

# Noting Using Templates

## Design Groundwork Exploration

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*Prepared by*



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Further design and patient safety assessments are required to finalize the content as CUI Design Guidance.

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# Executive Summary

## Problem

- Clinicians need only some of the clinical data entry structures ('templates') available to them in any given situation
- Clinicians risk missing the correct template, opening the wrong template or eschewing data structures and entering free text

## Scope

- Assist the clinician accessing and then entering data into the relevant template in a safe, efficient and timely manner
- Focus upon the entry of an acute medical admissions form implied by the relevant headings defined by the UK Royal College of Physicians (RCP)

## Headline Findings

- To afford the clinician sufficient flexibility during admissions clerking, searching as well as browsing must be considered in noting using templates
- The UI may proactively offer templates (either by following the concept encoding or by matching terms within free text)
- The UI must be able to accommodate repeated use of certain data fields within the same template

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# Problem Statement

## Background

Traditionally, hospital and acute care clinicians have recorded notes directly on paper or dictated to an assistant. With the advent of electronic noting, clinicians increasingly need to record structured data using electronic systems, in order that the data can be safely accessed, displayed and queried.

## The Problems

- In free text, a lot of meaning can be conveyed (and implied) by a small number of characters. Conversely, a lot of data fields may be required in order to capture the same meaning in structured data entry. This is particularly true of acute medical admission clerking, where, despite following standard high level topic areas, there could be much variation in the details captured. The UI must provide access to all these data fields
- In natural language, the structures are stored and accessed in the user's mind, whereas in structured data entry, the UI needs to offer access to many data permutations. In effect, the onus for navigating and selecting entry components is shifted from the clinician's mind, where most of the considerations are subconscious, to the UI, where the UI needs to offer options and the clinician needs to choose from them. This potentially introduces a big time penalty for capturing structured data

# Problem Statement

## The Problems (continued)

- Previous usability tests have shown that clinicians perceive electronic forms which have been literally translated from paper to be unwieldy to use in the context of admissions clerking
- Previous usability tests have shown that clinicians' natural inclination is to type in a string of words when noting
- A form in which the data fields are arranged in a fixed order is not conducive to noting in which different topics may be addressed in a number of different orders, depending upon factors such as the patient's specific health problems and needs, the way in which the patient relays their history, and the noting style of the individual clinician. A traditional form design does not afford such flexibility

# Scope Statement

- Basic searching
- Section search
- Additional template search
- Search on abbreviations
- SNOMED CT® search trigger
- Free text trigger
- Browsing
- Revisiting and adding templates
- Reordering

# Items Out of Scope

- Patient-specific decision support
- Special data previewing functions
- Any display of data beyond its initial entry
- Printing of forms
- Workflow management
- Saving data
- Actual form design (such as field layout)

# Background to design consultation

This design exploration is based upon the notion that data structure has been defined in the form of data ‘templates’, that is, fixed configurations of data fields, some of which are constrained by the values that can be entered. Templates have a number of different meanings, not least in the health informatics field, but the term is used in a general way in this consultation.

In graphical user interface terms, the most conventional manifestation of templates would be as ‘forms’, where the data fields are presented to the user, typically as a set of boxes into which the user can type or select data. They could be manifested in other ways, such as constraining matches in a text parsing context, but typically they are presented as forms.

Forms may comprise sections and subsections, all of which contain fields. In this consultation document, we assume that any section or subsection is a template in its own right. That is to say, templates can be nested.

Although ‘template’ refers to a standalone unit of data structure, in the wider noting context we are not assuming that any template can be used in isolation. A form may comprise a number of sections, each of which constitutes a template, and these templates may be accessed as individual units within the context of the form. However, it does not follow that clinicians can access sections outside of the context of the form in which they belong.

# About this design consultation

The purpose of the document is to summarize the current learning that has been achieved in the design and research process to date. This is articulated primarily in terms of the features that comprise the preferred current design. These design features aggregate into nine themes.

For each theme we summarise the key design points, plus the rationale for choosing these points. We then illustrate these with images of the current design, plus an indication of some of the alternatives we have been considering. We end each theme by outlining the proposed next steps and future exploration.

# Assumptions

- Aspects of care can be documented within standalone data templates which can be assembled to form a coherent patient record
- The UI should encourage the user to complete a template rather than entering free text, where appropriate templates exist
- The UI will offer multiple routes for opening structured data templates:
  - Providing a means to browse the template
  - Providing a means to search for sections within the template
  - Allowing the clinician to open the whole template in a single action
  - Suggesting possible templates based upon terms that the clinician has entered
- Appropriate search engine technology is available to support the searching outlined in this consultation
- Appropriate authorities will manage the creation of and access to appropriate clinical templates
- SNOMED CT is the chosen terminology
- The Royal College of Physicians (RCP) guidelines on acute medical admissions clerking provide the standard high level structure for an admission template

# Brief outline of the themes

This design consultation is addressing several solutions which address the problem of accessing the appropriate template from within a large set of templates. These solutions are intended to be mutually compatible.

The **Basic searching** design topic addresses how clinicians can search for templates. It provides the foundation for the rest of the searching designs, which in turn address specific searching needs.

The **Section search**, which also includes the **Additional template search** and **Search on abbreviations** topics, is a particular type of search where the clinician can search for section headings within a form, in addition to finding additional templates.

Another way in which the clinician can access sections within the form is by **Browsing**, for example via a tree structure.

In addition to allowing the clinician to search for templates, the designs also address how the UI can proactively suggest templates based upon terms that the clinician has entered, either via a **SNOMED CT search trigger** or via a **Free text trigger**.

Finally, the design addresses some auxiliary features. It covers what happens if the clinician decides to revisit a template via the search or browse functions, and how the clinician can add more of the same fields (**Revisiting and Adding templates**). It also deals with how the clinician may reorder the sections according to a standard sequence (**Reordering**).

# Design exploration themes

Themes	Key topics
<b>1. Basic searching</b>	Layout and ordering of search results
<b>2. Section search</b>	Accessing the feature; displaying results; inserting sections
<b>3. Additional template search</b>	Labelling; displaying alongside internal results
<b>4. Search on abbreviations</b>	Labelling; prioritisation in results
<b>5. SNOMED CT search trigger</b>	Triggering; display; access
<b>6. Free text trigger</b>	Tagging; display; access
<b>7. Browsing</b>	Location of browse; default visibility
<b>8. Revisiting and Adding templates</b>	Opening an existing section; opening new fields
<b>9. Reordering</b>	Standard reordering; reordering by entry

# Glossary and acronyms

Term/ Acronym	Details
<b>CF</b>	Clinical feedback: The designs were subjected to regular feedback from select members of a medical organization, including clinicians, a clinical architect and a clinical safety advisor
<b>CUI</b>	Previous or concurrent Microsoft Health Common User Interface (CUI) work: Where relevant, the designs take account of other Microsoft Health CUI work, such as guidance or design consultation
<b>EP</b>	Existing Practice: In creating the designs, we considered examples of existing practice, that is UI elements with existing software which perform similar actions (both within or without the health industry)
<b>PSA</b>	Patient Safety Assessment findings: The designs were subjected to a series of safety hazard assessments with healthcare professionals
<b>REQ</b>	User requirements: The designs have been based upon user requirements identified during early analyses of the design areas
<b>UR</b>	User research: The designs were tested with healthcare professionals
<b>UX</b>	User experience input: The designs have been shaped by knowledge and principles from the user experience domain

# **THEME 1 – BASIC SEARCHING**

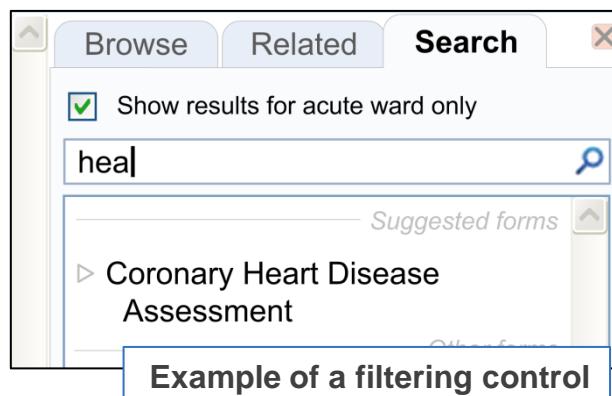
# 1.1 Introduction to Basic Searching

This theme explores the necessary features required to provide the clinician with a means for searching for and opening clinical templates, primarily manifested as forms, of varying sizes, but also as section headings within forms.

Such a function would be intended to be used in a number of situations, including at the start of clerking a patient and in those contexts where the clinician is already entering notes and needs an additional template.

