Generating EDI Message Translations from Visual Specifications

John Grundy, Rick Mugridge, John Hosking
University of Auckland, New Zealand

Paul Kendall
Orion Systems Ltd, Auckland, New Zealand

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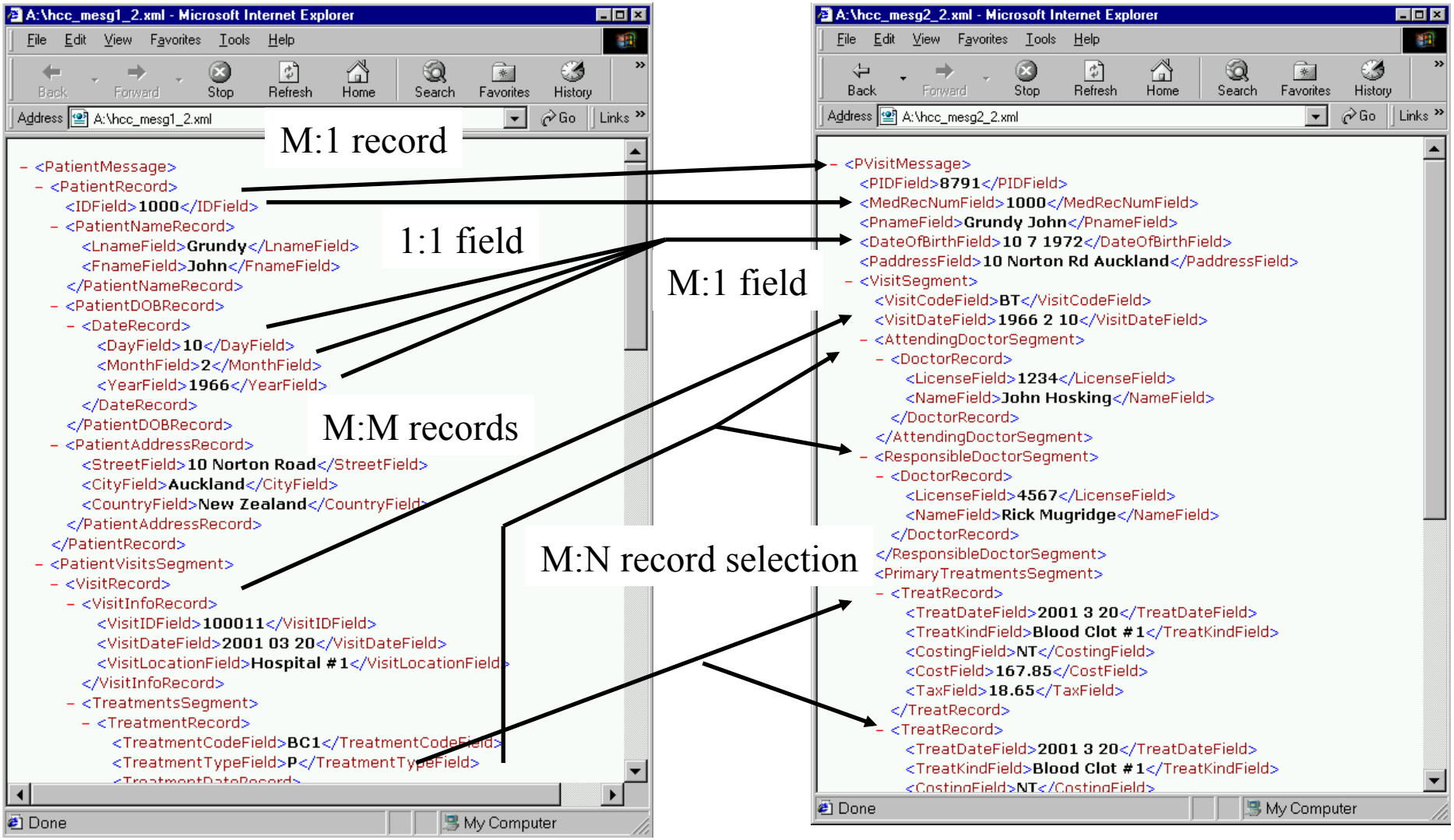
Outline

- Motivation
- Our Approach
- Visual mapping specifications
- Mapping code generation and Engine
- Visualisation of in-progress mappings
- Experience
- Future Work
- Conclusions

