

Report 1 - Validating
LifeScore Labs V1 Use Cases
Report on Concept Testing with
HK Underwriters

Agenda

- **0** Research Objectives
- **02** Research Method: Concept Testing
- **03** Participants
- **Quick Summary on UW Process and Existing UW Systems**
- **05** Results & Findings
 - 05.1 Use case 1: Predict LifeScore, Underwriting Decision & Medical Follow-up
 - Decision (Full Underwriting Model)
 - 05.2 Use case 2: Predict Health Age & Maximum Face Amount
 - 05.3 Use case 3: Predict Claim Experience w/ Simplified Underwriting Questions
- 06 Next Steps



01

Research Objectives



Research Objectives

Develop a deep understanding of Hong Kong life underwriters' work goals, practices and pain points.

Gather feedback from working underwriters on proposed use cases of LifeScore Asia underwriting models.

Identify primary and secondary use cases of LifeScore Asia underwriting models, within the setting of Hong Kong underwriters' operating workflows.



02

Research Method: Concept Testing



Research Method: Concept Testing

Concept testing was used in this research for evaluating the perceived usefulness of 3 proposed use cases with the help of prototypes.

Users were asked to:

- Rate the usefulness of each use case
- Share their likes and dislikes of each use case
- Suggest what could be improved
- Rank the use cases on their usefulness

What is Concept Testing?

It is a research method that involves asking customers questions about your concepts and ideas for a product or service before actually launching it.

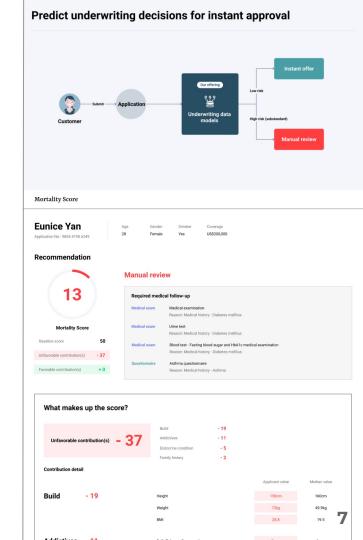
Source: Questionpro





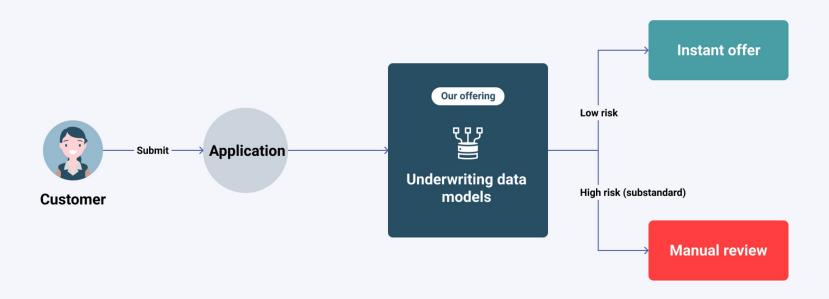
Use Case 1: Predict LifeScore, Underwriting Decision & Medical Follow-up Decision

- Use of LifeScore Labs to predict an applicant's:
 - LifeScore and risk decomposition report
 - Underwriting decision (STP / manual review)
 - Medical follow-up decision and recommendation





Predict underwriting decisions for instant approval





Mortality Score

Eunice Yan

Application No.: 9854 4790 6249

Age Gender Smoker Coverage
28 Female Yes US\$300,000

Recommendation



Mortality Score

50

Unfavorable contribution(s) - 37

Baseline score

Favorable contribution(s) + 0

Manual review

Required medical follow-up					
Medical exam	Medical examination Reason: Medical history - Diabetes mellitus				
Medical exam	Urine test Reason: Medical history - Diabetes mellitus				
Medical exam	Blood test - Fasting blood sugar and HbA1c medical examination Reason: Medical history - Diabetes mellitus				
Questionnaire	Asthma questionnaire Reason: Medical history - Asthma				

What makes up the score?

