

MULTI-AGENT SYSTEM: BOOSTING EFFICIENCY IN SEARCH ENGINE MARKETING (SEM)

Advisor: Dr.Thanachart Ritbumroong

SURAPAT VERAWUDH

6610424015



AGENDA

- ◆ Introduction & Overview
- ◆ Challenge & Solution
- ◆ Methodology
- ◆ Product Overview
- ◆ Output
- ◆ Evaluation
- ◆ Future Study
- ◆ Conclusion



Introduction

Google search results for "เรียนภาษาอังกฤษ" (Learn English) showing SEM (Search Engine Marketing) results:

Sponsored
engoo
<https://www.engoo.co.th> • เรียนอังกฤษ • คอร์สออนไลน์ :
เรียนภาษาอังกฤษ สด ตัวต่อตัว | เลือกเรียนได้ ตลอด 24 ชม.
อังกฤษครูเป็นผู้ช่วยส่วนตัว ช่วยแก้ทุกปัญหาทางภาษาอังกฤษ ติดขัดเรื่องเรียน หรือ การทำงาน

Sponsored
British Council
<https://www.britishcouncil.or.th> :
คอร์สภาษาอังกฤษสำหรับเด็ก | เรียนกับผู้เชี่ยวชาญระดับโลก
เพิ่มทักษะภาษาอังกฤษ พร้อมความติดสร้างสรรค์ในบรรยากาศการเรียนที่สนุกสนาน

**Search Engine Marketing
(SEM)**

Google search results for "เรียนภาษาอังกฤษ" (Learn English) showing SEO (Search Engine Optimization) results:

Engcouncil
<https://engcouncil.com> • Translate this page :
Engcouncil | เรียนภาษาอังกฤษออนไลน์ เน้นพูดตัวต่อตัวกับครูต่างชาติ
คอร์สเรียนภาษาอังกฤษออนไลน์ สอนสดตัวต่อตัวโดยครูต่างชาติ/เนตฟ์ แบบ Online Private Class เน้นฝึก
พูด เพียง 2100 บาท/เดือน ว่าครั้งต่อไป เลือกเวลาเรียนได้ ติดตามและประเมินผลตลอดคอร์สเรียน ...

Globish
<https://www.globish.co.th> • Translate this page :
Globish: เรียนภาษาอังกฤษออนไลน์ สอนสด พูดได้จริง
เน้นพัฒนาทักษะ การฟังและการพูด โดยเฉพาะ เรียนรู้ผ่านการฟังโดยครอบจักรวาลคุณครูแบบตัวต่อตัว ไม่ต้อง
ห้องจำ ให้เด็กๆ สามารถพูดภาษาอังกฤษได้อย่างมั่นใจ พูดถูกหลัก grammatical ก้าวสื่อสารกับชาวต่างชาติ.
คอร์สเรียน - Login - คุณครูสอนภาษาอังกฤษในเว็บ... - English for Career Growth คอร์...

