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%—  
Title: Not Exactly a Millennium  
Subtitle: Reading Revelation 20 in its Context  
Summary: >  
Revelation’s description of a millennial reign for saints and chaining of  
Satan is not intended to outline a millennial doctrine (a-, pre-, or post-),  
but rather signals in literary and symbolic fashion the assurance of God’s  
power over Satan and the reward for his saints.  
Tags: [SEBTS, M. Div., papers]  
Category: theology  
Date: 2015-07-22 21:45  
Template: formats/class  
Class: New Testament II  
Professor: Jon Morales  
School: Southeastern Baptist Theological Seminary  
bibliography: <https://nimdvir.github.io/assets/csl/proposal.bib>  
csl: <https://nimdvir.github.io/assets/csl/apa.csl>

[nimdvir.github.io/assets/csl/apa.csl](http://nimdvir.github.io/assets/csl/apa.csl)

[@eppler2004]  
[@dvir2019]

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# Possible titles

ICE TEA: interactive content engagement theoretical framework, extrinsic factors  
and automatic assessment (I.C.E T.E.A)

Abstract

* Providing information is critical
* However…
* This proposal aims
* To do so…
* In phase I
* In phase II
* In phase III
* Results

1. Introduction
   1. Background

Understanding how information is consumed, perceived and used, and why, is a  
question of fundamental interest to IS researchers and practitioners. In a  
recent editorial of the DATA BASE, Petter, Carter, Randolph and Lee (2018)  
‎express concerns about the lack of clear understanding of the core concept of  
‎information is defined as the meaning of data, in Information Systems (IS)  
research.‎ Specifcally, effectiveness. The challenge becomes how to

This research suggests an innovative framework to conceptually and operationally  
define, measure and design effective information. ‎

The question is not in IS research. During the last two decades, the use of ICT  
has increased radically . the growing proliferation, use of information and  
‎communications technologies ‎‎(ICT) profoundly changing all aspects of social  
organization, including the economy, ‎education, health, warfare, and  
government…‎ ‎The creation, use and communication of digital information come to  
play an increasingly important economic, political, and cultural role with the  
growing reliance on ICT. ‎

ICT have become a ‎crucial medium in the online environment for presenting the  
‎information and delivering ‎informational services. Websites become part of  
strategic ‎organizational tools for ‎generating revenue ranging from the corporate  
sector, ‎government ministries to ‎municipal, nonprofit organizational,  
semi-structure company ‎and even in small business. ‎ ICT are becoming ‎prominent  
way for people to consume information (Horrigan, 2017). ‎Foe example, 93% ‎of  
American adults reported consuming information online, either via ‎a mobile  
device or ‎a computer (Smith, 2017; Stocking, 2017). 79% of U.S. adults ‎reported  
ever making an ‎online purchase, spending nearly $350 billion annually (Smith,  
‎‎2017); 80% of Americans ‎have used at least one online government service (Chan &  
‎Pan, 2008; Im, ‎Porumbescu, & Lee, 2013); and 71% of Americans report looking  
online ‎for health ‎information (Perski, Blandford, West, & Michie, 2017; Rock  
Health, 2015). ‎93% of Americans report of consuming information online, either  
via a mobile device or a computer (Stocking, 2017). 80% of Americans have used  
at least one online government service

(Im, Porumbescu, & Lee, 2013). 79% of U.S. adults reported ever making an online  
purchase, spending nearly $350 billion annually

(Smith, 2017) . 71% of Americans report looking online for health information

(Rock Health, 2015).

## However, as technology advances, new challenges emerge.‎

The substantial increase in online information, published by commercial  
businesses, ‎‎governments, healthcare organizations, and private citizens, lead to  
billions of Web ‎‎pages available (Lucian, 2014).‎ As information becomes  
increasingly abundant and immediately available, ‎two undesirable phenomanens:  
**Information pollution** ‎refers to the contamination of information supply with  
irrelevant, ‎‎redundant, unsolicited , hampering and low-value information. ‎ The  
spread of information, often useless and undesirable, can have a ‎detrimental  
effect on ‎human activities.‎ this is called **Information overload** is a term  
used to describe the difficulty of understanding an issue and effectively making  
decisions when one has too much information about that issue.

‎ The flood of information has become a ubiquitous research and business problem,  
from reading relevant articles or reports to screening e-mails or browsing the  
Internet (Eppler & Mengis, 2004).

Encounters with massive amounts of potentially relevant information limit  
cognitive abilities and satisfaction As content has grown increasingly abundant  
and immediately available, ‎attention ‎‎becomes the limiting factor in the  
consumption of information. ‎

. As more web content becomes available user attention stretches even thinner  
across the online space, making it possible only for a small percentage to  
receive significant traffic (Arapakis, Cambazoglu, & Lalmas, 2017). From the  
information that is noticed, less than a third is read by users – On the  
average Web page, users have time to read at most 28% of the words during an  
average visit (Nielsen, 2008, 2015). Only a small portion of information  
receives significant attention, while the remaining majority is barely noticed

(Szabo & Huberman, 2008).

Information overload is associated with a host of undesirable outcomes including  
diminished productivity, poor decision making, or simply lack of effectiveness,  
as most information consumed using ICT is quickly forgotten (Ackoff, 1989; Chen  
et al., 2009; Eppler & Mengis, 2004; Klingberg, 2009).

constructs‎

## ‎Objectives and approach

## the paper proposes approaches to mitigate them.

I put forward information delivery and user engagement as important research  
‎constructs, and argue for their applicability across contexts. ‎

Drawing upon the knowledge-based view of information, we present a revised model  
of decision-making based on the interplay between data, information, and  
knowledge

Identify three information constructs that help define the problem space and  
identify possible solutions.

