

32144 Technology Research Preparation Semester 2, 2024.

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What is Research and
What is its Role in IT?

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What is Technology – Key Observations?

- Sum of techniques, skills, methods, and processes used in the production of goods or services or in the accomplishment of objectives.
- Knowledge of techniques, processes, and the like, or it can be embedded in machines to allow for operation without detailed knowledge of their workings.
- Black Box approach: Systems apply technology by taking an input, changing it according to the system's use, and then producing an outcome.
- Simplest form is the development and use of basic tools. E.g., the invention of shaped stone tools followed by the discovery of how to control fire.
- Developments in historic times, including the printing press, the telephone, and the Internet, have lessened physical barriers to communication on a global scale. **Technology fosters new technology.**

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What is Information Technology (IT)?

- Use of computers to store, retrieve, transmit, and manipulate data or information.
- Typically used within the context of organisations as opposed to personal or entertainment technologies.
- Considered to be a subset of information and communications technology (ICT).
- An Information Technology system (IT system) is generally an information system, a communications system, or, more specifically, a computer system – including all hardware, software, and peripheral equipment – operated by a limited group of users.
- **Question: Where does AI fit? What are implications of AI as a complex technology?**

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What is Research?

- Creative and systematic work undertaken to increase our knowledge (OECD 2015).
- Collection, organization, and analysis of information to increase our understanding.
- **Research is about the creation of knowledge, for yourself, organisation or culture.**

In General, How Do We Do Research?

Given a problem or an issue, a “research question” is framed that when answered in the affirmative will address the issue.

Devising your research problem:

- Focussed on a single well defined problem
- Researchable (**by you**)
- Feasible to answer within a timeframe and practical constraints (e.g. within UTS).
- Specific enough to answer thoroughly
- Complex enough to require developing and validating an answer
- The potential answer is open to debate rather than accepted facts
- Relevant to **your field** of IT expertise.

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What are the Attributes of Research?

- Creative: Producing or using original and unusual ideas. I have found research to be fun and satisfying. Thinking about something new and unique. For a short time, being the only one who knows about it. Enjoyment, satisfaction and acknowledged from sharing and helping.
- Systematic: A coherent body of ideas or principles. Methodical in procedure or plan. Thoroughness and regularity. **A systematic approach gives stakeholders confidence and trust in your work.**
- Knowledge: Understanding a subject from experience or study or combined in “learning by doing”. State of knowing about or being familiar with something.

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Why Do We Need Research?

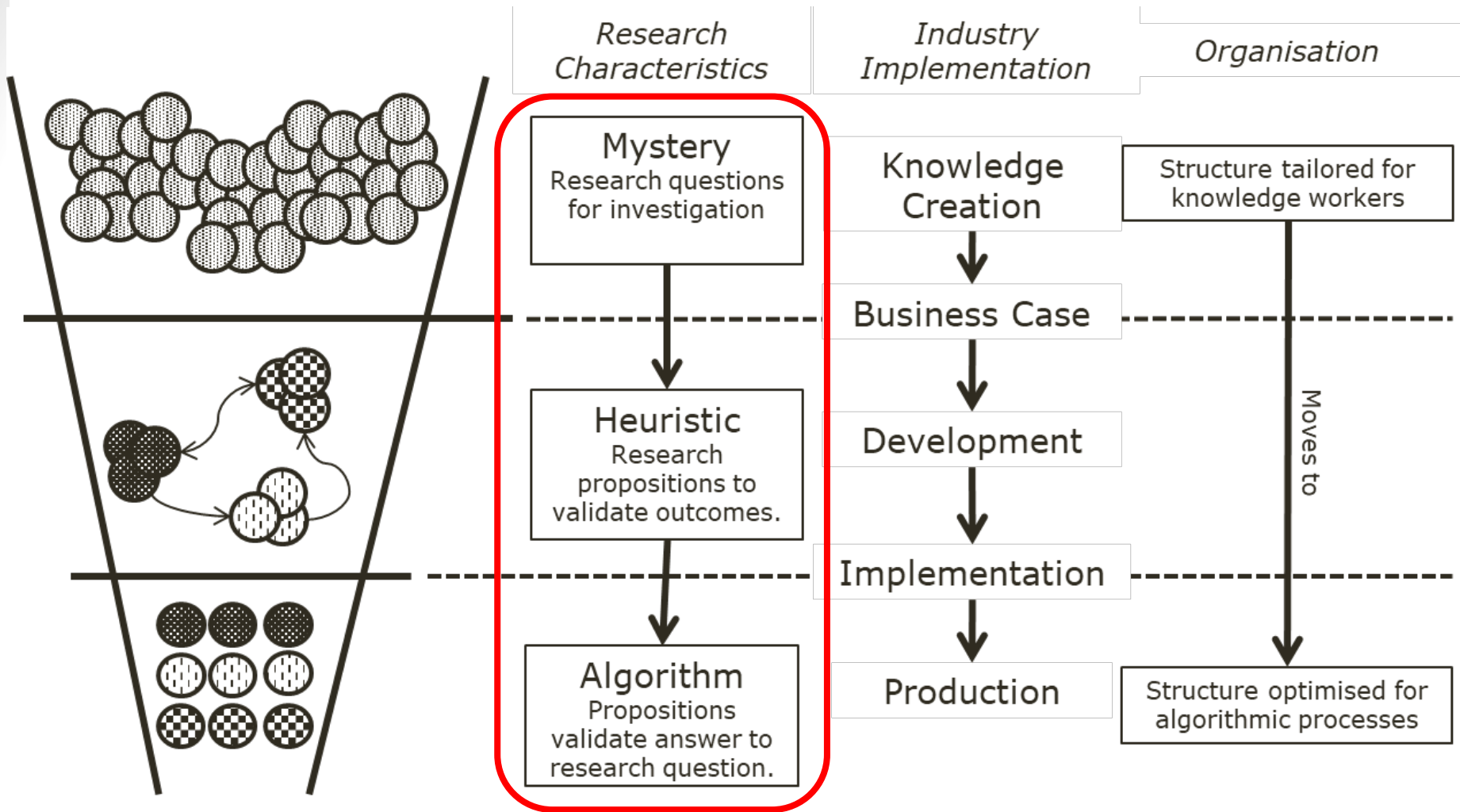
- Necessary to inform action, to prove a theory, and contribute to developing knowledge in a field or study.
- Tool for building knowledge and facilitating learning.
- Understand issues and increase public awareness.
- Necessary for a business (or any undertaking) to succeed.
- Outcomes of research are able to be independently replicated. This means research outcomes can be applied anywhere ideas can be communicated and by anyone with the requisite skills.