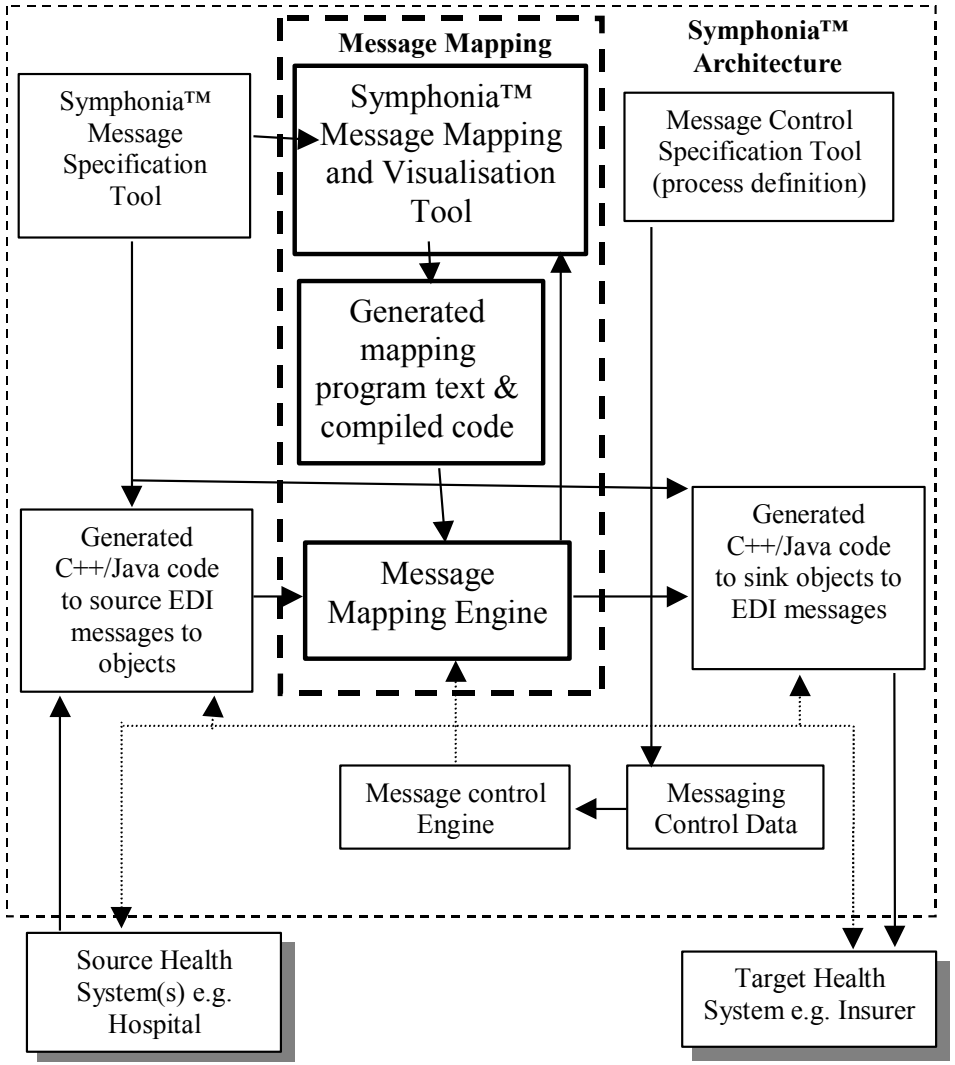
Motivation

- Message mapping:
  - EDI systems
  - XML-based systems
  - Message-oriented Middleware systems
- Mapping messages is HARD!
- Approaches:
  - Hard-coded in C++, Java etc
  - Scripting e.g. XSLT
  - Mapping tools e.g. MQ Integrator™, BizTalk™

