_CR\_***006***-V1.0 **Description** The parent will write his phone number

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**Req\_ID** Req\_PO\_TK\_CRS\_***019***-V1.1 **Covers** Covers\_PO\_TK\_CR\_***006***-V1.0 **Description** The parent will write his name

**Req\_ID** Req\_PO\_TK\_CRS\_***020***-V1.1 **Covers** Covers\_PO\_TK\_CR\_***006***-V1.0 **Description** The parent will write his home address location

**Req\_ID** Req\_PO\_TK\_CRS\_***021***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***007***-V1.0

**Description** After the parent added the kidnapped child photo the system will take the child face print

**Req\_ID** Req\_PO\_TK\_CRS\_***022***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***008***-V1.0 **Description** The system stores the child face print in the database

**Req\_ID** Req\_PO\_TK\_CRS\_***023***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***009***-V1.0 **Description** The user uploads a photo of the suspected child using device camera

**Req\_ID** Req\_PO\_TK\_CRS\_***024***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***009***-V1.0 **Description** The captured photo get processed

**Req\_ID** Req\_PO\_TK\_CRS\_***025***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***009***-V1.0 **Description** The system detect whether the child is kidnapped or not

**Req\_ID** Req\_PO\_TK\_CRS\_***026***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***010***-V1.0 **Description** The system will show the kidnapped child possible results

**Req\_ID** Req\_PO\_TK\_CRS\_***027***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***010***-V1.0 50

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**Description** The user can view the details of the resulted children

**Req\_ID** Req\_PO\_TK\_CRS\_***028***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***010***-V1.0 **Description** The user selects one of the resulted children as kidnapped child

**Req\_ID** Req\_PO\_TK\_CRS\_***029***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***011***-V1.0 **Description** If the detection failed the system will alert the user

**Req\_ID** Req\_PO\_TK\_CRS\_***030***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***011***-V1.0 **Description** The system will give the user the opportunity to repeat the process again

**Req\_ID** Req\_PO\_TK\_CRS\_***031***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***012***-V1.0

**Description** If detection was successful, the system will alert the parent of the kidnapped child with notification

**Req\_ID** Req\_PO\_TK\_CRS\_***032***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***013***-V1.0

**Description** If the child was back safe to his family the parent can change the child status to found

**Req\_ID** Req\_PO\_TK\_CRS\_***033***-V1.0 **Covers** Covers\_PO\_TK\_CR\_***014***-V1.1 **Description** The parent has the opportunity to delete the child data

**Req\_ID** Req\_PO\_TK\_CRS\_***034***-V1.0 **Covers** PO\_TK\_CR\_***015***-V1.0 **Description** An moderator can login to the dashboard using to pre-existing

**Req\_ID** Req\_PO\_TK\_CRS\_***035***-V1.0 **Covers** PO\_TK\_CR\_***015***-V1.0 **Description** An moderator can reset password using email

**Req\_ID** Req\_PO\_TK\_CRS\_***036***-V1.0 **Covers** PO\_TK\_CR\_***016***-V1.0 51

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**Description** Users of dashboard can see the summary of the cases

**Req\_ID** Req\_PO\_TK\_CRS\_***037***-V1.0 **Covers** PO\_TK\_CR\_***017***-V1.0 **Description** Admin can remove the users accounts

**Req\_ID** Req\_PO\_TK\_CRS\_***038***-V1.0 **Covers** PO\_TK\_CR\_***017***-V1.0 **Description** Admin can ban the users accounts

**Req\_ID** Req\_PO\_TK\_CRS\_***039***-V1.0 **Covers** PO\_TK\_CR\_***018***-V1.0 **Description** Admin can add another admin account

**Req\_ID** Req\_PO\_TK\_CRS\_***040***-V1.0 **Covers** PO\_TK\_CR\_***018***-V1.0 **Description** Admin can remove admin account

**Req\_ID** Req\_PO\_TK\_CRS\_***041***-V1.0 **Covers** PO\_TK\_CR\_***018***-V1.0 **Description** Admin can edit admin account info

**Req\_ID** Req\_PO\_TK\_CRS\_***042***-V1.0 **Covers** PO\_TK\_CR\_***018***-V1.0 **Description** Admin can reset password for admin account

**Req\_ID** Req\_PO\_TK\_CRS\_***043***-V1.0 **Covers** PO\_TK\_CR\_***019***-V1.0 **Description** Dashboard user can filter cases to active , closed , awaiting

**Req\_ID** Req\_PO\_TK\_CRS\_***044***-V1.0 **Covers** PO\_TK\_CR\_***019***-V1.0 **Description** Dashboard user can delete case

**Req\_ID** Req\_PO\_TK\_CRS\_***045***-V1.0 **Covers** PO\_TK\_CR\_***019***-V1.0 **Description** Dashboard user view each case information

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**Req\_ID** Req\_PO\_TK\_CRS\_***046***-V1.0 **Covers** PO\_TK\_CR\_***019***-V1.0 **Description** Dashboard user can set case to active

**Req\_ID** Req\_PO\_TK\_CRS\_***047***-V1.0 **Covers** PO\_TK\_CR\_***019***-V1.0 **Description** Dashboard user can set case to close

**Req\_ID** Req\_PO\_TK\_CRS\_***048***-V1.0 **Covers** PO\_TK\_CR\_***020***-V1.0 **Description** Admin can edit and view FAQ

**Req\_ID** Req\_PO\_TK\_CRS\_***049***-V1.0 **Covers** PO\_TK\_CR\_***020***-V1.0 **Description** Admin can add FAQ

**Req\_ID** Req\_PO\_TK\_CRS\_***050***-V1.0 **Covers** PO\_TK\_CR\_***020***-V1.0 **Description** Admin can remove FAQ

**Req\_ID** Req\_PO\_TK\_CRS\_***051***-V1.0 **Covers** PO\_TK\_CR\_***021***-V1.0 **Description** Admin can update about-us content

