



# Defeating Phone Scams with Conversational AI

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# Intro

The global phone scam challenge is growing exponentially

 A quarter of all unknown calls are scams or fraudulent

Scammers make 70 million calls globally every single day

- this costs victims billions of dollars annually;
- degrades consumer trust; and
- damages brand reputations.

*Our mission is to break the business model of scammers to beat them at their own game.*

# Background

## Scale of the problem in Australia

### \$3+ Billion Total Combined Losses ►

Reported to Scamwatch, ReportCyber, IDCARE, Australian Financial Crimes Exchange and government agencies.

Source: Australian Government, Australian Financial Crimes Exchange, IDCARE, ReportCyber, Scamwatch, 2022

Text Messaging



\$28 million reported lost

**Calls**



**\$141 million reported lost**

Email



\$77 million reported lost

Internet

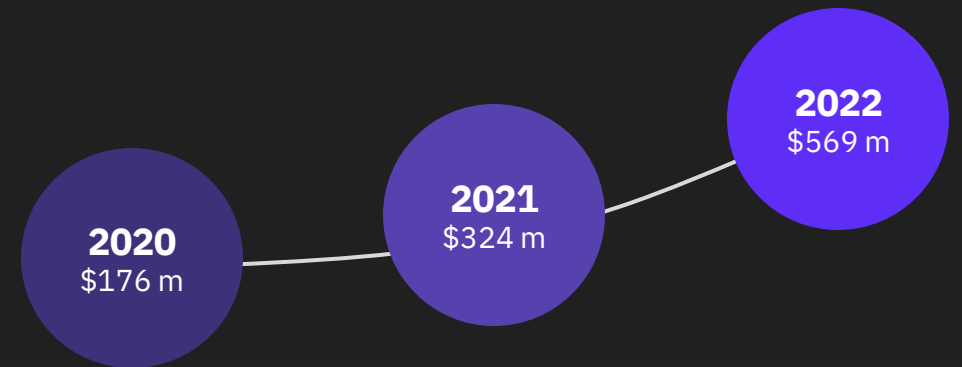


\$74 million reported lost

Social Media



\$80 million reported lost

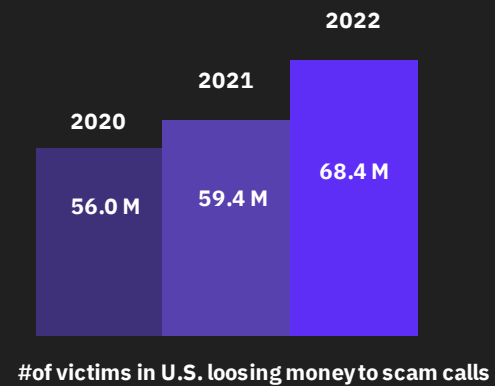
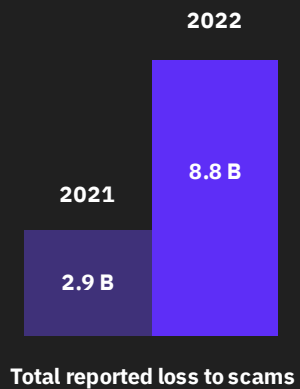


### ◀ \$141 Million Reported Lost from Phone Calls in 2022

Source: Australian Government, Australian Financial Crimes Exchange, IDCARE, ReportCyber, Scamwatch, 2022

# Background

## Reported cases and loses in the US and Singapore

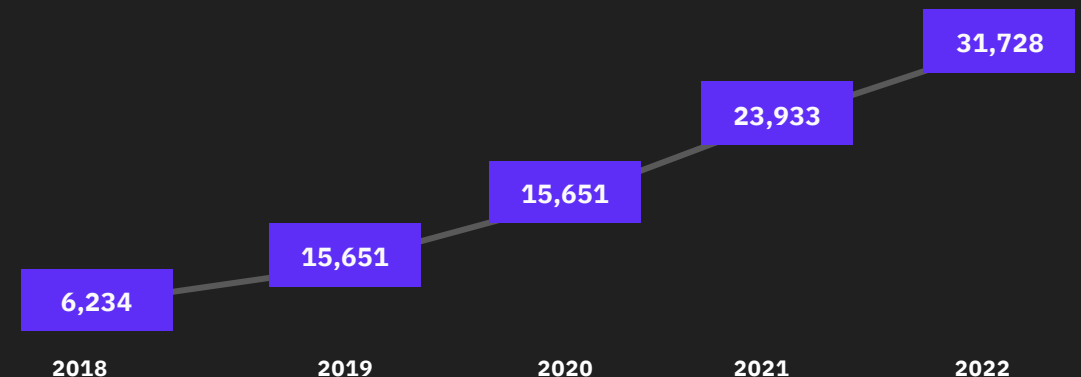


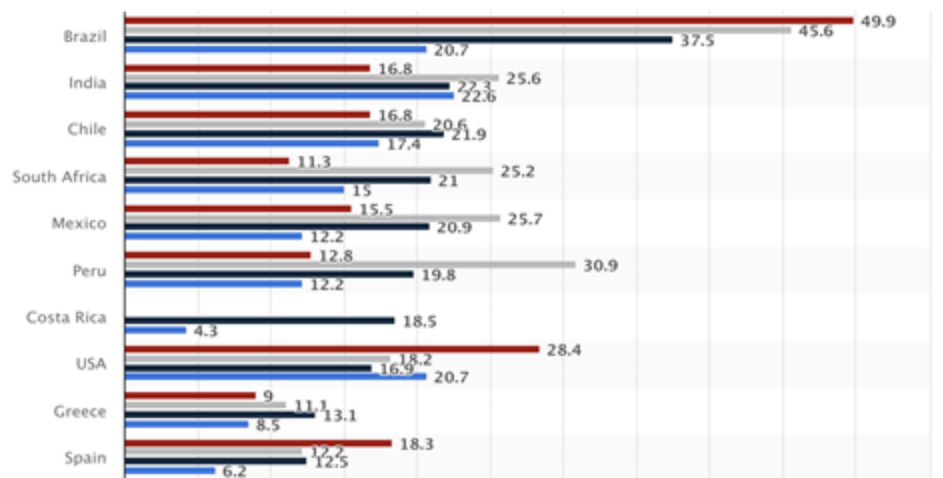
◀ **\$8.8 Billion Reported Loss in US in 2022**

FTC Report 2022, TrueCaller Data 2022

**An ever-increasing number of cases in Singapore**

Singapore Police Force Report, 2022



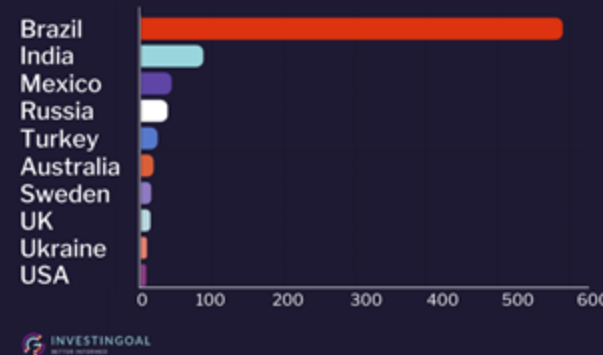


# Number of Spam Calls per User per Month

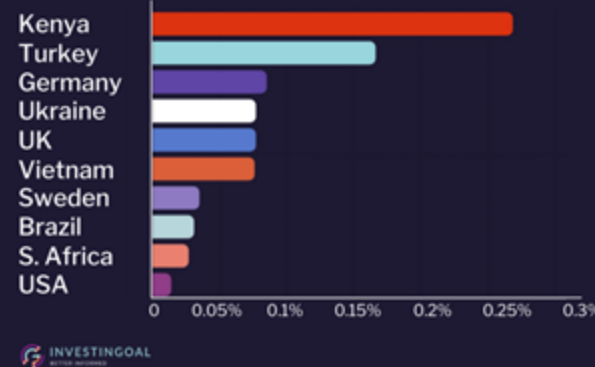
Petroc Taylor, Statista, 2023

*Average monthly number of spam phone calls per user in selected countries from 2017 to 2020, 2023*

## No. of scams per 1,000 people in 2021



## GDP loss due to scams (%)

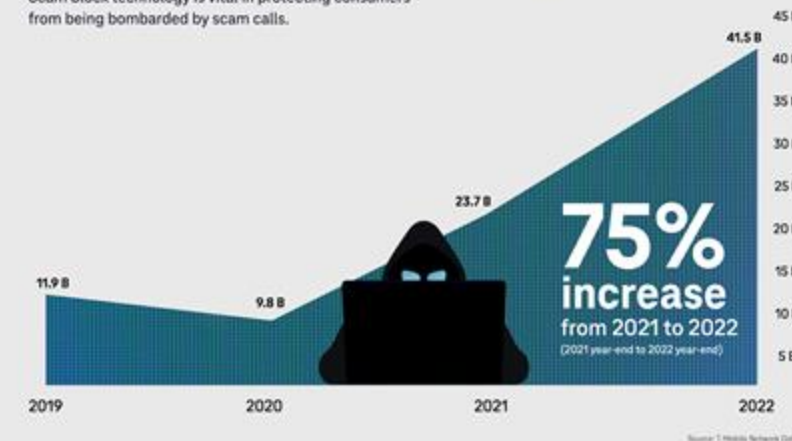


## Constantly evolving and improving scam attempts

T-Mobile Report US, 2022

## Scam Call Attempts Reached Record Highs

Scam block technology is vital in protecting consumers from being bombarded by scam calls.



