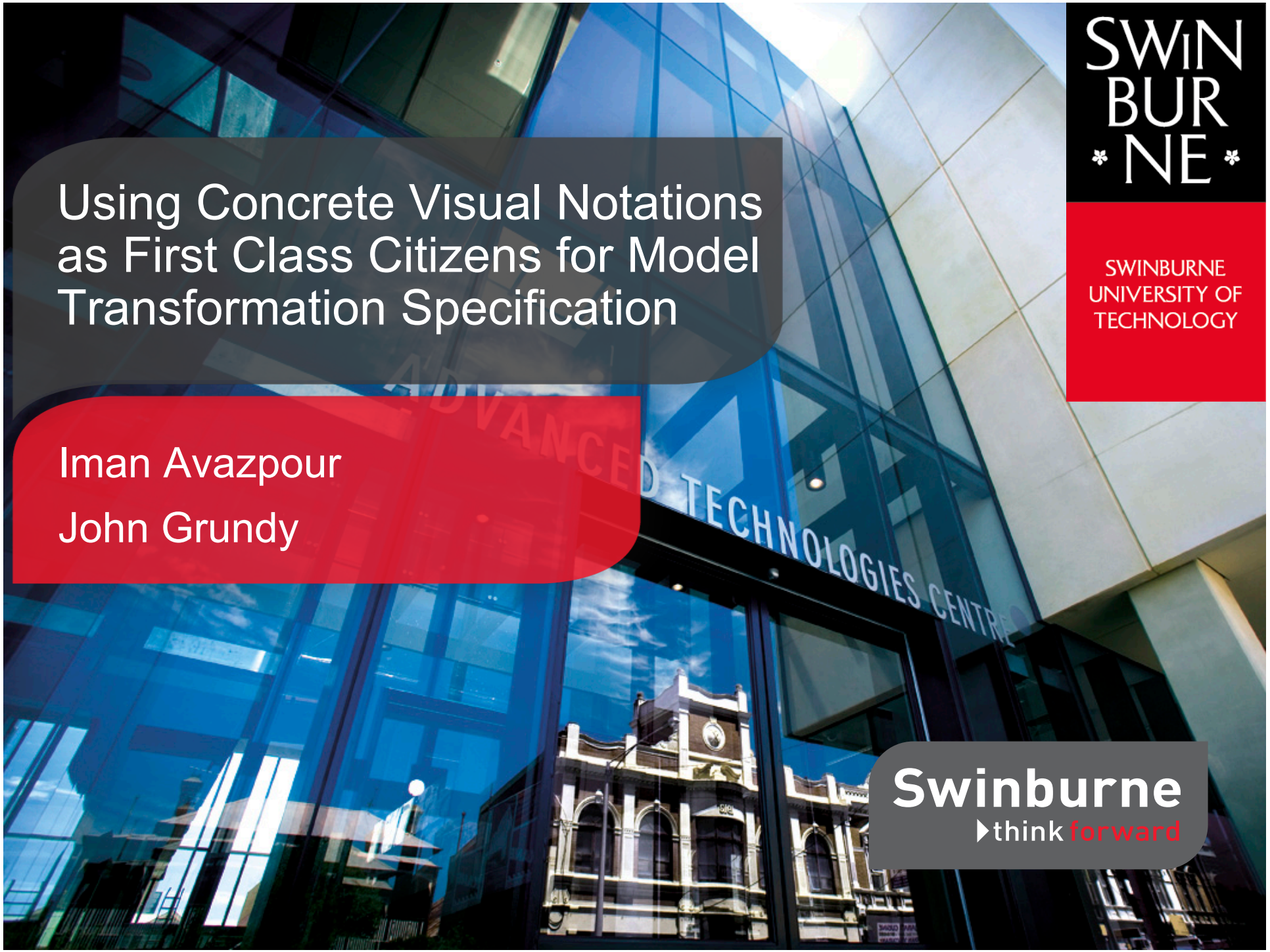

Using Concrete Visual Notations as First Class Citizens for Model Transformation Specification