Unfavorable contribution(s)

- 19 Build - 11 Addictives

Endocrine condition - 5

Family history - 2

Contribution detail

Build - 19

Addictives - 11

Height

Weight

BMI

Alcohol habit

Daily Tobacco Consumption

8 pcs Yes

Applicant value

158cm

72kg

28.8

No



Endocrine disorder

Endocrine disorder (any)

Yes

No

10

Median value

160cm

49.9kg

19.5

6 pcs

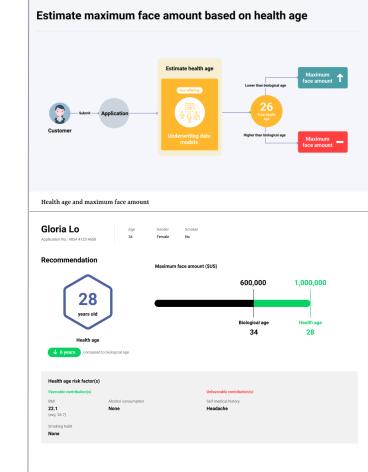
Hypotheses behind Use Case 1

Hypothesis 1 (H1)	Mortality risk model is useful for underwriters to make UW decision.
Hypothesis 2 (H2)	STP offer / manual review decision recommendation is useful for underwriters.
Hypothesis 3 (H3)	Medical follow-up recommendation is useful for underwriters.
Hypothesis 4 (H4)	The revised report including the risk score breakdown (as shown in the prototype) is easy for underwriters to understand.



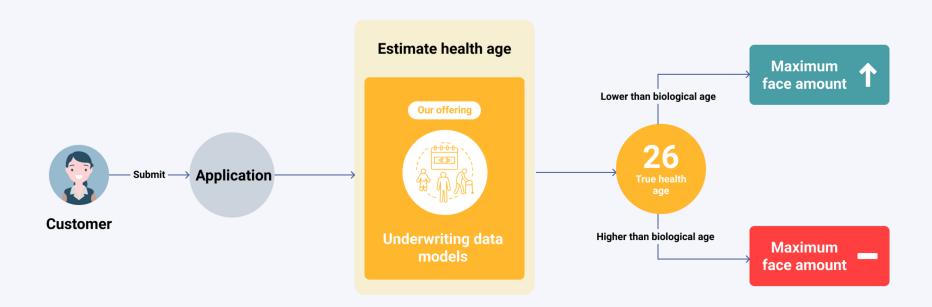
Use Case 2: Predict Health Age & Maximum Face Amount (FA)

- Use of LifeScore Labs to predict an applicants':
 - Health age (as opposed to biological age) based on health risk factors
 - The corresponding maximum FA according to the health age





Estimate maximum face amount based on health age





Health age and maximum face amount

Gloria Lo

Application No.: 9854 4123 4658

Age **34** Gender

Smoker

Female No

Recommendation

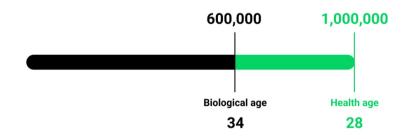


Health age

↓ 6 years

compared to biological age

Maximum face amount (\$US)



Health age risk factor(s)

Favorable contribution(s)

BMI

Alcohol consumption

None

22.1

(avg. 26.7)

Smoking habit

None

Unfavorable contribution(s)

Self medical history

Headache



Hypothesis behind Use Case 2

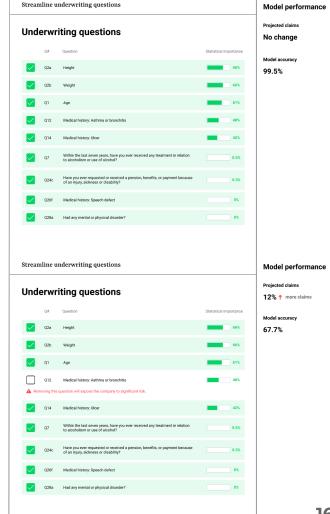
Hypothesis 5 (H5)

Offering of higher maximum FA based on health age is a useful tool for underwriters.