They are **information interaction** (the task), information experience and  
**engagement** (the user) and the **system** (information management and  
communication).

### Information interaction (HII)

Information interaction is specifically the “process that people use in  
interacting with the content” of a system (Toms, 2002, p. 855 ).

Data are sensory stimuli that we perceive through our senses. Information is  
data that has been processed into a form that is meaningful to the recipient  
(Davis and Olson, 1985). Knowledge is what has understood and evaluated by the  
knower. Data is the representation of information in a formalized manner, and  
hence capable ‎of being communicated or manipulated by ‎some process. Information  
is the meaning that a human assigns to data. ‎ ‎ ‎( Holmes, 2001). Data are a  
representation of facts or ideas ‎The representation of the Digital content, or  
simply “Content”, refers to information stored and accessed via ‎computers.  
Digital content may take the form of text (such as electronic documents),  
‎multimedia files (such as audio or video files), or any other file type that  
follows a ‎content lifecycle requiring management.‎

most work until the early mid-1970s was concerned with system use rather than  
user behaviour or “information behaviour”. Since the 1980s there has been a  
shift towards a “personcentred” approach, rather than a “system-centred”  
approach .

Second, there need to be a focus on the information itself. Early IS literature  
points to information, not technology, as the core of the IS discipline ‎‎(Petter  
et al., 2018). ‎

Addressing this call, we acknowledge that while the aspects of information in  
‎business ‎‎operations and decision-making have been studied for decades, there ‎is  
still a gap in ‎‎theorizing the concept in the IS literature.‎

lack of clear understanding of the core concept of in Information Systems (IS)  
research, ‎IS researchers often overlook the role of information as a component  
of (Petter et al., ‎‎2018).‎ ‎“information effectiveness” refers to a “literal  
economy of information and the reference disciplines ‎which deals with  
assessments of performance or valuation of information” ‎(Keen, 1980, p. 12).

Information The meaning that a human assigns to data by means of the known  
conventions used in their representation. [(Zins,  
2007)](https://www.zotero.org/google-docs/?FKf40i)

Data are a representation of facts or ideas in a formalized manner, and hence  
capable of being communicated or manipulated by some process.

Interaction pertains to the communication between the user and the computer  
interface (Schneiderman, 1997), where the interface is the medium enabling user  
experiences. The interface represents the union of information design (i.e., how  
data is categorized, presented, and made meaningful to the user), interaction  
design (i.e., how the information tells a story), and sensorial design (i.e.,  
the techniques employed to stimulate and utilize the five senses; Shedroff,  
1994). Information interaction is specifically the “process that people use in  
interacting with the content” of a system (Toms, 2002, p. 855 ).

The essence of the information phenomenon has been characterized as the  
occurrence ‎of a communication process that takes place between the sender and  
the recipient of ‎the ‎message. Thus, the various concepts of information tend to  
concentrate on the ‎origin and the end point of ‎this communication process  
(Wersig and Neveling, 1975). ‎

Interaction design focus on interactivity, or behaviour. It connects and  
transforms data to knowledge by extracting information from data, and ‎exploiting  
the ability of the human mind to assign meaning to information.‎

### Information engagement (IE)

engagement is an expression of that interactivity.

Information experience (IX) - User engagement is a quality of user experience  
characterized by the depth of an actor’s investment when interacting with a  
digital system (O’Brien, 2016a). **The international standard on ergonomics of**  
**human system interaction, ISO 9241-210,[1] defines user experience as “a**  
**person’s perceptions and responses that result from the use or anticipated use**  
**of a product, system or service”.**

Engagement is more than user satisfaction: it is believed that the ability to  
engage and sustain engagement in digital environments can result in positive  
outcomes for citizen inquiry and participation, e-health, web search,  
e-learning, and so on. Yet user engagement (UE) is an abstract construct that  
manifests differently within different computer-mediated contexts, and this has  
made it challenging to define, design for, and evaluate.

Quality of UX ([usability.gov](http://usability.gov)). **Estimate of The level of involvement end-users**  
**have with information interaction.** Focused attention on a particular item of  
information.

**Desired, even essential, experience when consuming online information** (Attfield,  
Kazai, Lalmas, & Piwowarski, 2011, Laurel, 1993)

**Engagement is considered a desirable—even essential—human response to**  
**computer‐mediated activities (Laurel, 2014).** **Despite the need to engage users**  
**and create engaging technologies, there is no agreed upon definition of the**  
**construct.** .

According to The Advertising Research Foundation (ARF), ‎"The industry is moving  
toward customer engagement with marketing communications as the 21st century  
metric of marketing efficiency and effectiveness (Plummer et al., 2006)

2016

Influenced by different variables – system, context, user, design, content  
(O’Brien, 2011)

**In recent years, the term user engagement (UE) has been increasingly used to**  
**describe ‎users’ interactions with Information and communication technologies**  
ICT). Given the ‎competition for users’ attention and interest, it is agreed  
that technologies must ‎engage users to be successful. ‎

User engagement is a quality of user experience characterized by the depth of an  
actor’s investment when interacting with a digital system (O’Brien, 2016a).  
Engagement is more than user satisfaction: it is believed that the ability to  
engage and sustain engagement in digital environments can result in positive  
outcomes for citizen inquiry and participation, e-health, web search,  
e-learning, and so on. Yet user engagement (UE) is an abstract construct that  
manifests differently within different computer-mediated contexts, and this has  
made it challenging to define, design for, and evaluate. User experience, a term  
used to describe **all aspects of a product or service as perceived by users.**

**As a whole, research emphasizes user-centred approaches to user ‎engagement,**  
**‎highlighting the individual’s cognitive, affective, and behavioural ‎factors of**  
**human-‎computer interactions, and their need for technologies that ‎stimulate each**  
**of these ‎components.‎**

**In recent years, the term user engagement (UE) has been increasingly used to**  
**describe users’ interactions with Information and communication technologies**  
ICT) [@dvir2019]. User engagement. While information interaction focuses on  
the user experience with content, **engagement is an expression of that**  
**interactivity.**

To move the mind of your readers, you’ll need their interest and tacit consent.