Vital you develop writing skills for sharing your research.

Type of Research (<https://www.scribbr.com/methodology/types-of-research/>)

Type of research	What's the difference?	What to consider
Basic vs applied	Basic research aims to develop knowledge, theories and predictions, while applied research aims to develop techniques, products and procedures.	Do you want to expand scientific understanding or solve a practical problem?
Exploratory vs explanatory	Exploratory research aims to explore the main aspects of an under-researched problem, while explanatory research aims to explain the causes and consequences of a well-defined problem.	How much is already known about your research problem? Are you conducting initial research on a newly-identified issue, or seeking precise conclusions about an established issue?
<u>Inductive vs deductive</u>	Inductive research aims to develop a theory, while deductive research aims to test a theory.	Is there already some theory on your research problem that you can use to develop <u>hypotheses</u> , or do you want to propose new theories based on your findings?

The Research Context in IT – The Big Picture. Based on Martin(2009 p.8)

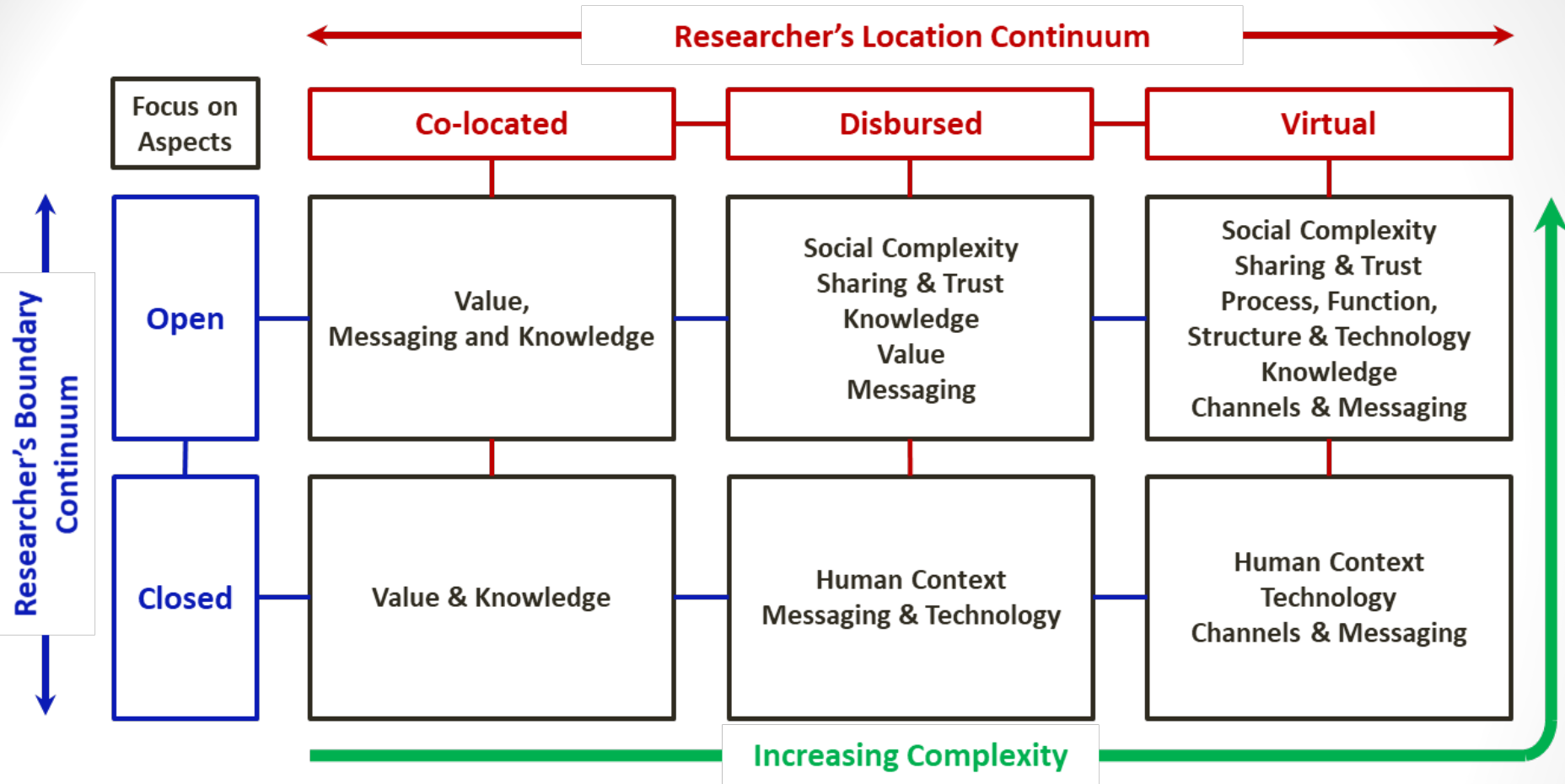


John Rose

A research project must have buy-in from an IT industry sponsor to enable implementation and delivery of benefits

MARTIN, R. L. 2009. *The design of business: Why design thinking is the next competitive advantage*, Boston, Massachusetts, USA, Harvard Business School Press.

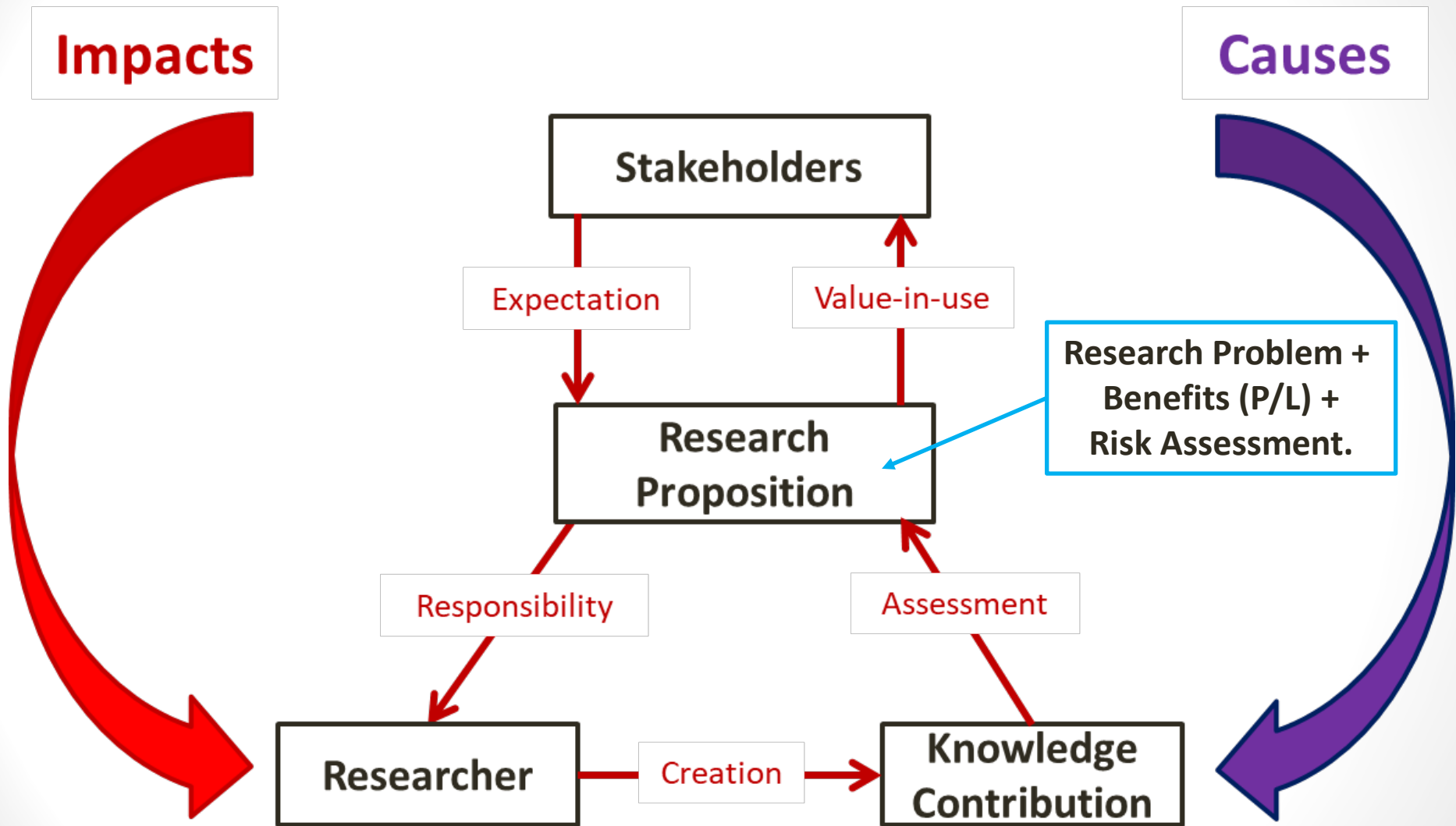
The Researcher's Context. Based on Rose(2016 p.105)