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Swinburne
think forward

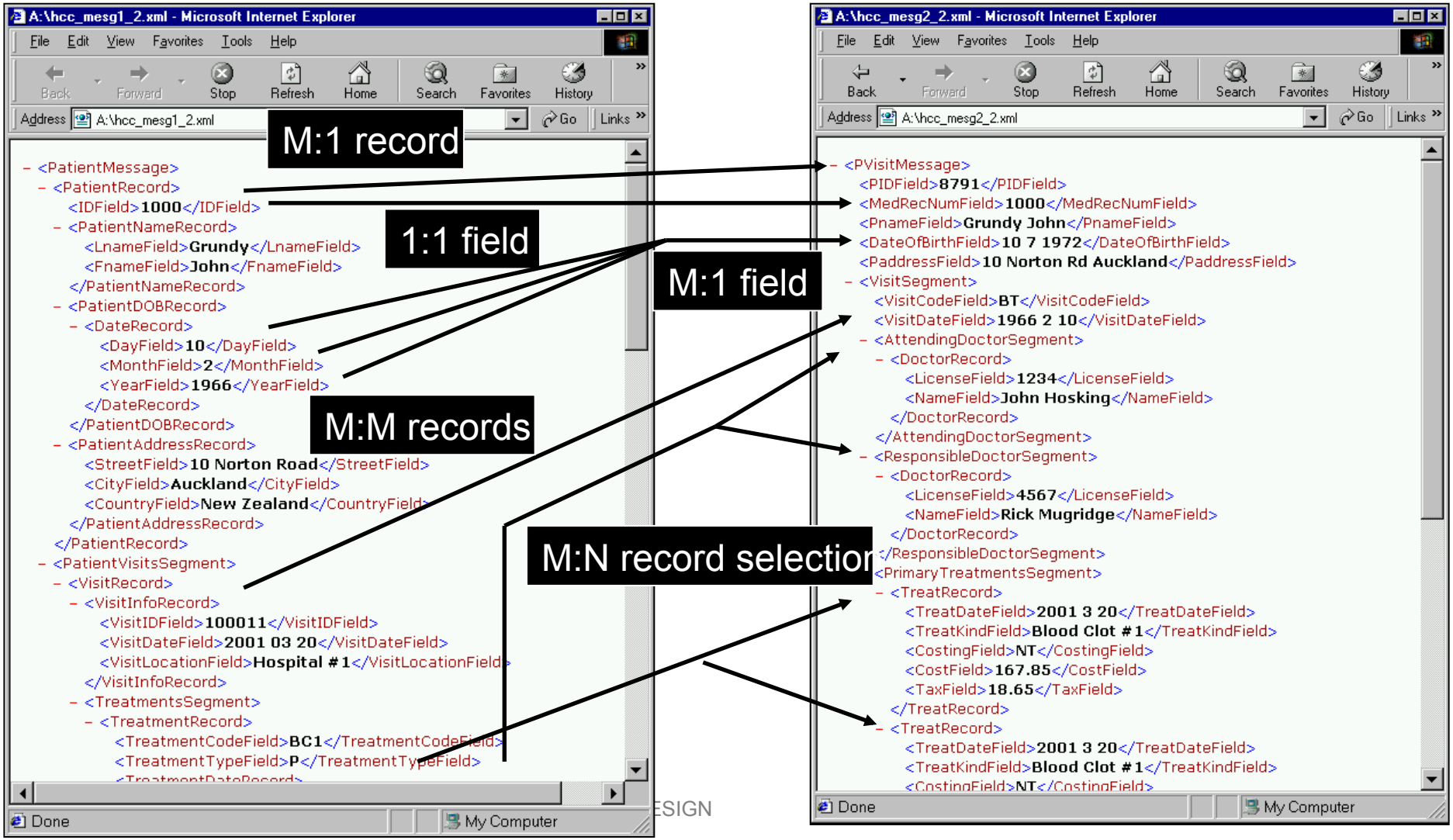
Outline

- Why CONVErT
- Approach
- Basic examples
- Case study – Minard's Map
- Future work