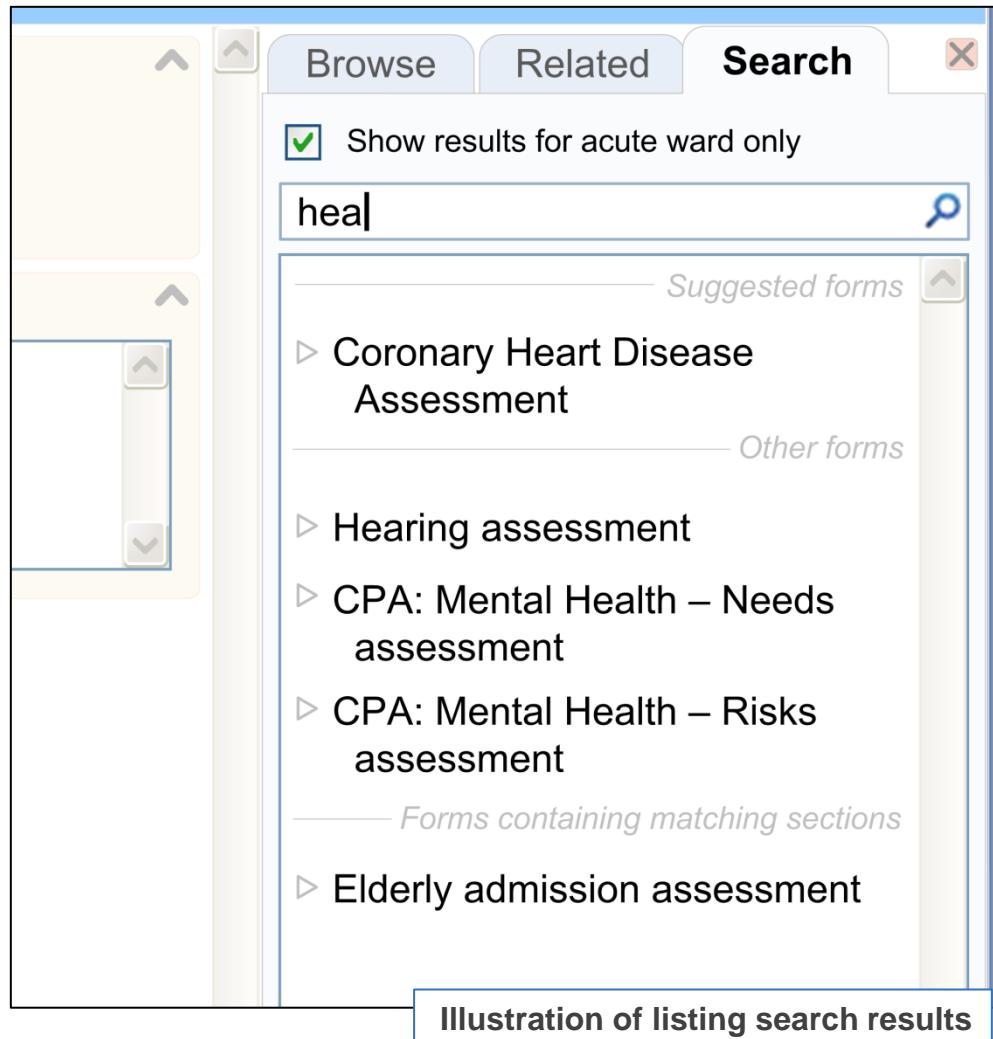
The designs in this theme explore the basic UI features that will comprise such a search function, including:

- How to allow clinicians to type in the (criteria) search text
- How to display the results
- How to filter the results, including displaying the current filter
- How to display relevant metadata
- How to search on metadata, such as structure (for example, section headings) within the form
- How to browse between and within search results



A screenshot of a software interface showing a list of suggested forms. The search term 'diabetes type I annual' is entered in the search bar. The results list includes 'Diabetes Mellitus Type I annual review'. A mouse cursor is hovering over this result. To the left of the results, a box contains the text 'Intended use: For use in diabetic outpatient clinic' and 'Sections: Patient details; Problems review; Symptoms Lifestyle/Risk factors; Foot; Visual acuity; Retinopathy; Kidney damage; Injection sites; Attendance; Analysis and planning; Recording NICE; published 2002'. At the bottom of the interface, a blue box contains the text 'Data was entered in this form for this patient on 07-Sep-2009; 14:56' and 'Example of a metadata display'.

# 1.1 Introduction to Basic Searching



**Note:** Although this design consultation focuses upon admissions clerking, the designs in Theme 1 may also apply to template searching in general.

# 1.2 Design summary

Design point	Rationale key points
The UI provides a search entry field which supports progressive matching	<p>This type of search mechanism has many precedents on the Internet and will be familiar to clinicians (EP)</p> <p>User research confirmed that clinicians understand how to use this mechanism (UR)</p>
<p>The template options are matched according to phrase similarity:</p> <ul style="list-style-type: none"><li>That is, the search engine matches the text entered by the clinician against the text in the template labels</li></ul>	<p>This type of search mechanism has many precedents on the Internet and will be familiar to clinicians (EP)</p> <p>Also, this type of searching has been shown to work in previous CUI research (for example, searching for SNOMED CT terms or for drugs) (UR)</p>
The search features 'fuzzy' matching	<p>Clinicians will not necessarily know the exact names of templates or sections, so some flexibility needs to be accorded their search (CF)</p> <p>Fuzzy matching, such as 'stem' matching, is a common feature on Internet search features and may be expected (EP)</p>

[Key to abbreviations \(slide 14\)](#)

# 1.2 Design summary

Design point	Rationale key points
The UI allows searching by section heading as well as by template title	<p>Clinicians may not know the exact title of the template they require, but may know what sections would be contained within it (CF)</p> <p>Must reduce the risk of the clinician being unable to find a template or choosing the wrong template (PSA)</p> <p>Clinicians understood the concept of searching by section, although the specific labelling of the feature was unclear. The primary focus should be on the template titles matching (UR)</p>
<p>The UI does not allow the user to search by fields:</p> <ul style="list-style-type: none"><li>Unless there is an appropriate use case</li><li>Field searches could be achieved by a separate 'Find' function</li></ul>	Searching for and opening a single field will rarely be required and could be risky due to the lack of resulting context surrounding the field (CF)
The UI is able to search for any size of template	Templates can vary significantly by size, from small templates for capturing measurement values through to large templates, such as the acute medical admission form (CF)

[Key to abbreviations \(slide 14\)](#)

# 1.2 Design summary

Design point	Rationale key points
<p><b>The results are filtered according to context:</b></p> <ul style="list-style-type: none"><li>For example, by a local filter which could account for the clinician's specialty, division or department</li><li>For example, by the specific stage in the patient's treatment</li></ul>	<p>There is a risk of the clinician choosing a template out of context, unless filtering is applied. Completing the wrong template could adversely affect future interpretations of the patient's health (PSA) (UX)</p> <p>The concept of filtering was supported by the clinicians tested (UR)</p>
<p><b>The filtering includes rather than excludes generic templates</b></p>	<p>Generic templates , such as a general medical admission form, may be missed if filtering means that only domain-specific templates are selected (UR)</p>
<p><b>The current filter label is displayed as part of the filter adjustment control</b></p>	<p>User research indicated the importance of clearly communicating the current filter, plus a control for adjusting (for example, breaking out of) the filter (UR)</p>
<p><b>The results are ordered by phrase similarity</b></p>	<p>Research within other areas of CUI have revealed that clinicians understand ordering by phrase similarity (CUI)</p>
<p><b>The list only displays a maximum number of results by default:</b></p> <ul style="list-style-type: none"><li>Meanwhile a widget is provided which reveals more results</li></ul>	<p>Depending upon the search criteria, the search could return any number of results. The space available will necessarily limit the number of results that can be displayed simultaneously. Also, showing more than several at a time can reduce the user's ability to find what they need. Therefore, although the search could return any number of results, only a set number are shown in the initial view (CF)</p>

[Key to abbreviations \(slide 14\)](#)

# 1.2 Design summary

Design point	Rationale key points
The search field is located above the results list	<p>Allows the clinician to easily recognize the association between the search control and the template that has been returned (UX)</p> <p>This is standard practice in search features (EP)</p>
The results are displayed in a vertical list	<p>The template labels returned must be visually presented as to allow scanning and comparison between them in order to reduce the risk that they choose the wrong template (PSA)</p> <p>Allows the clinician to easily recognize the association between the search control and the template that has been returned (UX)</p> <p>This is standard practice in search features (EP)</p> <p>The stacked approach was endorsed by user research (UR)</p>
<p>The template labels are not truncated in the results list:</p> <ul style="list-style-type: none"><li>Instead, the label wraps, with a slight indent on the second line and any subsequent lines</li></ul>	Avoiding truncation of labels in searches is an early conclusion in the emerging CUI design on truncation'(CUI)

[Key to abbreviations \(slide 14\)](#)

# 1.2 Design summary

Design point	Rationale key points
<p>The UI displays and allows searching on appropriate metadata for each template:</p> <ul style="list-style-type: none"><li>Where appropriate metadata exists</li><li>May include section headings, version details and other contextual details</li></ul>	<p>There is no universal convention for labelling templates and, even if there were, it is unlikely that an authority would be able to create one where every label can clearly and unequivocally communicate exactly the configuration of fields it contains. Metadata provides a further means of identifying the suitability of a template (CF)</p> <p>Clinicians agreed that access to certain metadata will be useful in identifying templates, although the template title is probably sufficient in the default view (UR)</p>
<p>Any metadata is displayed in a fly-out:</p> <ul style="list-style-type: none"><li>Appears upon hover and/or keyboard focus of a template option</li><li>Will be able to deal with data of varying lengths</li></ul>	<p>Displaying additional (meta) data in a fly-out is consistent with previous CUI designs, such as SNOMED CT matching (CUI)</p> <p>User research suggested that clinicians preferred meta-data to be shown in a fly-out, partly owing to problems with alternative designs (UR)</p>
<p>Any matched metadata text is highlighted</p>	<p>Sometimes there could be much metadata (for example, if there are many section headings). The clinician must quickly identify their search terms within this data (UX)</p> <p>There are precedents for highlighting search terms in existing online search features (EP)</p> <p>User research indicated a need for showing the connection between the search criteria and the metadata (UR)</p>

[Key to abbreviations \(slide 14\)](#)

# 1.2 Design summary

Design point	Rationale key points
The UI distinguishes 'suggested' matches	Local policy may promote certain templates over others, and this mechanism allows them to do this (CF)
<p>The search supports synonym matching:</p> <ul style="list-style-type: none"><li>Synonyms would be created and managed by an appropriate authority (for example, the medical organization)</li></ul>	User testing revealed that often the term for which the clinician is searching is not an exact match for the template label (for example, clinicians may search for the word 'examination' or 'o/e' instead of the word 'observations') (UR)
The UI displays a message where no matches are returned	<p>The UI must be able to deal with no templates being returned. In this case, it must communicate this to the user and must suggest ways in which the user may find what they seek (CF)</p> <p>This need for such a message was supported by user research (UR)</p>
The UI allows the clinician to browse within the search results, including viewing sections and subsections of each template	A mechanism for browsing within search results was understood by clinicians (UR)

[Key to abbreviations \(slide 14\)](#)

# 1.3 Design exploration

The screenshot shows a search interface with the following elements:

- Add section** and **Hide options** buttons at the top.
- A search bar with the text "heal".
- A checkbox labeled "Show results for acute ward only".
- A list of search results:
  - Coronary Heart Disease Assessment
  - Hearing assessment
  - CPA: Mental Health – Needs assessment
  - CPA: Mental Health – Risks assessment
  - Elderly admission assessment
- Labels indicating result types:
  - Suggested forms* (next to the first result)
  - Other forms* (next to the second result)
  - Forms containing matching sections* (next to the third result)

Annotations highlight various design features and alternatives considered:

- Design feature:** Vertically stacked list without truncation. (Applies to the main list of results.)
- Alternatives considered:**
  - Thumbnails
  - Narrow labels which expand
  - Icons
  - More upfront detail
  - Tabular design
- Design feature:** If the structure of the template is available to the UI, the clinician can click on the triangular icon to browse within the structure, although they can only select the whole template (rather than any individual section). (Applies to the "Elderly admission assessment" result.)
- Design feature:** Template search results progressively match as the clinician types in the criteria text. (Applies to the search bar.)
- Design feature:** Suggested results are visually prioritised. (Applies to the "Suggested forms" result.)
- Alternatives considered:**
  - Separate windows for each division
  - Up-front toggle between divisions
  - Distinct iconography
  - No divisions
- Design feature:** Search also matches sections within templates, and displays them in the final division of the search results. (Applies to the "Forms containing matching sections" result.)
- Alternatives considered:**
  - In this division, list by section name rather than by template name
  - Search by field rather than by section

# 1.3 Design exploration

The screenshot shows a search interface with the following elements:

- Add section** and **Hide options** buttons at the top.
- A search bar containing the text "heal".
- A checkbox labeled "Show results for acute ward only" which is checked.
- A list of search results:
  - Suggested forms:
    - Coronary Heart Disease Assessment
    - Hearing assessment
    - CPA: Mental Health – Needs assessment
    - CPA: Mental Health – Risks assessment
  - Other forms:
    - Elderly admission assessment
- Arrows on the left side for navigating the search results.

Annotations highlight several design features:

- Design feature:** The clinician may choose to switch off the filter to increase the search results. (Associated with the checkbox)
- Design feature:** The feature automatically filters the results, based upon the clinician context. (Associated with the search results list)
- Alternatives considered:** Allow the clinician to choose which filters are applied. A slider control to allow the clinician to set the level of filtering. (Associated with the checkbox)
- Design feature:** The clinician may browse the structure by clicking on these arrows. (Associated with the arrows on the left)
- Design feature:** Labels are wrapped, instead of truncated. (Associated with the search results list)
- Alternatives considered:** Cascading menu options, Web browser style navigation ('forward' and 'back'), '+' icons instead of arrows. (Associated with the arrows on the left)

# 1.3 Design exploration

**Design feature:**  
Display available metadata in the fly-out, including main sections, if known.  
Arrange the metadata types in a consistent order.

**Intended use:** For use in diabetic outpatient clinic

**Sections:** Patient details; Problems review; Symptoms Lifestyle/  
Risk factors; Foot; Visual acuity; Retinopathy; Kidney damage;  
Injection sites; Attendance; Analysis and planning; Recording  
NICE; published 2002

Data was entered in this form for this patient on **07-Sep-2009; 14:56**

**Alternatives considered:**

- Display the metadata in the main list
- Slider control to reveal/hide meta-data details
- Fisheye within the main list
- Separate dialog boxes to display meta-data

**Design feature:**  
Indicate the last time that data has been entered into this template for this specific patient

**Alternatives considered:**

- Access via an icon plus a pop-up
- Display in a table
- Display in a fly-out

**Add section** **Hide options**

Browse Related Search

Show results for acute ward only

diabetes type I annual

Suggested forms

Diabetes Mellitus Type I annual review

**Design feature:**  
Any words which match the search entry text will be highlighted.  
*(none shown in this example)*

## 1.4 Next steps

- Validate assumptions around the availability of templates, including understanding what templates could be available
- Explore and refine guidance around search logic. Further define the high level rules
- Test the usability of the filter function and confirm assumptions around what contextual information can be used automatically by the UI
- Evaluate the use of the template search function within the context of the acute medical admission clerking. In the current designs, this function is featured in the right-hand panel. Further testing is required to understand its potential use in relation to the other search and match features offered by the design
- Further explore the concept of browsing within search results. This was deemed to be worthy of further exploration by the user research

## 1.4 Future exploration

- Explore the utility and feasibility of searching on fields and possible field values within templates (for example, search on ‘stridor’, which is a possible selection value rather than a field or section)
- Validate the use of metadata. Given its potential utility, assess how feasible the creation and maintenance of such data would be in future
- Explore the management of suggested and/or prioritised templates
- Explore the interaction between this feature and wider knowledge and decision support mechanisms

# **THEME 2 – SECTION SEARCH**

## 2.1 Introduction to Section Search

This theme tackles a problem with offering someone a large template, namely the time taken to navigate around it to find the section and fields that one needs, in the order in which one needs them.

One solution is to provide a visual browsing mechanism (such as a tree). However, another solution is to provide a search function that allows the clinician to search for sections and subsections within the template. In this way, it starts to replicate the clinician's current noting behaviour: namely entering a heading and then entering notes below it.

The illustration shows a portion of a medical admissions form. At the top left, there is a search bar containing the text "History of Presenting Complaint". Below the search bar, the text "Central gripping chest pain radiating up into the neck and down the left arm with shortness of breath, lasting 45 minutes" is displayed. To the left of this text is a search icon followed by the acronym "cvs". Below this section, there is a blue header bar labeled "Observations and Findings – Cardiovascular System [CVS]". Underneath this bar, the text "Cardiovascular System Risk Calculator" is visible, accompanied by a small blue square icon with a white arrow pointing right. A horizontal line connects the "cvs" search area to the "CVS" header. In the bottom right corner of the illustration, the text "Illustration of a section search feature" is enclosed in a thin blue border.

The designs in this theme assume an initial situation where the clinician has opened the admissions noting page and it is blank (or possibly there are one or two default sections already there, such as 'Presenting Complaint(s)').

It addresses how clinicians can add and complete sections of the acute medical admissions form to the noting page incrementally, by typing in search text.

It builds on the designs explored in the Basic searching exploration.

## 2.2 Design summary

Design point	Rationale key points
Sections and subsections can be inserted in any order	Clinicians may enter medical admission data in multiple ways, depending upon the clinician encounter (UR) (CF)
The UI allows the user to choose which sections or subsections they open and which they do not	The Royal College of Physicians' (RCP) standard acute admissions headings will imply more content than is typically needed within an individual clinical situation (CF)
Encoding is not a required precursor for offering templates	Forcing an encoding first could be unintuitive and could result in users not completing structured templates (PSA)
<p>There are multiple ways to access the section search:</p> <ul style="list-style-type: none"><li>Clicking into white space outside of a section</li><li>Clicking a button at the top of the page</li><li>Pressing a key combination</li></ul>	<p>Users intuitively clicked into the next available white space and start typing headings (UR)</p> <p>Users also felt it is necessary to have an explicit control for inserting a heading, such as a button (UR)</p> <p>A key combination is an appropriate method where the user is not using a mouse (UX)</p>
We are considering offering a right-click mechanism for accessing templates, where possible	When searching for templates within free text, some users intuitively right-click to find a contextual menu which will offer a template (UR)

[Key to abbreviations \(slide 14\)](#)

## 2.2 Design summary

Design point	Rationale key points
The search results are ordered primarily by word similarity	The list will be ordered in a way that is meaningful to the user (REQ)
Synonyms are required to assist the search	Users searched on terms such as 'o/e' and 'examination', which yielded no results as the RCP headings use the prefix 'Observations and Findings' (UR)
The search text disappears after template chosen (or upon click away or <ESC>)	Without this feature, users had problems closing the results list. They tried to click away (UR)
The section search feature closes after inserting a template	The assumption is that the user will find a template, then complete it, rather than searching for another template (CF)
Upon opening a section, the UI shows where in the template structure it is located	To reduce the risk that the user enters data into the wrong section (PSA)

[Key to abbreviations \(slide 14\)](#)

## 2.2 Design summary

Design point	Rationale key points
<p>The sections are appropriately labelled, so that they are uniquely identifiable:</p> <ul style="list-style-type: none"><li>Templates labels comprise a composite of the immediate section label and the super-section label ('breadcrumb' style)</li></ul>	A field could exist under multiple headings, but the different contexts could imply different meanings (CF)
The UI does not allow sections to be inserted into other sections, except where the data structure allows it	The current design follows the Royal College of Physicians' guidelines on record keeping in acute admissions. Inserting a section into another section could affect its meaning in such a way that could lead to misinterpretation between author and subsequent reader (CF)

[Key to abbreviations \(slide 14\)](#)

## 2.3 Design exploration

The screenshot shows a 'Presenting Complaint' section with the text 'Central chest pain'. Below it is a 'History of Presenting Complaint' section with the text 'Central gripping chest pain radiating up into the neck and down the left arm with shortness of breath, lasting 45 minutes'. At the top right are 'Add section' and 'Show options' buttons. A search entry field is shown at the bottom left.