# A Global Problem

# Why are scams are still a major challenge

## Root Causes of Scams

Although billions of dollars are spent on scam detection and prevention, billions of dollars are still lost to scammers.



### Technological Aspect

Simple to execute, VoIP makes it easier, Hard to update telco infrastructure



### Social Aspect

Mimics real life stories (e.g. ATO), Preys on human emotions and fears, Targets the most vulnerable people



### Monetary Incentives and Financial Challenges

High gain to cost ratio for scammers, Hard to recover scammed money, Costly infrastructure change



### Prevention and Enforcement Challenges

Scams originate from foreign jurisdictions, Detection mechanisms overwhelmed, Not enough timely threat intelligence

“

**Behind the mind-boggling statistics are real human beings, who are crippled by debt, traumatised by their ordeal and are stuck wondering how to rebuild their lives.**

”

Nerida O'Loughlin, Australian Communication and Media Authority (ACMA)  
Chair, May 3rd 2022.



**Our Mission**

**To break the scammers'  
business model, globally**

# Content



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## Partnership

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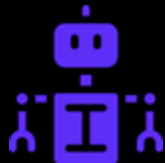
*Technology*

01

# What is Apate.AI

# What is Apate.AI

Apate offers the perfect Victim Chatbot



**Our Victim Chatbots are engaging scammers for up to 50 min**

## How

### LLM fine-tuned on call transcripts

- Scam transcripts sourced from multiple channels
- Youtube “scam baiters” and reddit enthusiasts

### Deep analysis of scammer methods

- To identify effective strategies to engage scammers
- We draw insights into scammer methods
- Hard to obtain, sellable info on current scams

### Early scam detection and alerts

- Trained ML on calls’ meta-data for scam identification
- Multi-platform scam detection for extended alerting

### Optimised AI for longer conversations

- Based on success or failure of current strategies.
- Reinforcement learning on call-length and dialogue of self-play.

## Features

### Diverse Personas

*Pre-Trained on hundreds of hours of real conversations*

### Scam Baiters Minded

*Conversation Memory, Trained Objective Function, Shared Mental Models*

### Reinforcement Learning

*Over 1000 hours and counting of real scammers conversations*

### AI Voice Cloning

*Supports convincing Victim Chatbot voices*

### Multi-Lingual

*English, Mandarin, Egyptian, German, Russian, Arabic, French and more*

### Enhanced Conversation Features

*Human-like voice, realistic interplay between interlocutors with injection of disfluencies, emotions, backchannelling and minimised speech delays.*

### Scam Fitting

*Bot derives intent of the scammer and reacts in a way to deceive them*

### Context and Category Awareness

*Probabilistic models built on the fly for each category of scam call, inferring conversation status and delaying transitions to the next stage of the scam plot*