Health XML Example

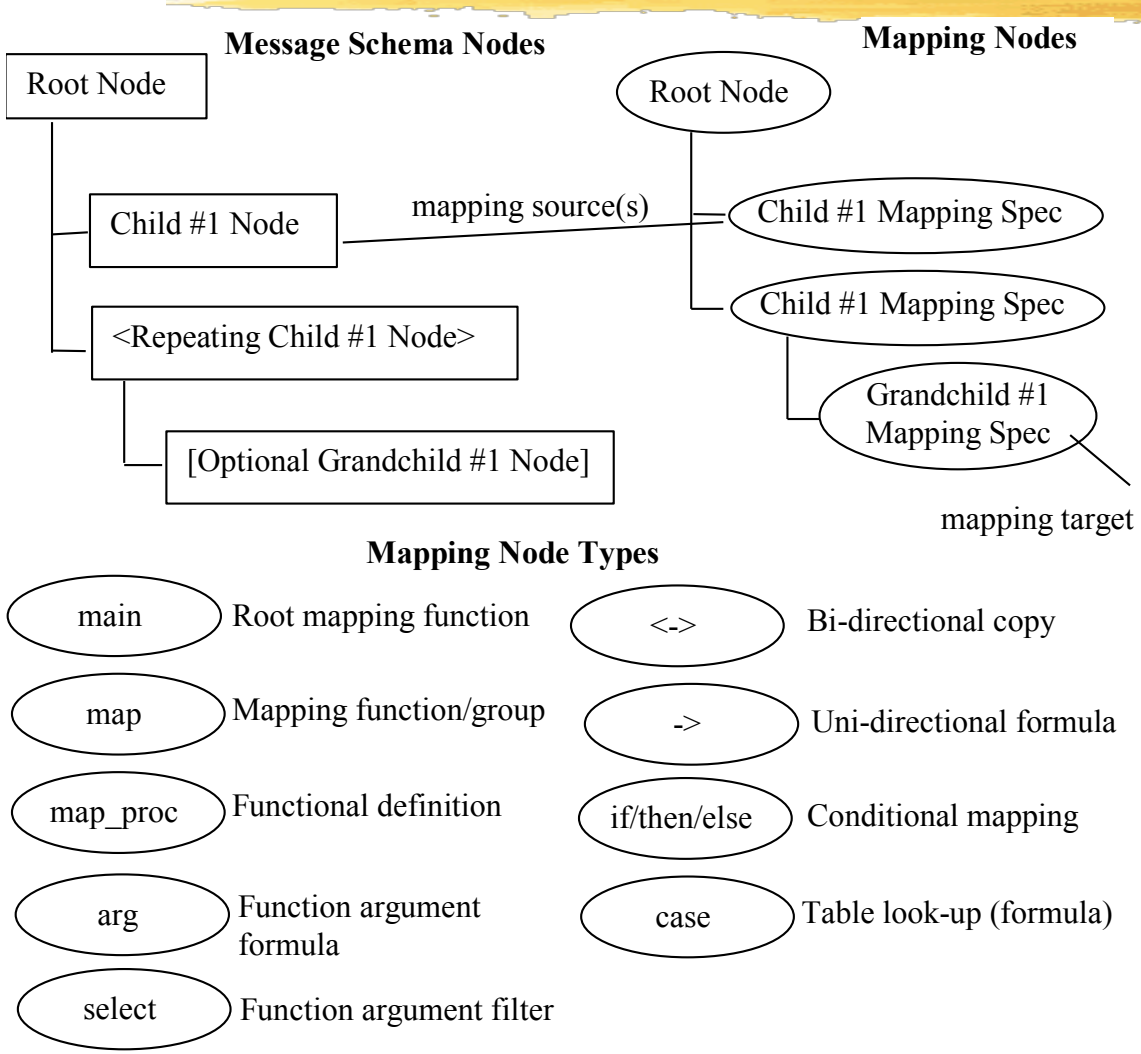


Our Approach



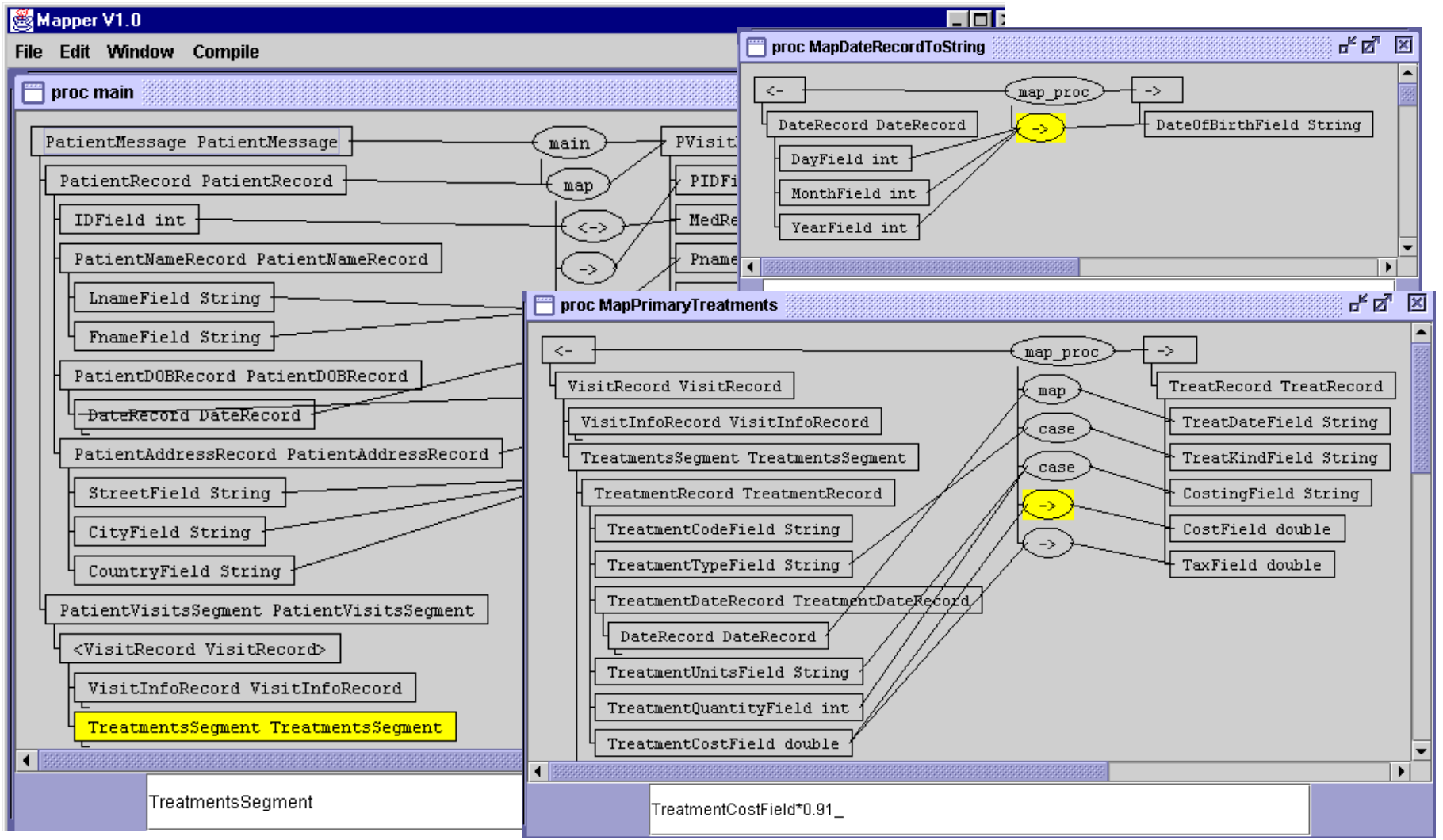
- Tool to source/sink EDI messages (generates C++/ Java code)
- Tool to co-ordinate message exchange (via workflow descriptions)
- **Tool to specify visually message mappings - generates mapping engine specification**
- Mapping engine to perform complex message mappings