**Design feature:**  
Search entry field (manifested as a marquee in this instance) and cursor appears when the user clicks in the white space. Key combination and a button can also trigger it

**Design feature:**  
This feature will appear by default if the clinician has just opened the admission form and the noting area is completely blank

**Design feature:**  
This button also opens the search entry marquee

**Alternatives:**

- Permanent entry field
- Feature in the right-hand panel
- Letter combination to open it
- Highlight or click on text that the user has already typed

## 2.3 Design exploration

**Add section** **Show options**

**Acute Medical Admissions**

Presenting Complaint

Central chest pain

History of Presenting Complaint

Central gripping chest pain radiating up into the neck and down the left arm with shortness of breath, lasting 45 minutes

cvs

Observations and Findings – Cardiovascular System [CVS]

Cardiovascular System Risk Calculator

**Design feature:**  
Results progressively appear below the search entry feature.  
The feature remains open until the user clicks away, presses <ESC> or selects a template

**Alternatives:**

- Clinician types in text and then clicks on a button to activate a search

## 2.3 Design exploration

Add section Show options

**Acute Medical Admissions**

Presenting Complaint

Central chest pain

History of Presenting Complaint

Central gripping chest pain radiating up into the neck and down the left arm with shortness of breath, lasting 45 minutes

Observations and Findings – Cardiovascular System

CVS Normal on Examination  Unknown  
 Yes  
 No Selecting 'No' automatically opens the details section

Further details: CVS examination

**Design feature:**  
Once selected, the section appears in place of the search feature

**Alternatives:**

- Search feature remains open until the clinician explicitly closes it

## 2.4 Next steps

### **Next steps:**

- Confirm the usability of opening the section search by clicking in white space

### **Future exploration:**

- Further explore the interaction between the section search, the right-hand template search and the suggested templates (such as single concept matching and narrative triggers)
- Explore the use of a right-click driven contextual menu for use in situations that can accommodate such a control
- Better define the need for synonyms in the section search

# **THEME 3 – ADDITIONAL TEMPLATE SEARCH**

# 3.1 Introduction to Additional Template Search

There may be points within the admission clerking process where the clinician needs to access additional templates, such as a score or a risk calculator. In this respect, templates built for medical admission clerking tend to be wide-reaching, but not exhaustive. We predict that a proportion of the noting will require templates which do not belong to the core template.

However, we assume that clinicians will not necessarily know which data structures belong within the core template and which are additional templates. Therefore, the designs assume that additional templates can be accessed in the same way as the core sections.

Nevertheless, the additional templates will open outside of the core admission template, and therefore, to avoid confusion, the clinician should be aware that there is a distinction between core and additional templates.

Therefore, the designs:

- Show how the clinician can access additional templates during admission clerking
- Show how to display additional templates results in the (section) search feature
- Distinguish core from additional templates

card

Cardiovascular

Cardiac catheterisation admission ↗

Cardiovascular System Risk Calculator ↗

Observations and Findings – Cardiovascular System [NCVS]

Illustration of additional templates in search results

Acute Medical Admissions | Cardiovascular Disease Risk Calculator

Smoking status: Please select

Tobacco form: Please select

Age:

Sex:

Current cigarette smoker:

Systolic blood pressure:

Illustration of an additional template opened in a new tab

## 3.2 Design summary

Design point	Rationale key points
The UI allows access to additional templates from within the admission form	<p>Users may wish to complete templates, such as scores or detailed examination templates, which are not part of the core acute medical admission form (REQ)</p> <p>Some headings could require significantly different data structures depending upon the patient's circumstances, for example, in the Family History section (REQ)</p>
The additional template search is provided through the same mechanism as the core section search	This has been done for the sake of convenience: to reduce the number of mechanisms. Also, the user may not be aware what is or is not included in the admission form (UX)
The additional and core template search results are displayed in same list and are ordered without bias to either category	Splitting the 'core' from the 'additional' templates as done in the test design (horizontal dividing lines and right-aligned headers) risks the user missing the lower, additional template results. Users may assume that the matches in the lower half are not well matched (UR)
<p>The additional template search results are distinct from the core template results:</p> <ul style="list-style-type: none"><li>For example, by featuring an icon next to the additional template search results</li></ul>	<p>Clinicians felt that this would be the most appropriate mechanism, if these core and additional results are combined in a single list (CF)</p> <p>This use of iconography has its origins in web conventions (UX)</p>

[Key to abbreviations \(slide 14\)](#)

## 3.2 Design summary

Design point	Rationale key points
The additional templates are labelled upon access	It is good UI practice to clearly label forms and fields, especially as the additional templates are not part of the standard structure of the admissions notes (UX)
<p>The additional templates are not inserted into sections with the admissions form:</p> <ul style="list-style-type: none"><li>• However, the system may link these templates to the terms which triggered them (where appropriate)</li></ul>	<p>The design aims to follow the standard RCP headings and medical organization data structures where appropriate (CF)</p> <p>Inserting a template under a heading may assign it new meaning, either in the mind of the author or the reader (UX)</p>

[Key to abbreviations \(slide 14\)](#)

# 3.3 Design exploration

**Add section** **Show options**

**Acute Medical Admissions**

Presenting Complaint

Central chest pain

History of Presenting Complaint

Central gripping chest pain radiating up into the neck and down the left arm, associated with shortness of breath, lasting 45 minutes

card

Cardiovascular

Cardiac catheterisation admission

Cardiovascular System Risk Calculator

Observations and Findings – Cardiovascular System [CVS]

**Design feature:**  
Additional templates results are distinguished by an icon

**Design feature:**  
Additional templates are displayed in the same list as the (core) section results  
There is no bias in the ordering of core and additional results

**Alternatives:**

- Divides the results between core and additional templates (under different headings)
- Provides an up front toggle between core and external templates

**Cardiovascular System Risk Calculator**

Enables an assessment of the patient's risk of dying within 5 years from cardiovascular disease, including both stroke and heart disease.

*Opens in another form*

**Design feature:**  
The fly-out could communicate that the template will open separately from the current template

### 3.3 Design exploration

Acute Medical Admissions    Cardiovascular Disease Risk Calculator

Smoking status:

Tobacco form:

Age:

Sex:

Current cigarette smoker:

Systolic blood pressure:

Total cholesterol:

Creatinine:

Height:

**Does the patient have:**

diabetes:  Yes  No  Not known

left ventricular hypertrophy:  Yes  No  Not known

**Has the patient already had:**

a myocardial infarction:  Yes  No  Not known

a stroke:  Yes  No  Not known

**Design feature:**  
Additional templates, if chosen, are not displayed in the acute medical admissions form. Instead, they are displayed in a separate tab.

**Calculate**

## 3.4 Next steps

### Immediate next steps:

- Further investigate the usability of returning additional template results in the same list as internal template results
- Confirm the usability of distinguishing additional from core template results by way of an icon
- Investigate whether clinicians understand the difference between additional and core templates and what are the consequences of them not recognising the difference

### Future exploration:

- Explore the linkages between a given template (such as the acute medical admissions form) and additional templates. Should the templates feature visible linkages, and, if so, how?
- Explore if additional templates can safely be inserted into a given form
- Explore if there are circumstances where additional templates could replace sections within the acute admissions form (for example, if the patient has a need for a specialist examination). How would these be inserted into the form? Should they then be represented within the browsable tree structure?

# **THEME 4 – SEARCHING USING ABBREVIATIONS**

# 4.1 Introduction to Searching Using Abbreviations

One of the values that clinicians can immediately see from electronic noting is the use of ‘acceleration’ facilities, such as ‘hot keys’ and shorthand codes. The current search can benefit from the use of ‘abbreviation’ search.

The designs show how the clinician can type in certain abbreviations of section labels. The search engine deals with the abbreviations in a similar way to other synonyms of the section labels.

For example, the clinician may type ‘PMH’ and the system will offer ‘Past Medical History’ in the results.

**Acute Medical Admissions**

Presenting Complaint

**Central chest pain**

History of Presenting Complaint

Central gripping chest pain radiating up into the neck and down the left arm with

 pmh |

**Past Medical History (PMH)**

Illustration of a search by abbreviation

## 4.2 Design summary

Design point	Rationale key points
The user can search on predefined abbreviations	
The results found by abbreviations are prioritised over other search criteria	Being able to search using abbreviations will provide immediately perceived value for the user (CF)

[Key to abbreviations \(slide 14\)](#)

## 4.3 Design exploration

**Acute Medical Admissions**

Presenting Complaint

**Central chest pain**

History of Presenting Complaint

Central gripping chest pain radiating up into the neck and down the left arm with

 pmh |

**Past Medical History (PMH)**

**Design feature:**

The user can search on abbreviation. Abbreviation matches are prioritised to the top of the results list

**Alternatives:**

- Features a separate search facility for abbreviations
- Provides an up front toggle between full word and abbreviation searching

## 4.4 Next steps

### **Next steps:**

- Explore the feasibility of a look-up list so that the user can browse the abbreviation labels for each section. Consider providing abbreviation labels in the existing browse section

### **Future exploration:**

- Explore whether abbreviations should be provided for additional templates as well as core templates (that is, sections within the admissions clerking form)
- Explore how the user can customise their own abbreviations and the safety implications of allowing them to do this
- Explore the implications of localised abbreviations
- What would the rules be regarding the vocabulary of abbreviations in these situations?

# **THEME 5 – SNOMED CT SEARCH TRIGGER**

# 5.1 Introduction to SNOMED CT Search Trigger

As part of electronic clinical noting, there may be many occasions where the clinician records a key clinical term (such as an individual problem or procedure), and they may do this meaningfully and efficiently by searching for and selecting an appropriate SNOMED CT term. Sometimes the clinician may enter several such terms sequentially (such as when they are listing items, such as in a past medical history).

Associated with certain terms may be one or more templates which, for example, may allow the clinician to enter further details and values relating to the term. For example, if the clinician indicates that the patient may have deep vein thrombosis, the template may offer them a Wells' Score to further assess this diagnosis.

The screenshot shows a clinical application window titled "Acute Medical Admissions". Under the heading "Problem List and/or Differential Diagnosis", there are two sections: "Acute diagnosis" and "Differential diagnosis", each with a text input field and a magnifying glass icon. In the "Acute diagnosis" field, the term "DVT" is entered. To the right of the input fields is a sidebar titled "Related". At the top of this sidebar are buttons for "Browse", "Related", and "Search". Below these buttons is a checkbox labeled "Automatically find related sections or forms" which is checked. A "Find" button is also present. The "Related" section lists "DVT", "Wells Score", and "Leg circumference", each preceded by a small blue square icon with a white arrow pointing outwards. A callout box labeled "Illustration of a suggested template list" points to the "Related" sidebar.

By suggesting templates, the UI may also reduce the risk that the clinician enters those further details as free text (for example, in an 'additional details' free text field).

For example if the clinician has performed an arterial blood gas analysis, it is preferred that they enter the results in a form rather than as free text. The UI can encourage this by suggesting the relevant templates once the clinician has entered the term 'arterial blood gas analysis'.

