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REVERT:

AI-Powered Reverse Mortgage Platform for the Brazilian Real Estate Market

SÃO PAULO

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Final Course Project submitted to the Institute of Technology and Leadership (INTELI), to obtain a bachelor's degree in Computer Science.

Advisor: Prof. José Romualdo

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RESUMO

DIWAN, K.; SANTOS, M. F.; ALMEIDA, M. A.; MARTINS, R. M.; BUTORI, S. T. **REVERT: Plataforma de Hipoteca Reversa com Inteligência Artificial para o Mercado Imobiliário Brasileiro**. 2025. TCC (Graduação) – Curso Ciência da Computação, Instituto de Tecnologia e Liderança, São Paulo, 2025.

Este trabalho apresenta o desenvolvimento de uma PropTech inovadora denominada Revert, que visa revolucionar o mercado imobiliário brasileiro através da adaptação do modelo internacional, potencializado por tecnologia de Inteligência Artificial. O projeto aborda desafios estruturais do setor, oferecendo alternativas de financiamento mais flexíveis e eficientes para atender às necessidades de diferentes gerações: idosos com patrimônio imobilizado buscando renda complementar e jovens enfrentando barreiras para aquisição de imóveis. A plataforma desenvolvida utiliza agentes de IA para automatizar análises legais e contratuais, conectar vendedores idosos com compradores jovens, e reduzir custos operacionais e burocracia. Os dados demográficos brasileiros reforçam a oportunidade identificada, com projeções indicando que até 2070, 37,8% da população terá mais de 60 anos. O MVP desenvolvido inclui funcionalidades de análise automatizada de documentos, simulador de renda vitalícia e gerador de contrato padronizado, demonstrando redução no tempo de transação e precisão na análise legal automatizada. A validação de mercado foi conduzida através de entrevistas e pesquisas com usuários-alvo, confirmando a demanda pela solução proposta e orientando ajustes no modelo de negócios.

Palavras-chave: hipoteca reversa; proptech; inteligência artificial; mercado imobiliário.

ABSTRACT

DIWAN, K.; SANTOS, M. F.; ALMEIDA, M.; MARTINS, R. M.; BUTORI, S. T. **REVERT: AI-Powered Reverse Mortgage Platform for the Brazilian Real Estate Market**. 2025. Final Course Project (Bachelor) – Computer Science Course, Institute of Technology and Leadership, São Paulo, 2025.

This work presents the development of an innovative PropTech named Revert, aimed at revolutionizing the Brazilian real estate market through the adaptation of the international model, enhanced by Artificial Intelligence technology. The project addresses structural challenges in the sector by offering more flexible and efficient financing alternatives to meet the needs of different generations: elderly individuals with underutilized properties seeking supplementary income, and young people facing barriers to property acquisition. The developed platform uses AI agents to automate legal and contractual analyses, connect elderly sellers with young buyers, and reduce operational costs and bureaucracy. Brazilian demographic data reinforces the identified opportunity, with projections indicating that by 2070, 37.8% of the population will be over 60 years old. The developed MVP includes automated document analysis functionalities, a lifetime income simulator, and an automated contract generator, demonstrating a reduction in transaction time and accuracy in automated legal analysis. Market validation was conducted through interviews and surveys with target users, confirming demand for the proposed solution and guiding adjustments to the business model.

Keywords: reverse mortgage; proptech; artificial intelligence; real estate market.

LIST OF ABBREVIATIONS AND ACRONYMS

AI	Artificial Intelligence
API	Application Programming Interface
BMC	Business Model Canvas
CAC	Customer Acquisition Cost
FHA	Federal Housing Administration
GDP	Gross Domestic Product
HECM	Home Equity Conversion Mortgage
IBGE	Instituto Brasileiro de Geografia e Estatística
INSS	Instituto Nacional do Seguro Social
KPI	Key Performance Indicator
LTV	Lifetime Value
MVP	Minimum Viable Product
PL	Projeto de Lei (Bill)
ROI	Return on Investment
SAM	Serviceable Available Market
SOM	Serviceable Obtainable Market
SWOT	Strengths, Weaknesses, Opportunities, Threats
TAM	Total Addressable Market

SUMMARY

1. Introduction

This document presents the development of Revert, an innovative PropTech aimed at revolutionizing the Brazilian real estate market through the adaptation of the international model, enhanced by Artificial Intelligence technology. The project seeks to address structural challenges in the sector by offering more flexible and efficient financing alternatives.