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**5.4 Project Software Requirements Specifications Software Context:**

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**SRS Requirements:**

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| --- | --- |
| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***001***-V1.1  ndler\_***001***-V1.3 |
| **Description** | When app check login state the app **INN\_UI\_Rediraction** to the login if he is’t logged in |
| **Inputs** | INN\_Login\_State **Outputs** INN\_UI\_Rediraction |
| **Test Scope** | UTD/ITD/STD |

|  |  |
| --- | --- |
| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***001***-V1.1  ndler\_***002***-V1.3 |
| **Description** | When app found the user has logged in , the app redirect the user to the **INN\_Home\_Screen\_Rediraction** |
| **Inputs** | INN\_User\_Loged\_In **Outputs** INN\_Home\_Screen\_Rediraction |
| **Test Scope** | UTD/ITD/STD |

|  |  |
| --- | --- |
| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***001***-V1.1  ndler\_***003***-V1.3 |
| **Description** | When the app found the user hasn't logged in, the app redirect the user to **INN\_Login\_Screen\_Rediraction** |
| **Inputs** | INN\_User\_Not\_Loged\_In **Outputs** INN\_Login\_Screen\_Rediraction |
| **Test Scope** | UTD/ITD/STD |

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| --- | --- |
| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***001***-V1.1  ndler\_***004***-V1.3 |
| **Description Inputs** | When user fill INN\_Email the app should do **INN\_Email\_Validity** to check that the email is valid  INN\_Email **Outputs** INN\_Email\_Validity |
| **Test Scope** | UTD/ITD/STD |

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| --- | --- |
| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***001***-V1.1  ndler\_***005***-V1.3 |
| **Description** | When user fill **INN\_Password** the app should validate how strong is the password (**INN\_Password\_Strong**) |
| **Inputs** | INN\_Password **Outputs** INN\_Password\_Strong |
| **Test Scope** | UTD/ITD/STD |

|  |  |
| --- | --- |
| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***001***-V1.1  ndler\_***006***-V1.3 |
| **Description** | When both of **INN\_Email** & **INN\_Password** are valid |
| **Inputs** | INN\_Email & INN\_Password **Outputs** INN\_Verification\_mail |
| **Test Scope** | UTD/ITD/STD |

|  |  |
| --- | --- |
| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***002***-V1.1  ndler\_***007***-V1.3 |
| **Description** | When user fill **INN\_Email** the app should validate the email using **INN\_Email\_Validity** |
| **Inputs** | INN\_Email **Outputs** INN\_Email\_Validity |
| **Test Scope** | UTD/ITD/STD |

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| --- | --- |
| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***002***-V1.1  ndler\_***008***-V1.3 |
| **Description** | When user fill **INN\_Email** the app should check if the email is existing or not using **INN\_Email\_Exsiting** |
| **Inputs** | INN\_Email **Outputs** INN\_Email\_Exsiting |
| **Test Scope** | UTD/ITD/STD |

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| --- | --- |
| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***002***-V1.1  ndler\_***009***-V1.3 |
| **Description Inputs** | When user fill INN\_Password the app should check the Correctness using **INN\_Password\_Correctness**  INN\_Password **Outputs** INN\_Password\_Correctness |
| **Test Scope** | UTD/ITD/STD |

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|  |  |
| --- | --- |
| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***002***-V1.1  ndler\_***010***-V1.3 |
| **Description** | When both of **INN\_Email** & **INN\_Password** are ok the app redirect the user to home screen |
| **Inputs** | INN\_Email & INN\_Password **Outputs** INN\_Home\_Screen\_Rediraction |
| **Test Scope** | UTD/ITD/STD |

|  |  |
| --- | --- |
| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***003***-V1.1  ndler\_***011***-V1.3 |
| **Description** | When some user wants to login by his Google account, he clicks the Google Login button. App redirects him to Google Login Handler, then chooses his Google account which wants to login with, Handler returns with the token. |
| **Inputs** | Auth\_Token **Outputs** INN\_UI\_Rediracation |
| **Test Scope** | ITD/STD |

|  |  |
| --- | --- |
| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***004***-V1.1  ndler\_***013***-V1.3 |
| **Description** | When the user clicks “forget password” the app redirects the user to forget password screen using **INN\_UI\_Rediraction** |
| **Inputs** | INN\_Forget\_Password\_Click **Outputs** INN\_UI\_Rediraction |
| **Test Scope** | STD |

|  |  |
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| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***004***-V1.1  ndler\_***014***-V1.3 |
| **Description** | When user fill **INN\_Email** the app should check if the email is existing or not using **INN\_Email\_Exsiting** |
| **Inputs** | INN\_Email **Outputs** INN\_Email\_Validity |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***004***-V1.1  ndler\_***015***-V1.1 |
| **Description** | When INN\_Email\_Exsiting is true an **INN\_OTP** get sent to the user via email |
| **Inputs** | INN\_Email\_Exsiting **Outputs** INN\_OTP |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Reset\_Pass  **Covers** Req\_PO\_TK\_CRS\_***004***-V1.1  word\_***016***-V1.1 |
| **Description** | When the user enters the sent OTP the app give the authorization to the user to reset the password authorization |
| **Inputs** | INN\_OTP **Outputs** INN\_Reset\_Password\_Authrization\_Re sult |
| **Test Scope** | ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Reset\_Pass  **Covers** Req\_PO\_TK\_CRS\_***004***-V1.1  word\_***017***-V1.1 |
| **Description** | If the user is authorized to reset the password. |
| **Inputs** | INN\_New\_Password **Outputs** INN\_New\_Password\_Validatity |
| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Reset\_Pass  **Covers** Req\_PO\_TK\_CRS\_***004***-V1.1  word\_***018***-V1.1 |
| **Description Inputs** | If the new password is valid, the app redirects the user to login screen INN\_Validity **Outputs** INN\_UI\_Rediraction |
| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Search  **Covers** Req\_PO\_TK\_CRS\_***005***-V1.0  Engine\_***019***-V1.1 |
| **Description** | After the user signed into the application the user redirected to the main screen where he can see a list of kidnapped children as an **INN\_Default\_filter**.  **Types of filters :**  - INN\_Default\_filter  - The newest kidnapped childrens.  - The closest kidnapped childrens for his area .  - First 20 rows in the database.  - Consists of child INN\_brief\_information\_photo.  - The photo of the kidnapped child.  - INN\_brief\_information\_name.  - The name of the kidnapped child.  - INN\_brief\_information\_location.  - The place where the child was lost. |