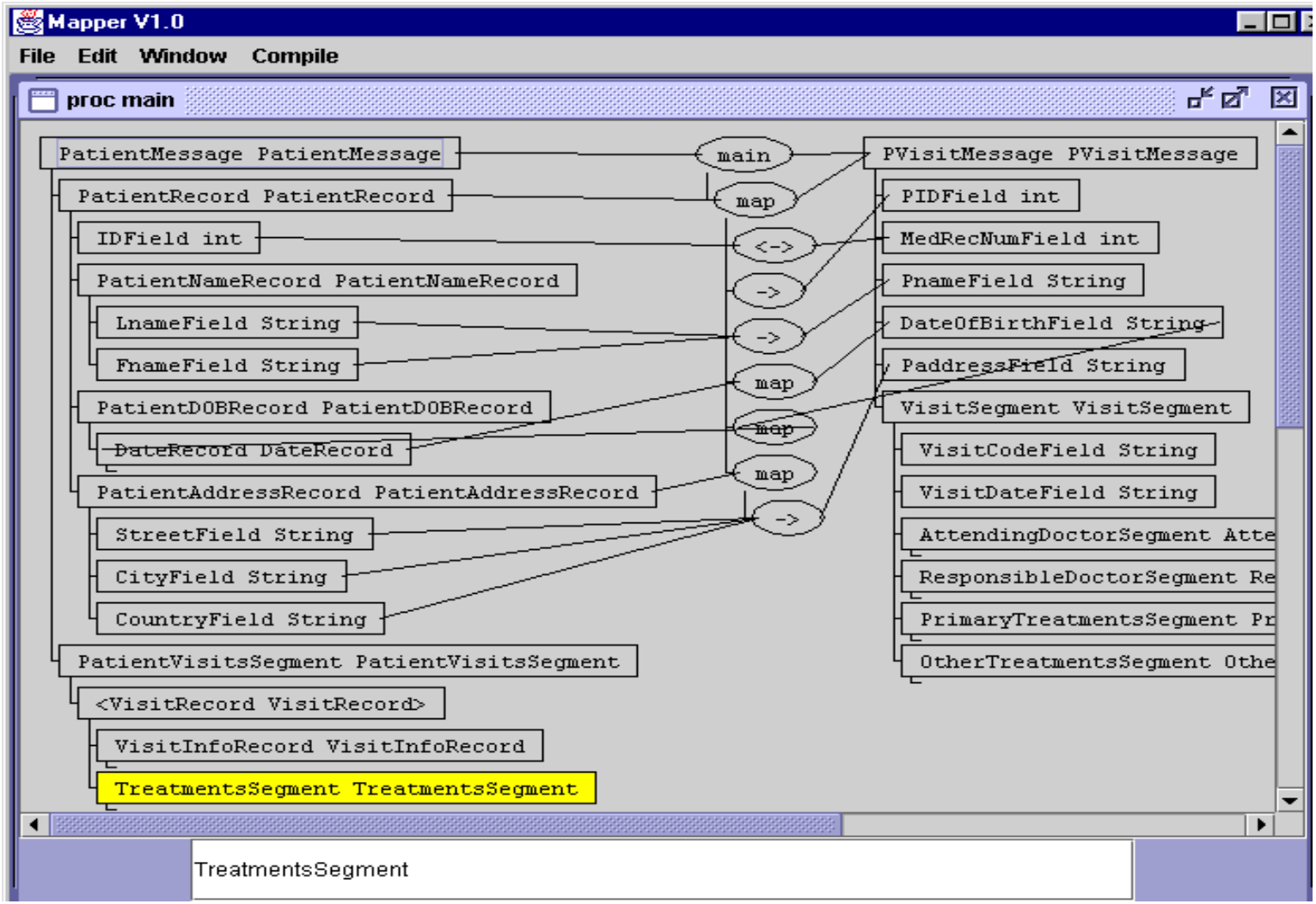
Motivation

- Complex data mapping is hard
  - Programming languages & APIs
  - Scripting languages e.g. QVT, ATL, XSLT
  - Abstraction visual mappers
  - Concrete, domain-specific visual mappers
- Wanted to provide end-users with concrete, example-based data mapping tool
  - Specify own visualisations of complex data
  - Visualise source / target model data
  - Drag and drop between elements to specify mappings
  - Generate model mapping script / code (XSLT)