Use Case 3: Predict Claim Experience w/ Simplified Underwriting Questions

- Use of LifeScore Labs to predict the projected claims of a life insurance product based on the selection/exclusion of UW questions
- Supports the simplification of UW questions at POS by identifying questions of low statistical importance to the model





Model performance

Projected claims

No change

Model accuracy

99.5%

Underwriting questions











Model performance

Projected claims

12% ↑ more claims

Model accuracy

67.7%

Underwriting questions

	Q#	Question	Statistical importance
	Q2a	Height	66%
<u></u>	Q2b	Weight	66%
<u></u>	Q1	Age	61%
⚠ Rem	Q12	Medical history: Asthma or bronchitis question will expose the company to significant risk.	48%
A Reif	loving this	question will expose the company to significant risk.	
<u></u>	Q14	Medical history: Ulcer	42%
	Q7	Within the last seven years, have you ever received any treatment in relation to alcoholism or use of alcohol?	0.5%

Hypotheses behind Use Case 3

Hypothesis 6 (H6)

UW questions are designed by underwriters.

Hypothesis 7 (H7)

Streamlining underwriting questions based on claim predictability is useful for underwriters.





Participants



5 Working UW Managers as Participants*



Mr K	UNDISCLOSEĎ U\	W Manager	Mr R	*	UW Senior Manager
	Experience	9		Experience	10+
	Team size	60		Team size	13
	UW Automation	n Yes		UW Automatic	n No

On request from the participants, the companies involved should not be disclosed to any external clients or parties.

^{*} The company name was not disclosed on request from the participant. The company was a newly established insurance company backed by a Chinese fund.



04

Quick Summary on UW Process and Existing UW Systems



The UW Process

Medical **Distribution of Work Application Decision Underwriting** More advanced Bigger companies Checking of Underwriters follow ST decisions for companies use only distribute cases not application reinsurer's manual cases with no risk POS system for completeness closely to make declarations, low FA passing STP Regulatory check: and complete info application automatically by decisions • Some POS systems UW authority or time anti-money Underwriters check Human judgment is able to perform submitted laundering past claim records. largely involved instant UW • Smaller companies Financial UW: medical history and where underwriters do not have issue affordability check need to consult Most companies current policies · Checking on other For undecided doctors and still accept distributing cases handwritten • Bigger UW teams risks: residential reinsurers for cases, underwriters will issue memos to applications \rightarrow need separate non-med occupational and complex cases for clerical staff for UW and med UW to lifestyle risks agents for medical Much time spent different teams follow-ups such as on explaining input Verifying • Design of POS (admin vs. UW) signatures reports, exams and decisions to agents Distribution of work Could be • Companies might system is a key to questions higher STP rates is largely automated automated with a • Up to 30% of the make different decisions for appeal except for Manulife sophisticated POS cases require medical follow-ups cases to attract system customers



Highlighted Painpoints in the UW Process

Full report in upcoming Report 2

Too much manual work (4/5 participants)

Wish for automation

- Checking of info completeness
- NIGO applications
- Manual check necessary for mainland Chinese clients
- Non-med UW requires a lot of calculations
- Med UW requires the checking of past records

Complex medical cases not covered by reinsurer's manual

(5/5 participants)

Human judgments needed

- A lot of the cases not covered by manual
- Comorbidity, unknown diseases to be judged by underwriters
- Hence difficult to train new underwriters

Time wasted on explaining UW decisions

(3/5 participants)

Making Justifiable decisions

- For cases not covered by manual / require med follow-up, underwriters need to explain decisions to reinsurers, agents and regulatory
- Much time spent on back-and-forth communication



Highlighted Problems of Existing UW Systems

Full report in upcoming Report 2

Inability to handle complex cases

(4/5 participants)

- Current automated system could not pass integrated products, comorbidity, cases with claim history
- Human judgment still needed to make confident UW decisions

Difficult access to required data

(5/5 participants)

- Current systems do not have access to medical data, claim history and existing policies
- Much time spent on bringing in all data

No recommendation on medical UW

(3/5 participants)

- Current systems show errors only upon rule rejection
- No medical follow up recommendations and decision updates upon medical reports



Results & Findings



Use cases 1 & 3 were desired but use case 2 yielded limited usage

USE CASE 1

Predict LifeScore, Underwriting Decision & Medical Follow-up Decision

Perceived Usefulness

2.8 /5

Suggested for Development?

Yes with modified use case.

USE CASE 2

Predict Health Age & Maximum Face Amount (FA)

Perceived Usefulness

2.0 /5

Suggested for Development?

No.

USE CASE 3

Predict Claim Experience w/ Simplified Underwriting Questions

Perceived Usefulness

4.3 /5

Suggested for Development?