**A quality of user experience characterized by the depth of an actor’s investment**  
**when interacting with a digital system** [@obrien2016]. Engagement is more than  
user satisfaction: it is believed that the ability to engage and sustain  
engagement in digital environments can result in positive outcomes for citizen  
inquiry and participation, e-health, web search, e-learning, and so on. **Yet**  
**user engagement (UE) is an abstract construct that manifests differently within**  
**different computer-mediated contexts, and this has made it challenging to**  
**define, design for, and evaluate.**

UE is a significant factor in system design and adoption, with theoretical and  
empirical evidence of the positive impact of user engagement in education,  
government, business and more (Arapakis, Lalmas, Cambazoglu, Marcos, & Jose,  
2014; R. Jacques & others, 1995; Oh & Sundar, 2016). It is generally agreed that  
given the competition for users’ attention and interest, technologies must  
engage users to be successful (H. L. O’Brien, 2016c). Thus, there is a growing  
need for a deep understanding of the process of **user engagement and the**  
**factors that influence it** (Lalmas et al., 2014; H. L. O’Brien, 2016c).  
**Engaging the user has become a goal – and to some extent, a necessity – in a**  
**variety of information-rich contexts (Lalmas et al., 2014). However, current**  
**research is unstructured and spread across various disciplines, leading ‎to**  
**wide-ranging, and sometimes disparate, perspectives, vocabularies, and**  
**measurement ‎methodologies‎.**

**The Merriam-Webster dictionary defines the term *engagement* as a “state of**  
**emotional involvement or commitment” and “process of drawing favorable attention**  
**and interest” (“Engagement,” 2018).**

Both as an end-state and a process, engagement has been considered a desirable  
goal in various contexts, such as government, education, marketing, health and  
more (Feng & Ots, 2015; Frick, 2010; Lagun & Lalmas, 2016; Lalmas et al., 2014).  
For example, in the context of government and public policy, the terms the  
“civic engagement” or “political engagement” indicate healthy participation in  
the political process (Abbas, 2010; Chan & Pan, 2008; Dvir, 2017;  
Grimmelikhuijsen et al., 2013; Gutman, 1982); In education research, “student  
engagement” describes desired participation in learning experiences (Appleton et  
al., 2008; Bomia et al., 1997; Cole, 2009; Dvir, 2015; Meece et al., 1988); In  
business and marketing, “consumer engagement” is used frequently to describe  
positive consumer relationships with a company or a brand (Batra & Ray, 1986;  
Brodie et al., 2013; Rowley, 2008; Zheng et al., 2015).

Recently, researchers from diverse fields and with a common interest in  
technologies began to pay attention to a new type of engagement – that is user  
engagement (UE). The term is used to describe users’ level of involvement and  
investment in the interaction with Information and communication technologies  
(ICT) (Attfield et al., 2011; O’Brien & Toms, 2008). It pertains to the quality  
and depth of the user experience (UX) (O’Brien, 2011; O’Brien & Toms, 2008). It  
emphasizes the phenomena associated with being captivated by technology and so  
being motivated to use it (Attfield et al., 2011; O’Brien & Toms, 2008).

Research on UE is thriving, as the term has been increasingly used in  
professional and academic literature. This reflects the centrality of UE to the  
formulation of successful interaction with technology.

However, current research is unstructured and spread across various disciplines,  
‎leading ‎to wide-ranging, and sometimes disparate, perspectives, vocabularies,  
and ‎measurement ‎methodologies‎. ‎

engagement with information at a theoretical and conceptual level is still  
limited (Boell, 2017). ‎In Petter et al.’s (2018) words, the IS discipline needs  
to be more “deliberate” about its study of ‎information.‎

### Content

Information delivery - Content strategy (CS) - representation

UI design Content

**Digital nudging** is the use of user-interface design elements to guide  
people’s behavior in digital choice environments (Weinmann, 2016). Digital  
choice environments are user interfaces – such as web-based forms and ERP  
screens – that require people to make judgments or decisions. Humans face  
choices every day, but **the outcome of any choice is influenced not only by**  
**rational deliberations of the available options but also by the design of the**  
**choice environment in which information is presented, which can exert a**  
**subconscious influence on the outcome. In other words, ‘‘what is chosen often**  
**depends upon how the choice is presented’’ (Johnson et al. 2012, p. 488)**

User interface (UI) or user interface engineering is the design of user  
interfaces for machines and software, such as computers, home appliances, mobile  
devices, and other electronic devices, with the focus on

**Content management (CM)** is a set of processes and technologies that supports  
the collection, managing, and publishing of information in any form or medium.

importance of the sender in the communication processes

**include generation and reception of information in such a way that a state of**  
**knowledge is transformed.**

[@content2019]

“Content” is the representation.