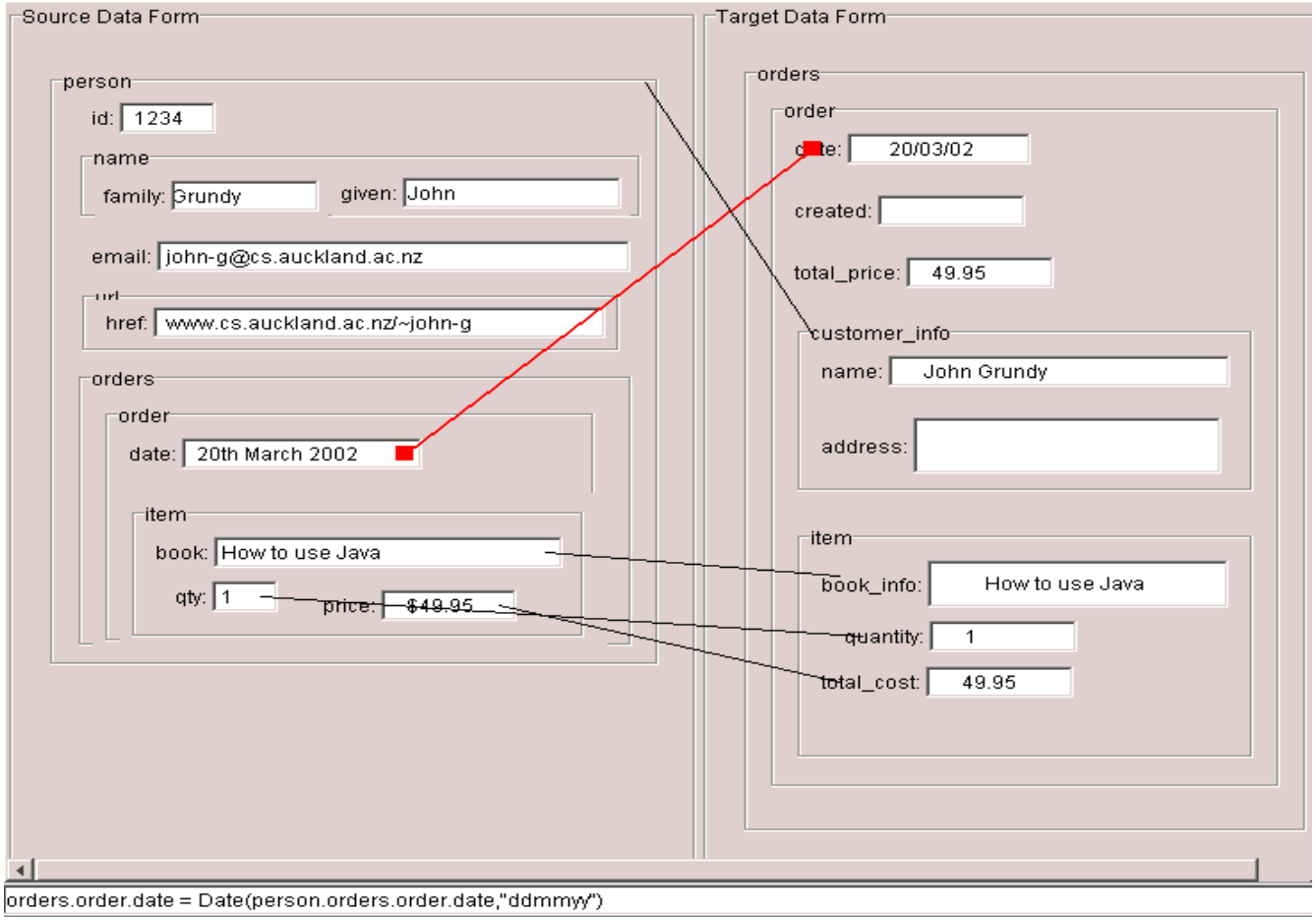
Example


A:\hcc_mesg1_2.xml - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History
Address A:\hcc_mesg1_2.xml
Go Links
M:1 record
1:1 field
M:1 field
M:M records
M:N record selection
- <PatientMessage>
- <PatientRecord>
<IDField>1000</IDField>
- <PatientNameRecord>
<LnameField>Grundy</LnameField>
<FnameField>John</FnameField>
</PatientNameRecord>
- <PatientDOBRecord>
- <DateRecord>
<DayField>10</DayField>
<MonthField>2</MonthField>
<YearField>1966</YearField>
</DateRecord>
</PatientDOBRecord>
- <PatientAddressRecord>
<StreetField>10 Norton Road</StreetField>
<CityField>Auckland</CityField>
<CountryField>New Zealand</CountryField>
</PatientAddressRecord>
</PatientRecord>
- <PatientVisitsSegment>
- <VisitRecord>
- <VisitInfoRecord>
<VisitIDField>100011</VisitIDField>
<VisitDateField>2001 03 20</VisitDateField>
<VisitLocationField>Hospital #1</VisitLocationField>
</VisitInfoRecord>
- <TreatmentsSegment>
- <TreatmentRecord>
<TreatmentCodeField>BC1</TreatmentCodeField>
<TreatmentTypeField>P</TreatmentTypeField>
Done
My Computer
A:\hcc_mesg2_2.xml - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History
Address A:\hcc_mesg2_2.xml
Go Links
- <PVisitMessage>
<PIDField>8791</PIDField>
<MedRecNumField>1000</MedRecNumField>
<PnameField>Grundy John</PnameField>
<DateOfBirthField>10 7 1972</DateOfBirthField>
<PaddressField>10 Norton Rd Auckland</PaddressField>
- <VisitSegment>
<VisitCodeField>BT</VisitCodeField>
<VisitDateField>1966 2 10</VisitDateField>
- <AttendingDoctorSegment>
- <DoctorRecord>
<LicenseField>1234</LicenseField>
<NameField>John Hosking</NameField>
</DoctorRecord>
</AttendingDoctorSegment>
- <ResponsibleDoctorSegment>
- <DoctorRecord>
<LicenseField>4567</LicenseField>
<NameField>Rick Mugridge</NameField>
</DoctorRecord>
</ResponsibleDoctorSegment>
<PrimaryTreatmentsSegment>
- <TreatRecord>
<TreatDateField>2001 3 20</TreatDateField>
<TreatKindField>Blood Clot #1</TreatKindField>
<CostingField>NT</CostingField>
<CostField>167.85</CostField>
<TaxField>18.65</TaxField>
</TreatRecord>
- <TreatRecord>
<TreatDateField>2001 3 20</TreatDateField>
<TreatKindField>Blood Clot #1</TreatKindField>
Done
My Computer

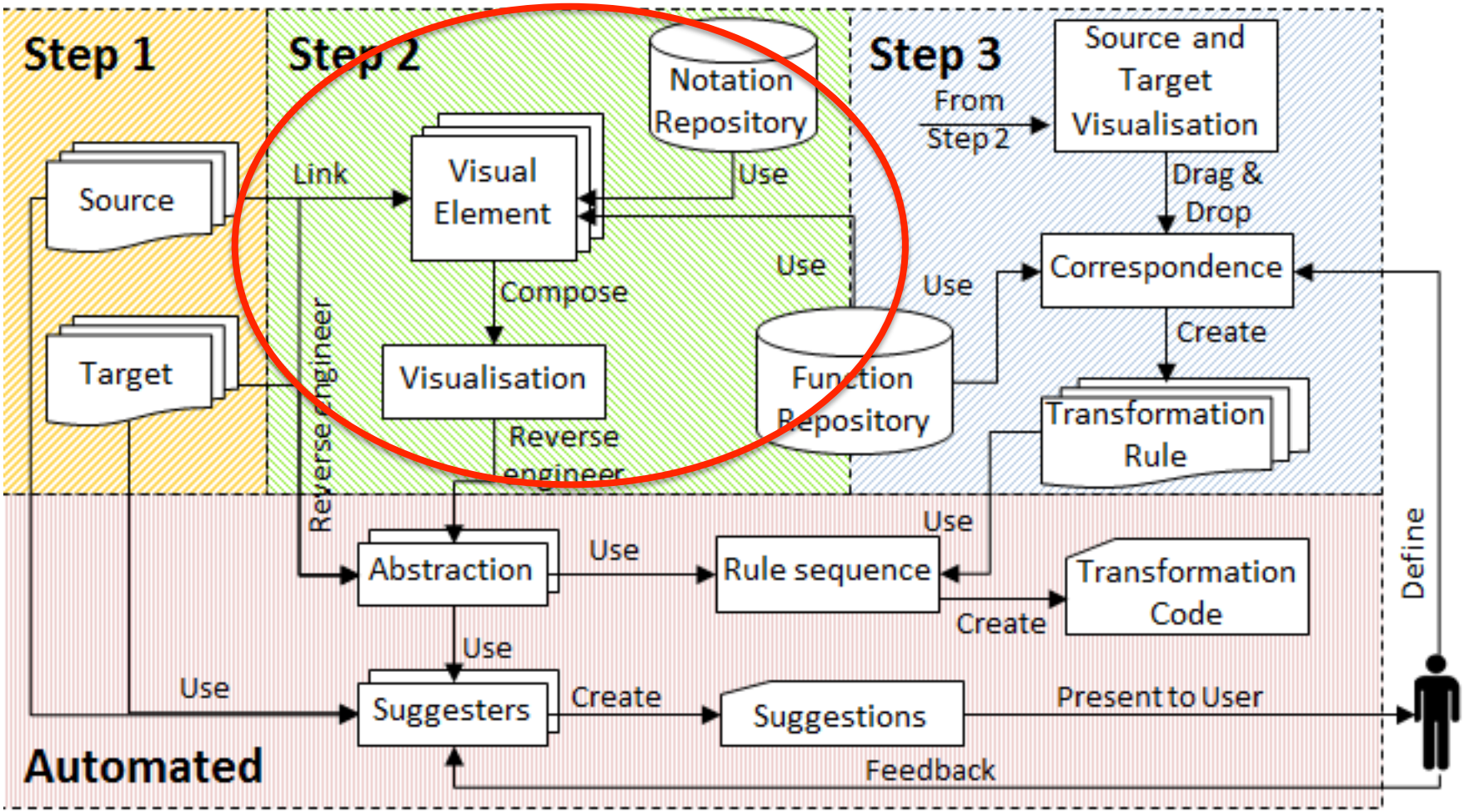
c.f. Orion health data mapper (ASE 2001)