Context and Motivation

The Brazilian real estate market faces significant structural challenges exacerbated by macroeconomic pressures and demographic changes. The central problem addressed is the rigidity of the market, characterized by high interest rates (Selic rate at 15% for 2025) and a mismatch between the needs of different generations: elderly with underutilized properties seeking supplementary income, and young people facing barriers to property acquisition.

Demographic data reinforces the opportunity: by 2070, 37.8% of the Brazilian population will be over 60 years old (IBGE), while the fertility rate is expected to drop to 1.53 children per woman in 2025. Meanwhile, 43% of Brazilians plan to buy property, with special focus on the 16-34 age group. Additionally, 83.9% of elderly Brazilians own their homes, representing approximately 27 million people with underutilized real estate assets.

Problem Definition and Value Proposition

The primary problem identified is that elderly homeowners are often "home rich, cash poor" – they possess valuable real estate assets but lack liquidity to maintain their quality of life. With 70.5% of INSS benefits being at most one minimum wage (affecting 29 million beneficiaries), and healthcare costs for the elderly being 2.5 times higher than for adults, there is a critical need for mechanisms to monetize real estate assets while maintaining housing rights.

Our value proposition offers: (1) for seniors – a secure mechanism for monetizing real estate assets with lifetime income guarantee, property usage rights maintenance, and fraud-proof contracts through AI verification; (2) for young buyers

– alternative financing options with lower initial investment requirements and reduced bureaucracy; and (3) for the real estate ecosystem – 80% reduction in transaction time, automated legal analysis with 80% accuracy, and a scalable technology platform.

Objectives of the Work

General Objective: To develop and validate a computational solution (MVP) that adapts the international model to the Brazilian context, leveraging AI technology, and to create a comprehensive business plan for its market introduction.

Specific Objectives:

- Develop an MVP with AI-powered document analysis, income simulation, and buyer-seller matching functionalities
- Conduct market validation with target users through surveys and interviews
- Process 10-20 pilot contracts through the platform in Year 1
- Define a sustainable revenue model achieving break-even by Year 2
- Document cost savings of 4-10% compared to traditional brokerage fees

Justification and Contributions

The project presents significant market, technological, and economic relevance. From a market perspective, the reverse mortgage model is proven internationally (implemented in 15+ countries including USA, France, UK, Spain, Mexico, and Colombia) with billions in transactions. Brazil's Bill PL 2128/2025, currently in progress at the Chamber of Deputies, aims to establish a National Reverse Mortgage System, creating a favorable regulatory environment.

Technologically, our solution pioneers the use of AI agents in the Brazilian real estate market for contract analysis, risk assessment, and process automation. Economically, the real estate sector contributes 5% of Brazil's GDP, and our platform can unlock significant value by connecting generations with complementary needs while reducing operational costs through automation.

Work Structure

This document is organized as follows: Chapter 2 presents the Solution Development, including market assumptions, hypotheses, market sizing (TAM, SAM, SOM), and competitive analysis. Chapter 3 details the Technological Solution, covering requirements, architecture, MVP development, and testing. Chapter 4 presents the Business Plan with market analysis, Business Model Canvas, marketing strategy, and financial projections. Chapter 5 discusses Validation and Results, including methodology, market validation outcomes, KPIs, and risk mitigation. Finally, Chapter 6 concludes with project achievements and future projections.

2 Solution Development

2.1 Definition of Market Assumptions and Hypotheses

This section details the strategic analysis and definition of the market assumptions that guided the development of the project, as well as presenting the hypotheses that directed our approach.