**Inputs** INN\_Default\_filter **Outputs** Search\_Result **Test Scope** UTD/ITD/STD

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Search  **Covers** Req\_PO\_TK\_CRS\_***005***-V1.0  Engine\_***020***-V1.1 |
| **Description Inputs** | The user can see kidnapped children **INN\_brief\_information\_photo** INN\_Default\_filter ⇒  **Outputs** Search\_Result  INN\_brief\_information\_photo |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Search  **Covers** Req\_PO\_TK\_CRS\_***005***-V1.0  Engine\_***021***-V1.1 |
| **Description** | The user can see kidnapped children **INN\_brief\_information\_name** |
| **Inputs** | INN\_Default\_filter ⇒  **Outputs** Search\_Result  INN\_brief\_information\_name |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Search  **Covers** Req\_PO\_TK\_CRS\_***005***-V1.0  Engine\_***022***-V1.1 |
| **Description** | The user can see kidnapped children **INN\_brief\_information\_location** |
| **Inputs** | INN\_Default\_filter ⇒  **Outputs** Search\_Result  INN\_brief\_information\_location |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Search  **Covers** Req\_PO\_TK\_CRS\_***006***-V1.0  Engine\_***023***-V1.1 |
| **Description** | The user able to see **INN\_Kidnapped\_Child\_Details** where he can access full information about him  INN\_Kidnapped\_Child\_Details:  - Child photo.  - Child name.  - Child age.  - Parent name. |
| **Inputs** | INN\_Kidnapped\_Child\_Details **Outputs** Search\_Result |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Search  **Covers** Req\_PO\_TK\_CRS\_***007***-V1.0  Engine\_***024***-V1.1 |
| **Description** | The user is able to reduce the search scope by **INN\_City\_filter** so the user will be able to see the kidnapped children in this particular area  INN\_City\_filter:  - Filtered data by city . |
| **Inputs** | INN\_City\_filter **Outputs** Search\_Result |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Search  **Covers** Req\_PO\_TK\_CRS\_***008***-V1.0  Engine\_***025***-V1.1 |
| **Description** | The user is able to reduce the search for particular children by **INN\_Name\_filter** using **INN\_Name\_filter**.  INN\_Name\_filter  - Filtered data by child name. |
| **Inputs** | INN\_Name\_filter **Outputs** Search\_Result |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Search  **Covers** Req\_PO\_TK\_CRS\_***009***-V1.0  Engine\_***026***-V1.1 |
| **Description** | The user is able to reduce the search scope by filtering the data by  **INN\_Age\_Range\_filter** so the user will be able to see the kidnapped children in this particular range of age  INN\_Age\_Range\_filter:  - Filtered data by age ranges. |
| **Inputs** | INN\_Age\_Range\_filter **Outputs** Search\_Result |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Search\_Engine\_  **Covers** Req\_PO\_TK\_CRS\_***010***-V1.0  ***027***-V1.1 |
| **Description** | The user select **INN\_dd\_filter\_Chossen\_City** and his choice will be passed as a parameter to the search engine  INN\_dd\_filter\_Chossen\_City  - Desired city from a list of cities |
| **Inputs** | INN\_dd\_filter\_Chossen\_City **Outputs** Search\_Data |
| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Search\_Engine\_ ***028***-V1.1 | **Covers** Req\_PO\_TK\_CRS\_***008***-V1.0 |
| **Description** | The Search engine query the database using **Search\_Data** and return **Search\_Result** to user in the UI | |
| **Inputs** | Search\_Data | **Outputs** Search\_Result |
| **Test Scope** | ITD | |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***029***-V1.0 | **Covers** Req\_PO\_TK\_CRS\_***011***-V1.0 |
| **Description** | The apps prompts the parent to open the phone’s gallery and select one picture of the child to send it to the Database as Case\_Data | |
| **Inputs** | INN\_Child\_Photos | **Outputs** Case\_Data |
| **Test Scope** | UTD | |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***030***-V1.0 | **Covers** Req\_PO\_TK\_CRS\_***011***-V1.0 |
| **Description** | The apps prompts the parent to open the phone’s camera and scan one picture of the child to send it to the Database as Case\_Data | |
| **Inputs** | INN\_Child\_Photos | **Outputs** Case\_Data |
| **Test Scope** | UTD | |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***031***-V1.1 | **Covers** Req\_PO\_TK\_CRS\_***012***-V1.1 |
| **Description** | The parent selects the child age | |
| **Inputs** | INN\_Child\_Age\_Per\_Photo | **Outputs** Case\_Data |
| **Test Scope** | UTD | |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***032***-V1.1 **Covers** Req\_PO\_TK\_CRS\_***013***-V1.1 |
| **Description** | The parent fills the child name in the form |
| **Inputs** | INN\_Child\_Name **Outputs** Case\_Data |
| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***033***-V1.1 **Covers** - |
| **Description** | The parent fills the child National ID in the form |
| **Inputs** | INN\_Child\_National\_ID **Outputs** Case\_Data |
| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***034***-V1.1 **Covers** Req\_PO\_TK\_CRS\_***016***-V1.0 |
| **Description** | The parent upload child kidnapped date in the form |
| **Inputs** | INN\_Child\_Kidnapped\_Date **Outputs** Case\_Data |

