KRR: Unit 6 Formative Activities
by Maria Ingold

Activity: Data Acquisition Methods
This non-assessed activity allows you to check your understanding of the unit topic.

Read Chapter 3 of Solanki, A (2019) *An Introduction to Knowledge Engineering*.

- Reflect on the various data acquisition methods.
- What are the advantages and disadvantages of each method?
- Think about scenarios and which methods would be suitable for each.

Answer
While Solanki provides a copy of the book, this book is actually by Kendal & Creen (2007): https://link.springer.com/book/10.1007/978-1-84628-667-4

They define knowledge acquisition is "the process of acquiring knowledge from a human expert, or group of experts, and using the knowledge to build knowledge-based systems". Below are the methods they discuss in Chapter 3, broken down by type, advantages, disadvantages and potential scenarios.

Data Acquisition Methods	Advantages	Disadvantages	Scenarios
EXPERT INTERVIEWS			
Expert interviews	• First-hand knowledge of domain • Quality-check comprehension of domain • Can use different interview methods to extract information	• Time-consuming • AI transcription and summarisation is improving but not perfect • Knowledge extraction time • Cross-checking accuracy • Gap analysis • Iterative • Sometimes difficult to explain intuitive behaviour. • Jargon • Interview stress on expert • Lack of (mutual) respect	•
Unstructured	• Gain understanding of knowledge domain • Identify areas previously not considered. • Little prior planning needed	• Unlikely to be complete or well-organised description of knowledge and processes involved. • Time-consuming to do and more to analyse. • Tangents.	• Usually first interview. • Find unspecified information on a topic. • Get open customer feedback
Structured	• Obtain depth of knowledge about specific domain. • Specific rather than general focus • Easier to analyse than unstructured.	• Time-consuming but analysis is easier • Narrow	• Usually after one or more unstructured interviews. • Why and how. • 1) Set out topics and goals • 2) Q&A • 3) QA – confirm accurate capture • E.g. ratings on a scale

			• E.g. specific performance requirements met
Event recall	• How dealt with a particular event (self-observation in past) • Model thought-process • Good to confirm completeness of other knowledge-acquisition sessions • Help articulate how apply rules to solve a problem	• Requires accurate memory. • Requires self-awareness to interpret each stage of solution and rules applied • Requires ability to interpret and explain. • Must develop questions and sequence to questions	• Self-observation of decision-making process • Good for reviewing case-studies • Questions about process in the past • E.g. how to plan a menu.
Thinking aloud	• Capture thinking behind a problem-solving process • Fill in knowledge gaps following the structured interview • Validate knowledge • Capture sequence of steps taken by expert (modelling for success) • Can use real or simulated (data-protected) cases • Can extend to "introspective"	• Asking too many questions can distract from thinking process.	• After structured interview • Questions about process in the present. • Ask why and how
QUESTIONNAIRES			
Questionnaires	• Collect information efficiently from a large number of people • Generally simple to analyse because structured	• Can't speak directly with respondent • Simple yes/no questions can restrict information obtained	• Where have enough data to create well-designed questionnaire

	• Can ask open or closed questions • Short yes/no easy to answer		• E.g. asking about a product to 5000 people in one country • Can do pilot-questionnaire with smaller cohort to refine questions for large-scale questionnaire.
LITERATURE REVIEW			
Documentation, manuals, case studies, textbooks, articles etc. (online or print)	• Familiarise with subject matter. • Learn terminology. • Basic grasp of subject area. • Prevents wasting expert's time for basic explanations.	• Documentation may be incomplete, out-of-date, not completely relevant, or difficult to find. • Time-consuming to sift, extract and analyse.	• Prepare list of questions for expert.
OBSERVATION			
Watch actions	• Better for watching actual process undertaken to model more clearly	• Access or ability to be able to observe	• E.g. joinery - woodworking
OTHER			
Tutorial interviews	• Good for start of knowledge acquisition for general overview	• More advanced sessions needed for deeper detail and potentially not one-to-one	• E.g. training on a new technology • Workshops
Twenty questions	• Yes or no answers only • Good to quickly ask questions of expert • Good to quickly confirm understanding by researcher	• Not good for detail	• After initial understanding
Trigger Interviews	• Good when have materials to trigger and stimulate expert memories and responses	• Not good when don't have material	• Postmortem analysis • Root-cause analysis

	• Archive data, structured diagrams etc.		
Teach Back Interviews	• Good to confirm understanding	• Bad if haven't yet learned enough	• After training sessions, to "certify" knowledge • E.g. good for solution engineers explaining products to customers
Repertory Grids	• Good when have information that can organise into two or three dimensions (e.g. heat map on two-D)	• Unstructured data without pattern • Data with more than two or three dimensions	• More of a tool when data has already been gathered to make sense of it

References

Kendal, S.L. & Creen, M. (2007) *An Introduction to Knowledge Engineering*. Available from: https://link.springer.com/book/10.1007/978-1-84628-667-4 [Accessed 8 January 2024].