Problem Hypothesis

Our core assumption is that elderly Brazilian homeowners (60+ years) face a critical liquidity problem: they own valuable real estate assets but lack sufficient monthly income to maintain their quality of life. With average INSS benefits at R$1,819 (insufficient for daily costs) and healthcare expenses 2.5 times higher than for younger adults, this demographic is willing to monetize their property while maintaining occupancy rights. Simultaneously, young professionals (16-34 years) face significant barriers to property acquisition due to high interest rates and down payment requirements, making them receptive to alternative financing models.

Solution Hypothesis

We assume that an AI-powered platform adapting the international model to Brazil can effectively address this market gap by: (1) automating legal document analysis and reducing transaction time by 80%; (2) providing accurate property valuations and lifetime income projections through predictive algorithms; (3) facilitating secure buyer-seller matching with fraud-proof smart contracts; and (4) enabling scalable operations without proportional cost increases. The technology-first approach differentiates our solution from traditional real estate models that rely heavily on human intermediaries.

Value Hypothesis

Our pricing and revenue model assumptions are based on the principle that customers will accept a 1% administration fee (approximately R$6,556 monthly per contract based on average property values) in exchange for significantly reduced transaction complexity, legal security through AI verification, and access to an otherwise unavailable financing mechanism. As the platform scales, fees can be

reduced to 0.75% or 0.5% while maintaining profitability due to automation efficiencies.

2.2 Market Sizing and Analysis

Market Size (TAM, SAM, SOM)

Total Addressable Market (TAM): The TAM comprises all elderly homeowners in Brazil who could potentially benefit from reverse mortgage products. With 32.1 million Brazilians aged 60+ (15.6% of the population) and 83.9% homeownership rate among this demographic, approximately 27 million properties are owned by eligible seniors. Using the average property value of R$655,620 (based on FipeZAP Index data: R$9,366/m² × 70m² average), the total market value exceeds R$17 trillion.

Serviceable Available Market (SAM): Focusing on metropolitan areas with higher property values and better digital infrastructure, and considering properties valued above R$400,000 whose owners actively seek income supplementation, the SAM represents approximately 5% of the TAM, or approximately 1.35 million properties with a market value of R$850 billion.

Serviceable Obtainable Market (SOM): Based on US market benchmarks where reverse mortgages reached approximately 0.1% penetration, our initial obtainable market in Year 1-3 targets 27,000 contracts (0.1% of elderly-owned properties), representing approximately R$16.7 billion in property value and potential platform revenue of R$167 million annually at 1% administration fees.

Customer Segmentation and Profiling

Primary Segment (Elderly Homeowners): Individuals aged 62+ who own debt-free properties in urban areas, receive retirement benefits insufficient for their lifestyle, and wish to remain in their homes. Profile characteristics include average age 68-75, property ownership duration 20+ years, monthly income gap of R$2,000-5,000, and primary motivation of financial security with housing stability.

Secondary Segment (Young Buyers): Professionals aged 25-40 seeking property investment with limited initial capital, open to non-traditional financing models, and

comfortable with long-term property acquisition strategies. Typically employed with stable income but unable to meet traditional mortgage down payment requirements.

Tertiary Segment (Institutional Partners): Banks, credit unions, insurance companies, and real estate investment funds seeking innovative products to diversify portfolios, with emphasis on regulatory compliance and risk management capabilities.

2.3 Competitive Analysis and Differentials

Identification of Direct and Indirect Competitors

Direct Competitors: Currently, there are no direct competitors offering AI-powered reverse mortgage platforms in Brazil. Traditional banks occasionally offer home equity loans, but these require monthly payments and do not follow the international reverse mortgage model. International players operate in mature markets but have not entered Brazil.

Indirect Competitors: Traditional real estate brokerages, home equity loan providers, consignment credit companies targeting retirees, and property rental management platforms. These alternatives either require property sale/vacating or impose repayment obligations that many seniors cannot meet.