**Search Engine Optimization
(SEO)**

Introduction



Google Ads



Introduction

Sponsored

 British Council
<https://www.britishcouncil.or.th>

Headline

Description

T Headlines 3/15 ② View ideas

For optimal ad performance, include these keywords in your headlines

EDSY เรียนอังกฤษสำหรับเด็ก Required 26 / 30

เรียนอังกฤษออนไลน์ครบวงจร Required 25 / 30

เรียนพิเศษภาษาอังกฤษ ตัวต่อตัว Required 30 / 30

T Descriptions 2/4 ② View ideas

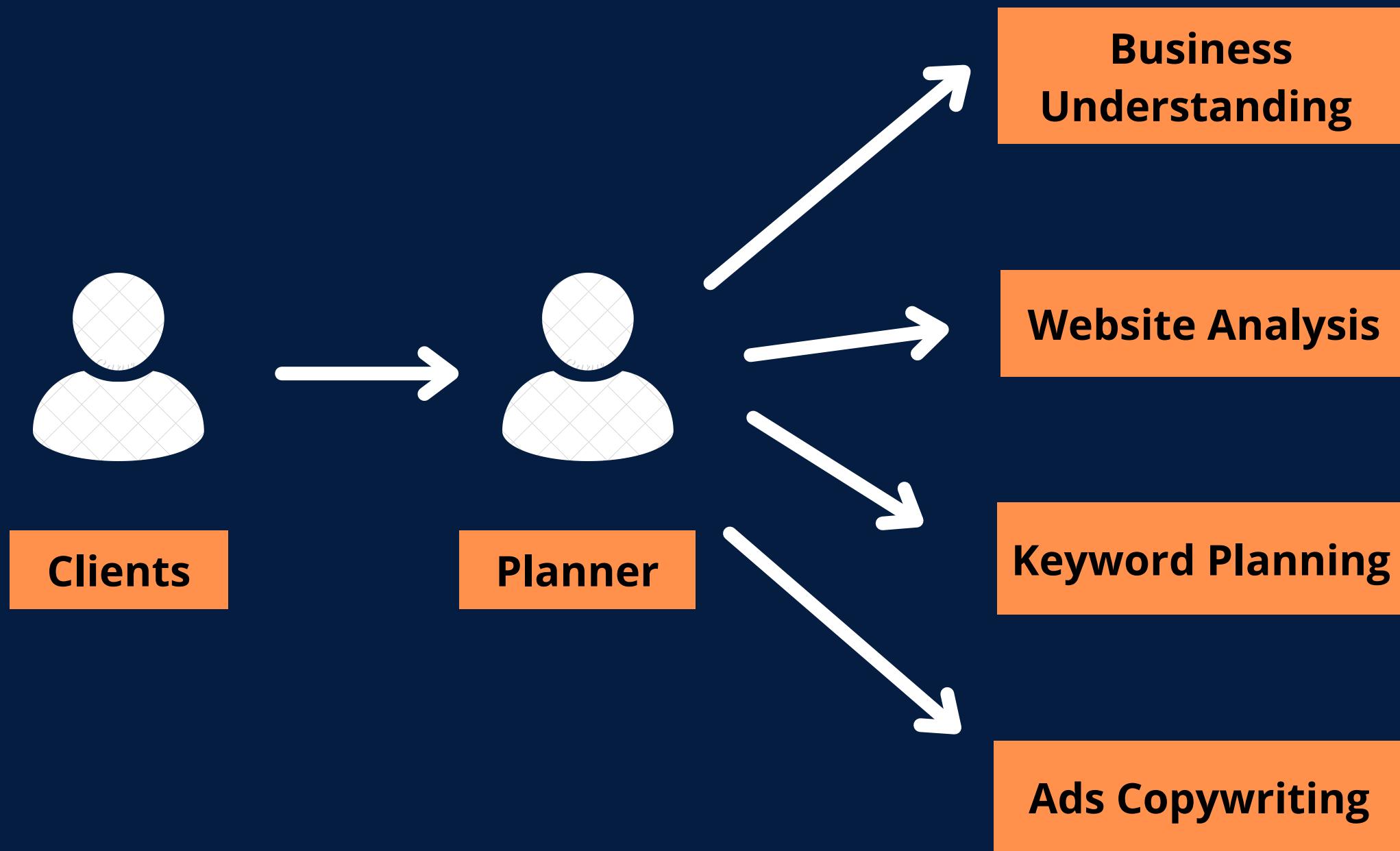
เจ้าคือสถาบันออนไลน์ที่ต้องการให้เด็กไทยสามารถเข้าถึงการเรียนภาษาอังกฤษที่มีคุณภาพ Required 81 / 90

เรียนภาษาอังกฤษอย่างในโรงเรียนนานาชาติ เรียนแล้วมีพื้นฐานที่ดี ใช้ภาษาได้จริง ครบทุกทักษะ Required 89 / 90