### Continuous updates

*Containerised solution flexibly adapted, and updates instantly deployed*

## Products

### APATE AI.Callee

***Calls are redirected to Victim Chatbots with virtually an infinite number of Profiles/Personas***

### APATE Insights

***Accurate and timely Threat Intelligence for enterprise and government agencies***

# A Novel Approach

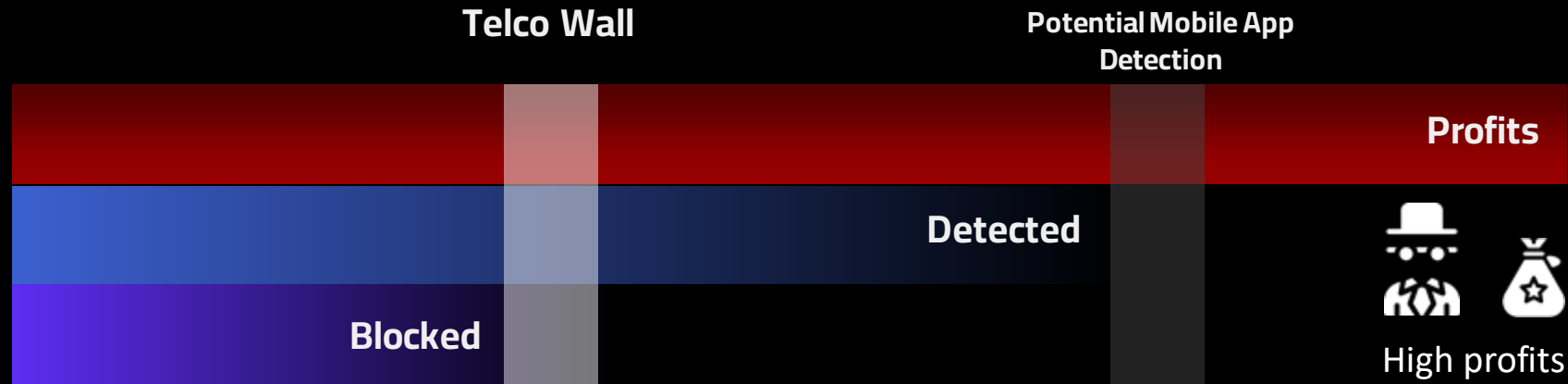
Breaking the business model of scammers

## EXISTING APPROACH

*(REACTIVE)*

Detect, Filter and  
Block

Scam calls



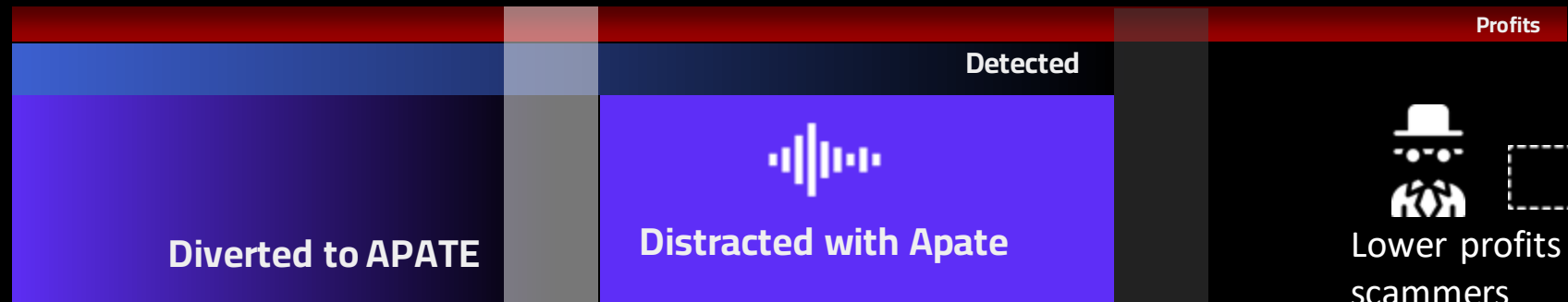
High profits for  
scammers

## APATE APPROACH

*(PROACTIVE)*

Divert, Distract  
and Disrupt

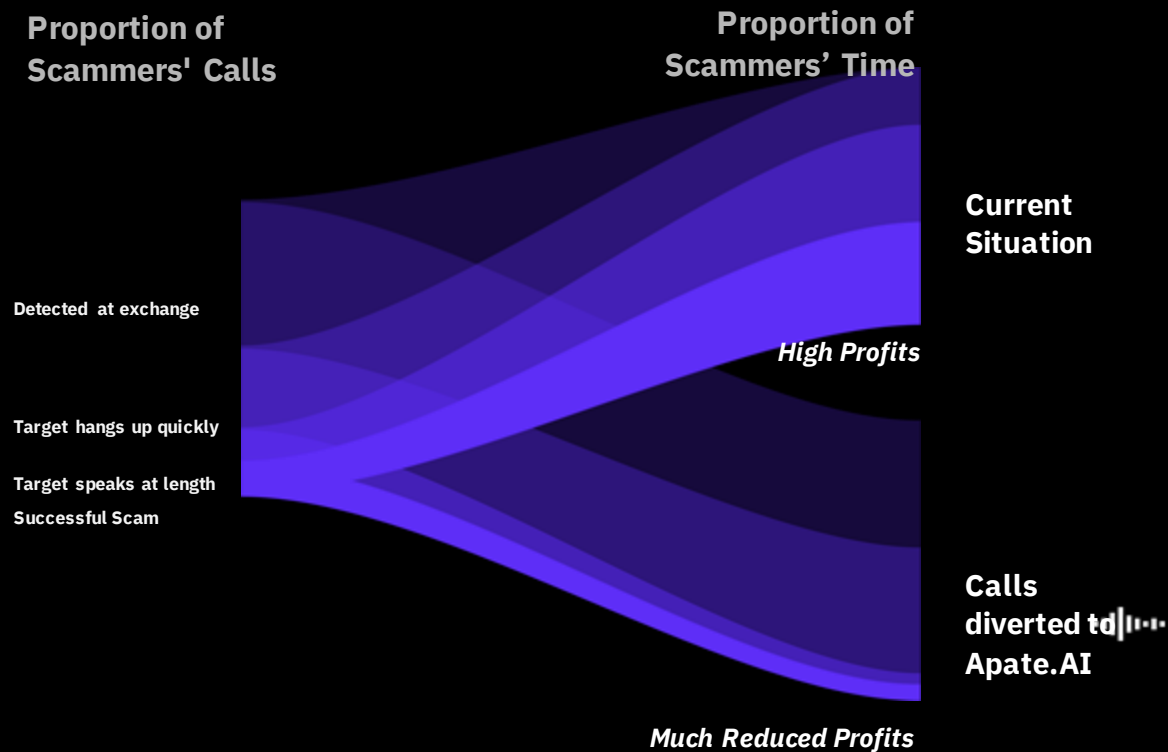
Scam calls



Lower profits for  
scammers

# Apate.AI

## From reactive to proactive scam defense



## Current (*Reactive*) approach to protect phone service users from scammers

- Educate users / share best practices
- Detect/Filter/Block some scam calls
- End users solutions (Mobile apps to detect scam, notifications based on callers reputation)
- Scam intelligence reliant on crowd-sourced victim reporting

- ▶ Detect, filter & block scam calls on telco (in-house and vendors)
- ▶ Educate consumers - augment consumer phone with a notification that a call may be a scam (Robokiller, Hiya, TrueCaller, etc.)
- ▶ Intelligence is crowd-sourced post scam losses or reports

## Apate.AI (*Proactive*) approach

- Conversational AI trained to imitate plausible, realistic scam victims
- Optimized to maximize scam call duration
- Early threat intelligence of "scampaigns"
- Deployable at any Telco network, preventing scammers from reaching actual phone service users
- Agnostic to the location of the scammer and adaptive to the location of the network to protect (Multi-lingual, multiple dialects)

- ▶ Disrupt & Deter scammers. Respond to and Prevent new scams.
- ▶ A network free of scam calls
- ▶ Extracts intelligence in real-time from scammer conversations

# A feel of what Apate bots sound like

**Edno**



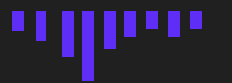
British, 65 Year Old Male  
Scam Category: Gift Card  
Overall Emotion: Collaborative  
[Have a listen](#)  
[Transcript](#)

**Edna**



Australian, 47 Year old Female  
Scam Category: Amazon Purchase  
Overall Emotion: Aggressive  
[Have a listen](#)  
[Transcript](#)

**Mary**



Australian, 50s Year Old Female  
Scam Category: Investment  
Overall Emotion: Skeptical  
[Have a listen](#)  
[Transcript](#)

**Ibrahim**



Egyptian, 62 years old Male  
Scam Category: Netflix Payments  
Overall Emotion: Collaborative  
[Have a listen](#)  
Transcript (In Egyptian)

**Ibrahim**



Egyptian, 62 years old Male  
Scam Category: Netflix Payments  
Overall Emotion: Collaborative  
[Have a listen](#)  
Transcript (in Egyptian)

**Brad**



American, 25 years old  
Scam Category: Social Security  
Overall Emotion: Cool, chilled  
[Have a listen](#)  
[Transcript](#)

02

Who is Apate.AI for?



# Products

## Core customer solutions

### Apate AI-Callee

- Calls blocked to be redirected to Apate AI-Callee (SIP or WebRTC)
- Guaranteed Minimum #min per call
- Multilingual Bots to be connected
- Targeted threat intelligence extraction via customisable dashboard and API calls

### Apate Insights

- Enterprise and Government agencies receives near real-time notification of scam campaigns
- Threat intelligence includes scam categorisation, scam stages/scripts and scammer narratives
- Periodic (daily/monthly) detailed reports via web portal dashboard and APIs
- Global intelligence sublicensed for all impersonated organisations across

#### Telco offer

#### Apate AI-Callee



per month to make phone scams ineffective in your network using Apate AI scam victim

- ✓ up to 100K calls per day
- ✓ **unlimited** AI personas
- ✓ > 5 mins of calls
- ★ **Bonus:** Scam near real-time notifications up to 10 entities

#### Org offer

#### Apate Insights (Targeted)



per month to continuously monitor who and how targets your organization (1 entity)

- ✓ Near real-time notifications
- ✓ Scam intelligence
- ✓ Scam analytics
- ✓ Detailed reports

#### Org and Gov offer

#### Apate Insights (Global)



per month to understand global scam market (all scam campaigns)

- ✓ Near real-time notifications for selected entities
- ✓ Scam intelligence
- ✓ Scam analytics
- ✓ Detailed reports

# Who Benefits

## Personas for our Products

### Apate AI-Callee



#### Telecommunication Providers

Globally, Telecommunication providers spend billions on scam call detection, blocking and filtering.

Legislation requires Telcos to reduce scam calls (e.g., Australia C661;2022 Rules from ACMA “Reduced Scam Calls Code”, Operation Stop Scam Calls 2023 FTC and attorneys general from 50 states, TRACED Act 2020, etc.)

- ▶ With Apate, increased customers trust and reduced expenditures on detection and blocking

Rules also require telecommunication providers to assist their customers in proactively managing scams and are required to share information about scam and report scam campaigns

- ▶ With Apate, Efficient Intelligence collection and real-time reporting of “Zero-day” Scam intelligence

### Apate Insights



#### Enterprise and Government

Impersonated businesses and government agencies currently know about campaigns targeting their customers only too late, mostly relying on crowd-sourced intelligence from user reports or scam loss reports/complaints.

- ▶ With Apate, real-time and accurate intelligence collection for timely response and prevention of loss. Insights into scammer methods and targets.
- ▶ Reduced effort by fraud teams seeking hard to obtain intel on current “scampaigns”
- ▶ Less scam complaints and mitigation work



#### Retail Consumers

Consumers are all vulnerable to scammers. When not falling for scams, consumers are spammed by undesirable calls, feeling vulnerable and **losing trust** in their phone network and service providers.

- ▶ With Apate, a greatly reduced number of scams, consumers regain trust facilitating increased use and sharing of positive sentiment.
- ▶ Consumers receive accurate information about current “scampaigns” and receive details on how to avoid falling victim

03

# Traction

# Key Partners

## Saudi Telecom

The logo for Saudi Telecom Company (stc) in white lowercase letters on a dark blue square background.

Heads of Agreement to quantify impact on scammers and demonstrate real-time threat intelligence. ~USD\$450K over 12 months

## TPG Telecom / CBA

The logo for TPG Telecom, featuring the lowercase letters 'tpg' followed by 'TELECOM' in uppercase, with five dots between them.