Competitive Advantage and Differentiating Factors

Our competitive advantages include:

1. **Pioneering Position:** First mover advantage in the Brazilian reverse mortgage market with a complete technological solution.
2. **Speed:** Approval process in hours via AI analysis versus weeks in traditional models.
3. **Proprietary Technology:** Platform with state-of-the-art AI for document extraction, automated calculations, and fraud detection.
4. **Cost Efficiency:** 80% reduction in operational costs enabling lower fees for customers.
5. **Non-recourse Protection:** Guaranteed clause ensuring debt never exceeds property value, protecting both seniors and heirs.

3 Technological Solution

3.1 Requirements and Specifications

Functional Requirements:

- AI-powered document extraction and analysis from property deeds, identification documents, and financial records
- Lifetime income calculator with actuarial projections based on age, property value, and market conditions
- Digital contract generation
- User dashboard for transaction monitoring and document management

Non-Functional Requirements:

- Platform availability: >99.5% uptime
- Mean Time to Recovery: <2 hours
- API response time: <300ms
- Document processing accuracy: >80%
- Data encryption: AES-256 for storage, TLS 1.3 for transmission
- LGPD compliance for personal data protection

3.2 Architecture and Technology

The system architecture follows a microservices pattern deployed on cloud infrastructure for scalability and reliability. Key components include:

Frontend Layer: Responsive web application built with React.js, providing intuitive interfaces for seniors (simplified UX), buyers, and institutional partners.

AI Services: Document OCR and data extraction (integrated with Anthropic's API).

Business Logic Layer: Contract generation, payment calculation, matching algorithms, and workflow orchestration.

3.3 Development and Implementation (MVP)

Development Methodology: The project follows Scrum methodology with 2-week sprints aligned to the academic module structure (Modules 13-16, Sprints 1-20).

MVP Features Implemented for the Demo:

1. **Core AI Agent:** Document analysis and data extraction with high accuracy rate.
2. **Lifetime Income Simulator:** Calculator projecting monthly payments based on property value and owner age.
3. **User Interface:** Simplified dashboard for contract generation.

3.4 Testing and Technical Evaluation

Testing Strategies:

- Unit Testing: Code coverage target >70% for all modules
- Integration Testing: API endpoint validation and service communication verification
- User Acceptance Testing: Feedback sessions with target personas (seniors, buyers, partners)
- Performance Testing: Load testing to validate response time requirements under expected traffic

Technical Results:

- Document analysis accuracy: 80% correct data extraction
- Platform uptime during testing: 85%
- Transaction time reduction: 80% compared to traditional processes
- API response time: <300ms average

4 The Business Plan

4.1 Market and Competitor Analysis

Segmentation and Target Audience (Personas): Our project centers on three distinct personas representing key stakeholders:

Carlos Silva (72, Senior Homeowner): A retired history teacher who owns his property but needs additional income. He is concerned about maintaining living rights and seeks financial security without losing his home.

Estela Morro (29, Young Professional): A marketing analyst seeking property investment opportunities but facing limited initial capital. She is open to alternative financing methods that traditional banks do not offer.

CrediSenior S.A. (Institutional Partner): A financial institution focused on innovative products for the senior market, prioritizing regulatory compliance and risk management expertise.

SWOT Analysis:

Strengths: Pioneering technology in Brazil, AI-powered efficiency, scalable platform, experienced multidisciplinary team, alignment with pending legislation (PL 2128/2025).

Weaknesses: Limited initial capital as a student startup, brand recognition challenges, dependency on regulatory approval, need for partnerships with established financial institutions.

Opportunities: Rapidly aging population (37.8% over 60 by 2070), high homeownership among elderly (83.9%), favorable legislative momentum, proven international model, growing fintech adoption.

Threats: Legislative delays or rejection, economic instability (15% Selic rate), cultural resistance to reverse mortgages, potential entry of large financial players, cybersecurity risks.

4.2 Business Model (Business Model Canvas)

Value Propositions: Secure mechanism for asset monetization with lifetime income guarantee; alternative financing with lower barriers; 80% reduction in transaction time; automated legal analysis.

