

INTRODUCTION

As the complexity of health economic models increase, a web-based user interface (UI) can offer a more user-friendly means for less-technical users to directly interact with a model.

The Innovation and Value Initiative (IVI) is building an open-source model in major depressive disorder through continual engagement with a 20-member multi-stakeholder advisory group.

The objective of this study was to describe how engaging with different stakeholders has informed the final UI design.

METHODS

A four-stage approach was used (Figure 1).

A draft UI prototype which consisted of a tutorial, 6 screens for users to specify the set-up of the model (e.g., efficacy input), and 4 screens to examine model output (e.g., costs) was first developed based on the economic model specification, a prioritized list of decision scenarios identified by target users and technical infrastructure of the hosting environment.

A structured interview guide was developed to elicit feedback on the overall design, user-modifiable inputs and assumptions, and key outputs.

Structured interviews were then conducted with 9 stakeholders representing payers, employers, manufacturers, patients, and researchers in December 2022 and January 2023 to seek feedback on the draft UI.

Feedback from the stakeholders was synthesized by the project team to inform the final design of the model.

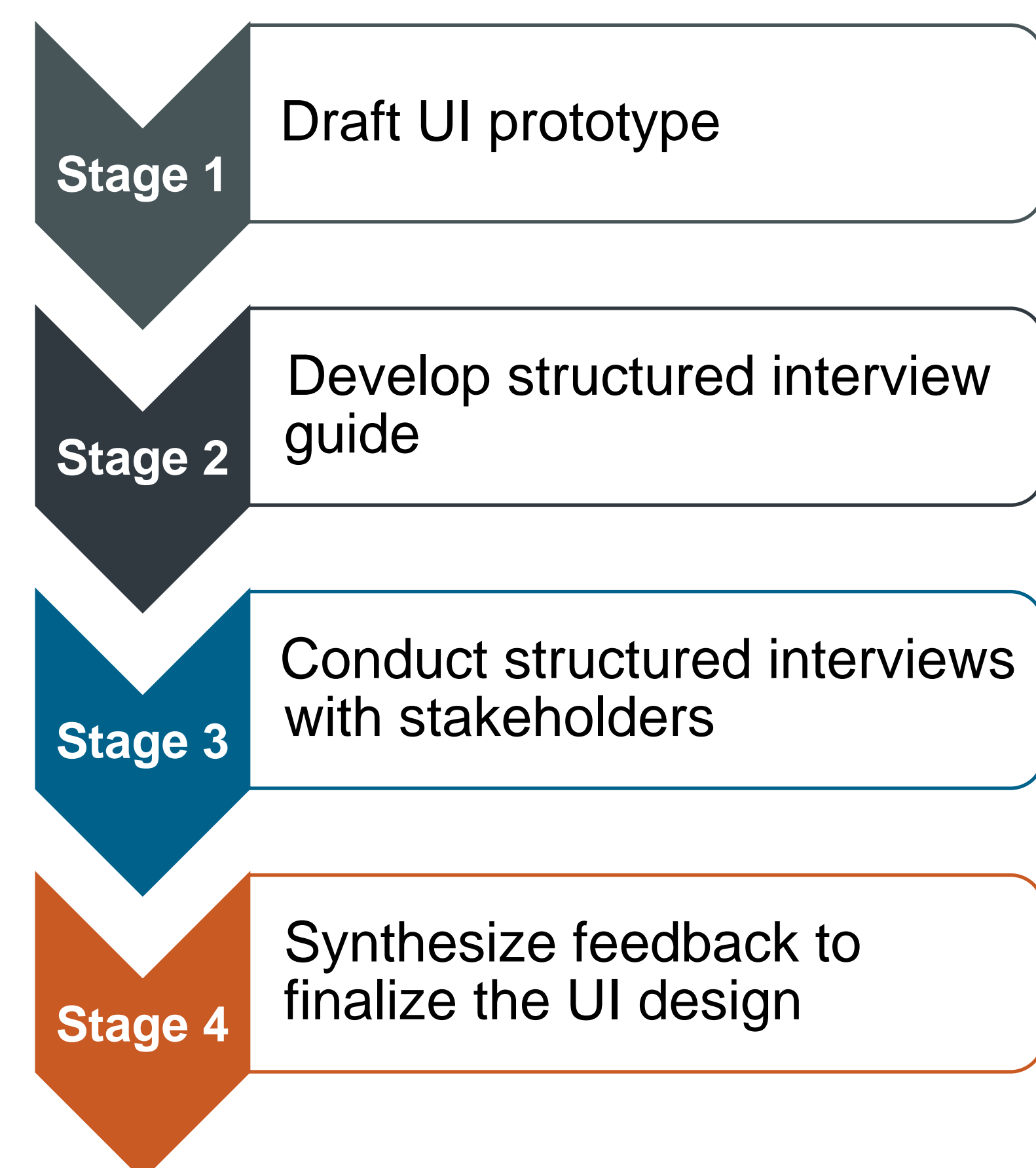
RESULTS

While all stakeholders agreed that an interactive UI made models more accessible for decision-making, they differed in technical knowledge, decision questions to answer, key model inputs/assumptions to vary, and desired model output.

Table 1 summarizes the key feedback by stakeholders. Their feedback revealed the following common themes:

- > UI design should be tailored to the needs of specific stakeholders,
- > Simplified design is preferred, and
- > UI should include clear instructions, explanations, and references, and document the limitations.

Figure 1. Four-Stage Study Approach



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RESULTS (continued)

Stakeholder feedback resulted in textual and design changes to customize UI design and identified areas of future development in the UI and underlying model (Table 2).

- > For example, in specifying treatment pathways, we designed a simplified workflow where users can first choose among first-line treatment strategies (i.e., what is most familiar) while providing workflows for users to discover and learn how more complex comparisons involving the ordering and sequencing of treatments (i.e., treatment pathways) are possible.

The final UI design consisted of a tutorial, 7 screens for users to specify the set-up of the model (e.g., efficacy inputs), 2 screens to examine model output (e.g., costs) and 1 screen for saving analyses.

Table 2. Select Action Steps & Future Development Areas to Improve UI Design

Types of Changes	Specific Action Steps