Description 0 / 90

SEM Planner Task

Many processes in planning are manual and time-consuming



Challenge and Solution

Business Problem



Takes a long time to plan



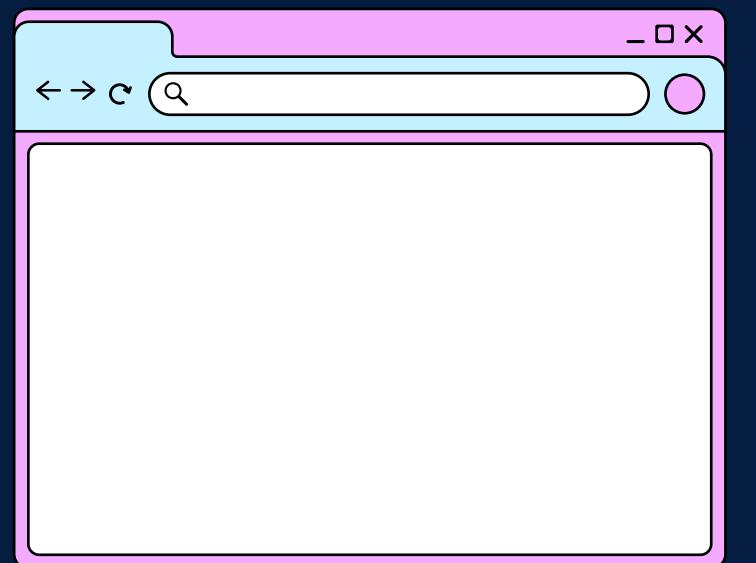
Operational inconsistencies

Propose solution



Generative AI Product
For SEM Planner

Methodology



**Generative AI
Product Development**

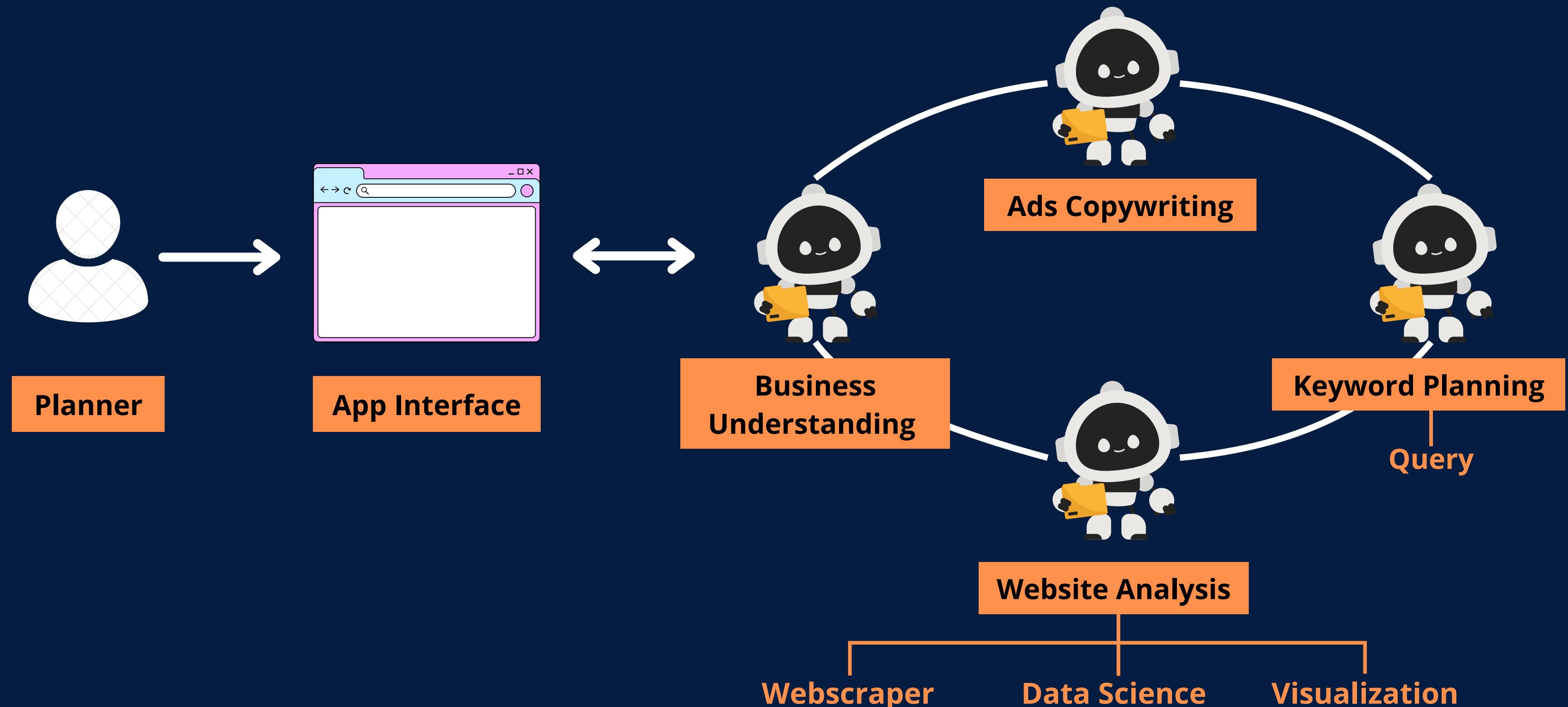


Validation

Methodology

Solution

Introducing an Multi-agent to automated SEM Planner Task



Multi-agent Framework



vs

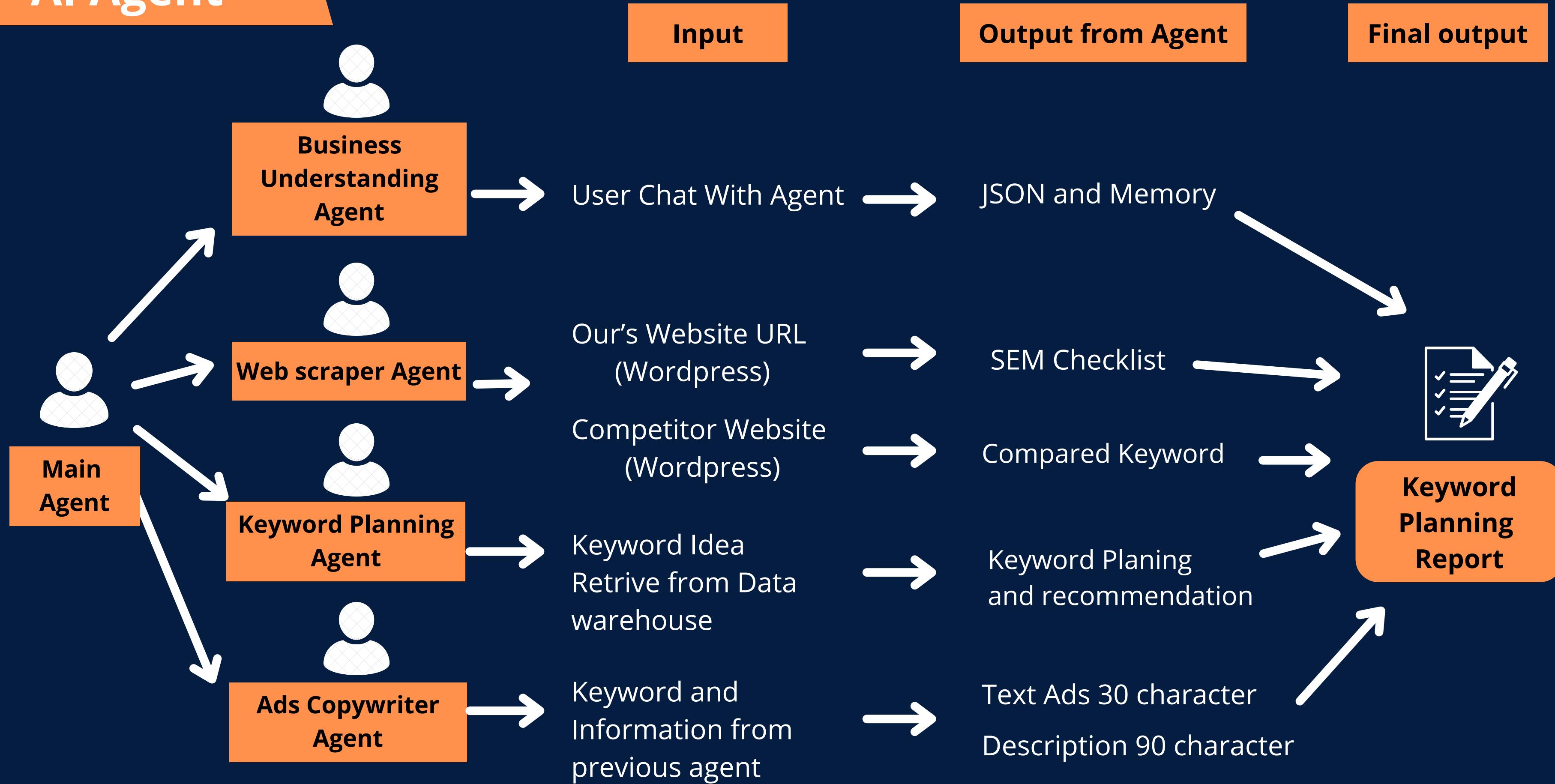


Methodology

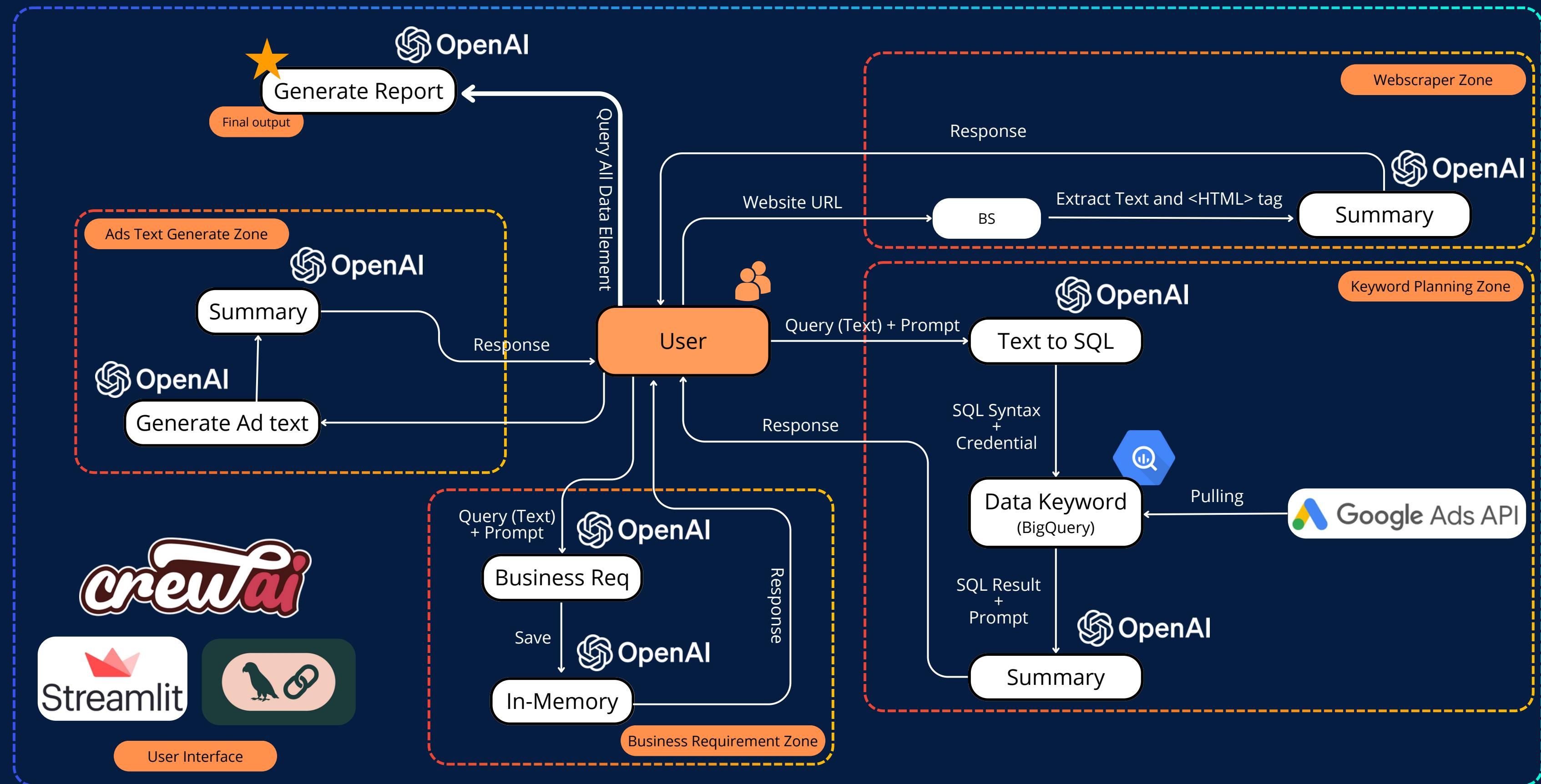


Design Philosophy	Focused on precision, modularity, and real-world applications.	Lightweight and simple, designed for educational experimentation.
Agent Roles	Supports role-based agents with well-defined goals and tools.	Agents perform tasks with simpler instructions and routines.
Task Management	Allows sequential, parallel, and hierarchical task execution.	Offers predefined routines but limited flexibility for complex workflows.
State Management	Built-in memory for context retention across tasks.	Stateless: external memory solutions required for context handling.
Structured Outputs	Uses Pydantic models for precise, validated outputs in JSON / Markdown.	Lacks built-in structured output validation.
Tool Integration	Supports custom and pre-built tools like scrapers, APIs, and analysis tools.	Basic function integration with limited extensibility for external tools.
Workflow Complexity	Handles complex, production-grade workflows effectively.	Suitable for lightweight, simple workflows.