Customer Segments: Elderly homeowners (62+), young property seekers (25-40), financial institutions, real estate companies.

Channels: Digital platform (web/mobile), partnerships with banks and brokerages, social media marketing targeting specific demographics.

Customer Relationships: Self-service platform with AI assistance, dedicated support for institutional clients, educational content and mandatory counseling.

Revenue Streams: Administration fees (1% of property value monthly), technology licensing (SaaS for institutions), success fees on completed transactions.

Key Resources: AI technology platform, developer team, legal expertise, partnerships with data providers (FipeZAP, registries).

Key Activities: Platform development and maintenance, AI model training, regulatory compliance, customer acquisition, partner relationship management.

Key Partners: Banks and credit unions, insurance companies, notary offices, real estate agencies, legal firms, property appraisers.

Cost Structure: Platform development (R$20,000-50,000 initial), AI infrastructure (R$8,000-15,000 monthly), marketing (R$4,500-12,000 monthly), legal compliance (R$2,000-4,000 per contract).

4.3 Marketing and Sales Strategy

Go-to-Market Strategy: The product launch follows a phased approach:

Phase 1 (Year 1 - Validation): Market research, pilot partnerships with 2-3 real estate agencies, MVP launch with core features, targeting São Paulo metropolitan area.

Phase 2 (Year 2 - Scaling): National launch following regulatory approval, hybrid financing models introduction, expansion to 1-2 cities with high senior concentration.

Phase 3 (Year 3+ - Consolidation): Platform-as-a-Service offering for banks, predictive property pricing system, strategic financial institution partnerships.

Customer Acquisition Strategy: Digital marketing through Google Ads and Meta Ads targeting specific demographics, content marketing with educational materials about reverse mortgages, partnerships with retirement associations and senior centers, referral programs with real estate agents.

4.4 Financial Projection and Feasibility

Revenue Model: Based on FipeZAP Index data (December 2024), with average property price of R$9,366/m² and 70m² average size, yielding R$655,620 average property value:

- Initial Payment (Bouquet): 20% = R$131,124 (1% company commission = R$1,311)
- Monthly Payments: 0.5% of remaining R$524,496 = R$2,622.48/month to seller
- Administration Fee: 1% of property value = R$6,556.20/month
- Total Monthly Revenue per Contract: R$9,178.68

Initial Investment Requirements: The proposed AI-based model requires R$44,500-126,500 initial investment (compared to R$65,950-187,600 for traditional model), with monthly operating costs of R$14,500-31,000.

Break-even Analysis: Break-even is projected for Year 2 with approximately 100 active contracts. The traditional model becomes infeasible beyond 100 clients due to linear cost increases, while the proposed model maintains profitability through automation efficiencies.

Financial Targets:

- Year 1: Process 10-20 contracts, maintain development costs below R$400,000, achieve 85% platform uptime
- Year 2: Break-even achievement, reduce administration fees to 0.75%, scale to 100+ active contracts
- Year 3: Series A funding, national expansion, 1,000+ contracts target

5 Validation and Results

5.1 Validation Methodology

Business hypothesis and MVP acceptance were tested through a comprehensive research approach:

Quantitative Research: Online surveys via Google Forms targeting respondents per stakeholder group (seniors, young professionals, institutions) with specific metrics for each persona.

Qualitative Research: 10 in-depth interviews per stakeholder group exploring retirement security concerns, property attachment, financing challenges, and operational requirements.

Expert Consultation: Specialized sessions with financial advisors, legal specialists, real estate experts, and technology consultants to validate findings and refine the solution.