Textual edits	<ul style="list-style-type: none"> • Include definitions, assumptions, and data inputs and values • Document key limitations in data and how it might impact model results • Add clear titles, axis labels, legends for charts/figures
Design features	<ul style="list-style-type: none"> • Create stakeholder-specific interfaces • Clearly indicate user-modifiable inputs and assumptions • Reorder the input and output screens based on stakeholder priorities
Future development areas	<ul style="list-style-type: none"> • Incorporate additional features to aid result interpretation • Develop additional modules to feature uncertainty • Allow users to examine and add specific adverse events • Build user portal where users can easily find past simulation scenarios

CONCLUSIONS

Stakeholder engagement is crucial to ensure UI design can be more effectively customized to meet the decision needs and user preferences of different stakeholders and lead to potentially higher uptake in using the model to inform decision-making.

Table 1. Select Feedback of the UI Prototype by Stakeholders

Stakeholder	Feedback
Patient Advocate	<ul style="list-style-type: none"> • Stakeholders are concerned about whether cost-effectiveness measures (e.g., QALY) can sufficiently capture patient priorities in managing MDD. • As side effects from treatments are a key patient priority, the UI should include specific adverse events considered in the model and the inputs used to measure their impacts (e.g., disutility, costs). • One patient stakeholder expressed interest in using the model to evaluate the impacts of coverage of treatments in insurance plans on patient well-being.
Payer	<ul style="list-style-type: none"> • The term “economic model” was unclear to payers, as they associated it with the financing of treatments from a health plan perspective. • Flexibility to select different time horizons is valued by payers (e.g., 1-5 years). • Aggregate cost measures should be presented first in the results screen.
Employer	<ul style="list-style-type: none"> • “Population” is understood as those covered under a health plan. • In presenting the age distribution, employers preferred detailed summary statistics (e.g., mean values) rather than distributions across groups. • Decisions typically focused on specific treatments, rather than sequences. • Laboratory monitoring costs can be removed due to negligible impacts. • A three-year time horizon will be very helpful for decisions.
Manufacturer	<ul style="list-style-type: none"> • All key modeling assumptions should be clearly stated. • UI should display either daily or monthly treatment costs (vs 3-month cost) for ease of interpretation by decision-makers. • Explanatory text to aid results interpretation should be added.
Researcher	<ul style="list-style-type: none"> • All input sources and values should be clearly documented. • The UI should provide sufficient details on how the nuances of productivity were included in the calculation. • Different types of sensitivity analyses should be featured to highlight uncertainties.