Use Case Suitability	Ideal for SEM tasks like keyword analysis, competitor research, and reporting.	Best for educational or lightweight applications like customer service.
Ease of Use	Steeper learning curve due to LangChain reliance and advanced features.	Easier to set up; beginner-friendly for quick experimentation.

AI Agent



System Overview



Product Overview

Share ⌂ ⌂ ⌂

Business Analyst Chatbot

Hello! My name is K Bus. Can you tell me your Business Name?

aquapro

What products or services do you offer?

action camera

Who is your target audience?

24-35 years old vlogger

What makes your product/service unique?

Lower price than competitor

What are your key marketing goals?

Your answer here... >

< Manage app

SEM Planner

Plan and Optimize SEM Campaigns:

- Define Target Audience
- Analyze Websites and Keywords
- Optimize Keyword Strategies
- Generate Ad Copies

Navigation

- Business Analyst**
- Web Analyst
- Keyword Planner
- Ad Copywriter

© 2024 SEM Planner. All rights reserved.

Show Version Info

Debug Mode

Product Overview

RUNNING... Stop Share ⌂ ⌂ ⌂

SEM Planner

Plan and Optimize SEM Campaigns:

- Define Target Audience
- Analyze Websites and Keywords
- Optimize Keyword Strategies
- Generate Ad Copies

Navigation

Business Analyst

Web Analyst

Keyword Planner

Ad Copywriter

© 2024 SEM Planner. All rights reserved.

Show Version Info

Debug Mode

Website Keyword Analyzer

Analyze and compare website content using NLP

Main Website URL: <https://www.aquapro.co.th/>

Competitor URLs: <https://goprothai.com/>

Analyze Websites

Analyzing websites... This may take a few minutes.

Keyword Extraction