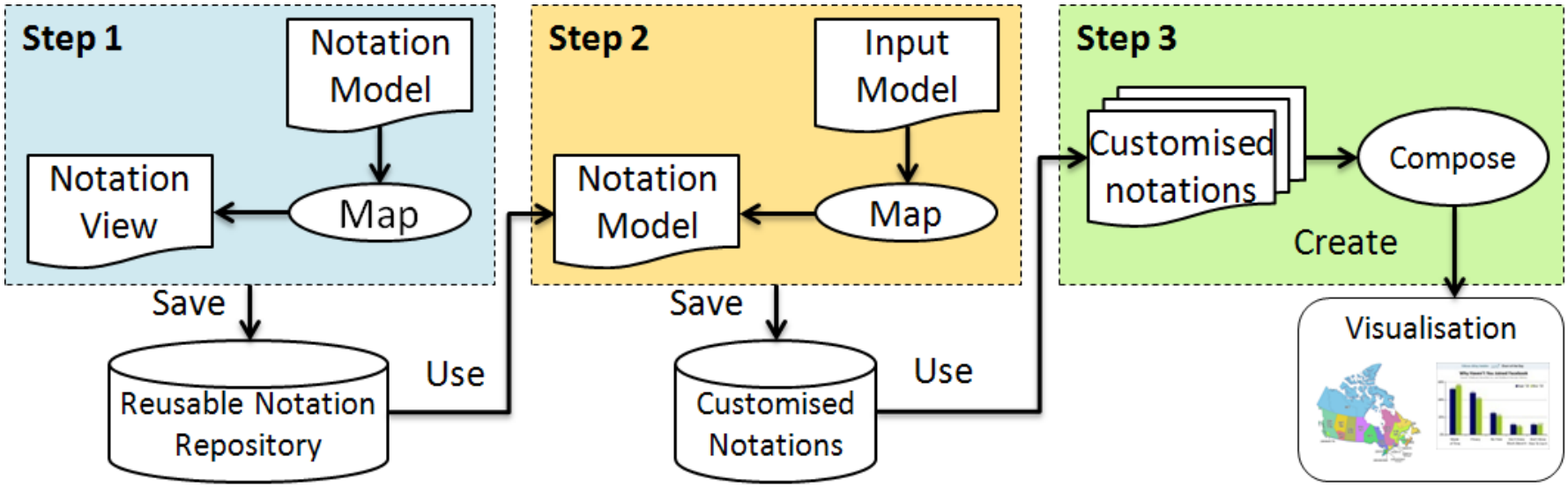
c.f. Form-based mapper (HCC 2002)



Our New Approach - CONVErT



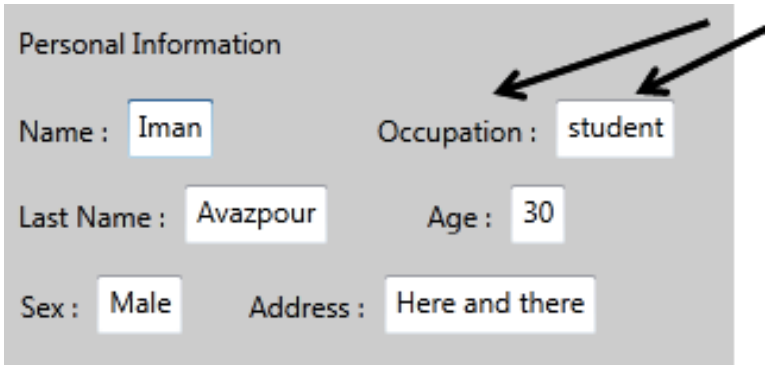
CONVErT – Specifying Concrete Model Visualisations