Mapping Language

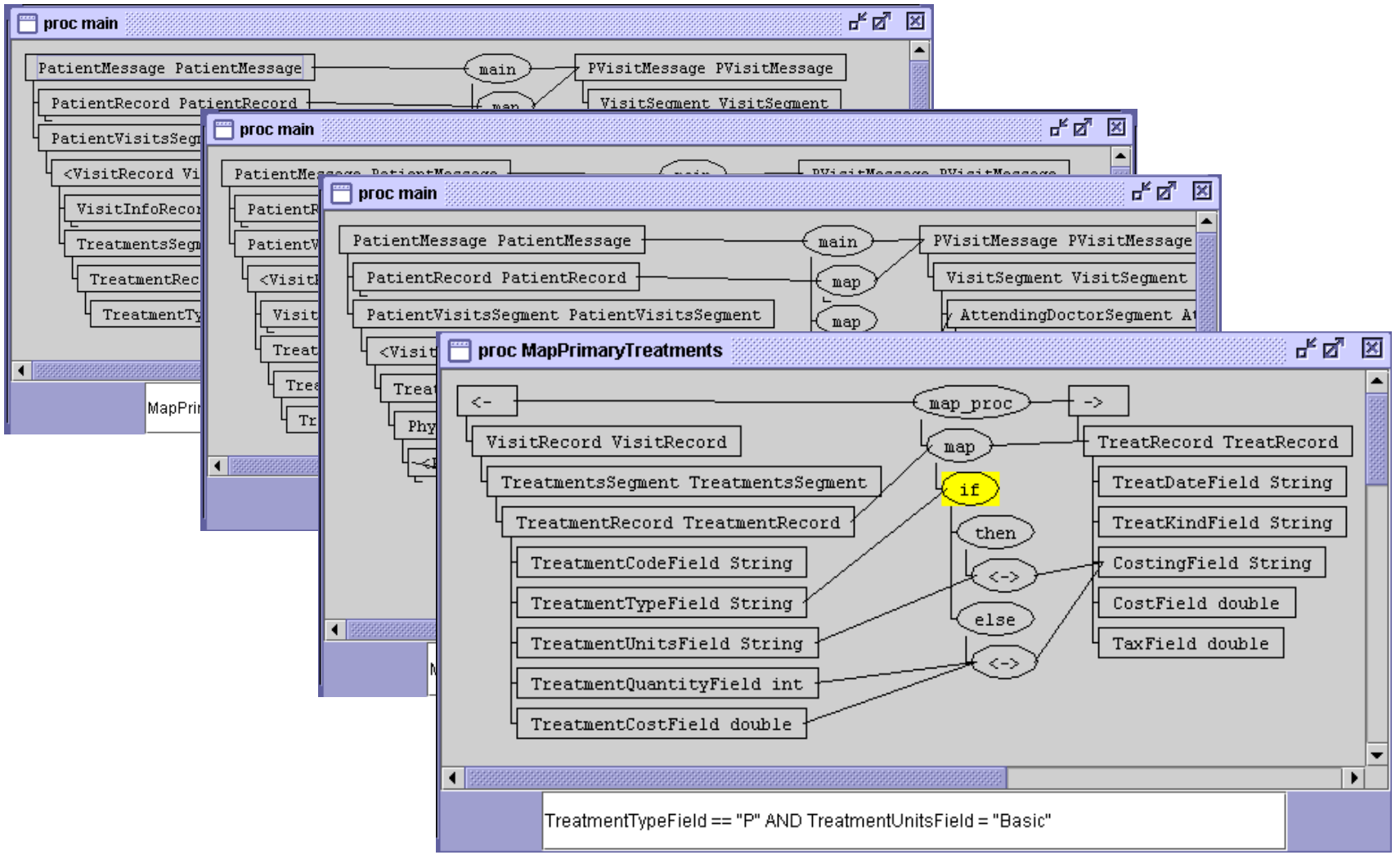


- Schema (message) and mapping nodes
- Schema = messages, segments, records, fields, repeating/ optional elements etc
- Hierarchical organisation
- Mappings run over source message and generate target message elements

Simple Example in Mapper Tool



Complex Example...