Trial with support from the AEA and Industry Growth programs

## Deutsche Telekom



Proof of concept with medium scale, multi-horizons collaboration

## ONI



Sponsor and Funder of the Research behind Apate. ~USD\$450K

## NVIDIA



Apate selected for Nvidia Inception Program. Free use of NVIDIA HPC, NVIDIA AI, Free cloud credits, on-going Discounts on NVIDIA services

## Octo.AI



Annual support with financial credits and custom low latency deployment

# POC Performance

## Preliminary Results with Early Design Partner

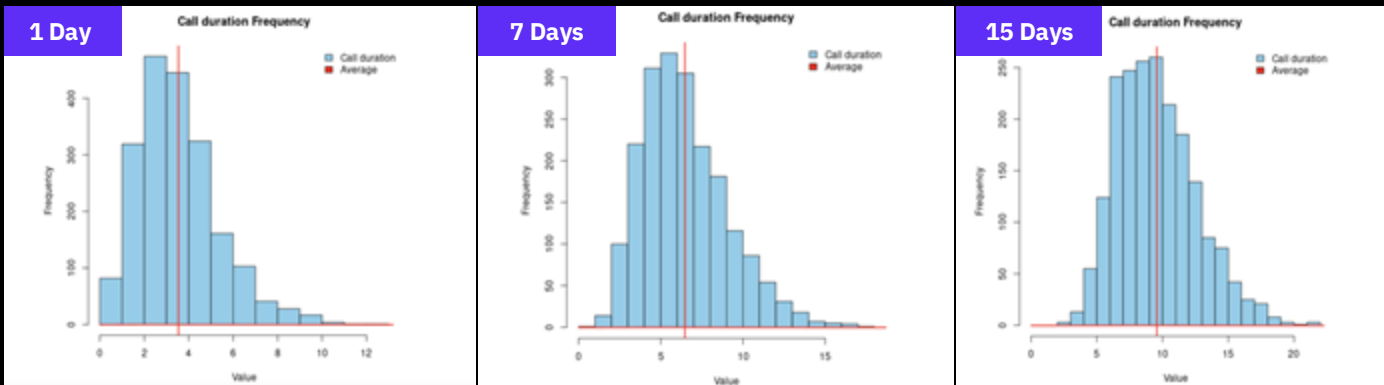


### Data

110 hours of Real Human (Scam baiters) Scammer Interactions

### ~14K phone scam calls over 3 months period

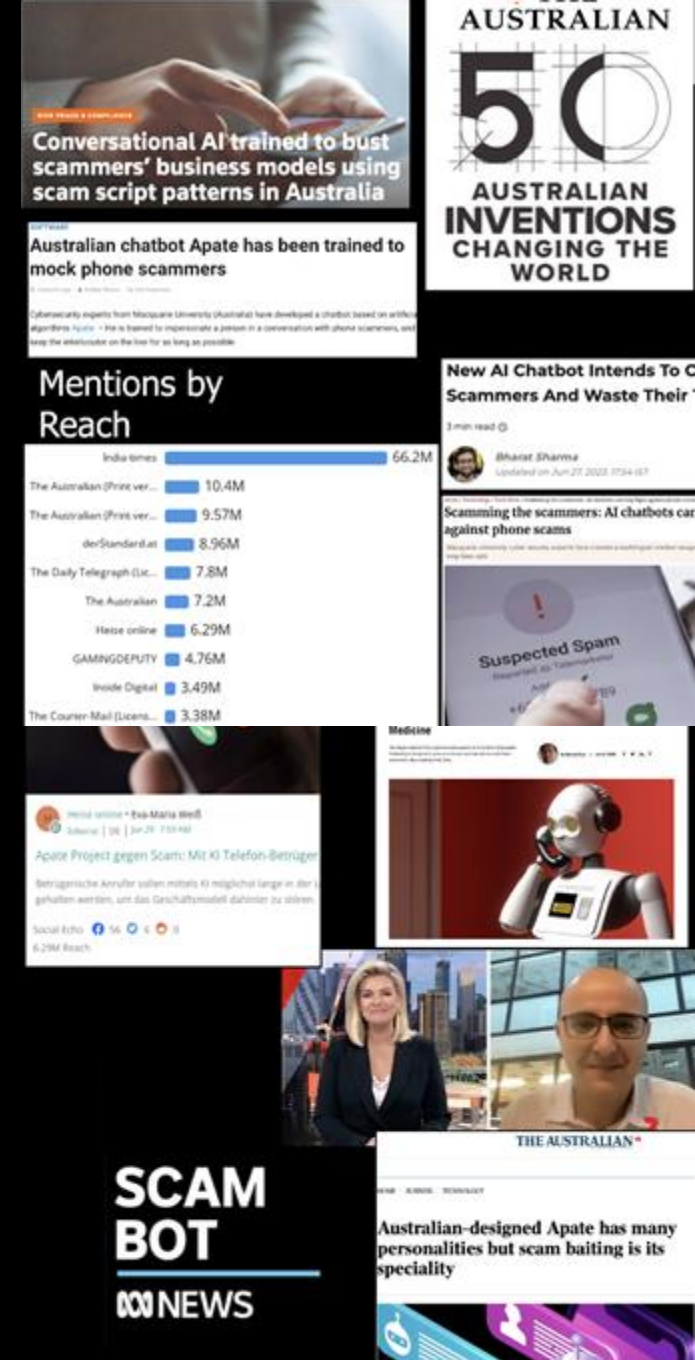
- Generated: 91840 min (1530 hours) of conversations between Victim Chatbots and Scammers
- Average call duration 6.56 min
- Reinforcement Learning (No-Yes): 620 – 910 hours



◀ **Average call length increased from 3.5mins to almost 10 minutes over the course of 15 days training**

# Achievements

- Generous **Funding from the Office of National Intelligence (ONI)**
- Recognised as **Top50 Australian Innovation of the year 2023**
- Founder recognised as **Top100 Inventors 2023**
- Awarded **First prize** of the Incubator's Researchers' IMPACT Program
- **Advanced PoC partnership trials** (12 months + Commercial agreement ~400K USD per year) with STC (KSA). Engagement with Deutsche Telekom (Germany) and TPG Australia
- **Over 15K requests** from end users worldwide, and **media coverage reaching over 150M individuals** (Reuters, National TV, India Times, BFM-TV, HeiseOnline, the Australian Podcast) since public launch (July 2023)



# Technology Development Roadmap

## What we've achieved so far (TRL 5)

- SIP and Web RTC Integrated
- **LLM/GenAI Based Bots**
- **Diverse AI Personas**
- Tailored High-Quality “victim” Voices
- Post Call Intelligence
- Seed data from scam calls on
- Conversation control heuristics
- Multi-Lingual bot (English (3 variants), Mandarin, Egyptian, German, Russian, Saudi, French)
- Scalable Pipeline
- Reinforcement Learning Enabled

## Future Development

- Run Cost Reductions (Fraction of a cent/min)
- Near Real-Time Threat Intelligence
- Global Fraud and Scam Alerting
- Language Detection and Cross-Language models
- Automated Personas Generation
- IM (WhatsApp, signal, etc.) and VoIP support

04

# Team



# Core Team

Born out of Macquarie University supported by the Office of National Intelligence (ONI)

## Dali Kaafar



Founder & CEO  
Professor of Cyber Security  
Executive Director Cyber Security Hub

## Ian Wood



Co-Founder  
Researcher and AI / NLP  
Specialist

## Michal Kepkowski



Co-Founder & Chief Architect  
Software Architect and DevOps  
specialist

## Nardine Basta



AI Researcher  
Post Doctoral Researcher  
Cyber Security and AI

## Connor Atkins



Researcher  
PhD candidate Conversational AI

## David Plisek



Operations  
Serial Founder and Cybersecurity  
Professional

# Advisors

Apate has assembled a world-class team of Advisors to help build, support, and grow



JOSH KENNEDY-WHITE  
(CO-FOUNDER)

- Commercialisation Advisory



NILOUFER SELVADURAI

- Legal Advisory



DAN JOHNSON

- Research Partnership Advisory

## Technology Advisory Board

Ersin Uzun (Leading Researcher, Ex-Innovation Manager XEROX PARC)

Simon Kriss (Chief Innovation Officer, Customer Experience Innovation Institute)

Cameron Esdaile (VP of Technology and Innovation, ThousandEyes - CISCO)

# University Support

**Macquarie  
University is an  
Equity Investor**

Board member

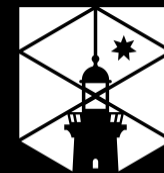
**Exclusive  
Commercial IP  
Licensing**

**Research  
partnership /  
collaboration**

Access to HPC infrastructure

**Campus Work  
Space and  
Admin Support**

**Research  
Student  
Contributions**



**MACQUARIE**  
University

05

**Partner with Us**

# Partnership with Apate

## **Trial at cost**

Guaranteed # of processed calls per day and scammers  
Minutes waived

## **Access to beneficial Commercial Licensing**

Including Real-time Threat Intelligence and sublicensing agreements for Impersonated Organisations

## **APATE AI.Callee and Insights combined**

Access to near real-time notifications of scam campaigns and global scam threat intelligence dashboard

## **Access to Personalized Personas/profiles in various networks**

## **Less than 1 hour Set up**

APATE AI.Callee is SIP and WebRTC Compliant.  
Simple Call Forward, requires NO APIs integration, NO additional code.