Top Keywords - Our Website:
aquapro, չափ, գլոբ, gopro, գլոբով, մեմ, րածա, , skip, to, content, , aquapro, , հետ, , սպասիկ, , շաղա

Top Keywords - Competitor Website:
goprothai, չափաթ, գլոբ, gopro, գլոբով, մեմ, հայտ, հայտ, skip, to, content, , contact, , 08:00, 17:00, , contact, , 08:00

Keyword Analysis

Cosine Similarity Score: 0.36

Keyword Distribution

Top 5 Keyword Comparison

Manage app

Product Overview

The screenshot shows the SEM Planner application interface. On the left sidebar, there's a blue box titled "Plan and Optimize SEM Campaigns" containing four items: "Define Target Audience", "Analyze Websites and Keywords", "Optimize Keyword Strategies", and "Generate Ad Copies". Below this is a "Navigation" section with icons for "Business Analyst", "Web Analyst", "Keyword Planner" (which is highlighted in blue), and "Ad Copywriter". At the bottom of the sidebar are two checkboxes: "Show Version Info" and "Debug Mode". The main content area has a dark header with a "RUNNING..." status bar and various control icons. The title "Keyword Planner" is prominently displayed in large white letters. A sub-header explains the tool's purpose: "This tool helps analyze keywords and develop content strategies. Supports Thai language keywords and analysis." Below this is a search bar with the placeholder "Enter Keyword or Topic" and a red button labeled "Analyze Keywords". A progress indicator shows "Analyzing keywords... This may take a few minutes." At the bottom of the page, there's a footer with copyright information ("© 2024 SEM Planner. All rights reserved."), a "Documentation" link, and a "Support" link.