Earlier Versions

INTRODUCTION

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- > The objective of this study was to describe how engaging with different stakeholders has informed the final UI design.

METHODS

- > A four-stage approach was used (Figure 1)
- > A draft UI prototype which consisted of a tutorial, 6 screens for users to specify the set-up of the model (e.g., efficacy input), and 4 screens to examine model output (e.g., costs) was first developed based on the economic model specification, a prioritized list of decision scenarios identified by target users and technical infrastructure of the hosting environment.
- > A structured interview guide was developed to elicit feedback on the overall design, user-modifiable inputs and assumptions, and key outputs.
- > Structured interviews were then conducted with 9 stakeholders representing payers, employers, manufacturers, patients, and researchers in December 2022 and January 2023 to seek feedback on the draft UI.
- > Feedback from the stakeholders was synthesized by the project team to inform the final design of the model.

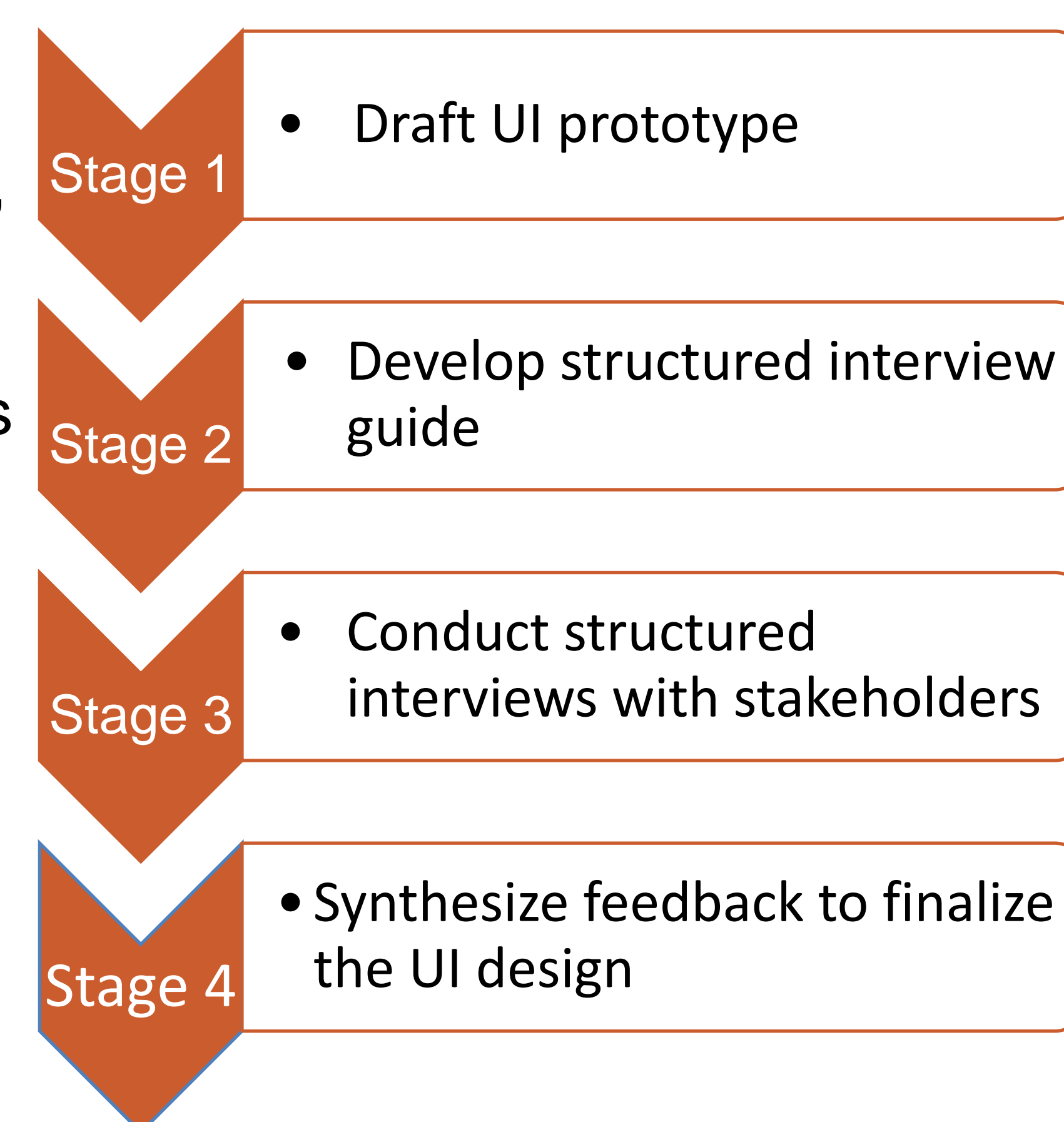


Figure 1. Four-Stage Study Approach

RESULTS

- > While all stakeholders agreed that an interactive UI made models more accessible for decision-making, they differed in technical knowledge, decision questions to answer, key model inputs/assumptions to vary, and desired model output.
- > **Table 1** summarizes the key feedback by stakeholders. Their feedback revealed the following common themes across stakeholders:
 - > UI design should be tailored to the needs of specific stakeholders,
 - > Simplified design is preferred, and
 - > UI should include clear instructions, explanations, and references, and document the limitations.

RESULTS (cont'd)

