32144 Technology Research Preparation

Week 2 Tutorial 1 Overview	
Topics Covered:	What is Research?
	Choosing a Research Topic
	Who are Stakeholders?
Points:	6
Date Due:	Week 2 – In Class
Submission	In-class contribution to discussions

Week 2 Tutorial Preparation

1. **READINGS**: Refer to Canvas Week 2 **Lecture *and* Tutorial Preparation documents**. Please be sure to read the material provided in this module.

   NB: You may also wish to use Internet and UTS library sources. Be sure to share interesting references or links with your tutorial members that you have identified.

2. **IDENTIFY YOUR RESEARCH INTERESTS** – Think about and make some notes about your research interests and potential research topic/ ideas. Be sure to cover the following:
   a. Industry sector (aerospace, automotive, health, defence, business, education, environment, government, etc.)
   b. Research domain (e.g. Cyber Security, Privacy in Artificial Intelligence, Digital Engineering and Data Quality, Automatic Recruitment and Gender Bias, Social Informatics, etc.)
   c. Research topics/ ideas (Try to articulate the concern or issue you have and what you think the solution might be)
   d. List the main concepts and keywords (e.g. AI, Big data, Web Design, etc.)
   e. Concept/ keyword definitions (what are some of the main definitions that your research relies on?)
   f. Research frame or lens (how do you see your research topic, is it through a technical, social, socio-technical, management based lens?)

   - The domain; Cyber security
   - Research idea; Creating and breaking current algorithms for cryptography
   -Industry sector; government, business, possi

   NB: We will continue this activity in Week 3, so you should see this as a starting point for discussions and further exploration. Not a final commitment.

3. **WHO ARE MY POTENTIAL STAKEHOLDERS?** – Identify the different types of potential stakeholders that may surround your targeted topic/ research ideas. You don't need to be overly detailed about who they may be here (remember it is early days yet), however you might like to think of your potential stakeholders terms of, for example, do you have:
   a. Primary stakeholders - those directly impacted?
   b. Secondary stakeholders - those that may benefit indirectly?
   c. Internal and external stakeholders – do your stakeholders belong to an identifiable group, e.g., an organisation or a community group?
   d. Social and non-social e.g., Social stakeholders include people and organisations who may be involved in your research project or may be associated via business interests. On the other hand, nonsocial stakeholders refer to entities such as animals, the environment, and generations of people who have not yet to be born.

The more salient candidates for primary stakeholders include:

- Government agencies

- Social media companies

Secondary stakeholders are limitless, but notably:

- Businesses

- Individuals

- Local communities

- Internet users

Due to the nature of Cryptography as a universal tool, any entity that desires to safeguard information benefits from this class of research.

4. **ORGANISE YOUR RESPONSES TO THE 5 IN-CLASS TUTORIAL ACTIVITIES** – Read the tutorial activities listed below and be sure to utilise the Week 2 readings on Canvas to prepare your responses and be ready for group discussions. Thanks.

In-Class Tutorial Activities

1. WHAT IS RESEARCH?

ACTIVITY 1: Introductions - Introduce yourself to others in your tutorial, include your:

a. Name and course, and briefly describe research interests and expectation of the subject.

ACTIVITY 2: Group Discussion – Discuss the following.

a. What is “Research”?

Systematic work undertaken to broaden knowledge (paraphrased from OECD 15).

b. Why do we need to do Research?

Stakeholders that have specific needs require some means through which to obtain theory or evidence necessary to make business decisions/feasibility studies. Research expands ideas that are universally applicable and is therefore necessary for all of humanity to face the current dilemmas of the modern age.

c. What are the different types of Research?

Explanatory; Research that concentrates of reasoning for phenomena or previous research results in addition to possible implications this research may have on a social, environmental or political basis, may inspire basic research.

Exploratory; Research that delves into seldom researched topics with the objective to establish strong fundamental results that enriches the field for possible future utility and research.

Basic; Research focused on discovering and developing theories and knowledge.

Applied; Research on methods of employing the current state of research into practical applications such as products, techniques etc.

d. What are differences between Academic and Industry Research?