Product Overview

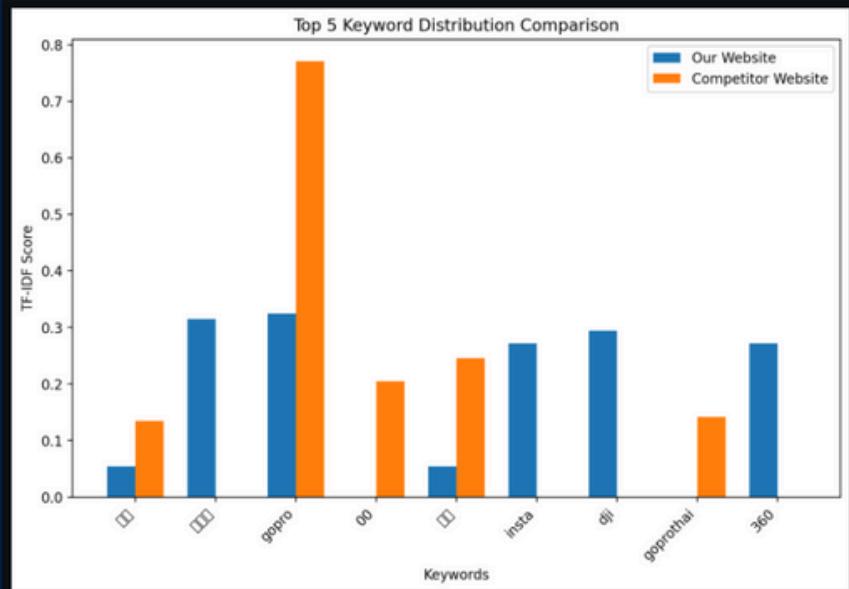
The screenshot shows the SEM Planner application interface. The left sidebar has a dark blue header "SEM Planner" and a "Plan and Optimize SEM Campaigns:" section with four items: "Define Target Audience", "Analyze Websites and Keywords", "Optimize Keyword Strategies", and "Generate Ad Copies". Below this is a "Navigation" section with icons for Business Analyst, Web Analyst, Keyword Planner, and Ad Copywriter (which is highlighted in blue). At the bottom of the sidebar are "Show Version Info" and "Debug Mode" checkboxes. The main content area has a dark background with a large white "Ad Copy Generator" title. Below it is a sub-header: "Generate optimized ad copies for your campaigns. Supports both Thai and English languages." A "Keyword Idea" input field contains "aquapro". Under "Writing Style", a slider is set between "Formal" and "Creative", with "Casual" selected. A red button labeled "Generate Ad Copies" is centered below these fields. Below the button, a circular progress bar indicates "Generating ad copies... This may take a few minutes." At the bottom of the page are copyright information ("© 2024 SEM Planner. All rights reserved."), a "Download Planner" button, and links for "Documentation" and "Support". The top right corner shows standard application controls: RUNNING..., Stop, Share, and a gear icon.

Output

Keyword Distribution Comparison and SEM Planning Insights

Here's a breakdown of the keyword distributions and recommendations for SEM planning:

Visualization:



Top 5 Keywords

Our Website:

	Keyword	TF-IDF Score
0	gopro	0.3253
1	80	0.3156
2	dji	0.2939
3	360	0.2721
4	insta	0.2721

Competitor Website:

	Keyword	TF-IDF Score
0	gopro	0.7716
1	80	0.246
2	00	0.2043
3	goprothai	0.1415
4	aa	0.1342

Insights:

- Focus on Branding:** Your website emphasizes your brand name "aquapro" while the competitor uses "goprothai." This suggests a stronger brand focus for the competitor tied to the GoPro brand.
- Sales-Oriented vs. Information-Oriented:** Your keywords ("ขาย," "ราคา," "รายการสั่งซื้อ") suggest a focus on sales and transactions. The competitor's keywords ("ข้อมูล," "รีวิว") suggest a more informational approach, likely aiming to build trust and educate potential customers.
- Membership & User Accounts:** Your site likely has user accounts ("สมาชิก") which is not indicated on the competitor's site. This could be a differentiating factor.
- Contact Information:** The competitor prominently features contact information and operating hours, emphasizing accessibility and customer service.

Recommendations for SEM Planning:

- Target "aquapro" Brand Keywords:** Bid aggressively on "aquapro" related keywords to build brand awareness and capture users specifically searching for your brand.
- Own the Sales-Focused Keywords:** Optimize for transactional keywords like "ซื้อ aquapro" (buy aquapro), "ราคา aquapro" (aquapro price), and related long-tail keywords.
- Consider Informational Content:** While focusing on sales is good, adding informational content (reviews, comparisons, how-to guides) can attract a wider audience and build trust. This will also help compete against the competitor's informational approach.
- Highlight Membership Benefits:** If membership offers advantages, promote them in your ad copy and landing pages. This could be a unique selling proposition.
- Improve Contact Information Visibility:** Make sure your contact information is easily accessible on your website and consider including it in your ad copy.
- Analyze Competitor's Keywords:** Conduct thorough keyword research to identify other keywords the competitor is ranking for and explore opportunities to compete. Look beyond just these basic keywords.
- Target Long-Tail Keywords:** Focus on longer, more specific search phrases (e.g., "ซื้อ aquapro online," "อุปกรณ์เสริม aquapro gopro hero 9") to target a more qualified audience.
- Track and Measure:** Continuously monitor the performance of your SEM campaigns and adjust your strategy based on the data.