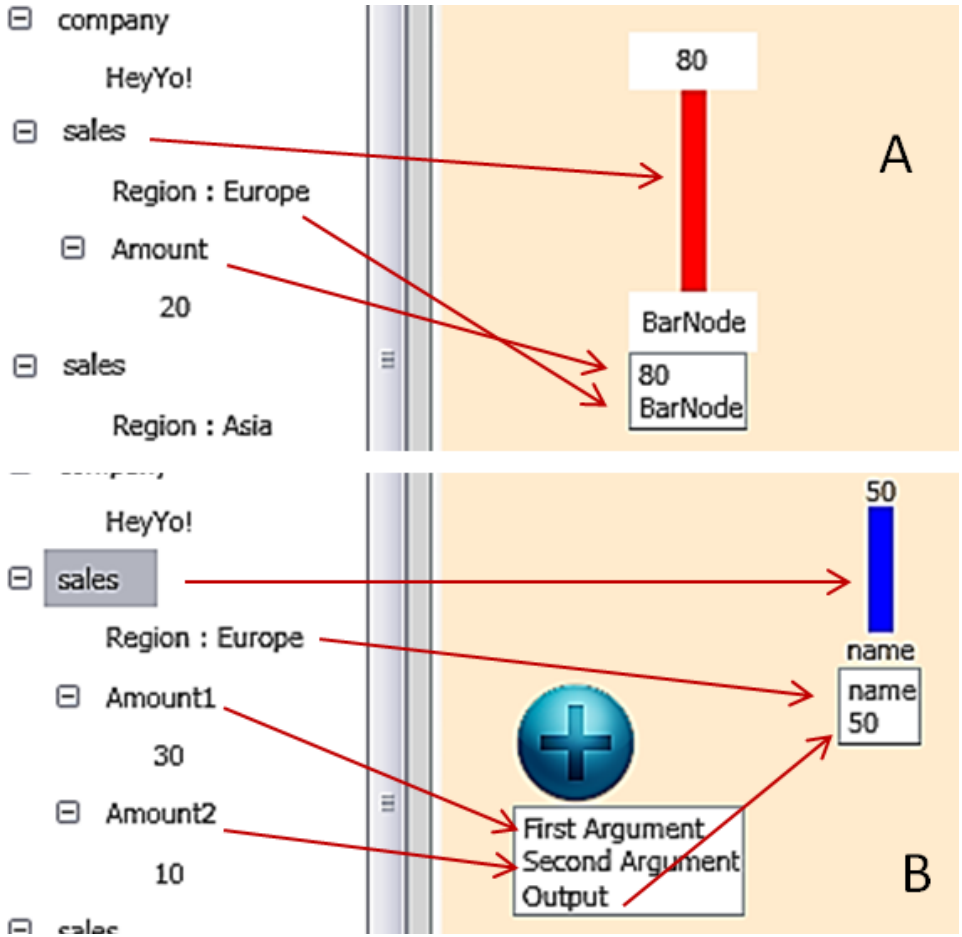
1. Specify Notational Elements

```
<FormFieldData>
<FieldLabel>Label</FieldLabel>
<FieldText>FieldText</FieldText>
</FormFieldData>
```

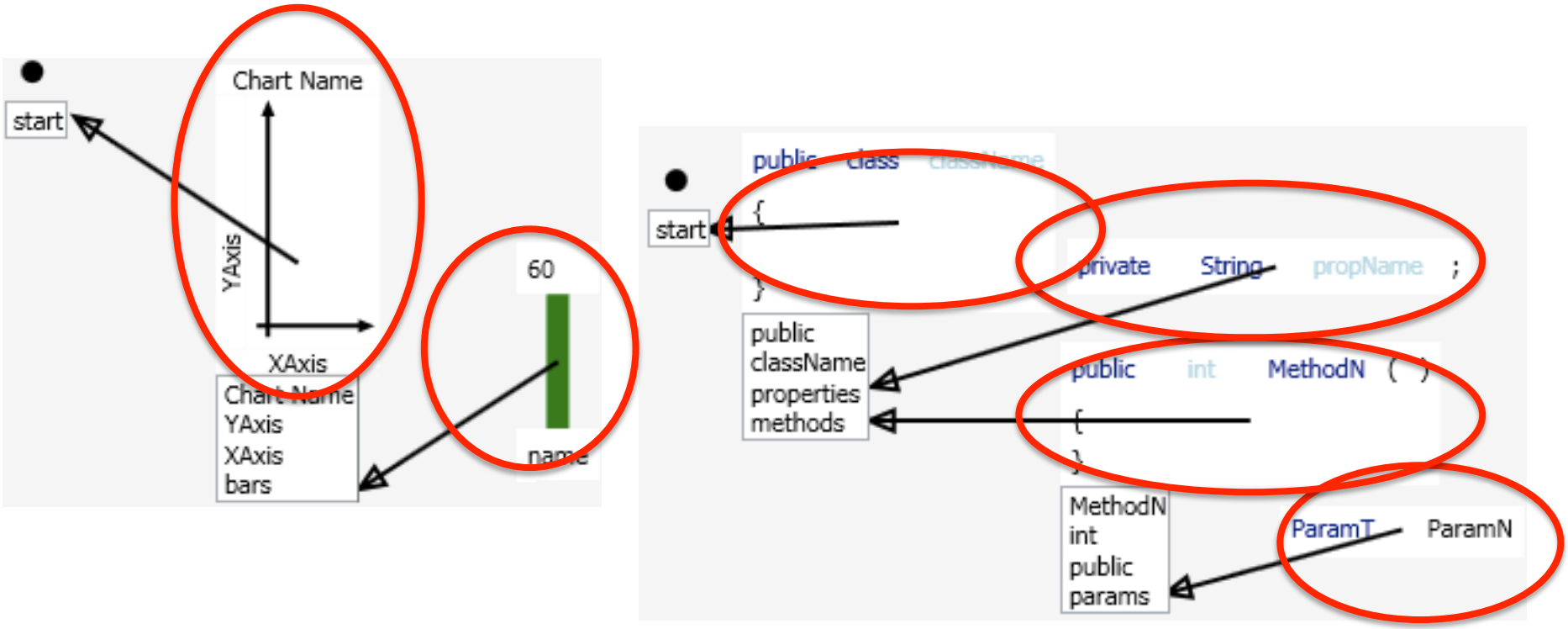
```
<StackPanel Orientation="Horizontal">
 <Label>
  <Label.Content linkto="FieldLabel">FieldLabel</Label.Content>
 </Label>
 <Label Content=" : " />
 <TextBox Background="White"  MinWidth="50">
  <TextBox.Text linkto="FieldText">Text1</TextBox.Text>
 </TextBox>
</StackPanel>
```