- > Stakeholder feedback resulted in specific textual and design changes to customize UI design and areas of future development in UI and the underlying model. (**Table 2**) For example, the design of the treatment selection (i.e. treatment strategy vs. treatment pathway) module is different by stakeholders. To strike a balance between making the interface user-friendly and educational for these users, we designed a simplified workflow where users can first choose among first line treatment strategies (i.e. what is most familiar) while providing workflows through the interface for these users to discover and learn how more complex comparisons involving the ordering and sequencing of treatments (i.e. treatment pathways) are possible.
- > The final design of UI consisted of a tutorial, 7 screens for users to specify the set-up of the model (e.g., efficacy input), 2 screens to examine model output (e.g., costs) and 1 screen for save the analysis.

Table 2. Select Action Steps & Future Development Areas to Improve UI Design

Types of Changes	Specific Action Steps
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Design features	<ul style="list-style-type: none"> • Create user-specific interface and accommodate different users' expectations • Clearly indicate user-modifiable inputs and assumptions • Reorder the input and output screens based on stakeholder priorities • Highlight select clinical and economic outcomes based on stakeholder decision-needs
Future Development Areas	<ul style="list-style-type: none"> • Incorporate additional features that will aid decision-makers in interpreting the key results • Develop additional modules to feature uncertainty through sensitivity analyses • Allow users to examine specific adverse events and add specific adverse events of interest • Build user portal where users can easily save past simulation scenarios

CONCLUSIONS

- > Stakeholder engagement is crucial to ensure UI design can be more effectively customized to meet the decision needs and user preference of different stakeholders and lead to potentially higher uptake in using the model to inform decision-making.