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| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***035***-V1.0 **Covers** Req\_PO\_TK\_CRS\_***017***-V1.0 |
| **Description** | The parent will enter his national ID numbers. |
| **Inputs** | INN\_Parent\_National\_ID **Outputs** Case\_Data |
| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***036***-V1.0 **Covers** Req\_PO\_TK\_CRS\_***018***-V1.1 |
| **Description** | The parent will enter his phone numbers. |
| **Inputs** | INN\_Parent\_National\_ID **Outputs** Case\_Data |
| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***037***-V1.1 **Covers** Req\_PO\_TK\_CRS\_***019***-V1.1 |
| **Description** | The parent will enter his name. |
| **Inputs** | INN\_Parent\_National\_ID **Outputs** Case\_Data |
| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***038***-V1.0 **Covers** Req\_PO\_TK\_CRS\_***020***-V1.1 |
| **Description** | The parent writes his home address location. |
| **Inputs** | INN\_Parent\_ Home\_Adress **Outputs** Case\_Data |
| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***039***-V1.1 **Covers** - |
| **Description** | stranger uploading pictures of the suspected child |
| **Inputs** | INN\_ suspected\_child\_Photo **Outputs** Case\_Data |
| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***040***-V1.1 **Covers** - |
| **Description** | The User fills the name of reported child in the form |
| **Inputs** | INN\_ reported\_child\_Name **Outputs** Case\_Data |

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| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***041***-V1.1 **Covers** - |
| **Description** | The user fills the place where he find the reported child in the form |
| **Inputs** | INN\_ Location\_of\_reported\_child **Outputs** Case\_Data |
| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***042***-V1.1 **Covers** - |
| **Description** | The user fills the age of reported child the form |
| **Inputs** | INN\_ age \_of\_reported\_child **Outputs** Case\_Data |
| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***043***-V1.1 **Covers** - |
| **Description** | The user fills additional information about reported child the form |
| **Inputs** | INN\_ additional\_information\_ about  **Outputs** Case\_Data  \_reported\_child |
| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***044***-V1.1 **Covers** Req\_PO\_TK\_CRS\_***024***-V1.0 |
| **Description** | After all data has been filled the user submit the form , and the case data will be sent to the database |
| **Inputs**  **Test Scope** | INN\_ Submit **Outputs** Case\_Data  ITD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Image\_Processin  **Covers** Req\_PO\_TK\_CRS\_***024***-V1.0  g\_Module\_***045***-V1.2 |
| **Description Inputs** | After the parent adds the child **Captured\_Photo** will be passed to  **Image\_Processing\_Module** to prepare it for the **AI\_Model.**  Captured\_Photo **Outputs** Processed\_Image |
| **Test Scope** | ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_AI\_Model\_***046***-V  **Covers** Req\_PO\_TK\_CRS\_***024***-V1.0  1.2 |
| **Description** | When **Processed\_Image** is passed, the **AI\_Model** extracts the **Child\_Faceprint\_ID**. |
| **Inputs** | Processed\_Image **Outputs** Child\_Faceprint\_ID |
| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Data\_Base\_***047***-  **Covers** Req\_PO\_TK\_CRS\_***022***-V1.0  V1.2 |
| **Description** | After the **AI\_Model** extracts the **Child\_Faceprint\_ID**. It’s stored in the **Database** in the missing children query to be searched at any update. |
| **Inputs** | Child\_Faceprint\_ID **Outputs** INN\_Success\_Storing\_Confirmatio n |
| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Image\_Processin  **Covers** Req\_PO\_TK\_CRS\_***024***-V1.0  g\_Module\_***048***-V1.2 |
| **Description** | After the user uploads a suspected child **Captured\_Photo** will be passed to **Image\_Processing\_Module** to prepare it for the **AI\_Model.** |
| **Inputs** | Captured\_Photo **Outputs** Processed\_Image |
| **Test Scope** | ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_AI\_Model\_***049***-V  **Covers** Req\_PO\_TK\_CRS\_***024***-V1.0  1.2 |
| **Description** | After the **AI\_Model** extracts the **Child\_Faceprint\_ID** of the suspected Child, **it** searches for this Faceprint ID in the **Database.** |
| **Inputs** | Processed\_Image **Outputs** Match\_Data |
| **Test Scope** | ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Data\_Base\_***050***-  **Covers** Req\_PO\_TK\_CRS\_***025***-V1.0  V1.2 |
| **Description** | If the **Child\_Faceprint\_ID** matched one or more than kidnapped child, the **Database** displayed possible results in superficial look. |
| **Inputs** | Match\_Data **Outputs** INN\_Notification\_for\_Matched\_Chil d |

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| **Test Scope** | ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***051***-V1.1 **Covers** Req\_PO\_TK\_CRS\_***026***-V1.0 |
| **Description** | The user can click any result to view the child data in detail. |
| **Inputs** | INN\_View\_in\_detail **Outputs** INN\_Detailed\_Child\_Data |
| **Test Scope** | STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***052***-V1.2 **Covers** Req\_PO\_TK\_CRS\_***026***-V1.0 |
| **Description** | The user selects one from the result list if he found the suspected child. |
| **Inputs** | INN\_Confirmation\_of\_found\_Child **Outputs** INN\_Notification\_for\_found\_Child |
| **Test Scope** | STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_ai\_model\_  **Covers** Req\_PO\_TK\_CRS\_***029***-V1.0,  ***053***-V1.0 |
| **Description** | if the detection failed ,the system will send message to tell user the detection is fail |
| **Inputs**  **Test Scope** | - **Outputs** INN\_Error\_Message  STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_ai\_model\_  **Covers** Req\_PO\_TK\_CRS\_***030***-V1.0  ***054***-V1.0 |
| **Description Inputs** | if the detection failed , the system will give the user the opportunity to repeat the process again  - **Outputs** INN\_Redirect\_To camera |
| **Test Scope** | UTD |