	Horizon 1: Jan 2024 – June 2024			Horizon 2: July 2024 – Sep 2024			Horizon 3: Oct 2025 onward		
Scope	<b>Preparing for scaled deployment in the context of live scam calls</b>  Complete development of our current prototype, adding scaling capabilities, establishing cost saving methodologies, refining pipeline design, and developing data insight models and infrastructure, all in the context of moderate scale conversations with scammers			<b>Scaled deployment POC</b>  Deployment at medium scale to demonstrate obtaining real-time business intelligence and quantify impact on scammers. Core reductions in running costs demonstrated and further refinements made. Ongoing innovation in core pipeline capabilities and adaptive AI			<b>Commercial customer</b>  Deployed at full scale with live business intelligence and significant impact on scammers. Ongoing collaboration on pipeline/bot optimisation for further improvements to costs and effectiveness in the face of inevitable behaviour changes from scammers		
Products/ Outcomes	Proof of Concept <ul style="list-style-type: none"> <li>- Scaling capabilities</li> <li>- Cost saving methodologies</li> <li>- Adaptive AI testing</li> <li>- Data insight capabilities</li> </ul>			<ul style="list-style-type: none"> <li>- Live deployment monitoring and controls</li> <li>- Live scam insight monitoring and alerts</li> <li>- Novel cost reduction methodologies (eg: caching utterances)</li> </ul> Optional: Scam intelligence			<ul style="list-style-type: none"> <li>- Significant impact on scammers including significant reduction in successful phone scams to customers.</li> <li>- Low-cost use of Apace services discounted markup on cost.</li> <li>- Ongoing Apace R&amp;D in pipeline/bot adaptation and scam monitoring</li> </ul>		
Commercial	<b>1,000 daily calls, 10c per minute</b>			<b>10,000 daily calls, 4c per minute</b>			<b>100,000 daily calls, 0.5c per minute</b>		
	TTS	75%	Realistic voice generation	TTS	57%	Discounted realistic voice generation	TTS	59%	Custom voice generation
	STT	19.5%	MZ Azure speech recognition	STT	41%	Discounted speech recognition	STT	30%	Custom speech recognition
	AI Bot	4.0%	GPT 3.5 large language model	AI Bot	1.5%	GPT 3.5 large language model	AI Bot	9%	Custom speech recognition
	Cloud	1.5%	Azure VMs	Cloud	0.5%	Azure VMs (economies of scale)	Cloud	2%	Discounted Azure VMs
Financial	Platform		USD\$10,000 per/month	Platform		USD\$15,000 per/month	Platform		USD\$20,000 per/month
	Personnel		To be co-defined	Personnel		To be co-defined			
	Total		To be co-defined	Ask		To be co-defined	Total Cost		USD\$25,000 per/month

# Sample Design Partner Program

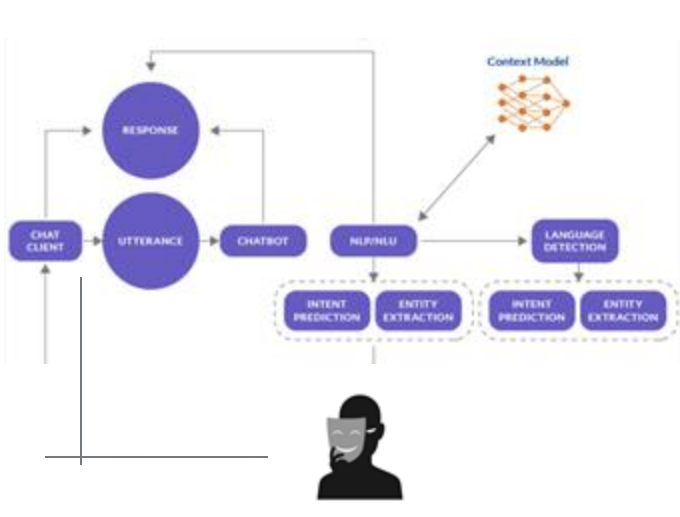
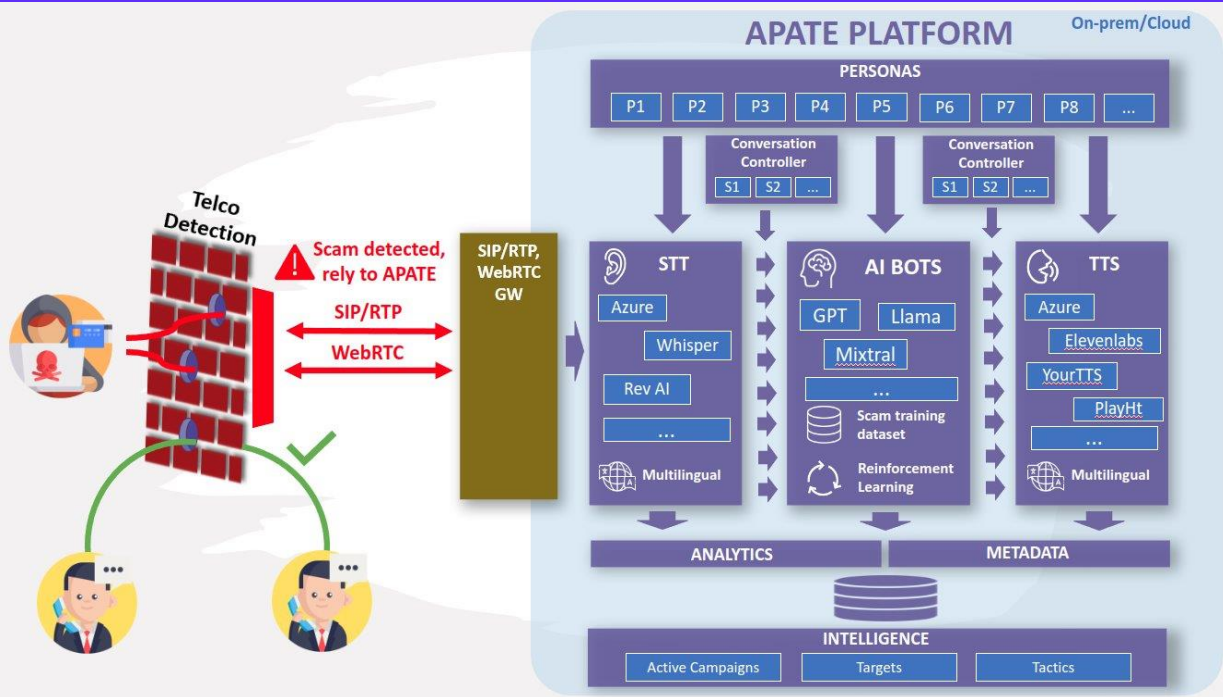


06

# Appendix

# DevOps Pipeline (SIP and WebRTC compliant)

Blocked calls are diverted to APATE AI.Callee



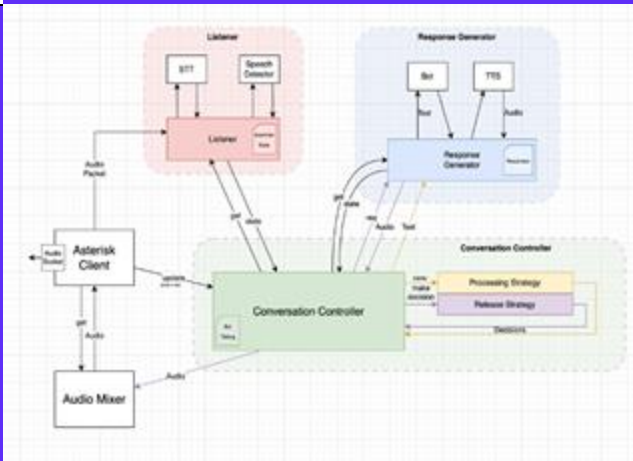
**Embedded Shared Mental Models**

Bots are trained to waste scammers time

They recognise scam categories and drag conversations while baiting scammers

**Enhanced Conversation features**

Cultural Nuances, Indistinguishable from humans



# The Technology

What we have built



# Configuration List

Add Config

Doug Mitchell (Guy, Whisper)