Table 1. Feedback of UI Prototype by stakeholders

Stakeholder Perspective	Feedback
Patient Advocate	<ul style="list-style-type: none"> • While "population" is commonly used in economic modeling, its meaning is unclear to patient stakeholders. One interpreted it as "covered population" for an insurance plan. • Stakeholders are concerned about whether cost-effectiveness can sufficiently reflect and captured patient priorities in managing their disease condition. • Specifically, some are concerned about whether life years or quality-adjusted life years as appropriate measures for evaluating the key outcomes. • As side effects from treatments are a key patient priority, the UI should include specific adverse events considered in the model and the inputs used to measure their impacts (e.g., disutility, costs). • One patient stakeholder expressed interests in using the model to evaluate the impacts of coverage of treatments in insurance plans on patient well-being.
Payer	<ul style="list-style-type: none"> • The term "economic model" was unclear to payers, as they associated it with the financing of treatments from a health plan perspective. • To better support decision-making, payers valued the flexibility to select different time horizons (e.g., 1 year, 3 years). • Payers preferred to see the aggregate cost measures presented first in the results screen.
Employer	<ul style="list-style-type: none"> • Employer stakeholders interpreted "population" as those covered under a specific health plan. • In presenting the distribution of ages of the population in simulation, employers preferred detailed summary statistics (e.g., mean values) rather than distribution across age groups. • The decisions of employers typically focused on specific treatments, rather than treatment sequences. • Lab monitoring costs were suggested to be removed from the UI as the total costs were usually much smaller in scale for MDD. • Employers suggested the inclusion of a three-year time horizon as options in simulation. • The UI should explain how comorbid conditions were incorporated into the model specifications as MDD is a highly comorbid condition with other psychiatric and non-psychiatric conditions.
Manufacturer	<ul style="list-style-type: none"> • It is important for the UI to include all the key modeling assumptions that might impact the key modeling results and insights. • It was suggested that the UI should display either daily/monthly treatment costs (vs the 3-month cost) for ease of interpretation by decision-makers. • The UI should include explanatory texts on how the results should be interpreted for different stakeholders.
Researcher	<ul style="list-style-type: none"> • All input sources and specific values should be clearly documented throughout. • The UI should provide sufficient details on how the nuances of productivity were included in the calculation. • Researchers also suggested that the model should feature different types of sensitivity analyses to highlight the modeling uncertainties.