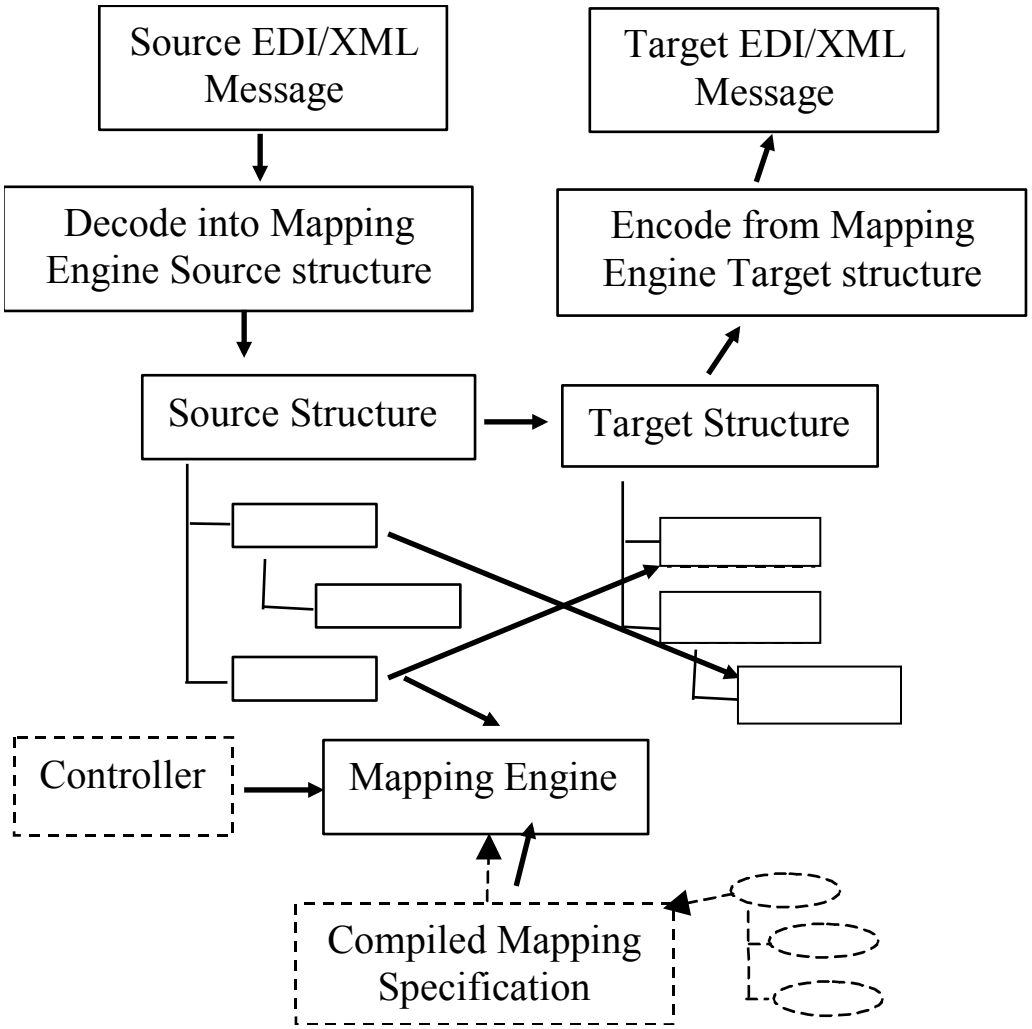


Mapping Language

```
type PatientMessage = struct {
  PatientRecord PatientRecord;
  PatientVisitsSegment PatientVisitsSegment;
};
type PatientRecord = struct {
  int IDField;
  PatientNameRecord PatientNameRecord;
  PatientDOBRecord PatientDOBRecord;
  PatientAddressRecord PatientAddressRecord;
};
…
map main(<- PatientMessage PatientMessage,
-> PVisitMessage PVisitMessage)
{
  PatientMessage.PatientRecord.IDField <->
      PVisitMessage.MedRecNumField;
  ExternalGeneratePatientID(,PVisitMessage.PIDField);
  Concat(PatientMessage.PatientRecord.PatientNameRecord.LnameField,
      ' ', …);
  DOBRecordToDateOfBirth(PatientMessage.PatientRecord.
      PatientDOBRecord, PVisitMessage.DateOfBirthField);
  MapTreatmentRecordToTreatRecord(select(I from
        in.PatientVisitsSegment.VisitRecord.TreatmentsSegment.
  TreatmentRecord[*] where I.TreatmentSegment … ));
…
}
```