Created: 2023-07-21 08:50:30  
Modified: 2023-08-29 07:03:05  
Uses: 73

Associated Numbers:  
61255260572, 61256268069,  
61256323099, 61258367092,  
61260810093, 61264368015

Edit View Delete

Bernard Stapien (Whisper, Merge Calls)

Created: 2023-07-24 02:42:14  
Modified: 2023-09-13 01:51:01  
Uses: 13

Associated Numbers:  
61480096725

Edit View Delete

Bernard Stapien (Coqui, Whisper Calls)

Created: 2023-07-25 03:12:48  
Modified: 2023-09-20 00:59:54  
Uses: 525

Associated Numbers:  
\* (Default), 61291880650

Edit View Delete

Doug Mitchell, Truck Driver (Coqui, Rev)

Created: 2023-08-02 02:13:33  
Modified: 2023-08-29 07:11:12  
Uses: 8

Associated Numbers:  
61283535360, 61863655375

Edit View Delete

Arvind Mehta, Indian Entrepreneur

Created: 2023-08-17 01:11:21  
Modified: 2023-08-24 07:39:56  
Uses: 22

Associated Numbers:  
61242110152, 61260611083, 61280465370,  
61287552654, 61288454866

Edit View Delete

Elma Fisher (Coqui, For Examples)

Created: 2023-08-24 07:20:36  
Modified: 2023-08-24 07:25:46  
Uses: 2

Associated Numbers:  
61243131806

Edit View Delete

Bernard Stapien (Coqui, For Examples)

Created: 2023-08-28 23:18:21

Jenny (Chat) with BB

Created: 2023-08-28 23:18:21

Jessica Mitchell (Jenny Chat)

Created: 2023-08-29 07:06:19

Configuration List

# Configuration

Back to Config List Edit this Config Delete this Config

## Doug Mitchell (Guy, Whisper)

Phone Numbers:  
61255260572 61256268069 61256323099 61258367092 61260810093 61264368015

JSON information:

```
{
  "tts": {
    "tts_provider": "AZURE",
    "voice_name": "en-US-GuyNeural",
    "universal_ssl": {}
  },
  "stt": {
    "stt_provider": "WHISPER",
    "speech_detection": {
      "speech_prob_threshold": 0.3,
      "ipw_threshold": 0.2,
      "enable_stt_thresholds": false
    }
  },
  "bot": {
    "bot_server_submitted": "BotGPT",
    "bot_first_messages": [],
    "bot_talk_first": false,
    "silent_convo_seed": [],
    "context": "Act as an American Truck driver from Tulsa, Oklahoma.\n Your name is Doug Mitchell.\n You",
    "min_sentence_words": 1,
    "time_wasting_freq": 0,
    "enable_disfluencies": false,
    "bot_server": "ws://bot-gpt:8002/"
  },
  "audio_mixer": {
    "max_buffer": 40,
    "background_audio": "RANDOM",
    "background_volume": 0.05,
    "bot_volume": 1,
    "effects": "[]"
  }
}
```

Back to Config List Edit this Config Delete this Config

Back to Config List

# Phone Number List

Phone Number

## Phone Numbers:

Phone Number	Config
61264368015	Doug Mitchell (Guy, Whisper) View Config Edit Config Unlink Config
* (Default)	Bernard Stapien (Coqui, Whisper) View Config Edit Config Unlink Config
61480096725	Bernard Stapien (Whisper, Merge Calls) View Config Edit Config Unlink Config
61291880198	Aussie Edna Fisher (GPT-whisper-azure) View Config Edit Config Unlink Config
61863655375	Doug Mitchell, Truck Driver (Coqui, Rev) View Config Edit Config Unlink Config
61291599113	Jenny (Chat) with BB View Config Edit Config Unlink Config
61242110152	Arvind Mehta, Indian Entrepreneur View Config Edit Config Unlink Config
61243131806	Elma Fisher (Coqui, For Examples) View Config Edit Config Unlink Config
61244807796	Bernard Stapien (Coqui, For Examples) View Config Edit Config Unlink Config
61245479985	Jessica Mitchell (Jenny Chat)

Phone Number List

# Apate Personas

06 - Appendix

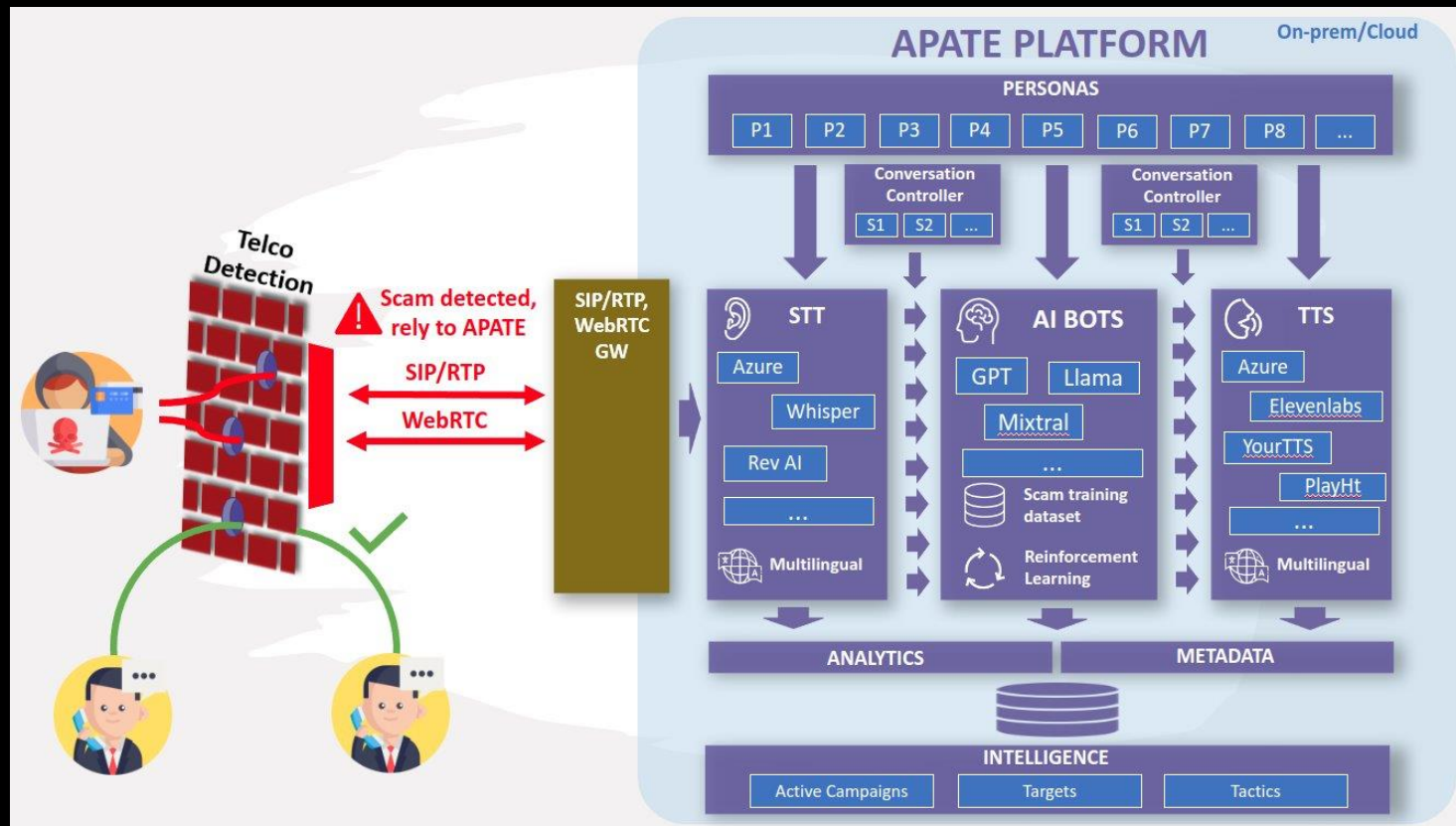
# Flexible & Infinitely Scalable



On-Prem or Cloud – containerized solution flexibly adapted depending on customer preference and data/intelligence acquisition requirements

Easy to integrate with existing in-house offerings – we can customize voices, bot personas, speech recognition and incorporate a wide-range of existing in-house LLMs and trained AI models.