Ads Generation

Headline

Headline 1

Edsy เรียนอังกฤษสำหรับเด็ก

Copy

Headline 2

เรียนทักษะภาษาอังกฤษ

Copy

Headline 3

เรียนพิเศษภาษาอังกฤษ ตัวต่อตัว

Copy

Description

Description 1

เรียนภาษาอังกฤษออนไลน์ที่ต้องการให้เด็กไทยสามารถเข้าถึงการเรียนภาษาอังกฤษที่มีคุณภาพ

Copy

Description 2

เรียนภาษาอังกฤษอย่างในโรงเรียนนานาชาติ เรียนแล้วมีพื้นฐานที่ดี ใช้ภาษาได้จริง ครบวงจร

Copy

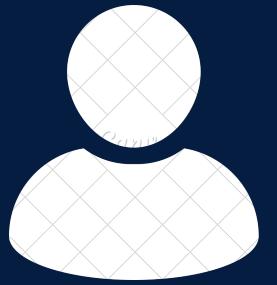
Description 3

Edsy เรียนอังกฤษสำหรับเด็ก กับตัวเตอร์ Young Gen คนไทยรุ่นใหม่ จากสถาบันชั้นนำทั่วโลก

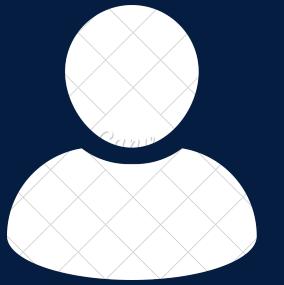
Copy

All fields are generated using GPT-4o and include the keyword: ภาษาอังกฤษ

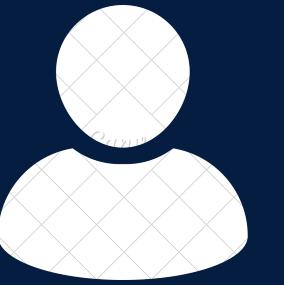
Focus Group: Search Engine Marketing Planner



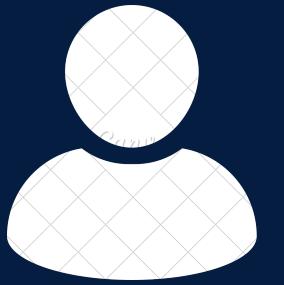
Focus Group



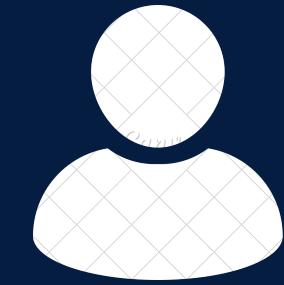
Focus Group



Focus Group



Focus Group



Focus Group

5 People

Evaluation

Feedback

Module 1: Business Analyst

- There is a lack of consistency in how individuals input data and fill in the details.

Module 2: Website Analyst

- Keywords used between two websites are similar suggest converting Cosine Similarity Score into a percentage.

Module 3: Keyword Planner

- Provides good guidance for junior staff, especially in creating Phrase, Broad, and Exact Match types.

Module 4: Ad Copy

- Suggest adding an option to adjust ad settings for Formal and Non-Formal tone.

Evaluate by ask question



Q : Has AI product reduced the time required to complete SEM tasks?

A : Yes, reduced the time to complete SEM tasks.

Q : How much time do you think you'll save?

A : Time saving 4 - 5 day.

Q : After testing Product, How consistent is the use of keywords across your SEM Plan and ad copy?

A : Yes, increasing consistent use of keywords across your SEM Plan and ad copy.

Comparative Analysis

Task	Old Process Time (minutes)	New Process Time (minutes)	% Improvement
Business Analyst	402	5.4	98.66
Web Analyst	132	6.2	95.30
Keyword Planner	522	7	98.66
Ad Copywriter	228	1.8	99.21

Next Version of Product: Enhance Usability and UI

The screenshot shows a dark-themed user interface for a Business Research Tool. On the left, a sidebar titled "SEM Planner" contains icons for "SEM Planner" (150x150 placeholder), "Plan and Optimize SEM Campaigns" (with steps: Define Target Audience, Analyze Websites and Keywords, Optimize Keyword Strategies, Generate Ad Copies), "Navigation", "Business Analyst" (selected), "Web Analyst", "Keyword Planner", and "Ad Copywriter". The main content area has a title "Business Research Tool" and a subtitle "Collect and analyze business information for further processing." It features input fields for "Business Name" and "Website URL", "Product or Service" and "Industry" (set to "Technology"), and "Target Audience Description". A large red button at the bottom is labeled "Research". At the bottom, there are links for "Documentation" and "Support", and a footer note "Made with ❤️ by Your Company Name". The top right corner includes sharing options.

Share

SEM Planner

150 x 150

Plan and Optimize SEM Campaigns:

- Define Target Audience
- Analyze Websites and Keywords
- Optimize Keyword Strategies
- Generate Ad Copies

Navigation

Business Analyst

Web Analyst

Keyword Planner

Ad Copywriter

Business Research Tool

Collect and analyze business information for further processing.