Yes for a new product for actuarial use.



Validation of Hypotheses in the 3 Use Cases

USE CASE 1

Mortality risk model is useful for underwriters to make UW decision.



H2 STP offer / manual review decision recommendation is useful for underwriters.



Medical follow-up recommendation is useful for underwriters.



The revised report is easy for underwriters to understand.



USE CASE 2

H5 Offering of higher maximum FA based on health age is a useful tool for underwriters.



USE CASE 3

H6 UW questions are designed by underwriters.



H7 underwriting questions based on claim predictability is useful.

Streamlining





05.1 Use Case 1

Predict LifeScore, Underwriting Decision & Medical Follow-up Decision



Generally Accepted but Key Doubts are to be Clear Before Adoption

USE CASE 1

Perceived Usefulness

Q: How would you rate this use case on its usefulness? (5=Very useful, 1=Not useful at all)

2.8 /5

Why this score?

- Good Source of Reference with Risk Prediction in a Quantifiable Manner
- Support for Underwriters in Making Medical Decision
- Clear and Intuitive Layout

- Limited Usage to Life Insurance Products
- Lack of Understanding and Confidence
- Contradictory to Current Practice
- Questioned applicability to unknown and complex conditions





Good Source of Reference with Risk Prediction in a Quantifiable Manner

- 2 participants viewed the model as an objective source for risk assessment
- The quantifiable breakdown of risk contribution was also pointed out as a good way for isolating risk factors for further application





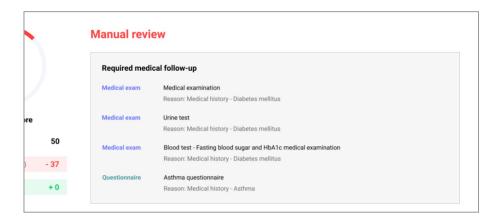
Underwriting effect may not be always accurate ... The model helps predict risks and will adjust by itself as conditions change.





Support for Underwriters in Making Medical UW Decisions

- All participants reported that making medical UW decisions highly involved human judgment as many scenarios were not covered in their current guidelines or rule engines
- Current decisions were made based on UW experience, doctor's advices and reinsurer's manual
- Participants found the medical follow-up action suggestion useful as their existing systems did not provide any (except for Manulife)





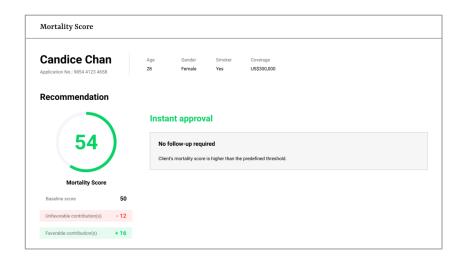
The medical follow-up suggestions are a good reminder for underwriters to avoid overlooking certain risks.





Clear and Intuitive Layout

- 2 participants found the layout of the prototype clear and intuitive
- The information presented in the dashboard was considered very easy to follow







Limited Usage to Life Insurance Products

- 3 participants saw limited usage of the use case as it was only applicable to life insurance products
- Participants pinpointed that life insurance was usually sold as a part of the integrated policies with medical or critical illness products
- Desirability for application to medical, critical illness and integrated products where underwriting decisions are considered more complex



The product needs to extend to CI (critical illness) and medical products. There are extremely few pure life products at Prudential. Usually they are linked with CI/ Medical which yield higher profits.





Lack of Understanding and Confidence

- 4 participants did not understand:
 - How the AI model worked
 - How Life Score was computed
 - What are the differences from a rule engine
 - What is the value of an AI model in UW
- Some participants were not confident to use the model to replace their their manual work
- Effectiveness and accuracy of the model was a concern



Due to past habit, I am not confident enough to make the decision right away ... I still want to look at the supporting documents before that.





Contradictory to Current Practices

- Concerns over contradiction with their current practices:
 - Deduction only in contribution calculations
 - Rule checking rather than prediction
- Major considerations at making an UW decision:
 - Alignment with reinsurer's manual
 - Justification of decisions to stakeholders for outlying cases
- Underwriters' performance not related to claim experience



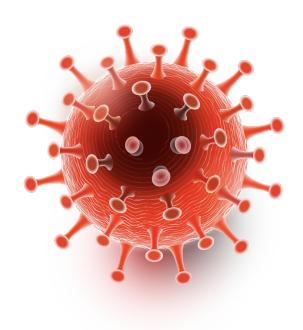
I still prefer to stick to RI manual for judgement, rather than AI model built on claim data.