However, the measurement of within-content engagement remains a difficult and  
unsolved task. **This is because of the lack of standardised, well-validated**  
**methods for measuring engagement, especially in an online context.**

**How to create engaging interactions with digital content, or interactive**  
**content engagement (ICE)**

Part of the efforts have focused on understanding how users interact and engage  
‎with web content, ‎

Nim has developed a conceptual model of user engagement with digital content; a  
‎methodology for evaluation and creation of engaging content based on reliable  
and ‎reusable metrics, and an instrument for automatic optimization of given  
content ‎employing ‎

**The challenge becomes how to conceptually and operationally define, measure ‎and**  
**design ICE engaging content interactions, as importantly. how to operationally**  
**‎measure and design it.‎**

ICE

The objectives of this research are to define engagement conceptually and  
operationally in the context of interactive search systems. This research will  
deconstruct engagement into a set of attributes that can be defined and  
measured. Specifically, it will confirm which attributes constitute engagement,  
develop and instrument for assessing engaging interactions, and then evaluate  
the reliability, validity, and generalizability of the instrument by examining  
humancomputer interactions with applications such as multimedia webcasts  
repositories and Web searching.

The purpose of this research is to develop a theoretical framework to root  
engagement, defining it both conceptually and practically, and to construct a  
reliable, valid, and generalizable model instrument **that measures engagement**  
**outcomes**.

The key research questions are:

**Q1. What characterize ICE?**

What are the distinct stages in engagement? **‎** How can we reliably and validly  
measure those attributes? ‎

**Q2. What content features influence ICE?**

**Q3. Can ICE be systematically evaluated and developed?**

To do so, I propose a three-phase research project:

### Phase I — Conceptual definition

Identify the dimensions of ICE by developing and testing a conceptual model of  
engagement.

I support my thesis through an interdisciplinary literature review, in which I  
synthesize relevant research streams.

First, I draw on well-established theories relating to **motivational**  
**behaviour** (e.g., self-determination theory and uses and gratifications  
theory), **technology adoption and usage** (e.g., the technology acceptance  
model and the unified theory of acceptance and use of technology), and the  
**subjective user experience** (e.g., flow and play theories).

Second, This section investigates domain research and empirical studies that  
have expanded ‎our understanding of the complexity of user engagement and its  
role in various ‎contexts: Digital news, e-commerce and marketing, Gaming, Social  
media, online ‎information search, Digital Health Technologies, Public policy and  
governance and ‎eLearning. ‎

Third, user interviews

**User experience research** focuses on understanding user behaviors, needs, and  
motivations through observation techniques, task analysis, and other feedback  
methodologies (Kuniavsky, 2003). ADDIN ZOTERO\_ITEM CSL\_CITATION  
{“citationID”:“EmHoQin2”,“properties”:{“formattedCitation”:"(Zins,  
2007)",“plainCitation”:"(Zins,  
2007)",“noteIndex”:0},“citationItems”:[{“id”:161,“uris”:[“[http://zotero.org/users/2644296/items/4XGQVNVF"],“uri”:[“http://zotero.org/users/2644296/items/4XGQVNVF”],“itemData”:{“id”:161,“type”:“article-journal”,“title”:"Conceptual](http://zotero.org/users/2644296/items/4XGQVNVF%22%5D,%22uri%22:%5B%22http://zotero.org/users/2644296/items/4XGQVNVF%22%5D,%22itemData%22:%7B%22id%22:161,%22type%22:%22article-journal%22,%22title%22:%22Conceptual)  
approaches for defining data, information, and  
knowledge”,“container-title”:“Journal of the American Society for Information  
Science and  
Technology”,“page”:“479-493”,“volume”:“58”,“issue”:“4”,“source”:“CrossRef”,“URL”:“[http://doi.wiley.com/10.1002/asi.20508",“DOI”:“10.1002/asi.20508”,“ISSN”:"15322882](http://doi.wiley.com/10.1002/asi.20508%22,%22DOI%22:%2210.1002/asi.20508%22,%22ISSN%22:%2215322882),  
15322890”,“note”:“00000”,“language”:“en”,“author”:[{“family”:“Zins”,“given”:“Chaim”}],“issued”:{“date-parts”:[[“2007”,2,15]]},“accessed”:{“date-parts”:[[“2015”,12,6]]}}}],“schema”:“<https://github.com/citation-style-language/schema/raw/master/csl-citation.json>”}  
(Zins, 2007)

The result of these steps is **a conceptual process model of user engagement**  
**with digital content.** In particular, the model explicates three steps  
(discovery, perception, and participation), and identifies a set of attributes  
of engaging content (i.e., novelty, familiarity, and sentiment polarity).

### Phase II — Instrument development

In this phase, I conduct exploratory (qualitative and quantitative) studies to  
refine the content attributes, operationalize the constructs, and **develop a**  
**method for creating engaging content that is precise enough to allow for**  
**quantitative evaluation and operational formulation.**

Quantitative predictions are made from a model for word recognition. The model  
has as its central feature a set of “logogens,” devices which accept information  
relevant to a particular word response irrespective of the source of this  
information. When more than a threshold amount of information has accumulated in  
any logogen, that particular response becomes available for responding. The  
model is tested against data available on (1) the effect of word frequency on  
recognition, (2) the effect of limiting the number of response alternatives, (3)  
the interaction of stimulus and context, and (4) the interaction of successive  
presentations of stimuli. Implications of the underlying model are largely  
upheld. Other possible models for word recognition are discussed as are the  
implications of the logogen model for theories of memory. (30 ref.) (PsycINFO  
Database Record © 2016 APA, all rights reserved)

Based on the method, I develop an instrument for automatic or semi-automatic  
evaluation, optimization, and creation of engaging content using NLP techniques,  
such as word frequency, sentiment analysis and lexical substitution.