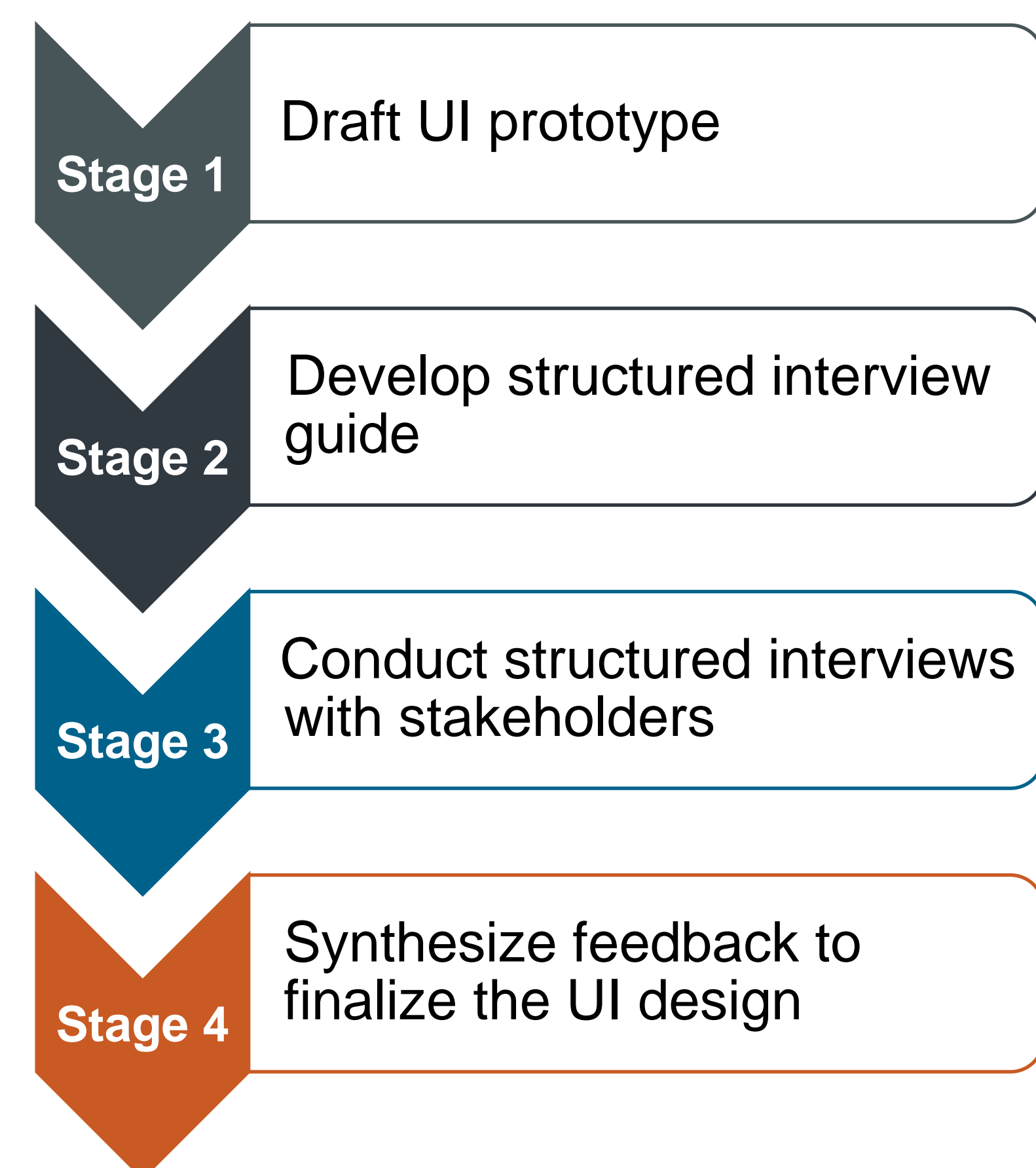
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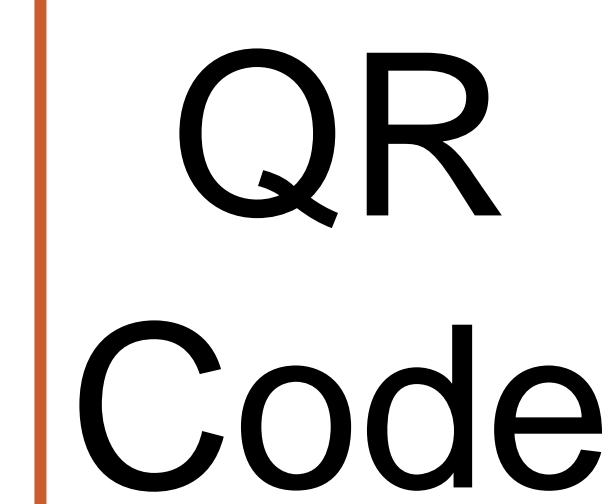
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RESULTS (continued)