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| **Req\_ID** | ---Req\_PO\_TK\_SRS\_Database\_***055***-  **Covers** Req\_PO\_TK\_CRS\_***031***-V1.0  V1.0 |
| **Description** | if the detection Success , the system change the status of the child from absent to found |
| **Inputs** | Inn\_change\_status\_request **Outputs** Notification |
| **Test Scope** | ITD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Database\_***056***-V  **Covers** Req\_PO\_TK\_CRS\_***032***-V1.0  1.0 |
| **Description** | parent can change the status of his child from lost to found |
| **Inputs** | Inn\_change\_child\_data\_request **Outputs** - |
| **Test Scope** | ITD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Database\_***057***-V  **Covers** Req\_PO\_TK\_CRS\_***033***-V1.0  1.0 |
| **Description** | The parent can delete the child data from application |
| **Inputs** | Inn\_delete\_child\_data\_request **Outputs** INN\_Delete\_Confirmation |
| **Test Scope** | ITD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Database\_***058***-V  **Covers** Req\_PO\_TK\_CRS\_***033***-V1.0  1.0 |
| **Description** | The parent can delete the child data from application |
| **Inputs** | Inn\_delete\_child\_data\_request **Outputs** INN\_Delete\_Confirmation |
| **Test Scope** | ITD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***034***-V1.0  ndler\_***059***-V1.0 |
| **Description** | When app check login state the app **INN\_UI\_Rediraction** to the login if he is’t logged in |
| **Inputs** | INN\_Login\_State **Outputs** INN\_UI\_Rediraction |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***034***-V1.0  ndler\_***060***-V1.0 |
| **Description** | When app found the user has logged in , the app redirect the user to the **INN\_Summary\_Screen\_Rediraction** |
| **Inputs** | INN\_User\_Loged\_In **Outputs** INN\_summary\_Screen\_Rediraction |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***034***-V1.0  ndler\_***061***-V1.0 |
| **Description** | When the app found the user hasn't logged in, the app redirect the user to **INN\_Login\_Screen\_Rediraction** |
| **Inputs** | INN\_User\_Not\_Loged\_In **Outputs** INN\_Login\_Screen\_Rediraction |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***034***-V1.0  ndler\_***062***-V1.0 |
| **Description** | When user fill **INN\_Email** the app should check if the email is existing or not using **INN\_Email\_Exsiting** |
| **Inputs** | INN\_Email **Outputs** INN\_Email\_Exsiting |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***034***-V1.0  ndler\_***063***-V1.0 |
| **Description** | When user fill INN\_Password the app should check the Correctness using **INN\_Password\_Correctness** |
| **Inputs** | INN\_Password **Outputs** INN\_Password\_Correctness |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***034***-V1.0  ndler\_***064***-V1.0 |
| **Description** | When both of **INN\_Email** & **INN\_Password** are ok the app redirect the user to home screen |
| **Inputs** | INN\_Email & INN\_Password **Outputs** INN\_Home\_Screen\_Rediraction |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***035***-V1.0  ndler\_***065***-V1.0 |
| **Description** | When the user clicks “forget password” the app redirects the user to forget password screen using **INN\_UI\_Rediraction** |
| **Inputs** | INN\_Forget\_Password\_Click **Outputs** INN\_UI\_Rediraction |
| **Test Scope** | STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***035***-V1.0  ndler\_***066***-V1.0 |
| **Description** | When user fill **INN\_Email** the app should check if the email is existing or not using **INN\_Email\_Exsiting** |
| **Inputs** | INN\_Email **Outputs** INN\_Email\_Validity |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***035***-V1.0  ndler\_***067***-V1.0 |
| **Description** | When INN\_Email\_Exsiting is true an **INN\_OTP** get sent to the user via email |
| **Inputs** | INN\_Email\_Exsiting **Outputs** INN\_OTP |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***035***-V1.0  ndler\_***068***-V1.0 |
| **Description Inputs** | When the user enters the sent OTP the app give the authorization to the user to reset the password authorization  INN\_OTP **Outputs** INN\_Reset\_Password\_Authrization\_Re sult |