## 5.2 Design summary

Design point	Rationale key points
The UI offers templates related to a recently encoded term	<p>This is one way in which UI can encourage users to enter data in a structured manner, which brings huge benefits of data organisation and retrieval (CF)</p> <p>Encoded terms (such as in SNOMED CT) carry sufficient meaning that it is safer to link them to specific templates, with less risk of ambiguity than simply running searches against free text (UX)</p> <p>Clinicians were positive about the concept of the UI automatically offering template suggestions based upon their input (UR)</p>
It automatically 'pushes' template options, in addition to allowing the user to request them ('pull')	<p>If the system does not provide prompts of related templates, there is the potential to miss essential assessments related to the original clinical problem (CF)</p> <p>There are precedents in the medical arena, such as popular Primary Care systems (EP)</p>
It can offer more than one template for a single term	We assume that, in some cases, an encoded term could have several templates associated with it (CF)

[Key to abbreviations \(slide 14\)](#)

## 5.2 Design summary

Design point	Rationale key points
<p>The UI ensures the suggestions are sufficiently prominent:</p> <ul style="list-style-type: none"><li>• Right hand side panel</li><li>• Does not rely upon a hover over</li><li>• Drop-down to select terms</li><li>• Not at header or footer of the page</li><li>• Template options for a term persist in the panel until clinician chooses another term</li><li>• The feature is non-modal (that is, it does not force the clinician to interact with it)</li></ul>	<p>Users may not wish to open a related template immediately after encoding a term, so the ability to browse the related templates some time after encoding is important (CF)</p> <p>Users may not expect suggestions to appear on the left-hand side (PSA)</p> <p>The footer location is too hidden and displaying at the top would preclude a conventional list, unless initially hidden (UX)</p>
Templates are filtered according to context	Lack of contextual constraints in offering templates could result in inefficient noting due to the time taken to search for templates (CF)
Templates are displayed in a vertical text list	This format is familiar to clinicians, is flexible and economical (UX)
The UI visually links templates to trigger words	The clinician may be confused as to why or how to use the suggested template if they do not realize what term triggered it (UX)
The UI is able to deal with 'no templates found'	We assume that only a proportion of encoded terms will be appropriate triggers for a template and some encoded terms distinctly preclude a template (CF)

[Key to abbreviations \(slide 14\)](#)

## 5.2 Design summary

Design point	Rationale key points
The suggestions do not obstruct the noting task	User must not be unduly distracted from the task of noting by the task of opening templates (CF)
The interface does not become too cluttered: <ul style="list-style-type: none"><li>• Does not cumulatively build up a single list</li><li>• Does not disrupt the ability to scan a list of matched terms</li></ul>	There is a risk of information overload, confusion and frustration when suggesting templates/forms (PSA)  Building up the results in a single list as terms are being encoded could produce a very long list (CF)  Users did not like templates being offered in-line, where they obstructed scanning the main notes (UR)
The UI emphasises that suggestions are optional	There is a risk that clinicians rely on the template suggestions as diagnostic support (PSA)  There is a risk that the user feels obliged to complete templates just because they are offered to them, even though the specific circumstance may not require them (PSA)
The template matching accounts for post coordination (for example, contextual wrappers)	In some cases, the UI will need to present templates for post coordinated expressions. The majority of these are contextual wrappers. For example, if the user types 'Family history of Cystic Fibrosis', they would expect templates that are matched to the resulting post coordinated SNOMED CT expression (CF)

[Key to abbreviations \(slide 14\)](#)

## 5.2 Design summary

Design point	Rationale key points
<p>Templates can be opened by default:</p> <ul style="list-style-type: none"><li>• If there is only a single template available</li><li>• If it is assumed that the user will need to complete it</li><li>• And the user can then 'opt out' rather than 'opt in'</li></ul> <p>Observables, such as arterial blood gases, are a good example of terms which may have default templates</p>	<p>In some cases, such as the entry of measurement values, it is vital that the clinician enters the values as structured data. If not, important values may be missed in later analysis (PSA)</p> <p>In these cases, the UI should be able to force the user to either complete or opt out of a template (CF)</p>
<p>Access to suggested templates is also provided in one of two ways in the main noting area:</p> <ul style="list-style-type: none"><li>• By a hover-over which appears upon mousing-over or focusing on a matched concept</li><li>• By a button located adjacent to the matched term</li></ul>	<p>Users did not immediately notice the templates being suggested on the right-hand side, although some felt that it was good for them to be sufficiently unobtrusive (UR)</p> <p>A button could be easier for the user to understand and operate (UX)</p>
<p>Options are shown to the right of the matched term to minimise obstruction of other terms in a list</p>	<p>There is a risk that displaying a floating menu adjacent to a term matched by the single concept matching control in a list could obscure other items in the list (CF)</p>

[Key to abbreviations \(slide 14\)](#)

# 5.3 Design exploration

The screenshot shows a 'Acute Medical Admissions' form with sections for 'Problem List and/or Differential Diagnosis', 'Acute diagnosis', and 'Differential diagnosis'. A search bar for 'DVT' is present. The right side features a 'Related' panel with terms like 'Wells Score' and 'Leg circumference'. Three callout boxes provide detailed explanations of design features and alternatives:

- Design feature:** List only displays templates for one term at a time.  
**Alternatives:** Builds up a list of all the matched templates.
- Design feature:** An icon also indicates that there are templates associated with the term.  
**Alternatives:**
  - The icon only appears upon hovering over the term
  - Does not feature an icon. Just display the options upon hovering over the term
- Design feature:** Related template matches are displayed in the right-hand panel. They are displayed as soon as the term is matched until another term is matched or brought into focus.  
**Alternatives:**
  - Features a panel on the left-hand side
  - Features options immediately adjacent to the term
  - Only displays options when the term is in focus

# 5.3 Design exploration

**Add section** **Hide options**

**Acute Medical Admissions**

Problem List and/or Differential Diagnosis

Acute diagnosis

DVT

Differential diagnosis

Cellulitis

Lymphoedema

Pressure ulcers

**Browse** **Related** **Search**

Automatically find related sections or forms

Find

Pressure ulcers

DVT

Cellulitis

Lymphoedema

Pressure ulcers

**Design feature:**  
The user can choose the term for which the UI displays templates by selecting it from this list.  
The list builds up as the user encodes terms (and as the UI matches terms in the narrative – see Theme 6)

**Alternatives:**

- Features a panel on the left-hand side
- Features options immediately adjacent to the term
- Only displays options when term is in focus

# 5.3 Design exploration

The screenshot shows a medical software interface for 'Acute Medical Admissions' under 'Problem List and/or Differential Diagnosis'. On the left, there are dropdown menus for 'Acute diagnosis' (DVT), 'Differential diagnosis' (Cellulitis, Lymphoedema, Pressure ulcers), and search fields. A floating palette titled 'Related templates and forms' is open over the 'DVT' field, listing 'Wells Score' and 'Leg circumference' with blue info icons. A green callout box labeled 'Design feature:' explains that users can view related template options by hovering over the icon and clicking the drop-down. A yellow callout box labeled 'Alternatives:' lists two options: displaying features at the point of encoding or in a separate floating palette.

**Design feature:**  
The user can also view related template options by mousing-over the template icon and then clicking on the floating drop-down that appears

**Alternatives:**

- Options only displayed at the point of encoding, and as part of the encoding section
- Feature options in a separate floating palette

# 5.3 Design exploration

## Investigations and Initial Procedures

arterial blood gas | 

Common matches

Arterial blood gases  All matches

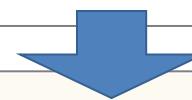
Arterial blood gas analysis  
Blood gases, arterial measurement  
ABG – Arterial blood gas analysis

Searching...

**Arterial blood gases**  
*Synonym for*  
**Analysis of arterial blood gases and pH (procedure)**

**Design feature:**

If there is a default template associated with a term, once the term has been selected, the template automatically appears



## Investigations and Initial Procedures

### Arterial blood gases

pH	<input type="text"/>
PaCO <sub>2</sub>	<input type="text"/> kPa
PaO <sub>2</sub>	<input type="text"/> kPa
Bicarbonate	<input type="text"/> mmol/l
Base excess	<input type="text"/>
Haemoglobin (abb Hb)	<input type="text"/>

Additional comments

**Design feature:**

The user then has the option to 'opt-out' of the template by ignoring it and moving to the next field

# 5.4 Next steps

## Immediate next steps:

- Explore if and how contextual filters should be displayed and manipulated
- Further define the circumstances under which default templates may be triggered
- Validate, through user testing, the designs where the options are accessed in the main noting area

## Future exploration:

- Explore whether decision support can be ‘pushed’ here alongside the template options:
  - For example, in the right-hand panel
  - However, decision support should be considered in a wider focus; and not just in relation to admission clerking
- Explore work-flow triggers, namely template suggestions that are independent of any user action (for example, triggered by Quality Outcome Framework criteria)
- Generalise design findings and/or guidance to other templates (such as discharge forms)

# **THEME 6 – FREE TEXT TRIGGER**

# 6.1 Introduction to Free Text Trigger

Although there will be occasions where the clinician actively searches for individual SNOMED CT terms, often the quickest and most appropriate entry format will be free text. In these instances, there is a risk that the clinician enters data which would be better recorded as structured data (for example, via a form) than as free text.

Therefore, the designs in this theme show how the UI can:

- Offer templates based upon terms it matches in the free text
- Allow the clinician to choose between and open these templates

The screenshot shows a medical admissions form titled "Acute Medical Admissions". The "Presenting Complaint" section contains the text "Central chest pain". The "History of Presenting Complaint" section contains the text "Central gripping chest pain radiating up into the neck and down the left arm with shortness of breath, lasting 45 minutes. blood pressure 135". To the right, a sidebar displays a dropdown menu with "Blood pressure (BP)" selected. A callout box points to this sidebar with the text "Illustration of visually tagging a term for which related templates have been found".

The designs assume that the terms which the UI matches are SNOMED CT terms (before identifying which templates are associated with those terms). However, they stop short of showing how this feature may integrate with full SNOMED CT text parsing and the emphasis is upon offering templates rather than encoding terms within the text.