DevOps Pipeline - SIP and WebRTC compliant

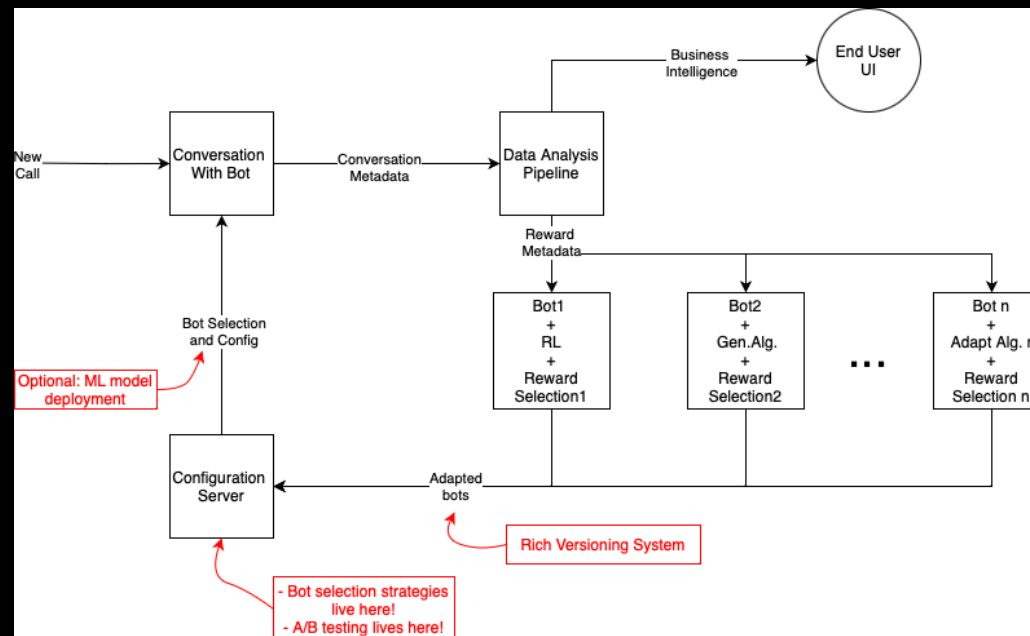


# Embedded Shared Mental Models

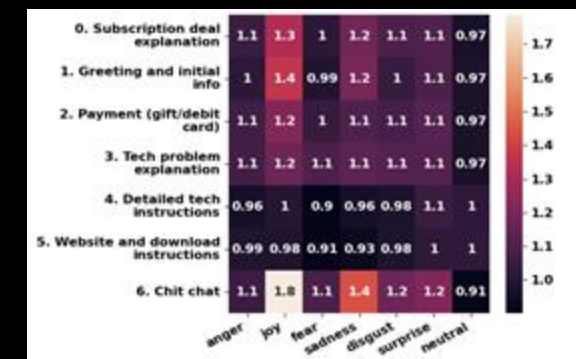
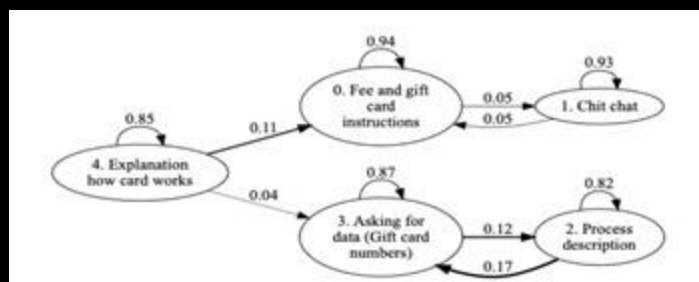
The Apace Bot is optimized for longer conversations.

The **Context Model** is updated based on the success or failure of current strategies - using Reinforcement Learning.

During the conversation, the bot derives the intent of the scammer and reacts in a way to deceive them from reaching advanced stages of their scam script/plot.