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| **Test Scope** | ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***035***-V1.0  ndler\_***069***-V1.0 |
| **Description** | If the user is authorized to reset the password. |
| **Inputs** | INN\_New\_Password **Outputs** INN\_New\_Password\_Validatity |
| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***035***-V1.0  ndler\_***070***-V1.0 |
| **Description** | If the new password is valid, the app redirects the user to login screen |
| **Inputs** | INN\_Validity **Outputs** INN\_UI\_Rediraction |
| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Database\_***071***- V1.0 | **Covers** Req\_PO\_TK\_CRS\_***036***-V1.0 |
| **Description Inputs** | When the user enters the main screen of dashboard he sees a summary data of the app :  INN\_Total\_Cases , INN\_Active\_Cases , INN\_Pending\_Cases , INN\_Closed\_Cases - **Outputs** Summary\_Data | |
| **Test Scope** | UTD | |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Database\_***072***-V  **Covers** Req\_PO\_TK\_CRS\_***037***-V1.0  1.0 |
| **Description** | Admin can delete an app user from the list of users |
| **Inputs** | INN\_Remove\_User **Output**  INN\_Removal\_Confirmation  **s** |
| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Database\_***073***-  **Covers** Req\_PO\_TK\_CRS\_***038***-V1.0  V1.0 |
| **Description** | Admin can ban an app user from using the apps services |
| **Inputs** | INN\_Ban\_User **Outputs** INN\_Ban\_Confirmation |
| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***074***-V1. 0 | **Covers** Req\_PO\_TK\_CRS\_***039***-V1.0 |
| **Description** | Admin enters the to be added admin’s name | |
| **Inputs** | Dashboard\_User\_Data | **Outputs** - |
| **Test Scope** | UTD | |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***075***-  **Covers** Req\_PO\_TK\_CRS\_***039***-V1.0  V1.0 |
| **Description Inputs** | When admin fill INN\_Email the app should do **INN\_Email\_Validity** to check that the email is valid  INN\_Email **Outputs** INN\_Email\_Validity |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***039***-V1.0  ndler\_***076***-V1.0 |
| **Description** | When user fill **INN\_Password** the app should validate how strong is the password (**INN\_Password\_Strong**) |
| **Inputs** | INN\_Password **Outputs** INN\_Password\_Strong |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***039***-V1.0  ndler\_***077***-V1.0 |
| **Description** | When user fill **INN\_Password\_Confirmation** the app should validate how strong is the password (**INN\_Password\_Matches**) |
| **Inputs** | INN\_Password **Outputs** INN\_Password\_Matches |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Database\_***078***-  **Covers** Req\_PO\_TK\_CRS\_***040***-V1.0  V1.0 |
| **Description** | Admin can delete an admin from the list of admins |
| **Inputs** | INN\_Remove\_Admin **Outputs** INN\_Removal\_Confirmation |
| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***079***-V1. 0 | **Covers** Req\_PO\_TK\_CRS\_***041***-V1.0 |
| **Description** | Admin can edits the to be added admin’s name | |
| **Inputs** | Dashboard\_User\_Data | **Outputs** - |
| **Test Scope** | UTD | |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***080***-  **Covers** Req\_PO\_TK\_CRS\_***041***-V1.0  V1.0 |
| **Description** | When admin edits INN\_Email the app should do **INN\_Email\_Validity** to check that the email is valid |
| **Inputs** | INN\_Email **Outputs** INN\_Email\_Validity |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***042***-V1.0  ndler\_***081***-V1.0 |
| **Description** | After the admin fills **INN\_Password** the app should validate how strong is the password (**INN\_Password\_Strong**) |
| **Inputs** | INN\_Password **Outputs** INN\_Password\_Strong |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Account\_Ha  **Covers** Req\_PO\_TK\_CRS\_***042***-V1.0  ndler\_***082***-V1.0 |
| **Description** | After the admin fills **INN\_Password\_Confirmation** the app should validate how strong is the password (**INN\_Password\_Matches**) |
| **Inputs** | INN\_Password **Outputs** INN\_Password\_Matches |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Database\_***083*** -V1.0 | **Covers** | Req\_PO\_TK\_CRS\_***043***-V1.0 |
| **Description** | The admin can see a list of all cases and filter it as following :  - INN\_Active\_Cases  - INN\_Awaiting\_Cases  - INN\_Closed\_Cases | | |
| **Inputs** | - | **Outputs** | Child\_Data |
| **Test Scope** | UTD/ITD/STD | | |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Database\_***084***-V  **Covers**  1.0 | Req\_PO\_TK\_CRS\_***044***-V1.0 |
| **Description Inputs**  **Test Scope** | Admin can delete a case from the list of cases  INN\_Remove\_Case **Outputs** INN\_Removal\_Confirmation UTD | |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Dtabase\_***085***-  **Covers** Req\_PO\_TK\_CRS\_***045***-V1.0  V1.0 |
| **Description** | When the admin presses “more info. Btn” get redirected to **INN\_Case\_Detailed\_View** |
| **Inputs** | INN\_More\_Info\_Click **Outputs** INN\_UI\_Rediraction |
| **Test Scope** | STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Database\_***086***-  **Covers** Req\_PO\_TK\_CRS\_***046***-V1.0  V1.0 |
| **Description** | The admin can change the state of a case to **INN\_Active\_Case** |
| **Inputs** | INN\_Activate\_Click **Outputs** INN\_Active\_Case |
| **Test Scope** | STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Database\_***0***  **Covers** Req\_PO\_TK\_CRS\_***047***-V1.0  ***87***-V1.0 |
| **Description** | The admin can change the state of a case to **INN\_Closed\_Case** |
| **Inputs** | INN\_Close\_Click **Outputs** INN\_Closed\_Case |
| **Test Scope** | STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***088***-  **Covers** Req\_PO\_TK\_CRS\_***048***-V1.0,  V1.0  Req\_PO\_TK\_CRS\_***049***-V1.0 |
| **Description** | the admin fills faq\_question input field |
| **Inputs** | INN\_Faq\_Question **Outputs** - |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***089***-  **Covers** Req\_PO\_TK\_CRS\_***048***-V1.0,  V1.0  Req\_PO\_TK\_CRS\_***049***-V1.0 |
| **Description** | the admin fills faq\_answer input field |
| **Inputs** | INN\_Faq\_answer **Outputs** - |
| **Test Scope** | UTD/ITD/STD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Database\_***090***-  **Covers** Req\_PO\_TK\_CRS\_***050***-V1.0  V1.0 |
| **Description** | Admin can delete a Faq from the list of Faqs |
| **Inputs** | INN\_Remove\_Faq **Outputs** INN\_Removal\_Confirmation |
| **Test Scope** | UTD |

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| **Req\_ID** | Req\_PO\_TK\_SRS\_Form\_***091***-  **Covers** Req\_PO\_TK\_CRS\_***051***-V1.0  V1.0 |
| **Description** | the admin fills about-us content in the input field |
| **Inputs** | INN\_Faq\_answer **Outputs** - |
| **Test Scope** | UTD/ITD/STD |

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**5.5 Project Requirements Traceability Matrix**