## 6.2 Design summary

Design point	Rationale key points
<p>The UI allows the user to trigger templates from free text</p> <p>The UI proactively offers certain template matches from within free text</p>	<p>The clinician's inclination is to write in free-text, as it is often intuitive and quick. However, organisation and retrieval of the patient record benefits from the entry of structured data.</p> <p>Triggering templates from free-text encourages structured entry while allowing an intuitive data entry style (CF)</p> <p>Risk that clinician enters all data in free text. Important measurement values could be missed in later retrieval (PSA)</p> <p>Clicking on or highlighting a word was not sufficiently 'discoverable' for some users (UR)</p>
Template options are displayed in the right-hand panel	<p>In order to be noticed, the templates options need to be displayed (semi) permanently. However, there is a risk of visual overload if the template options were to be permanently displayed in the noting area (UX)</p> <p>Clinicians appreciated the template options being displayed in the right-hand panel (UR)</p>
The UI also provides access by tags (icons overlaid on top of text)	Clinicians agreed that a proactive free text template trigger could work by marking up text the UI has matched against SNOMED CT terms with associated templates as well as by displaying template options in the right-hand panel in the same way as the Single Concept Matching feature (CF)

[Key to abbreviations \(slide 14\)](#)

## 6.2 Design summary

Design point	Rationale key points
Free text triggering is markedly distinct from the section search	Clinicians were confused by previous designs where the free text trigger feature performed the same function as the section search (UR)
The floating drop-down control appears on focus and reveals template options	This mechanism has several precedents in existing software and so should be familiar to clinicians (EP)
Text tags demarcate the whole of the relevant matched phrase	There is a risk that the clinician thinks that the tag is associated with a different term if the whole phrase is not clearly tagged (for example, 'pressure' rather than the full phrase 'blood pressure') (CF)
Text tags do not comprise an underline	Underlines are too prevalent (with other meanings) in existing software. Also, previous Microsoft Health CUI research has shown that they make the text too prominent (EP) (CUI)
Visual tagging clinical terms in the text is sufficiently muted	
There is an option to switch off the free text template trigger mode	Risk that the template options are too overwhelming and they distract from the primary noting task or the clinician ends up ignoring them (PSA)

[Key to abbreviations \(slide 14\)](#)

## 6.2 Design summary

Design point	Rationale key points
The UI matches terms without requiring active encoding	The approach cannot rely on the user encoding a term before the UI offers a template (if it is important for the user to use the template) (CF)
Matching is driven by a specific subset (for example, of SNOMED CT terms) which is determined by the context	An unlimited text search would match templates against most words in the narrative. Only constrained matching against specific terms, such as measurement concepts, will be useful (CF)
<p>The following template access and data entry, one of two conditions apply:</p> <ul style="list-style-type: none"><li>Original free text remains</li><li>Text is replaced by the template values</li></ul>	There are some clinical phrases which can be easily inserted back into free text and some which cannot (for example, measurement values can be easily inserted back into the free text) (CF)
The search algorithm is sufficiently ‘fuzzy’ in order to find words and phrases that almost match the search text	In usability tests, clinicians were unable to invoke a template because they were using slightly different words (such as ‘smokes’ instead of ‘smoking’). This could be managed by introducing some ‘fuzziness’ to the search algorithm (UR)

[Key to abbreviations \(slide 14\)](#)

# 6.3 Design exploration

**Acute Medical Admissions**

**Presenting Complaint**  
**Central chest pain**

**History of Presenting Complaint**  
Central gripping chest pain radiating up into the neck and down the left arm with shortness of breath, lasting 45 minutes. blood pressure 135

**Design feature:**  
The matched terms are visually tagged in the narrative text

**Alternatives:**

- Other visual tagging styles are being considered

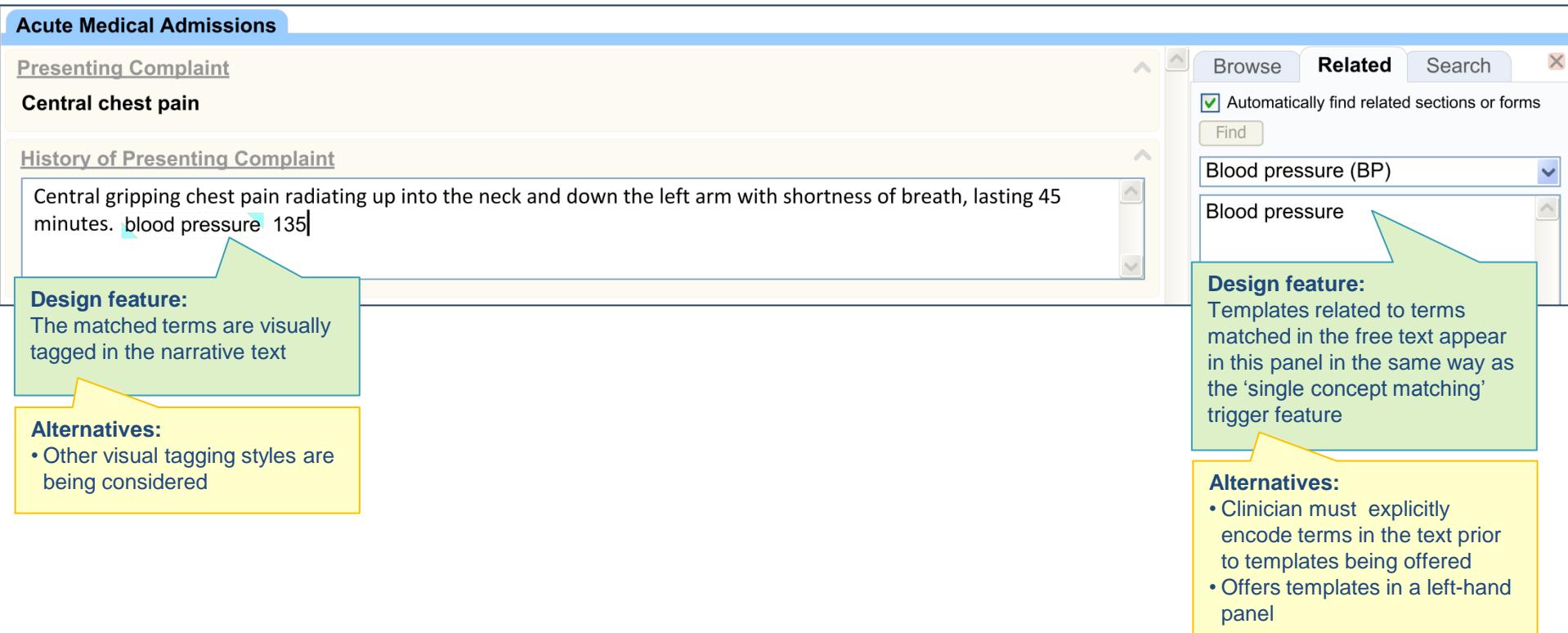
**Browse    Related    Search**  
 Automatically find related sections or forms  
Find

**Blood pressure (BP)**  
Blood pressure

**Design feature:**  
Templates related to terms matched in the free text appear in this panel in the same way as the 'single concept matching' trigger feature

**Alternatives:**

- Clinician must explicitly encode terms in the text prior to templates being offered
- Offers templates in a left-hand panel



## 6.3 Design exploration

The screenshot shows a medical software interface titled "Acute Medical Admissions". In the main panel, under "Presenting Complaint", the text "Central chest pain" is entered. Below it, under "History of Presenting Complaint", the text "Central gripping che" is followed by a dropdown menu. The menu is titled "Related sections and forms" and contains three items: "Blood pressure" (which is highlighted with a yellow background), "Remove this tag", and "Switch off auto-find". A cursor arrow is pointing at the "Blood pressure" option. To the right of the main panel, there is a vertical toolbar with buttons for "Browse", "Related" (which is selected and highlighted in red), "Search", and "Find". Below the toolbar, there is a section titled "Blood pressure (BP)" with a dropdown arrow, and a text input field below it.

**Design feature:**  
In addition to selecting from the right-hand panel, the clinician can also mouse-over or move focus to the text and click on the resulting drop-down to reveal template options

**Alternatives:**

- Offers options in a floating 'mini-menu'
- Offers options in a menu activated by a right-hand click action
- Offers options in a modal dialog box
- Formats the options in the same way as the search feature
- Provides an input field in which the clinician can change the text

## 6.4 Next steps

### Immediate next steps:

- Test and refine the design with an interactive prototype
- Comparatively test alternative visual tags
- Investigate the extent to which fuzzy matching should be implemented
- Investigate how to link the template data with the original matched term. Should there be a visual indication that remains with the original term?

### Future exploration:

- Investigate ways in which a value entered into the template can replace or complement the original term within the free text
- Explore the further knowledge and decision support implications of this feature. How could this integrate with other support systems?
- Explore how the templates may be applied, but without the use of a form. For example, how the UI may recognise values in free text, where the parsing is constrained by a template (and the subsets and relationships implied by it)

# **THEME 7 – BROWSING**

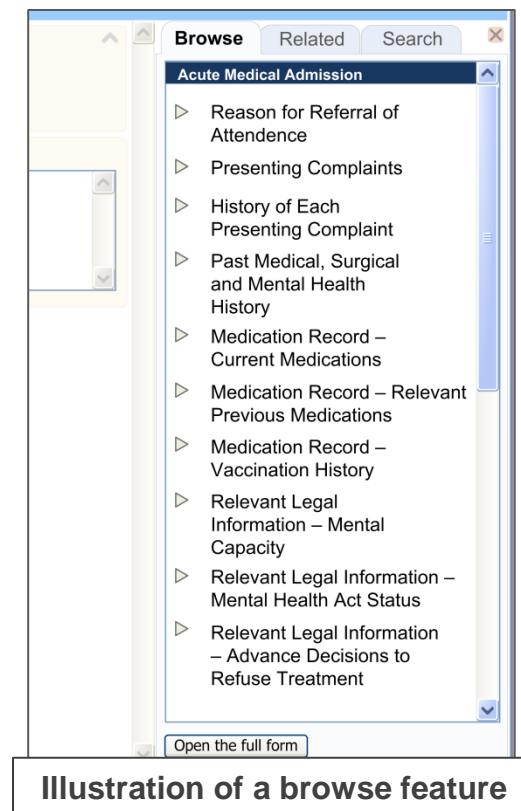
# 7.1 Introduction to Browsing

In addition to showing how the clinician can search for sections within the acute medical admission form, the designs also illustrate another familiar way of navigating data structure, namely browsing.