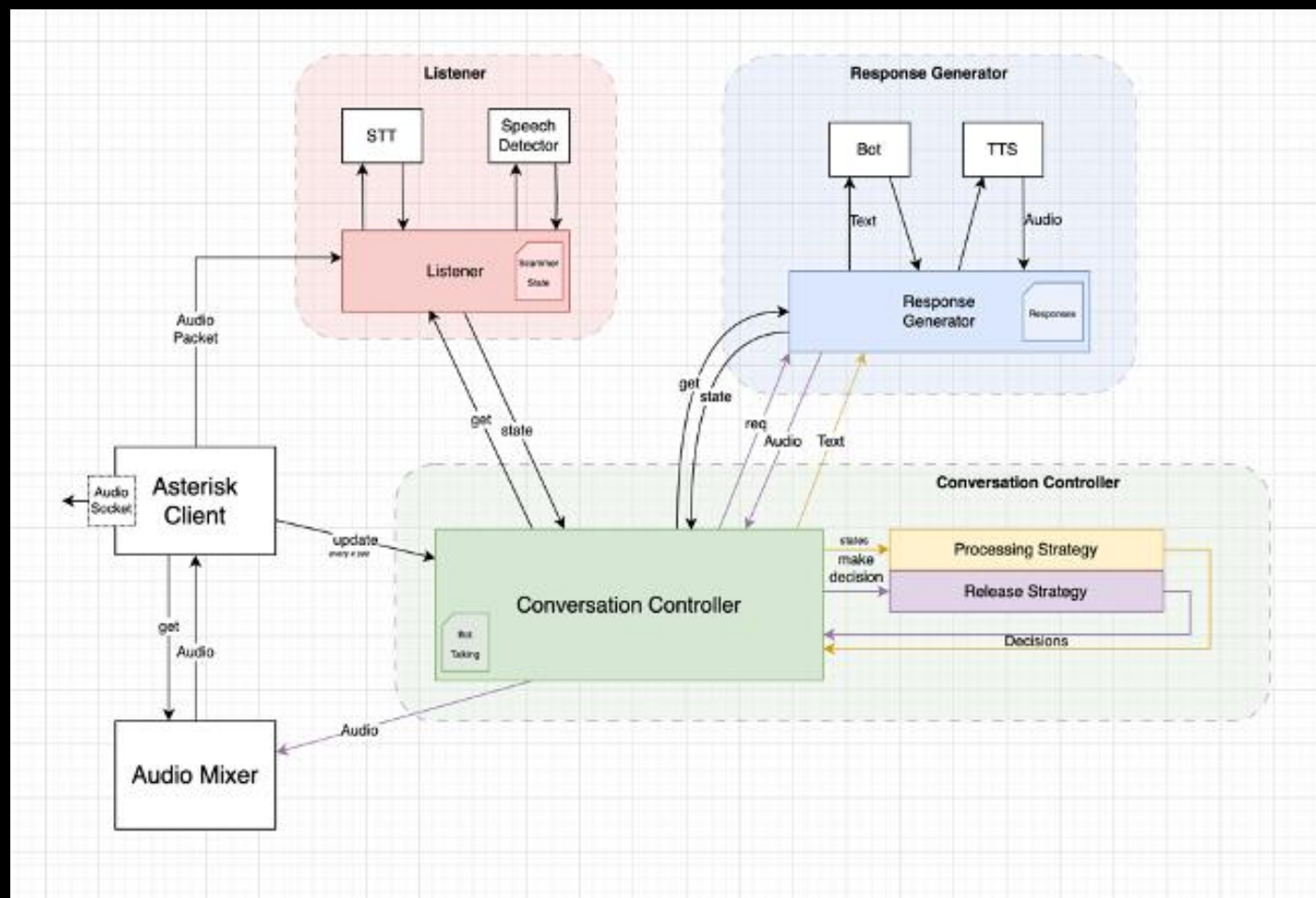
## Probabilistic model for Reward Scams



# Enhanced Conversation Features

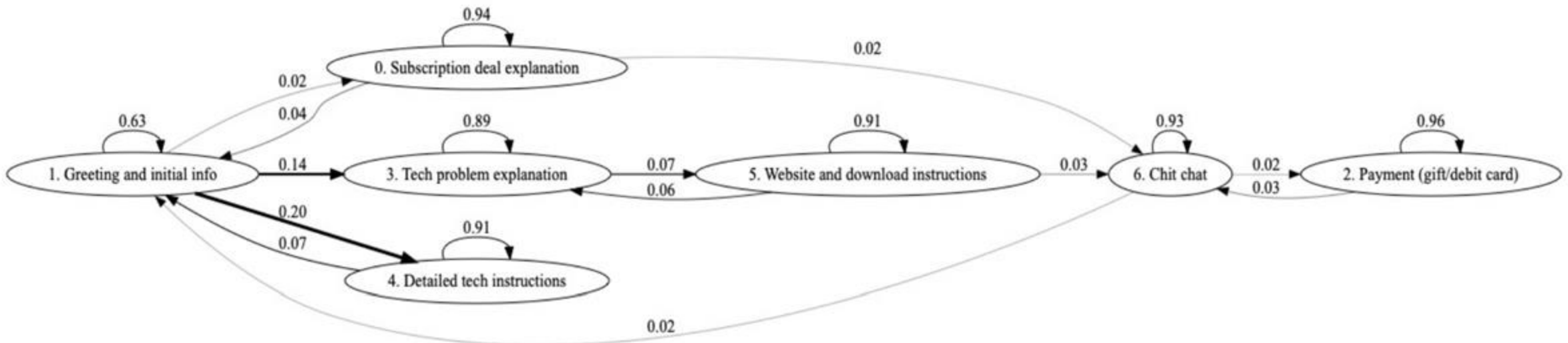
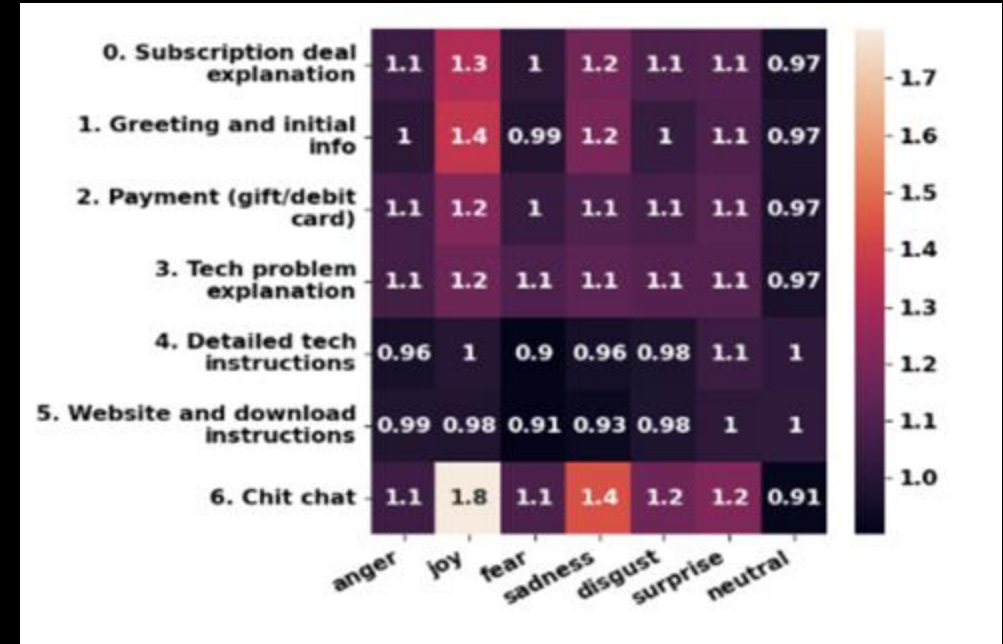
A **Conversation Controller** manages listening and talking. This includes enhanced conversational features to create a human-like voice, realistic interplay between interlocutors with injection of disfluencies, emotions, backchannelling and minimized speech delays.

The result? A flexible asynchronous conversation control architecture that intelligently manages turn taking and conversation **based on a deep knowledge of scammer/victim conversation structure.**



# Probabilistic model for Technical Support Scams

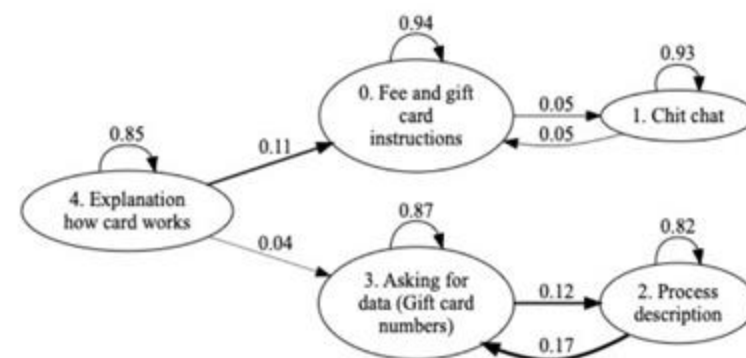
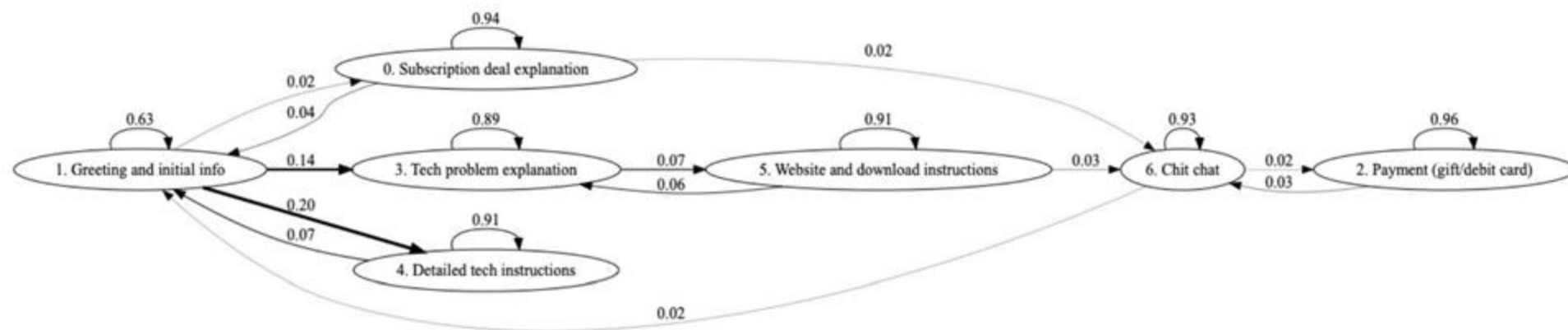
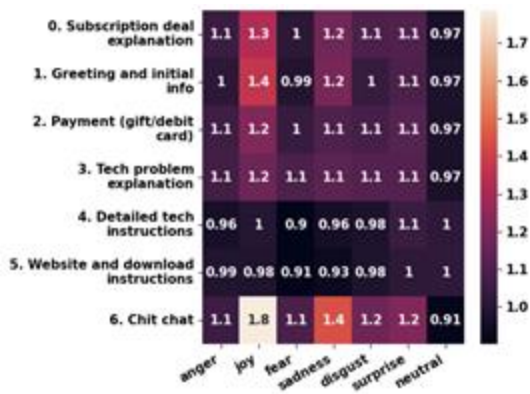
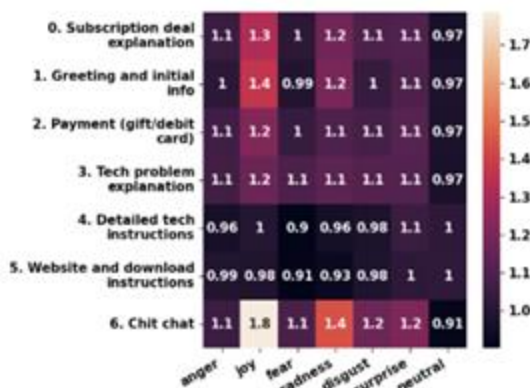
Hidden Markov Models (HMM) are probabilistic models. These probabilistic models of scams allow us to infer conversation status from observed data. These transition graphs allow us to get inside the head of the scammers to bait them.





# Context and Scam Category Awareness

## Scam Baiters Minded



HMM state transition graph for "Technical Support" scams



HMM state transition graph for "Reward" scams