### Phase III — Empirical validation

In this phase (future) I will test the reliability and validity of the  
instrument and conceptual model, and assess their generalizability to other  
contexts.

In the doctoral consortium I plan to present the results from a pilot study  
(*n*=416) in which the model, methodology and instrument were **employed to**  
**formalize evaluation and optimization of ‎engaging ‎content; specifically, titles**  
**and abstracts of academic publications.**

## Significance

interactive content engagement requires a theoretical framework that takes into  
account multiple attributes that are likely related to users, systems, and tasks  
within search contexts. This research will confirm the nature of ICE, how to  
measure and design it. The **Interactive Content Engagement** Theory will bridge  
interdisciplinary (e.g. information science, computer science, HCI) approaches  
to framing search experiences by demonstrating the complex and dynamic  
relationships between users’ behaviour, affect, and cognition and the computer  
interfaces they use to accomplish their tasks in various search contexts. By  
understanding and operationalizing engagement, we can begin to focus efforts on  
designing search interfaces that engage users with features appropriate to the  
task and context of their interactions. Thus, the contributions of this work are  
both theoretical and applied, and will benefit the information science field by  
enabling researchers and practitioners alike to understand the dynamic  
relationship between users and computer applications and tasks, and how to  
assess whether engagement is taking place. Future work will examine how to  
design interfaces that engage users.

# Literature review

*significant prior research*  
no established theoretical frameworks exist for articulating engagement, but  
several theories may be drawn upon to explore and understand it.

For the synthesis, We followed an approach suggested by Webster and Watson  
(Webster & Watson, 2002): We first analyzed and compared the various  
contributions to research and identified similarities and differences among the  
various perspectives. **We then followed an inductive method of generalization**  
**– the formulation of general concepts from specific instances by abstracting**  
**common properties.**

The existence of multiple conflicting theories regarding information poses  
‎challenges to ‎‎IS research. A critical mission for IS research is to design IS to  
‎improve business ‎‎operations and decision-making (Arnott & Pervan, 2014; ‎Lederman  
& Johnston, 2011)‎

## The DeLone and McLean Model of Information Systems Success

https://upload.wikimedia.org/wikipedia/commons/thumb/3/3b/Information\_systems\_success\_model.png/420px-Information\_systems\_success\_model.png

https://upload.wikimedia.org/wikipedia/commons/thumb/3/3b/Information\_systems\_success\_model.png/420px-Information\_systems\_success\_model.png

The DeLone and McLean Model of Information Systems Success [@delone2003]

The information systems success model (alternatively IS success model or Delone  
and McLean IS success model) is an [information  
systems](https://en.wikipedia.org/wiki/Information_systems) (IS) theory which  
seeks to provide a comprehensive understanding of IS success by identifying,  
describing, and explaining the relationships among six of the most critical  
dimensions of success along which information systems are commonly evaluated.

The IS success model identifies and describes the relationships among six  
critical dimensions of IS success: information quality, system quality, service  
quality, system use/usage intentions, user satisfaction, and net system  
benefits.

**Information quality** - refers to the quality of the information that the  
system is able to store, deliver, or produce, and is one of the most common  
dimensions along which information systems are evaluated. Information quality  
impacts both a user’s satisfaction with the system and the user’s intentions to  
use the system, which, in turn, impact the extent to which the system is able to  
yield benefits for the user and organization.

Information quality was proven to be significant and measured in terms of  
accuracy, timeliness, completeness, relevance, and consistency” (DeLone &  
McLean, 2003; William H. DeLone & Ephraim R. McLean, 1992)

The quality of information is positively related to decision quality

The creation of the D&M IS Success Model was driven by a process  
understanding of IS and their impacts. This process model has just three  
components: the creation of a system, the use of the system, and the  
consequences of this system use.

The information systems success model (alternatively *IS success*  
*model* or *Delone and McLean IS success model*) is an [information  
systems](https://en.wikipedia.org/wiki/Information_systems) (IS) theory which  
seeks to provide a comprehensive understanding of IS success by identifying,  
describing, and explaining the relationships among six of the most critical  
dimensions of success along which information systems are commonly evaluated.

* Information use is key factor
* Individual impact was measured in terms decision-making performance, job  
  effectiveness, and quality of work
* *Satisfaction* refers to the extent to which a user is pleased or contented  
  with the information system. the User Information Satisfaction (UIS)  
  instrument [2, 19]” (DeLone and McLean 2003:20)“UIS continues to be the most  
  commonly used and developed **success measure;** but, when used alone, it  
  cannot fully measure IS success.” (DeLone and McLean 2003
  1. Wilson’s theory of information behaviour