Academic and industry research differs primarily by their stakeholders; the former seeks grants to advance knowledge whilst the latter aims to apply research to a product. This in turn may affect time and resource constraints, for instance, academic researchers have

less pressure to release a commercial product and hence may allow more time for research to product stronger results, while industry sectors must limit their research time so that a product can be released on the consumer's basis.

The form of collaboration also differs slightly between sectors, for example, academic researchers collaborate through exchanged ideas while industry researchers often collaborate closely on the same project.

2. CHOOSING A RESEARCH TOPIC

ACTIVITY 3: Group Discussion – Based on the preparatory work you have undertaken (refer to #2 on previous page), discuss the following topics.

a. What is my potential/ targeted research topic?

   Possibly related to Cryptography, three points relating to possible directions of research include:

   - Post-Quantum

   - Optimised CRC polynomials

   -Algorithms breaking cryptographic systems

b. Why does this interest me? - How does it relate to, for example, my broader knowledge or experience, my principles and what I stand for? What things in my personal and academic background have shaped my beliefs?

   My background in Mathematics has brought two topics to my attention; Cryptography (despite lack of Mathematics courses on abstract algebra) and Applied Mathematics for Machine Learning. Though machine learning is highly relevant, most research projects at an undergraduate level seem to be purely applications of previous models to some application. Since my major is not AI, I do not yet have the background in machine learning to develop concepts related to this field. Cryptography presents a unique and personally interesting challenge that resonates with personal sentiments on cybersecurity.

c. What learning do I need to do about the research topic itself and how much do I understand the industry sector and research domain?

   I have a foundational understanding of the research domain through studying CRC and RSA as well as a basic understanding of elliptic curve cryptography. Research in cryptography will definitely require further research and training to understand the state of the art cryptographic systems to further enrich the research produced.

d. What are the main concepts and keywords of me topic and how can they help me build my research frame or lens?

NB: You will find useful information to think about your research topic in: **Denscombe (2012) Appendix 4 on 'Choosing a Topic'** – available on TRP Canvas site in the Week 2 module.

3. WHO ARE STAKEHOLDERS?

ACTIVITY 4: Group Discussion – Discuss your research ideas/ topic relative to the following types/ groups of stakeholders, who may be:

a. People affected by the impact of an activity

b. People who can influence the impact of an activity.

c. Individuals, groups, a community or an institution.

   Cryptography is relied upon by any entity that transmits sensitive data through a network, such as individuals, corporations, governments, and other communities. Since virtually every entity with access to a network is a stakeholder to further research in cryptography, advancements in research protect the privacy and reliability of the global internet.

   Governments are a stakeholder that have a high degree of influence of the utility of further research by means of legal restrictions (such as the notably strict cryptographic laws in China). If the research

motivations do not align with the ideals of government stakeholders, applications and popularity of cryptographic research may be severly limited despite the benefits for the wider community.

ACTIVITY 5: Group Discussion – Discuss importance of understanding your stakeholders – and conducting a stakeholder analysis, relative to **one** of the following:

a. Identifying the right set of stakeholders in terms of their profile, roles and interests.
b. Identifying potential winners and losers that may result from the project.
c. Eliminating/ reducing the potential negative impacts.
d. Identifying people who have rights, interests, skills, abilities and resources to participate in, inform or influence the project.
e. Identifying collaborations that can be established.
f. Eliminating risks of conflicts of interest.
g. Managing stakeholders' expectations.

Stakeholder analysis is crucial in managing stakeholder expectations due to the researchers role as an intermediate between scientific results and possible application. Due to researchers often being the sole party having sufficient understanding of both their stakeholders and the scientific field of interest, it is their responsibility to evaluate the expectations of stakeholders and discern their feasibility in relaion to the status quo of research.

It is therefore necessary for researchers to keep in regular contact and iteratively solidify understanding the intentions of stakeholders, as a deep understanding of these goals allows for researchers to provide more meaningful research, for instance, providing suitable alternative solutions to expectations that have been deemed unfeasible.

NB: You will find useful information about Stakeholder Analysis in: **Blackman (2003) Stakeholder Analysis Chapter** – available on TRP Canvas site in the Week 2 module.