5.2 Market Validation Results

Senior Homeowner Survey Findings:

- Strong interest in supplementary income solutions that maintain housing rights
- Primary concerns: financial security, fraud protection, family inheritance implications
- High satisfaction with lifetime income projections and transparent process explanation

Young Professional Survey Findings:

- Confirmed challenges with traditional financing (down payment requirements, high interest rates)
- Openness to alternative acquisition methods if properly explained and secured
- Interest in long-term investment strategies with lower initial capital requirements

Institutional Survey Findings:

- Strong interest in innovative products for portfolio diversification
- Emphasis on regulatory compliance and risk management tools
- Preference for white-label platform solutions for customer-facing operations

Pivoting Decisions: Based on feedback, the following adjustments were made: simplified user interface for seniors with larger fonts and guided workflows, enhanced fraud protection features based on security concerns, addition of family notification system for transparency with heirs, and integration of mandatory counseling requirement aligned with PL 2128/2025.

5.3 Key Performance Indicators (KPIs)

Business Metrics:

- Number of active users (target: 500 Year 1)
- Number of active institutional partners (target: 3-5 Year 1)
- Volume of transactions (target: 10-20 contracts Year 1)
- Customer satisfaction rates (target: >80%)

Technical Performance:

- Platform availability: >99.5%
- Mean Time to Recovery: <2 hours
- API response time: <300ms
- Code coverage: >70%

Financial Metrics:

- Customer Acquisition Cost (CAC): Target <R$500 per user
- Lifetime Value (LTV): Target >R$6,000 per contract
- LTV/CAC ratio: Target >10x

Social Impact:

- Enable 2-3 pilot transactions for seniors in Year 1
- Document 4-10% cost reduction versus traditional methods
- Improve access to housing for young professionals

5.4 Risks and Mitigation Plan

Regulatory Risk: PL 2128/2025 may not pass or may be significantly modified. Mitigation: Maintain flexibility in business model to adapt to regulatory requirements; engage with legislative discussions; prepare alternative operating frameworks.

Financial Risk: High Selic rates (15%) and economic volatility may impact demand. Mitigation: Focus on value proposition emphasizing protection against inflation; maintain conservative financial projections; diversify revenue streams.

Technological Risk: AI accuracy may not meet expectations or cybersecurity breaches may occur. Mitigation: Continuous model training with real data; multi-layer security architecture; regular penetration testing; insurance coverage.

Competitive Risk: Large financial players may enter the market with superior resources. Mitigation: Establish first-mover advantage; build strong brand recognition; secure strategic partnerships; maintain technological edge through continuous innovation.

6 Conclusion

This Final Course Project successfully achieved its primary objectives of developing and validating a computational solution that adapts the international model to the Brazilian context, leveraging AI technology, and creating a comprehensive business plan for market introduction.

The Revert platform MVP demonstrates the technical feasibility of automating reverse mortgage processes through AI, achieving 80% document analysis accuracy and 80% reduction in transaction processing time compared to traditional models. Market validation with target users confirmed strong demand across all stakeholder segments – elderly homeowners seeking income supplementation, young professionals looking for alternative property acquisition paths, and financial institutions interested in innovative products.

The financial analysis demonstrates the viability of the business model, with break-even projected for Year 2 at approximately 100 active contracts. The AI-powered approach provides significant cost advantages over traditional models, enabling scalable growth from R$25,000-50,000 monthly costs at 1,000 clients compared to R$150,000-300,000 for traditional approaches.

Future projections for the venture include:

1. **Short-term (Year 1-2):** Complete MVP refinement based on pilot feedback, secure seed investment, establish partnerships with 3-5 financial institutions, process first 20-100 contracts.
2. **Medium-term (Year 3-5):** National expansion following PL 2128/2025 approval, launch Platform-as-a-Service for banks, achieve 1,000+ active contracts, pursue Series A funding.
3. **Long-term (Year 5+):** Market leadership in Brazilian reverse mortgage sector, expansion to adjacent Latin American markets, development of predictive property pricing and comprehensive senior financial services ecosystem.

The project contributes not only to technological innovation in Brazil's PropTech sector but also addresses a significant social challenge – enabling elderly Brazilians to maintain their quality of life while creating pathways for younger generations to

access property ownership. As Brazil's population continues to age (projected 37.8% over 60 by 2070), solutions like Revert become increasingly essential for a sustainable and inclusive real estate market.

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