Business Name

Website URL

Product or Service

Industry

Technology

Target Audience Description

Research

Made with ❤️ by Your Company Name

Documentation

Support

© 2024 SEM Planner. All rights reserved.

Manage app

Future Study



Google Ads

Integrate with Google Ads

- Automate Negative Keyword
- Ads Optimization
- Keyword Trend Analysis

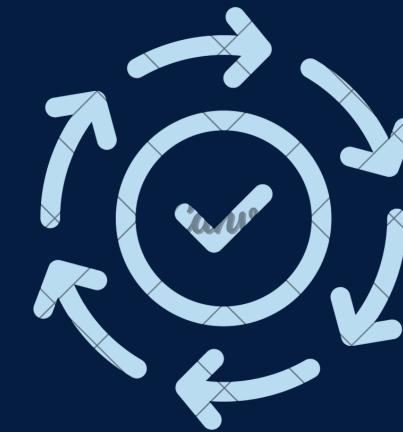


Expand to SEO Functional

Conclusion



Improved Efficiency



Improve Consistencies



Reduce Manual Effort



Human in the Loop

Thank you

Connect with me.



+66 98 389 1541



surapatpine@gmail.com

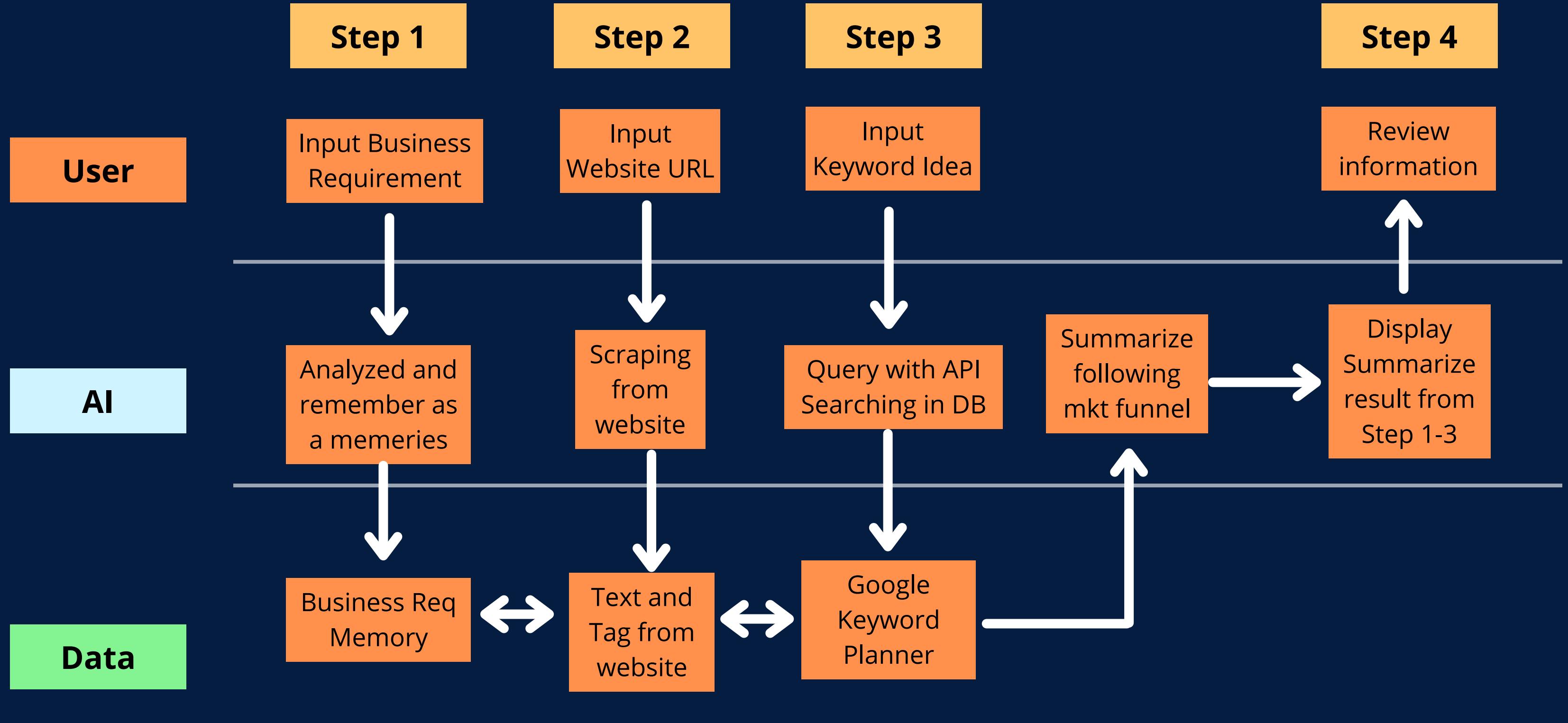


APPENDIX

See Full Paper

[CLICK HERE!](#)

Workflow AI-Enabled



Workflow AI-Enabled