Organisational lines of communication and collaboration must be as simple as possible to avoid introducing cognitive complexity and slowing down research.

ROSE, J. F. 2016. *Collaborative Wellness through Dynamic Role Alignment*. PhD Research, University of Technology Sydney.

The Role of Research in IT = How it fits.



A note on Complexity https://en.wikipedia.org/wiki/Complex_system

Experience in TRP has shown that many chosen research questions involve complex systems. A complex system is composed of many components which interact with each other to produce emergent behaviours that are intrinsically difficult to predict.

Implication is that you cannot be certain that your research will be successful.

Your research proposal should include:

1. Discussion of the risks and mitigations in **doing** your research (<https://www.uts.edu.au/about/safety-wellbeing/health-and-safety-management/risk-management>)
2. Consideration of the risk of not fully answering your research question. For example, if your objective is for a 10% improvement in a measure, what is the risk in just achieving 5%? Would the research still be worthwhile?

Suggestion: Look at Netlogo (<https://ccl.northwestern.edu/netlogo/>) download, install and run the “Flocking Model” (<https://ccl.northwestern.edu/netlogo/models/Flocking>). Exploring the model will give you an insight into complexity (takes about an hour or so).

Use of AI Technologies.

In this subject, unless otherwise instructed by the Subject Coordinator, you are permitted to use AI technologies in an ethical and transparent manner to generate materials for background research and self-study. Only assistive use is permitted.

Content generated by AI technologies or other sources presented as your own work is considered to be academic misconduct as per the [UTS Student Rules on misconduct](#).

Unless otherwise instructed by the Subject Coordinator:

1. Any use of generative AI tools must be acknowledged by citing their use through referencing in students' work
2. Students must provide all interactions with the generative AI tool, including prompts and responses, as an Appendix to submitted work (including assessments).

It is your responsibility to check and verify the accuracy and integrity of the information used, and to rewrite any text provided by AI or other sources in your own words.

You may be asked to participate in a viva voce assessment to confirm or clarify your work and/or marks.

Finding a Problem: The Literature Review. (Hart, 1998)

A literary review is defined by Hart(1998 p.13) as “The selection of available documents (both published and unpublished) on the topic, which contain information, ideas, data and evidence written from a particular standpoint to fulfil certain aims or express certain views on the nature of the topic and how it is to be investigated , and the effective evaluation of these documents in relation to the research being proposed”

The literary review, covers not only peer-reviewed IT publications, but also knowledge extant in the IT organisation. It will involve interviews of key personnel (enterprise architects, programmers, data scientists, business analysts and most importantly users) and perusal of IT documents – guidelines, program documentation, user instructions, record keeping, etc.

The literature review is about discovering knowledge gaps that your research must fill in order to answer the research question. This means, **the literature review is an iterative process** that is started when the research problem is conceived.

HART, C. 1998. Doing a literature review: releasing the social science research imagination. *Book*.

Thank You.

Questions please?