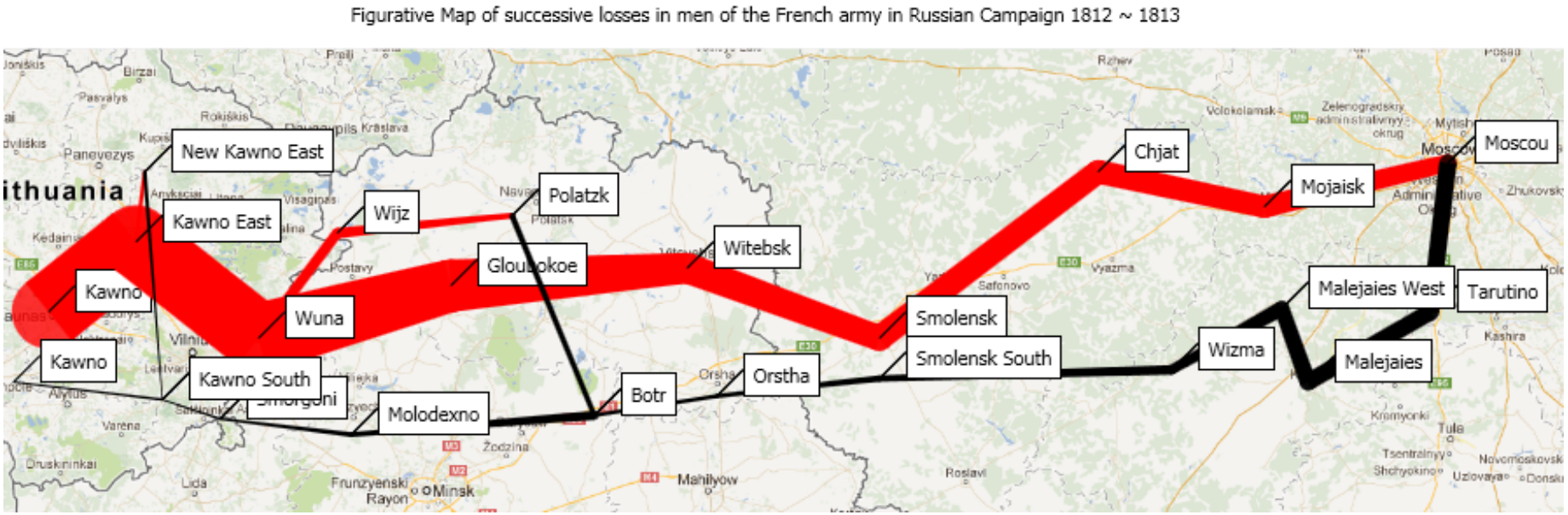
2. Map data fields to elements



3. Compose basic notational elements

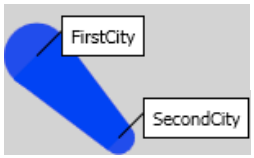


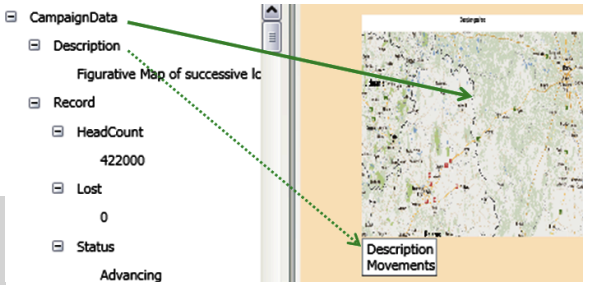
Case study – Minard's Map (see the paper!)

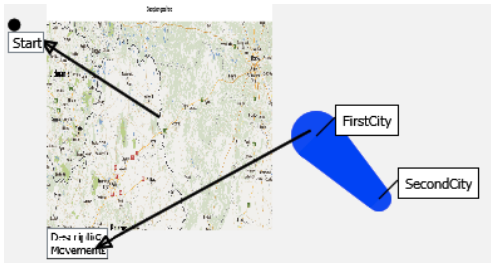



```
<MapData>
<Description>Discription goes here</Description>
<Movements>Troop Movements</Movements>
</MapData>
```

```
<StackPanel Orientation='Vertical' Height='290' Width='716'>
 <TextBlock Height='27' TextAlignment='Center' Background='White'>
  <TextBlock.Text linkto='Description'>Description of the map
   </TextBlock.Text>
  </TextBlock>
 <Canvas Height='263' Width='716'>
  <Canvas.Background>
   <ImageBrush ImageSource='NapoleonMap.bmp' />
  </Canvas.Background>
  <local:Minard Height='263' Width='716' callfor='Movements'>
  </local:Minard>
 </Canvas>
</StackPanel>
```