### Figure . Wilson’s Model of Information Behavior ADDIN ZOTERO\_ITEM CSL\_CITATION {“citationID”:“wXMyNd4j”,“properties”:{“formattedCitation”:"(Wilson, 1997)",“plainCitation”:"(Wilson, 1997)",“noteIndex”:0},“citationItems”:[{“id”:1508,“uris”:[“[http://zotero.org/users/2644296/items/ZACW4ZUX"],“uri”:[“http://zotero.org/users/2644296/items/ZACW4ZUX”],“itemData”:{“id”:1508,“type”:“article-journal”,“title”:"Information](http://zotero.org/users/2644296/items/ZACW4ZUX%22%5D,%22uri%22:%5B%22http://zotero.org/users/2644296/items/ZACW4ZUX%22%5D,%22itemData%22:%7B%22id%22:1508,%22type%22:%22article-journal%22,%22title%22:%22Information) behaviour: An interdisciplinary perspective”,“container-title”:“Information Processing & Management”,“page”:“551-572”,“volume”:“33”,“issue”:“4”,“source”:“CrossRef”,“abstract”:“This paper reports on a recent review of the literature of “information behaviour” as it is studied in a variety of disciplines, other than information science. As a result of the review, areas of research interest to information science are identified and a general model of information behaviour is proposed.”,“URL”:“[http://linkinghub.elsevier.com/retrieve/pii/S0306457397000289",“DOI”:“10.1016/S0306-4573(97)00028-9”,“ISSN”:“03064573”,“note”:“01197”,“shortTitle”:"Information](http://linkinghub.elsevier.com/retrieve/pii/S0306457397000289%22,%22DOI%22:%2210.1016/S0306-4573(97)00028-9%22,%22ISSN%22:%2203064573%22,%22note%22:%2201197%22,%22shortTitle%22:%22Information) behaviour”,“language”:“en”,“author”:[{“family”:“Wilson”,“given”:“T.D.”}],“issued”:{“date-parts”:[[“1997”,7]]},“accessed”:{“date-parts”:[[“2016”,4,12]]}}}],“schema”:“<https://github.com/citation-style-language/schema/raw/master/csl-citation.json>”} (Wilson, 1997)(Wilson, 1996)

the reduction of uncertainty or doubt

Wilson’s theory of information behaviour was born out of a need to focus on  
human use of information, rather than the use of information systems and  
sources. Wilson proposed that the term **information behavior** refers to **the**  
**way people search for and utilize information and** covers all aspects of human  
information behavior, whether active or passive, in relation to sources and  
channels of information (T.D. Wilson, 1997, 2000).

Wilson’s model of information behaviour include the following sub-processes:

‎’Activating mechanisms’ - Relevant impetus that prompt a decision to seek  
‎information

(Wilson, 1996)

**Information Seeking** behavior is the act of actively seeking information in  
order to answer a specific query, i.e. **purposive seeking** of information as a  
consequence of a need to satisfy some goal.

**Information Searching behavior** is the behavior which stems from the searcher  
interacting with the system in question.

**Information Use** pertains to the searcher adopting the knowledge they sought.

maximizing usability and the user experience. The goal of user interface design  
is to ‎make the user’s interaction as simple and efficient as possible, in terms  
of ‎accomplishing user goals (user-centered design). ‎

Usefulness is the issue of whether the system can be used to achieve some  
desired goal. It can again be broken down into the two categories of utility and  
usability. Utility is the question of whether the functionality of the system in  
principle can do what is needed, and usability is the question of how well users  
can use that functionality (Nielsen, 1993).

Wilson’s Model is aimed at linking theories to action. However, there have not  
been many links made between this research and **changes in policy or practice**  
(Tom D. Wilson, 2010) .

## UE theory

Since its early days, HCI research focused almost exclusively on the achievement  
of behavioural goals. The task became the pivotal point of **user-centred**  
**analysis and evaluation techniques** (e.g. usability testing).

‎●‎

There have been a few attempts to develop models that depict the UE process, its  
influences, and its antecedents. Extant UE models focus on engagement as an  
interaction process and examine relationships amongst variables with the goal of  
predicting or identifying outcomes of UE (O’Brien, 2016).

(Jacques, 1996; Jacques & others, 1995) proposed that engagement consists of six  
attributes, each of which operated along a continuum. These components include  
the degree of attention (divided or focused), motivation to continue the task,  
perceived control (presence or absence), and needs satisfaction experienced by  
the user, as well as the user’s perception of time (“dragging on” or “flying  
by”) and attitude (negative or positive).

Hart et al. (2012) focus on users’ judgement within session. Originating from a  
series of experimental studies a three-stage process model of user judgement for  
quality was proposed, encompass the nature of interaction as explored through  
affect, flow and presence. It focuses on how judgements of quality criteria  
(e.g. usability, classic and expressive aesthetics) are determined by the  
intersection of the user goal or task, the domain or application type and  
product features. According to Hart et al. (2012), the principles of affect  
(mood and emotion), flow (immersion) and presence (involvement) are known to  
affect human behavior and judgement, yet how these principles influence user  
engagement is poorly understood.

O’Brien and Toms (2008) also suggested that UE is not a singular element, but  
rather a process, as users move in the same trajectory when interacting with  
ICT. The process model is comprised of four distinct stages: point of  
engagement, period of sustained engagement, disengagement. Each of these is  
characterized by a set of attributes.

|  |
| --- |
| **Figure 3. The Process model of User engagement (O’Brien & Toms, 2008)** |
| <./media/image5.png> |
|  |

This conceptual behavioral model views engagement as a process in which computer  
users initiate and sustain engagement, disengage with the application or task,  
and potentially re-engage once or several times (O’Brien & Toms, 2008).

**The point of engagement** occurs when the user decides to invest in the  
interaction. It is initiated by the aesthetic appeal and novelty of the  
interface, interest, motivation, or a specific or experiential goal to be  
achieved through the interaction.

**Period of sustained engagement** happens when users are able to maintain their  
attention and interest in the application.

**Disengagement** occurred when participants made an internal decision to stop  
the activity, or when factors in the participants’ external environment caused  
them to cease being engaged.

**Re-engagement** is returning to an application in future was the result of  
positive experience with that application.

By segmenting engagement into stages, O’Brien & Toms were able to identify  
attributes of UE from previous research that seemed most salient for that phase  
of the interaction and therefore predict and facilitate engagement.

**engagement attribute** is a characteristic of the user-computer interaction  
that influences or is a component of the engagement. Engagement attributes are  
products of users’ interactions with the technology, since they depend on what  
the user finds innately compelling (O’Brien & Toms, 2008).