Questioned applicability to unknown and complex conditions

- 2 participants questioned if the model could apply to:
 - New diseases
 - Unknown diseases
 - Multiple disease conditions (comorbidity)
- There was also a question on how the model could learn to cater for the above conditions





Hypothesis 1

Mortality risk model is useful for underwriters to make UW decision.



- ✓ Participants agreed that the risk model was a good source of reference with risk prediction in a quantifiable manner (related to p.33)
- Limited usage only life insurance products (related to p.36)
- Lack of sufficient confidence and knowledge of the risk model for full use (related to p.37)
- Prediction model was considered contradictory to current practice (related to p.38)



Hypothesis 2

STP offer / manual review decision recommendation is useful for underwriters.



- ✓ Consistent with underwriters' wish for more automation (related to p.25)
- Limited usage only life insurance products (related to p.36)
- Unawareness of the differences from a rule engine (related to p.37)
- X Exhaustive checking still considered necessary for substandard cases (related to p.38)



Hypothesis 3 Medical follow-up recommendation is useful for underwriters.



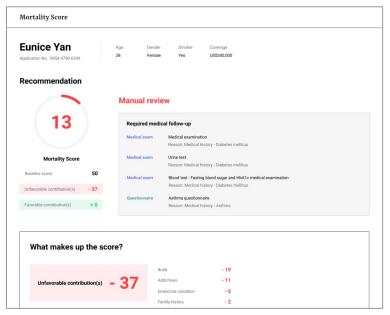
- ✓ Medical follow-up decisions were not covered in reinsurers' manual (related to p.25)
- Human judgment required in making medical UW decisions for cases uncovered in manual (related to p.25, 27)
- ✓ Participants liked the detailed medical follow-up recommendations (related to p.34)
- ✓ Most current systems do not support medical follow-up recommendations and final decisions on medical reports (related to p.27)



Hypothesis 4 The revised report is easy for underwriters to understand.



✓ Participants found the report as presented in the prototype clear and intuitive (related to p.35)





Recommended Actions for Use Case 1 Short Term

Requirement / Design

Enhancement

- Keep current medical follow-up model and recommendation table
- Improve design to better justify model decisions

New features

 Add recommended UW decision (standard offer) upon medical report inputs (via full UW model) decisions

Exploration

 Explore existing model's capability in handling complex cases (e.g. comorbidity and new conditions)

Sales / Pitching

• Value proposition

- Position product as a supplement to rule engines rather than a replacement of rule engines
- Emphasize the value of AI models because medical UW decisions require a lot of human judgment

Target customers

 Market to actuaries instead of underwriters as a tool for reducing claims



Recommended Actions for Use Case 1 Long Term

Requirement / Design

- Make it easier for underwriters to refer to LifeScore reports during decisionmaking process
- Continue to simplify the integration efforts to rule engines

Product / Model Development

Expand to medical,
 Cl and integrated
 products

Partnership

 Secure buy-ins from reinsurers so the product be a powerful proof for decisions uncovered by manual



Other Suggestions from Participants on How Use Case 1 Could be Improved

Endorsed by 3 participants

Straight through process with decision / offer automation

Further automation of the UW system with automatic issuance of memos and offers to agents.

Endorsed by 3 participants

Incorporation of customer's historical data

Underwriters mentioned that medical history and past policies were key factors in making their decisions but current systems did not incorporate them.

Endorsed by 1 participant

Follow up questions embedded in POS

Endorsed by 1 participant

Predicting healthy clients for agents



05.2 Use Case 2

Predict Health Age & Maximum Face Amount (FA)



Increasing Maximum FA Yielded Little Benefits to Both Insurers and Customers

USE CASE 2

Perceived Usefulness

Q: How would you rate this use case on its usefulness? (5=Very useful, 1=Not useful at all)

2.0 /5

Why this score?