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| **CR** | **CRS SRS** |
| PO\_TK\_CR\_***001***-V1.1 | Req\_PO\_TK\_CRS\_***001***-V1.1 Req\_PO\_TK\_SRS\_Account\_Han dler\_***001***-V1.3  Req\_PO\_TK\_SRS\_Account\_Han  dler\_***002***-V1.3  Req\_PO\_TK\_SRS\_Account\_Han  dler\_***003***-V1.3  Req\_PO\_TK\_SRS\_Account\_Han  dler\_***004***-V1.3  Req\_PO\_TK\_SRS\_Account\_Han  dler\_***005***-V1.3  Req\_PO\_TK\_SRS\_Account\_Han  dler\_***006***-V1.3 |
| Req\_PO\_TK\_CRS\_***002***-V1.1 Req\_PO\_TK\_SRS\_Account\_Han dler\_***007***-V1.3  Req\_PO\_TK\_SRS\_Account\_Han  dler\_***008***-V1.3  Req\_PO\_TK\_SRS\_Account\_Han  dler\_***009***-V1.3  Req\_PO\_TK\_SRS\_Account\_Han  dler\_***0010***-V1.3 |
| Req\_PO\_TK\_CRS\_***003***-V1.1 Req\_PO\_TK\_SRS\_Account\_Han dler\_***011***-V1.3 |
| Req\_PO\_TK\_CRS\_***004***-V1.1 Req\_PO\_TK\_SRS\_Account\_Han dler\_***013***-V1.3  Req\_PO\_TK\_SRS\_Account\_Han  dler\_***014***-V1.3  Req\_PO\_TK\_SRS\_Account\_Han  dler\_***015***-V1.1  Req\_PO\_TK\_SRS\_Reset\_Pass  word\_***016***-V1.1  Req\_PO\_TK\_SRS\_Reset\_Pass  word\_***017***-V1.1 |

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|  | Req\_PO\_TK\_SRS\_Reset\_Pass  word\_***018***-V1.1 |
| PO\_TK\_CR\_***002***-V1.1 | Req\_PO\_TK\_CRS\_***005***-V1.0 Req\_PO\_TK\_SRS\_Search Engine\_***019***-V1.1  Req\_PO\_TK\_SRS\_Search  Engine\_***020***-V1.1  Req\_PO\_TK\_SRS\_Search  Engine\_***021***-V1.1  Req\_PO\_TK\_SRS\_Search  Engine\_***022***-V1.1 |
| Req\_PO\_TK\_CRS\_***006***-V1.0 Req\_PO\_TK\_SRS\_Search Engine\_***023***-V1.1 |
| Req\_PO\_TK\_CRS\_***007***-V1.0 Req\_PO\_TK\_SRS\_Search Engine\_***024***-V1.1 |
| PO\_TK\_CR\_***003***-V1.0 | Req\_PO\_TK\_CRS\_***008***-V1.0 Req\_PO\_TK\_SRS\_Search Engine\_***025***-V1.1  Req\_PO\_TK\_SRS\_Search\_Engi  ne\_***028***-V1.1 |
| PO\_TK\_CR\_***004***-V1.1 | Req\_PO\_TK\_CRS\_***009***-V1.0 Req\_PO\_TK\_SRS\_Search Engine\_***026***-V1.1  Req\_PO\_TK\_CRS\_***010***-V1.0 Req\_PO\_TK\_SRS\_Search Engine\_***027***-V1.1 |
| PO\_TK\_CR\_***005***-V1.0 | Req\_PO\_TK\_CRS\_***011***-V1.0 Req\_PO\_TK\_SRS\_Form\_***029***-V 1.0  Req\_PO\_TK\_SRS\_Form\_***030***-V  1.0 |
| Req\_PO\_TK\_CRS\_***012***-V1.0 Req\_PO\_TK\_SRS\_Form\_***031***-V 1.1 |
| Req\_PO\_TK\_CRS\_***013***-V1.1 Req\_PO\_TK\_SRS\_Form\_***032***-V 1.1 |
| Req\_PO\_TK\_CRS\_***014***-V1.1 - |
| Req\_PO\_TK\_CRS\_***015***-V1.1 - |
| Req\_PO\_TK\_CRS\_***016***-V1.0 Req\_PO\_TK\_SRS\_Form\_***034***-V 1.1 |
| PO\_TK\_CR\_***006***-V1.0 | Req\_PO\_TK\_CRS\_***017***-V1.0 Req\_PO\_TK\_SRS\_Form\_***035***-V 1.0 |

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|  | Req\_PO\_TK\_CRS\_***018***-V1.0 Req\_PO\_TK\_SRS\_Form\_***036***-V 1.0 |
| Req\_PO\_TK\_CRS\_***019***-V1.1 Req\_PO\_TK\_SRS\_Form\_***037***-V 1.1 |
| Req\_PO\_TK\_CRS\_***020***-V1.1 Req\_PO\_TK\_SRS\_Form\_***038***-V 1.0 |
| PO\_TK\_CR\_***007***-V1.0 | Req\_PO\_TK\_CRS\_***021***-V1.0 - |
| PO\_TK\_CR\_***008***-V1.0 | Req\_PO\_TK\_CRS\_***022***-V1.0 Req\_PO\_TK\_SRS\_Data\_Base\_ ***047***-V1.2 |
| PO\_TK\_CR\_***009***-V1.0 | Req\_PO\_TK\_CRS\_***023***-V1.0 - |
| Req\_PO\_TK\_CRS\_***024***-V1.0 Req\_PO\_TK\_SRS\_Form\_***044***-V 1.1  Req\_PO\_TK\_SRS\_Image\_Proce  ssing\_Module\_***045***-V1.2  Req\_PO\_TK\_SRS\_AI\_Model\_***04***  ***6***-V1.2  Req\_PO\_TK\_SRS\_Image\_Proce  ssing\_Module\_***048***-V1.2  Req\_PO\_TK\_SRS\_AI\_Model\_***04***  ***9***-V1.2 |
| Req\_PO\_TK\_CRS\_***025***-V1.0 Req\_PO\_TK\_SRS\_Data\_Base\_ ***050***-V1.2 |
| PO\_TK\_CR\_***010***-V1.0 | Req\_PO\_TK\_CRS\_***026***-V1.0 Req\_PO\_TK\_SRS\_Form\_***051***-V 1.1  Req\_PO\_TK\_SRS\_Form\_***052***-V  1.2 |
| Req\_PO\_TK\_CRS\_***027***-V1.0 - |
| Req\_PO\_TK\_CRS\_***028***-V1.0 - |
| PO\_TK\_CR\_***011***-V1.0 | Req\_PO\_TK\_CRS\_***029***-V1.0 Req\_PO\_TK\_SRS\_ai\_model\_***0 53***-V1.0 |
| Req\_PO\_TK\_CRS\_***030***-V1.0 Req\_PO\_TK\_SRS\_ai\_model\_***0 54***-V1.0 |
| PO\_TK\_CR\_***012***-V1.0 | Req\_PO\_TK\_CRS\_***031***-V1.0 Req\_PO\_TK\_SRS\_Database\_***05 5***-V1.0 |
| PO\_TK\_CR\_***013***-V1.0 | Req\_PO\_TK\_CRS\_***032***-V1.0 Req\_PO\_TK\_SRS\_Database\_***05*** |