O’Brien and Toms (2010) developed an attribute-based approach to UE, which can  
be used as a methodological framework for measurement. They produced and  
evaluated a multidimensional tool for evaluating engaging outcomes with a  
technology called the User Engagement Scale (UES). The UES taps into six  
dimensions of experience: Novelty and aesthetics reflect users’ attraction to  
the media system or interface, focused attention and felt involvement capture  
cognitive and emotional focus on media content, and the endurability of system  
use represents evaluations of success and voluntary participation to recommend  
the website to others.

|  |
| --- |
| **Figure 4. The User engagement scale (UES) (O’Brien et al., 2018)** |
| <./media/image6.png> |

Recently, the UES was refined to a new short form. Although the original six  
factors had some explanatory power, a revised model was recently offered, where  
the items did not change, but how they were grouped based on modified dimensions  
as subscales were altered. The of the UES are an aesthetic appeal, focused  
attention, perceived usability, and endurability (O’Brien et al., 2018).

The table below lists the various attributes of the UES and the definitions:

**Table 4. Attributes of UES and their definitions**

|  |  |
| --- | --- |
| **Attributes** | **Definition** |
| **Novelty and** **Aesthetic Appeal** | Users’ level of interest and curiosity evoked by the system and its contents. The users’ perception of the visual appearance of a computer application interface |
| **Focused Attention** | The concentration of mental activity; contains some elements of Flow, specifically focused concentration, absorption, and temporal dissociation |
| **Felt Involvement** | Users’ feelings of being drawn in, interested, and having fun during the interaction |
| **Perceived Usability** | Users’ affective (e.g., frustration) and cognitive (e.g., effort) responses to the system |
| **Endurability** | Users’ overall evaluation of the experience, its perceived success and whether users would recommend the site to others. This factor combines concepts related to users’ likelihood to return and evaluation of system success. |

The frameworks proposed of the UE Process Model and the UES have been tested for  
reliability, validity, and generalizability in various domains, mostly leisure  
(online news, shopping, digital games, social media) (O’Brien, 2011). The  
studies corroborate the UE process model and the feasibility of a universal  
measure of UE (O’Brien et al., 2016, 2017, 2018; O’Brien & Cairns, 2016; O’Brien  
& Toms, 2008, 2010). The studies also demonstrated that engagement is consistent  
across diverse types of applications in terms of the trajectory followed by  
users through the process and the attributes present. The UES has been adopted  
by more than 50 international research teams who have used it to examine UE with  
educational technologies, search systems, haptic technologies, health and  
consumer applications, and other media (O’Brien et al., 2018; O’Brien & Cairns,  
2016).

### THE USER ENGAGEMENT SCALE (UES)

Attribute-based approach for evaluating engaging outcomes with a technology.  
Taps into six dimensions of experience:

|  |  |  |  |
| --- | --- | --- | --- |
| Novelty & Aesthetic appeal | Focused attention & Felt involvement | Perceived usability ‎ | Endurability & Reward |
| Users’ level of interest and curiosity evoked by the ‎system and its contents. ‎ |  |  |  |

Novelty and aesthetics reflect users’ attraction to the media system or  
interface, focused attention and felt involvement capture cognitive and  
emotional focus on media content, and the endurability of system use represents  
evaluations of success and voluntary participation to recommend the website to  
others.

The UE process model does not emphasize content; Rather, it focused primarily on  
the characteristics of the system and how these were perceived and acted upon by  
users.

O’Brien et al. ( 2016) suggested that the user engagement framework be broadened  
to incorporate content

## Cumulative prospect theory

Cumulative prospect theory (CPT) is a model for descriptive decisions under risk  
and uncertainty which was introduced by Amos Tversky and Daniel Kahneman  
(Tversky & Kahneman, 1992).

The main observation of CPT (and its predecessor Prospect Theory) is that people  
tend to think of possible outcomes usually relative to a certain reference point  
(often the status quo) rather than to the final status, a phenomenon which is  
called **framing effect.**

Prospect theory distinguishes two phases in the choice process: framing and  
valuation. In the ‎framing phase, the decision maker constructs **a**  
**representation** of the acts, contingencies, and ‎outcomes that are relevant to  
the decision. In the valuation phase, the decision maker assesses the ‎value of  
each prospect and chooses accordingly.

**Cognitive biases -** Unconscious, automatic influences on human ‎judgment and  
decision making that ‎reliably produce reasoning ‎errors.‎

**Heuristics -** Simple, efficient rules which people often use to form  
judgments and make decisions. They are mental shortcuts that usually involve  
focusing on one aspect of a complex problem and ignoring others.

Although no formal theory of framing is available, ‎we have learned a fair amount  
about the rules that govern  
the representation of acts, outcomes, and contingencies ‎(Tversky & Kahneman,  
1992)

1. Thesis / project statement
   1. Unified definition

* Aims to provide a conceptualization that is applicable across a range of  
  situations, Integrates knowledge and methods from different disciplines
* Includes adoption and usage of technology, the feeling when using the  
  technology and the motivation to use it
* As a whole, research emphasizes **user-centred approaches** to user  
  engagement, highlighting the individual’s cognitive, affective, and  
  behavioural factors of human-computer interactions, and their need for  
  technologies that stimulate each of these components.
* UE should be measured using a thoughtful mix of qualitative and quantitative  
  methods, considering the particulars of the use context, and balancing  
  established and emerging subjective and objective metrics (O’Brien, 2018).
  1. Information rerival

The activity of obtaining information system resources relevant to an  
information need from a collection of information resources.

reasons for requiring information, fulfilment of factual or emotional goals

possibilities of action

reception of information

the **recognition** of

### Evaluation

the process of assessing how well a system meets the information needs of its  
users.‎