N/A

- Mismatch with Customers' Expectations
- Incompatibility with Current Work Approach
- Limited Usage to Life Insurance Products





Mismatch with Customers' Expectations

- 2 participants were definite in concluding that this was not the expectations from customers
- Participant (Ms L) recalled the bad reaction from customers in a similar promotion campaign at her last company



This solution does not provide any benefits to customers ... And I can't see any benefits to any parties.





Incompatibility with Current Work Approach

- 3 participants found the use case difficult to understand as the underlying approach for FA increment did not exist
- 2 participants pointed out that maximum FA was not determined by health risk factors but salaries as per current reinsurer's manual





It's not useful at all. Maximum face amount is not related to health but solely based on income.





Limited Usage to Life Insurance Products

- Maximum face amount adjustment is only applicable to life insurance products
- A participant doubted its applicability to integrated products



I guess this approach only useful for Life product with single life benefit. Nowadays, the products usually have combined benefits.





Hypothesis 5

Offering of higher maximum FA based on health age is a useful tool for underwriters.



- Mismatch with customers' expectations (related to p.47)
- Incompatibility with current work approach (related to p.48)
- Limited usage to life insurance products (related to p.49)

Recommendation(s)

SHORT TERM

Drop the use case for further exploration and development



Suggestions from Participants on How Use Case 2 Could be Improved

Endorsed by 2 participants

Offering premium discounts based on health age

Instead of maximum FA, participants suggested that a more practical approach was to offer the pricing rate based on applicant's health age. In this way, extra premium discount could be offered to applicants if a lower health age has been predicted.

Endorsed by 1 participant

Targeted upselling / cross-selling towards customers with lower health age

The health age could serve as a reference for agency to upsell or cross sell products to healthy customers at a favorable risk level.



05.3 Use Case 3

Predict Claim
Experience w/
Simplified
Underwriting
Questions



High Potential Identified for Actuary with Concerns Over Regulation

USE CASE 3

Perceived Usefulness

Q: How would you rate this use case on its usefulness? (5=Very useful, 1=Not useful at all)

4.3 /5

Why this score?

- Simplifying UW Questions to Improve Customer Experience
- Reducing Claims
- Useful for Insurance Product Design

- Lack of Confidence on the Model Accuracy
- Concern Over the Data
 Source and Application on
 Non-HK Customers
- Problem Getting Approval from Reinsurers
- Tight Regulations on UW Questions



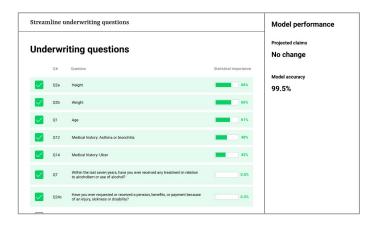


Simplifying UW Questions to Improve Customer Experience

- Achieving a balance between customer journey and risk management was identified as a common goal in the research
- Participants agreed that use case 3
 was a useful tool to improve
 customer experience by identifying
 obsolete UW questions



(We) struggled on customer journey, risks, regulator's question list, if we can justify risk assessment by claim experience, (it would be great).







Reducing Claims

- Participants agreed that use case 3 aligned with their UW principle of claim control and reduction
- 1 participant mentioned that use case 3 could be used to design UW questions for lowering claim experience



Because the goal of underwriting is to control claim. If you tell me this set of questions can control claims, then (this is) definitely helpful.







Useful for Insurance Product Design

- All participants agreed that use case 3 was useful in designing insurance product and related UW questions
- However, the use case was more for actuarists, doctors and reinsurers instead of underwriters as they were usually less or even not involved in the product design process



This is useful ... It's for actuarial team to design products and underwriting questions, but not for underwriters.







Lack of Confidence on the Model Accuracy

- 3 participants raised questions on the accuracy of the model in predicting claim experience
- Concern was also raised over the inclusion of all necessary data



It's important to ensure the accuracy of the prediction.







Concern Over the Data Source and Application on Non-HK Customers

- 1 participant raised the question on the model's application on non-HK customers, especially mainland Chinese customers which accounted for >50% of his company's customers
- Another participant suggested that it was important to adjust the model to fit each company's claim experience
- Participants mentioned that risk profiles differed as the segment / company changed



It's necessary to re-tune the model by company specific claim experience.