The clinician may use a 'tree' to find and open the section they require. The advantage given by browsing rather than searching is that the clinician can see the structure available, which may be particularly useful for clinicians who are unfamiliar with the precise structure of the template. The disadvantage is that it may require more actions to browse rather than search, and browsing may be best done with a mouse whereas a lot of the noting may be done via a keyboard. This may make the search a more attractive option in places, especially for clinicians who are more familiar with the structure and know exactly what they want.

This design consultation assumes that a mixed economy of browse and search is the most accommodating solution which can deal with varying levels of experience and different types of noting needs.

The clinician may browse up and down the tree, and open sections by clicking on them.



## 7.2 Design summary

Design point	Rationale key points
<p>A browsing feature is provided in addition to search features:</p> <ul style="list-style-type: none"><li>• This allows the user to browse the structure of the Acute Medical Admission form and open subsections from within it</li></ul>	<p>Browse is a function which clinicians expect and, for first-time users at least, the browse is a more popular feature than search (UR)</p>
<p>The browsing feature is opened by default</p>	<p>The browsing feature can communicate the structure of the template in an economical way, while providing access to sections (UX)</p> <p>Allowing users to enter data in fragments, rather than as a coherent whole template, may mean the clinician loses sight of where they are in the process. The browsing feature can provide context to the noting (PSA)</p> <p>Clinicians like the idea of the browsing feature being open by default, as long as they can hide it (UR)</p>
<p>The browsing feature can be hidden and then subsequently revealed</p>	<p>There is a risk that the clinician is distracted from their primary noting task by the template options (PSA)</p> <p>Therefore, they need the ability to hide the browsing feature from view (UX)</p>

[Key to abbreviations \(slide 14\)](#)

# 7.3 Design exploration

The screenshot shows a 'Presenting Complaints' section with 'Shortness of breath' selected. A search icon is visible next to the input field. Below it, a 'History of Presenting Complaint' section contains a detailed patient history. To the right, a sidebar titled 'Acute Medical Admission' lists various clinical history items. Six callout boxes with blue borders provide annotations:

- Design feature:** The clinician may choose to hide the browse tree.
- Design feature:** The browsing tree is displayed by default
- Design feature:** The default view is just the top-level sections
- Design feature:** The clinician may select sections to open via the browse tree
- Design feature:** The browsing tree is displayed in the right-hand panel
- Design feature:** Provide a feature to open the full form in a single action

**Add section** **Hide options**

**Browse** **Related** **Search**

**Acute Medical Admission**

- ▷ Reason for Referral of Attendance
- ▷ Presenting Complaints
- ▷ History of Each Presenting Complaint
- ▷ Past Medical, Surgical and Mental Health History
- ▷ Medication Record – Current Medications
- ▷ Medication Record – Relevant Previous Medications
- ▷ Medication Record – Vaccination History
- ▷ Relevant Legal Information – Mental Capacity
- ▷ Relevant Legal Information – Mental Health Act Status
- ▷ Relevant Legal Information – Advance Decisions to Refuse Treatment

**Open the full form**

**Alternatives:**

- Opens all the sections by default
- Automatically opens up relevant sections within the tree when the clinician adds a section via the search feature

**Alternatives:**

- Displays in a left-hand panel
- Features the browsing feature as part of a search feature
- Links the section search feature with the browse feature so that the user can navigate between data within them

# 7.4 Next steps

## Next steps:

- Further understand the possible interaction between the search and browse features
- Test the browse feature alongside the search features in an interactive prototype. Refine the designs where appropriate
- Explore how some sections could be further nested in order to make the browsing experience clearer. For example, nest all the sections with the prefix 'Observations and Findings' into a single item of the same name and remove the prefix from all the remaining labels

## Future exploration:

- Explore how the browse feature could be used to indicate which sections the clinician has addressed (that is, opened and possibly entered information into) and which remain closed. This gives the clinician a quick overview of what is left to do

# **THEME 8 – REVISITING AND ADDING TEMPLATES**

# 8.1 Introduction to Revisiting and Adding Templates

As the clinician progresses through the notes, there may be times where they need to revisit sections that they have already opened. In those cases, they could scroll back up the form to revisit them. However, in this theme, the designs show how the UI may assist the clinician to access previously opened sections by using the search or browse functions.

The designs show how the UI will open a new instance of the section, while pre-populating it with the previous data, so the clinician does not need to look for the previous instance.

Family History ⚠ Please note: there is already an entry in the current form for family history. The data has been moved down here

Mother became ill and died when she was in her 60s. She thinks it may have been Alzheimer's, but not sure.

Illustration of mitigation for revisiting a section ('Family History')

# 8.1 Introduction to Revisiting and Adding Templates

In other instances, the clinician may wish not to revisit existing sections or subsections but to add a new instance.

For example, the clinician may wish to add a new 'Blood pressure' subsection in order to add a new reading not to edit the blood pressure they entered earlier in the clerking.

Therefore, the design will show how the clinician can add further instances of a data type, where this is permitted (such as for examination measurement values).

The diagram illustrates the process of adding a new blood pressure reading. It consists of two side-by-side interface snippets connected by a large blue arrow pointing from left to right.

**Left Snippet:** This shows a 'Blood pressure' section with two entries:

- 15:34; 02-Jan-2008:
  - Systolic pressure: 135 mmHg
  - Diastolic pressure: 84 mmHg
- 15:40; 02-Jan-2008:
  - Systolic pressure: 149 mmHg
  - Diastolic pressure: 85 mmHg

A yellow button labeled '+ Add another' is visible at the bottom, with a cursor pointing towards it.

**Right Snippet:** This shows the same 'Blood pressure' section after the new entry has been added:

- 15:34; 02-Jan-2008:
  - Systolic pressure: 135 mmHg
  - Diastolic pressure: 84 mmHg
- 15:40; 02-Jan-2008:
  - Systolic pressure: 149 mmHg
  - Diastolic pressure: 85 mmHg
- New entry:
  - Systolic pressure: [empty input field] mmHg
  - Diastolic pressure: [empty input field] mmHg

A yellow button labeled '+ Add another' is visible at the bottom.

**Bottom Right Label:** Illustration of adding further fields

## 8.2 Design summary

Design point	Rationale key points
The search returns section options even when there is already an instance open within the form	Given the flexible approach to section entry, there is a risk that the clinician will try to open a template that is already open. In such a case, the UI could do nothing and leave it up to the user to go back and find the opened template. A more helpful approach is to open the template at the current point in the template, but mitigate the risks associated with a duplication (UX)
The UI does not open multiple instances of the same section  Upon opening a duplicate section, the UI will pre-populate it with the existing data (from within the form) and will simultaneously remove the original instance of the template	Allowing duplication raises the risk of contradiction between different data. Having the data in separate places reduces ability to compare (PSA)  Clinicians preferred the approach where data is pulled into a newly duplicated template rather than being forced back up to the location of the original instance (PSA)

[Key to abbreviations \(slide 14\)](#)

## 8.2 Design summary

Design point	Rationale key points
<p>There is a feature for adding multiple instances of the same template (for example, a set of data fields):</p> <ul style="list-style-type: none"><li>For example, for ordinal/numerical measurement data</li></ul> <p>Duplicate fields are displayed adjacent to each other</p>	There will be occasions where the clinician will need to enter multiple instances of the same data type (CF)
The ‘add another’ control is located in a prominent position, adjacent to the most recent instance	It is useful for the clinician to be able to see previous measurement values when entering the current value (PSA)
Each set of duplicate fields are uniquely labelled	Clinicians indicated that they preferred designs where the fields are uniquely labelled (UR)
Each set of duplicate fields are labelled with the time of entry/measurement	Clinicians preferred labels which indicated the time of entry (or the time of measurement) (UR)
The UI may automatically open a set of new fields upon revisiting a section with the search/browse feature	If a clinician chooses to open a previously opened section, which contains populated measurement fields, it is assumed that the clinician requires fresh fields to enter future values (UX)

[Key to abbreviations \(slide 14\)](#)

## 8.2 Design summary

Design point	Rationale key points
The UI warns if statements have been duplicated	This would help to prevent duplication of actual data (CF)

[Key to abbreviations \(slide 14\)](#)

# 8.3 Design exploration

Add section

Show options

## Acute Medical Admissions

Smoking status: Please select

Tobacco form: Please select

Age commenced:

Age stopped:

Average daily consumption:

Tobacco weight per week:

Pack years:

Comment:



## Family History (FH)

### Design feature:

Through the search (or the browse), the clinician may search for and open sections that have already been added

### Alternatives:

- Does not display sections which are already opened
- Warns the clinician in the search results that the section is already opened

# 8.3 Design exploration

**Add section** **Show options**

**Acute Medical Admissions**

Smoking status:

Tobacco form:

Age commenced:

Age stopped:

Average daily consumption:

Tobacco weight per week:

Pack years:

Comment:

**Design feature:**  
Provide a warning message to explain what has happened

**Family History**  Please note: there is already an entry in the current form for family history. The data has been moved down here

Mother became ill and died when she was in her 60s. She thinks it may have been Alzheimer's, but not sure.

**Design feature:**  
The UI opens the section and populates it with any data that the clinician has entered in the previous instance. Meanwhile, the UI closes the previous instance of the section  
This also applies even if the duplicate section is only a subsection of the previous instance or vice versa. If the clinician had previously opened a blood pressure section, and then chose to open a vital signs section, the UI would move the blood pressure data down to the vital signs section and close the previous blood pressure section

**Alternatives:**

- Provides a link to jump the user back up to the previous instance of the section.
- Automatically jumps the focus back up to the previous instance of the section.
- Duplicates the sections
- Provides a hover which displays some or all of the previously entered data

## 8.3 Design exploration

**Acute Medical Admissions**

**Observations and Findings - Vital Signs | Blood pressure**

**Blood pressure**

Entered at: 13:46, 03-Dec-2009

Systolic pressure  mmHg

Diastolic pressure  mmHg

Systolic pressure  mmHg

Diastolic pressure  mmHg

+ Add another

**Design feature:**  
If the section contains certain examination measurement data, the UI also automatically opens a fresh set of fields, where appropriate

**Alternatives:**

- Does not automatically open a fresh set of fields; the clinician must click on an 'Add another' button to open fresh fields

## 8.3 Design exploration

The diagram illustrates two versions of a blood pressure tracking application interface, separated by a large blue arrow pointing from left to right.