- > Stakeholder feedback resulted in specific textual and design changes to customize UI design and areas of future development in UI and the underlying model (Table 2). For example, the design of the treatment selection (i.e. treatment strategy vs. treatment pathway) module is different by stakeholders. To strike a balance between making the interface user-friendly and educational for these users, we designed a simplified workflow where users can first choose among first line treatment strategies (i.e. what is most familiar) while providing workflows through the interface for these users to discover and learn how more complex comparisons involving the ordering and sequencing of treatments (i.e. treatment pathways) are possible.
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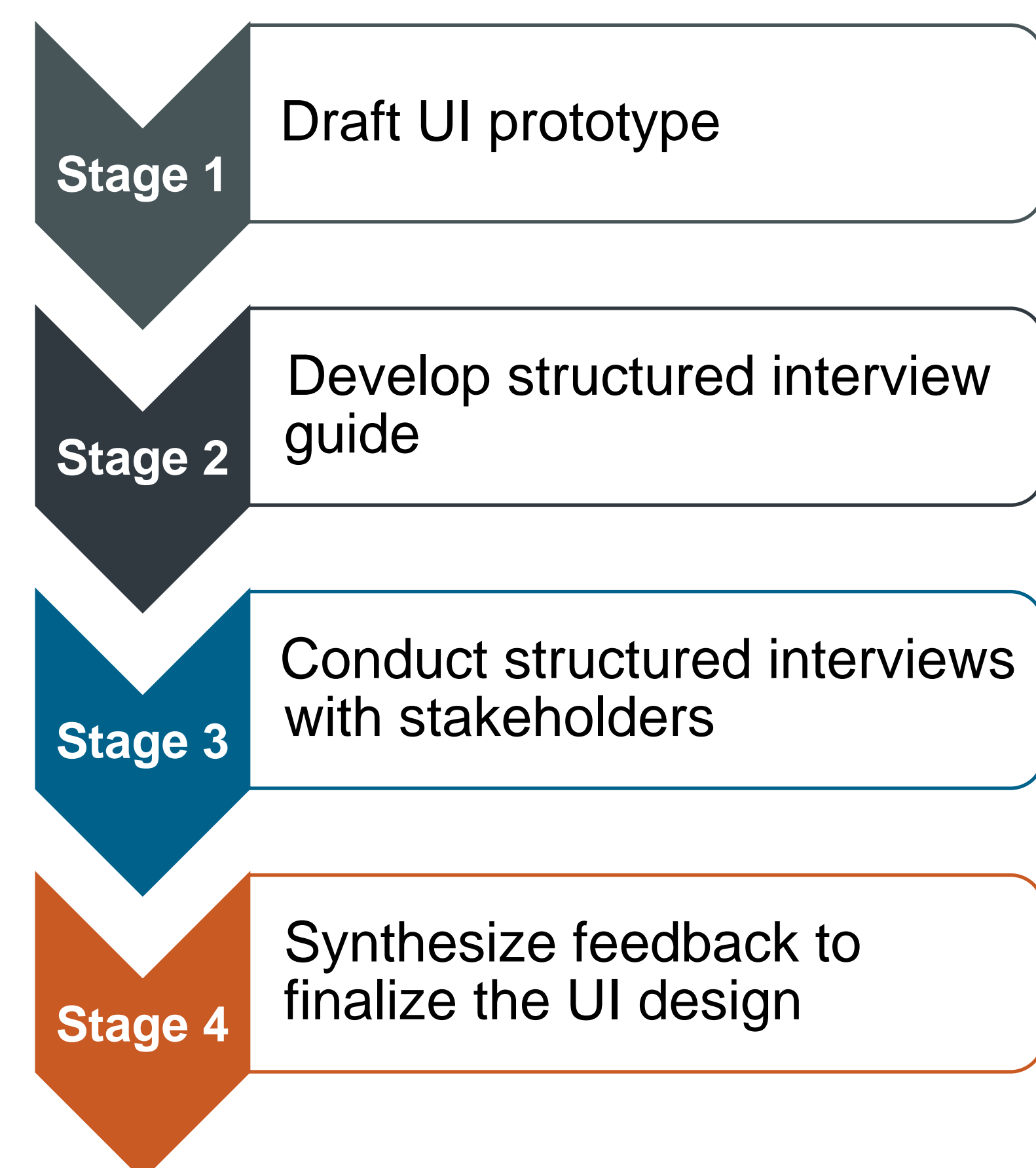
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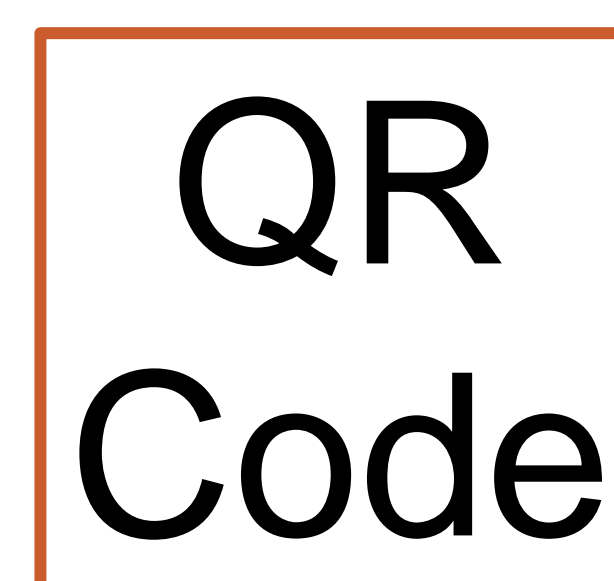
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