Problem Getting Approval from Reinsurers

- 1 participant commented that in current process, changes to UW questions need approval from reinsurers
- Reinsurers adjusted offers (premiums, face amount, UW questions) based on their own risk assessment
- Buy-ins from reinsurers are necessary







Tight Regulations on UW Questions

- 1 participant pointed out that he predicted there would be less room for simplifying UW questions
- HKIA is going standardize UW questions for medical products in January 2022, followed by Life and CI products (To be confirmed)
- Limited potential in HK if this regulation is in force





Hypothesis 6 UW questions are designed by underwriters.



W question design more a concern for actuaries than underwriters (related to p.58)



Hypothesis 7

Streamlining underwriting questions based on claim predictability is useful.



- ✓ Participants agreed that the use case could help simplify UW questions for improving customer experience (related to p.56)
- ✓ Participants related the use case to claim reduction (related to p.57)
- ✓ Useful for insurance product design though not a matter of underwriters (related to p.58)



Recommended Actions for Use Case 3

Long Term

Requirement / Design

- Conduct further research to gauge actuarial, product teams' feedbacks on this
 use case
- Explore on data filtering
- Explore on inclusion of data from non-HK customers
- Confirm with regulation changes in HK
- Explore the regulatory environment in other markets



Suggestions from Participants on How Use Case 3 Could be Improved

Endorsed by 1 participant

Identification of relevant follow up questions based on risks at POS

Match applicants with relevant follow up questions immediately at POS based on risk prediction by the model.

Endorsed by 1 participant

Filter for selecting segments for prediction

Select cohorts or segments for prediction instead of all population for targeted prediction.

Endorsed by 1 participant

Further prediction on questions' options and granules

Test the predictability of questions' options, sub questions and granules instead of the entire question for more accurate prediction.



Next Steps



What's Next for Use Case 1?

Short Term - Requirement / Design

Recommendation	Next Step	Finished by
Enhancement - Keep current follow-up model and recommendation table	Jessica and Xiangdong to confirm the requirement	Sprint 3
Enhancement - Improve design to better justify model decisions	 Gordon to run ideation workshop with the team Xiangdong to nominate data science team members to join the design workshop 	Sprint 3
New features - Add recommended UW decision (standard offer) upon medical report inputs (via full UW model)decisions	Jessica and Xiangdong to confirm the requirement	Sprint 3



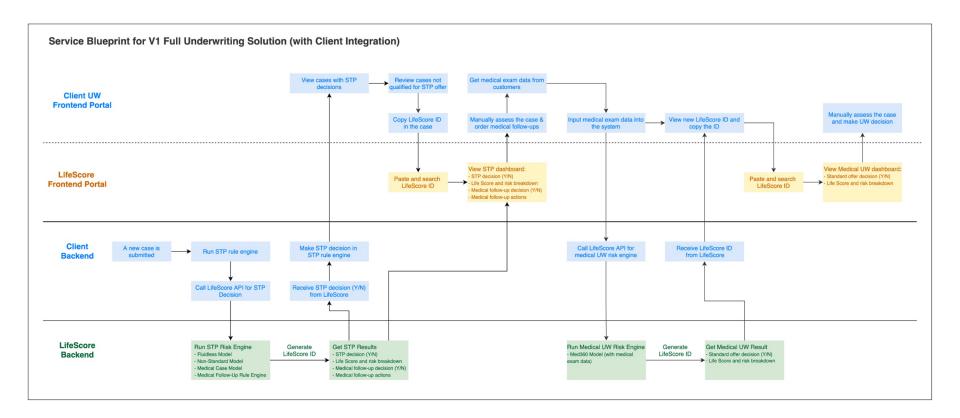
What's Next for Use Case 1?

Short Term - Sales / Pitching

Recommendation	Next Step	Finished by
Value proposition - Position product as a supplement to rule engines rather than a replacement of rule engines	Jessica, Cecilia and Herman be reminded when preparing new pitch decks	N/A
Enhancement - Emphasize the value of AI models because medical UW decisions require a lot of human judgment	Run brainstorming session on how to emphasize the value of AI models	TBC
Target customers - Market to actuaries instead of underwriters as a tool for reducing claims	Invite actuaries in future client pitch	N/A



Translation Into a Concrete Use Case





THANK YOU