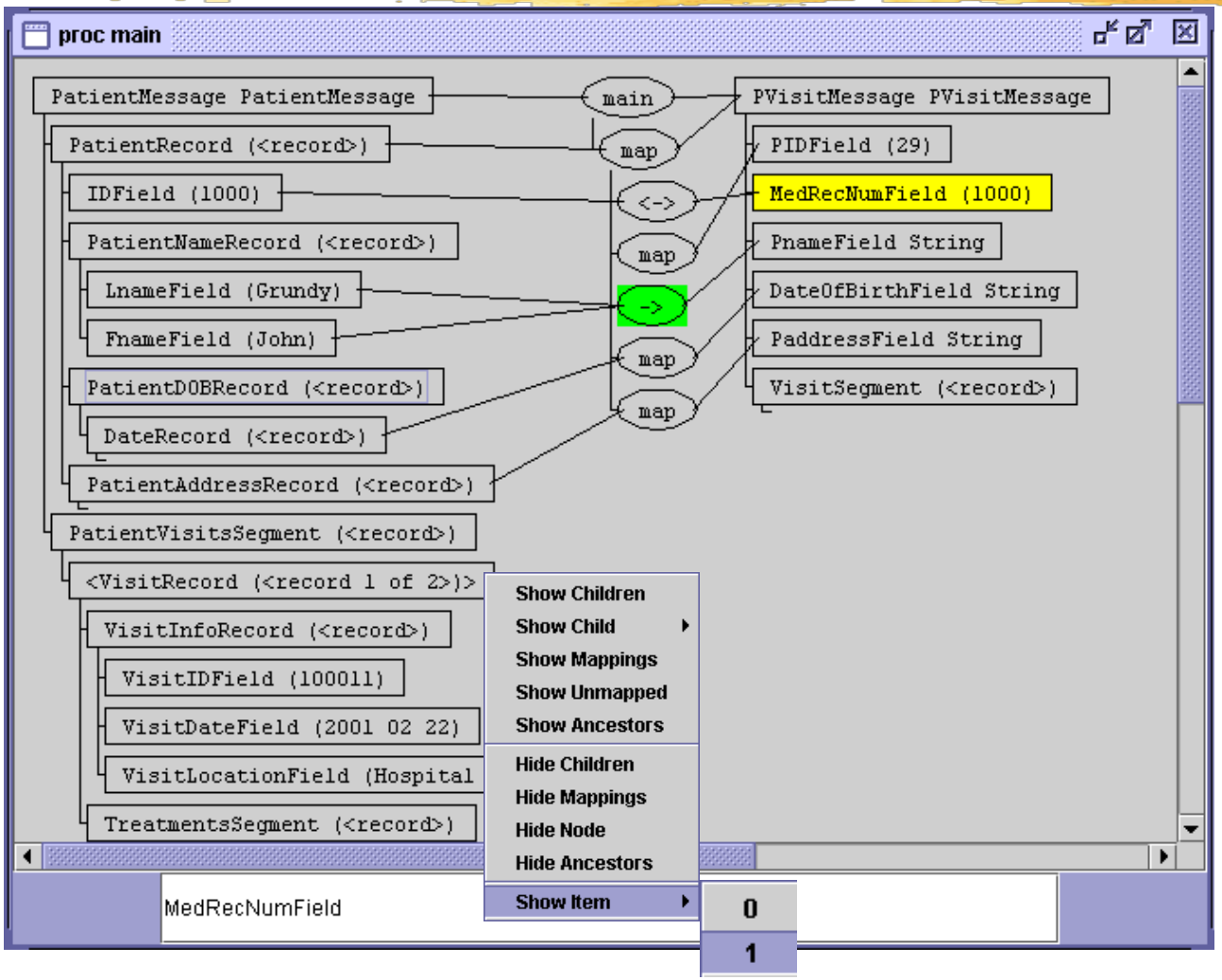
- Visual specifications + formulae used to generate a domain-specific textual language
- This includes record manipulation constructs, functional language constructs, source/target message expressions etc
- User DOES NOT edit this code - compiled and used by mapping engine...

Mapping Engine



- Message co-ordinator (controller) invokes mapping engine when needs to translate EDI (or XML) messages
- Compiled message mapping specification used to transform source->target message
- New message converted into target domain & used by controller...

Run-time Visualisation...



Experience…

- Prototype = Java 1.2/JAXP/Orion EDI APIs
- Used to specify bunch of different health EDI and business EDI and XML message mappings (HL7, UB92, 837a, EDIFACT, SOAP(ebXML), …)
- Example: 3 month Java UB92<->837a mapper vs. 3 day mapping system specified map between these
- Good performance - ~30,000 complex messages/min…
- Usability evaluation of visual tool - good feedback on usefulness of visual language + tool
- Orion Systems Ltd developed commercial version of IDE/text language/engine... (using C++, MFC)

Future Work/Conclusions

- Richer visual presentation of structures/mappings
- Message->database; database->message mappings
- Further visual metaphors for non-programmers

- Can automatically map complex EDI and XML messages using high-level visual specifications
- Visual specification useful at specification time and to debug mappings (dynamic visualisation)
- Commercialisation of basic research successful

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