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|  | ***6***-V1.0 |
| PO\_TK\_CR\_***014***-V1.1 | Req\_PO\_TK\_CRS\_***033*** Req\_PO\_TK\_SRS\_Database\_***05 7***-V1.0  Req\_PO\_TK\_SRS\_Database\_***05***  ***8***-V1.0 |
| PO\_TK\_CR\_***015***-V1.0 | Req\_PO\_TK\_CRS\_***034***-V1.0 Req\_PO\_TK\_SRS\_Account\_Han dler\_***059***-V1.0  Req\_PO\_TK\_SRS\_Account\_Han  dler\_***060***-V1.0  Req\_PO\_TK\_SRS\_Account\_Han  dler\_***061***-V1.0  Req\_PO\_TK\_SRS\_Account\_Han  dler\_***062***-V1.0  Req\_PO\_TK\_SRS\_Account\_Han  dler\_***063***-V1.0  Req\_PO\_TK\_SRS\_Account\_Han  dler\_***064***-V1.0  Req\_PO\_TK\_CRS\_***035***-V1.0 Req\_PO\_TK\_SRS\_Account\_Han dler\_***065***-V1.0  Req\_PO\_TK\_SRS\_Account\_Han  dler\_***066***-V1.0  Req\_PO\_TK\_SRS\_Account\_Han  dler\_***067***-V1.0  Req\_PO\_TK\_SRS\_Account\_Han  dler\_***068***-V1.0  Req\_PO\_TK\_SRS\_Account\_Han  dler\_***069***-V1.0  Req\_PO\_TK\_SRS\_Account\_Han  dler\_***070***-V1.0 |
| PO\_TK\_CR\_***016***-V1.0 | Req\_PO\_TK\_CRS\_***036***-V1.0 Req\_PO\_TK\_SRS\_Database\_***07 1***-V1.0 |
| PO\_TK\_CR\_***017***-V1.0 | Req\_PO\_TK\_CRS\_***037***-V1.0 Req\_PO\_TK\_SRS\_Database\_***07 2***-V1.0 |
| Req\_PO\_TK\_CRS\_***038***-V1.0 Req\_PO\_TK\_SRS\_Database\_***07 3***-V1.0 |

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| PO\_TK\_CR\_***018***-V1.0 | Req\_PO\_TK\_CRS\_***039***-V1.0 Req\_PO\_TK\_SRS\_Form\_***074***-V 1.0  Req\_PO\_TK\_SRS\_Form\_***075***-V  1.0  Req\_PO\_TK\_SRS\_Form\_***076***-V  1.0  Req\_PO\_TK\_SRS\_Form\_***077***-V  1.0 |
| Req\_PO\_TK\_CRS\_***040***-V1.0 Req\_PO\_TK\_SRS\_Database\_***07 8***-V1.0 |
| Req\_PO\_TK\_CRS\_***041***-V1.0 Req\_PO\_TK\_SRS\_Database\_***07 9***-V1.0  Req\_PO\_TK\_SRS\_Database\_***08***  ***0***-V1.0 |
| Req\_PO\_TK\_CRS\_***042***-V1.0 Req\_PO\_TK\_SRS\_Account\_Han dler\_***081***-V1.0  Req\_PO\_TK\_SRS\_Account\_Han  dler\_***082***-V1.0 |
| PO\_TK\_CR\_***019***-V1.0 | Req\_PO\_TK\_CRS\_***043***-V1.0 Req\_PO\_TK\_SRS\_Database\_***08 3***-V1.0  Req\_PO\_TK\_CRS\_***044***-V1.0 Req\_PO\_TK\_SRS\_Database\_***08 4***-V1.0 |
| Req\_PO\_TK\_CRS\_***045***-V1.0 Req\_PO\_TK\_SRS\_Dtabase\_***085*** -V1.0 |
| Req\_PO\_TK\_CRS\_***046***-V1.0 Req\_PO\_TK\_SRS\_Database\_***08 6***-V1.0 |
| Req\_PO\_TK\_CRS\_***047***-V1.0 Req\_PO\_TK\_SRS\_Database\_***08 7***-V1.0 |
| PO\_TK\_CR\_***020***-V1.0 | Req\_PO\_TK\_CRS\_***048***-V1.0 Req\_PO\_TK\_SRS\_Form\_***088***-V 1.0,  Req\_PO\_TK\_CRS\_***049***-V1.0  Req\_PO\_TK\_SRS\_Form\_***089***-V  1.0 |
| Req\_PO\_TK\_CRS\_***050***-V1.0 Req\_PO\_TK\_SRS\_Database\_***09 0***-V1.0 |
| PO\_TK\_CR\_***021***-V1.0 | Req\_PO\_TK\_CRS\_***051***-V1.0 Req\_PO\_TK\_SRS\_Form\_***091***-V 1.0 |
| - | - Req\_PO\_TK\_SRS\_Form\_***033***-V |

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