**Left Version (Initial State):**

- Blood pressure** section header.
- Two entries:

  - 15:34; 02-Jan-2008
    - Systolic pressure: 135 mmHg
    - Diastolic pressure: 84 mmHg
  - 15:40; 02-Jan-2008
    - Systolic pressure: 149 mmHg
    - Diastolic pressure: 85 mmHg

- A yellow button labeled **+ Add another** with a cursor icon pointing at it.

**Right Version (Improved State):**

- Blood pressure** section header.
- Two entries:

  - 15:34; 02-Jan-2008
    - Systolic pressure: 135 mmHg
    - Diastolic pressure: 84 mmHg
  - 15:40; 02-Jan-2008
    - Systolic pressure: 149 mmHg
    - Diastolic pressure: 85 mmHg

- An empty input field for Systolic pressure (1 mmHg) and an empty input field for Diastolic pressure (2 mmHg).
- A yellow button labeled **+ Add another**.

**Annotations:**

- Design feature:** Provides an 'Add another' button to enable the clinician to duplicate certain categories of field (such as for examination measurement data)
- Alternatives:**
  - Labels the duplicate fields by the order in which they have been added (for example "first", "second"...etc)
  - Doesn't distinguish by label; only by order
- Design feature:** Ensures that the duplicated fields are distinguished by labelling (by time/date)
- Alternatives:**
  - Displays at the top of the section
  - Provides a drop-down at the top of each section from which the clinician can select further instances of whichever fields they want (if allowed)

## 8.4 Next steps

### Next steps:

- Test the design in an interactive prototype. Refine the design where appropriate
- Further define where fields can be duplicated (that is, so the clinician can enter multiple instances of the same value type). Currently the designs assume that certain numerical examination measurement values can be duplicated (such as vital signs data). However, there may be other types of data that can be duplicated
- Explore in more detail how sections may be revisited via the browsing feature, and whether any further UI will be required

### Future exploration:

- Explore ways in which the UI may alert clinicians that they are entering duplicate statements (that is, statements they have entered into the form earlier)

# **THEME 9 – REORDERING**

# 9.1 Introduction to Reordering

It is assumed that sections are arranged according to the order in which they were added, but this may make it difficult for clinicians to assess what they have done and what is missing. It would be simpler to scan through the sections in a standard order as, this way, it becomes more apparent what is missing (as missing sections would stand out against the familiar pattern).

Therefore, the designs in this theme show how the UI can:

- Show how clinicians can reorder the sections within the form according to a standard sequence, so that they can better review the completeness of their note
- Show how clinicians may rearrange the sections back to the order in which they were added

The diagram illustrates the process of reordering medical data. On the left, a screenshot of a medical admissions form shows sections in a non-standard order: History of Each Presenting Complaint, Presenting Complaints, Observations and Findings - Vital Signs | Blood pressure, Family History, and Past Medical History. A large blue arrow points to the right, indicating the transition to a standard sequence. On the right, another screenshot shows the same form reordered: Presenting Complaints (highlighted in red), History of Each Presenting Complaint, Past Medical History, and Medication History.

**Initial State (Left): Acute Medical Admissions**

- History of Each Presenting Complaint**  
Been feeling unwell for last 5 days. Shortness of breath more than usual for last 2 weeks. Shortness of breath on exertion- approximately 50 metres. Wheeze. Cough productive green sputum. Diarrhoea.
- Presenting Complaints**  
shortness of breath and cough
- Observations and Findings - Vital Signs | Blood pressure**  
Systolic 135 mmHg  
Diastolic 84 mmHg  
+ Add another
- Family History**  
Paternal history of IHD  
Father died of MI aged 55  
Mother had stroke 2 months ago, aged 75
- Past Medical History**  
Pre-proliferative retinopathy 2009  
COPD 2005 Admission with COPD  
PE 2004 admitted with suspected PE

**Standard order** Order by entry

**Reordered State (Right): Acute Medical Admissions**

- Presenting Complaints**  
shortness of breath and cough
- History of Each Presenting Complaint**  
Been feeling unwell for last 5 days. Shortness of breath more than usual for last 2 weeks. Shortness of breath on exertion- approximately 50 metres. Wheeze. Cough productive green sputum. Diarrhoea.
- Past Medical History**  
Pre-proliferative retinopathy 2009  
COPD 2005 Admission with COPD  
PE 2004 admitted with suspected PE
- Medication History**  
Mild aortic stenosis 2003  
COPD 2001 admission with COPD  
Community acquired pneumonia 2001 admitted with pneumonia  
Venous eczema 2000  
Bacterial gastroenteritis 1999  
Diabetes Mellitus Type II 1990  
Hypertension 1990  
Pernicious anaemia 1989

**Standard order** Order by entry

**Illustration of reordering the data according to a standard sequence**

## 9.2 Design summary

Design point	Rationale key points
By default, sections are arranged in the order in which the user has added them	Users will expect the sections to build up sequentially as they access them (UX)
During input, a control is provided to reorder the template sections according to the standard RCP headings order	The clinician needs to be able to view the data according to a standard order, partly in order to check that they had completed all that they need to (CP)  Clinicians believed it would be useful for the UI to be able to reorder the templates to a standard (RCP) order (UR)
The ‘reordering’ control does not automatically reorder lists within sections (for example, by chronology)	The order in which a clinician has entered items into a list may be intentionally out of (chronological) order. For example, they may wish to give emphasis to certain items in the list (CF)
During input, a control is provided to reorder the template sections back to the order in which they were added by the user	There is a risk that the user chooses to automatically reorder the form (according to a standard) and then wants to change it back, but cannot (PSA).  The record needs to retain a history of the order in which the user added and completed the sections (CF)

[Key to abbreviations \(slide 14\)](#)

# 9.3 Design exploration

**Acute Medical Admissions**

History of Each Presenting Complaint

Been feeling unwell for last 5 days. Shortness of breath more than usual for last 5 days. Short of breath only when walking. Sore throat. Decreased exercise tolerance- approximately 50 metres. Wheeze. Cough productive green sputum 3 days. Fever. Took a five day course of co-amoxiclav given by GP. 1 day diarrhoea.

Presenting Complaints

**shortness of breath and cough**

Observations and Findings - Vital Signs | Blood pressure Further details ▾

Systolic 135 mmHg  
Diastolic 84 mmHg  
+ Add another

**Design feature:**  
By default, the UI leaves the sections arranged in the order in which the clinician has added (or arranged) them

**Alternatives:**

- Automatically arranges sections according to a standard order as the clinician adds them

Family History

Paternal history of **IHD**  
Father died of **MI** aged 55  
Mother had **stroke** 2 months ago, aged 75

**Design feature:**  
A control is provided to change the order to a standard order

Past Medical History

Pre-proliferative retinopathy  
COPD  
PE

2009 Admission with COPD  
2004 admitted with suspected PE

**Standard order** **Order by entry** **Save** **Save and close** **Discard**

# 9.3 Design exploration

**Acute Medical Admissions**

Presenting Complaints  
shortness of breath and cough

History of Each Presenting Complaint  
Been feeling unwell for last 5 days. Shortness of breath more than usual for last 5 days. Short of breath only when walking. Sore throat. Decreased exercise tolerance- approximately 50 metres. Wheeze. Cough productive green sputum 3 days. Fever. Took a five day course of co-amoxiclav given by GP. 1 day diarrhoea.

Past Medical History

Pre-proliferative retinopathy	2009
COPD	2005 Admission with COPD
PE	2004 admitted with suspected PE
Mild aortic stenosis	2003
COPD	2001 admission with COPD
Community acquired pneumonia	2001 admitted with pneumonia
Venous eczema	2000
Bacterial gastroenteritis	1999
Diabetes Mellitus Type II	1990
Hypertension	1990
Pernicious anaemia	1989

Medication History

Ramipril 2.5mg od
Amlodipine 5mg od

**Design feature:**  
Clicking the control changes the order of the sections to the standard order

**Design feature:**  
The UI does not reorder items **within** lists contained within the sections (such as Past Medical History)

**Design feature:**  
The UI also offers control to reorder back to the order in which the clinician added the sections to the noting area

**Standard order**  **Order by entry**

**Save** **Save and close** **Discard**

## 9.4 Next steps

### Immediate next steps:

- Design, test and refine a control for reordering the form. Address the type of control, where it may be offered and how it should be labelled
- Consider the implications of allowing the clinician to manually reorder the sections
- Create a design feature to allow the clinician to manually reorder the sections

### Future exploration:

- Explore whether to present the clinician with a reordered view before saving and closing the form. Would this be a redundant step?

# Areas/questions for further work and study

The previous sections have outlined next steps and further areas of exploration. To summarise the immediate next steps:

- Test and refine the existing designs
- Answer any relevant design questions that remain open
- Translate the design features into CUI guidance
- Refine and prioritise the future areas of design exploration

# Areas/questions for further work and study

Additionally, there are some general themes which have not been discussed, but which would be important to address:

- Providing a special preview feature in order to help the clinician scan through the salient points of their notes. The format may be more condensed than the entry view (which contains additional screen furniture, such as drop-down mechanisms and empty fields)
- Exploring the end-to-end passage of data from admission to discharge, including possible viewing and querying of the data
- Exploring how to ‘cite’ previous data in the current notes
- Further exploring whether and how clinicians can hide or close template sections that they have added to a form. Our research into this topic proved inconclusive, with clinicians failing to understand why they would want to perform this action. We would want to conclude whether such actions should be disallowed