Evaluation and Future Work

- Range of example models visualised and mapped
  - Business, Buildings and eHealth, software (MDE)
- Range of end users surveyed
  - 11 people - business charts; 12 people – MDE (UML +Java code); Its pretty good!!! ☺
- Key issues to improve:
  - Scaling (set of “Suggesters” provided)
  - More reusable functions, notational elements
  - By-example function specification & reuse
  - Other implementations e.g. ALT, JavaScript/HTML etc
  - Live, incremental visualisation; web-based GUI

Summary

- Support end users to **interactively specify rich, human- centric visualisations** of complex data using a visual, drag-and-drop, by-example approach
- Support end users to **generate reusable visualisation implementations** from these high-level specifications
- Allow end users **to reuse their generated, reusable model visualisations** to visualise two (or more) complex data sets (i.e. example models)
- Support end users to **specify model element mappings** between these data sets **via drag-and-drop between their concrete visualisation elements**
- **Generates complex, reusable model transformation implementations** from these visually specified mappings

Questions?

CONVErT Videos & Web site:

http://www.youtube.com/watch?v=RExa0MT-zqU

https://sites.google.com/site/iavazpour/tools-manuals

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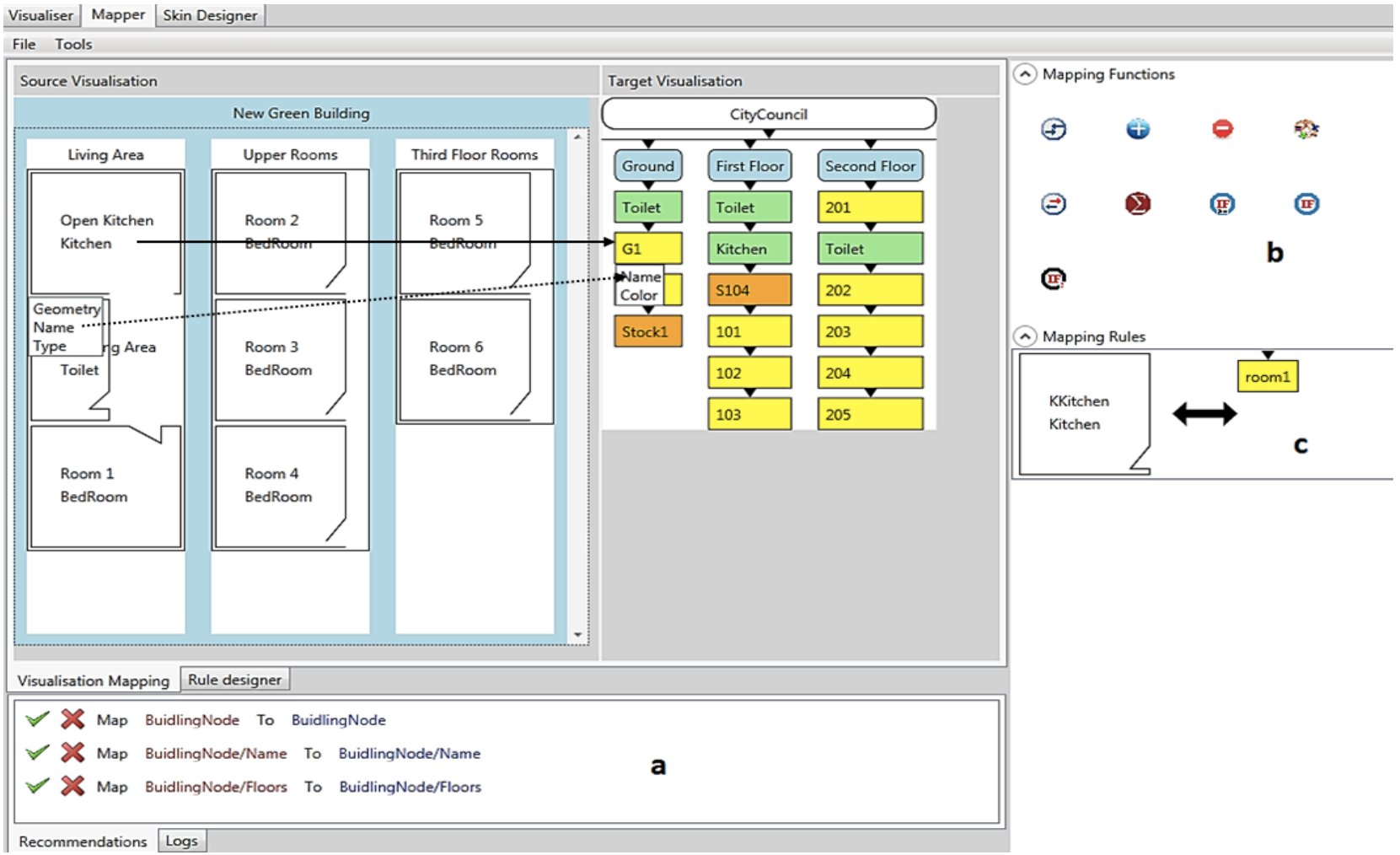
Swinburne think forward

CAD building design data to Hierarchical org data



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