1. Akusion / affect
2. Decision making

|  |  |  |  |
| --- | --- | --- | --- |
| **R** | **E** | **A** | **D** |
| Retrieval | Evaluation | Acquisition | Decision making |
|  | UES |  |  |

### H1: Same trajectory

## Content

* Disposional and situatiutional
* user’s internal state (predispositions, expectations, needs, motivation,  
  mood, etc.)
* Characteristics of the designed system (e.g. complexity, purpose, usability,  
  functionality, etc.) and
* the context and task (e.g. organizational/social setting, meaningfulness of  
  the activity, voluntariness of use, etc)

|  |  |  |  |
| --- | --- | --- | --- |
| **R** | **E** | **A** | **D** |
| Recognizability | Emotion | Accessibility | Distribution (distinctiveness and diffusion) |
|  |  |  |  |

### Recognizability

if you cannot establish common ground with your readers—it is likely they will  
dismiss your work as untethered to reality or simply find it irrelevant to  
anything they can relate to or wish to read more about (Davis, 1971).

1. Emotion
2. Accessibility
3. Distribution

must negotiate the trade-off between novelty (distinctiveness) and  
recognizability (diffusion). The greater the novelty, the less anchored it may  
be to the current literatureand themore challenging it may be for your readers  
to understand and accept. In contrast, a more incremental complication may  
strike your readers as trite and mundane.

## Modification

* Lexical substitution is the task of identifying a substitute for a word in  
  the context of a clause (using semantic analysis, natural language  
  processing ‎and a rule-based approach)
* automatic substitution (synanoms) to improve user engagement with academic  
  content.
* Sentimentant analysis
* Frequency

# Research plan

developing or refining theory

## Project I: User research

\*R.E.A.D: A conceptual framework for **defining interactive content**  
**engagement** \*

1. Objectives
2. Method

* a comprehensive literature review of the various dimensions of user  
  engagement.
* **User and task analysis –** a form of field research, it’s the analysis of  
  the potential users of the system by studying how they perform the tasks  
  that the design must support, and conducting interviews to elucidate their  
  goals.[3] Typical questions involve:
* What would the user want the system to do?
* How would the system fit in with the user’s normal workflow or daily  
  activities?
* critical interpretive synthesis
  1. Potential outcomes
  2. Project II: Content analysis
* C.H.E.R: Content Heuristics Evaluation and Refinement
  1. Objectives
  2. Method

Web scraping, data extraction and automation.

### Potential outcomes

## Project III: Web experiments

* D.I.M.A: Digital Information Modification and Assessment
  1. Objectives
  2. Method
  3. Potential outcomes

# Conclusion

User engagement requires a theoretical framework that takes into account  
multiple attributes that are likely related to users, systems, and tasks within  
search contexts. This research will confirm the nature of engagement and  
measuring engagement with search interfaces. The Conceptual Model of User  
Engagement will bridge interdisciplinary (e.g. information science, computer  
science, HCI) approaches to framing search experiences by demonstrating the  
complex and dynamic relationships between users’ behaviour, affect, and  
cognition and the computer interfaces they use to accomplish their tasks in  
various search contexts. By understanding and operationalizing engagement, we  
can begin to focus efforts on designing search interfaces that engage users with  
features appropriate to the task and context of their interactions. Thus, the  
contributions of this work are both theoretical and applied, and will benefit  
the information science field by enabling researchers and practitioners alike to  
understand the dynamic relationship between users and computer applications and  
tasks, and how to assess whether engagement is taking place. Future work will  
examine how to design interfaces that engage users.

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1. Appendix I: Glossary
   1. Definitions

**information behavior**

The way people search for and utilize information

**Information overload**

is a term used to describe the difficulty of understanding an ‎issue and  
effectively making decisions when one has too much information about that ‎issue.‎

**Information pollution**

the contamination of information supply with irrelevant, redundant, unsolicited  
, hampering and low-value information. The spread of useless and undesirable  
information can have a detrimental effect on human activities.

**User experience (UX)**

momentary, primarily evaluative feeling (good-bad) while ‎interacting with a  
product or service‎

**Dispositional attribution**

The assumption that a person’s behavior reflects his internal dispositions like  
his personality, beliefs, attitude etc.

**Situational attribution**

The assumption that a person’s behavior is influenced by an external influence  
from the environment.

**Dispositional attribution**

~ The assumption that a person’s behavior reflects his internal dispositions

like his personality, beliefs, attitude etc.

**Content management (CM)**

A set of processes and technologies that supports the collection, managing, and  
publishing of information in any form or medium.

**Digital content (or simply “Content”)**

to information stored and accessed via computers. Digital content may take the  
form of text (such as electronic documents), multimedia files (such as audio or  
video files), or any other file type that follows a content lifecycle requiring  
management.

Interaction *[UE]: User Engagement* [UX]: User Experience *[IM]: Information*  
*Management* [IS]: Information Systems

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Cognitive biases

**User experience (UX)**

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**Dispositional attribution**

The assumption that a person’s behavior reflects his internal dispositions like  
his personality, beliefs, attitude etc.

**Situational attribution**

The assumption that a person’s behavior is influenced by an external influence  
from the environment.

**Cognitive biases**

Unconscious, automatic influences on human ‎judgment and decision making that  
reliably produce reasoning ‎errors.‎

Information management (IM)

concerns a cycle of organizational activity: the acquisition of information from  
one or more sources, the custodianship and the distribution of that information  
to those who need it, and its ultimate disposition through archiving or  
deletion.

Abbreviations

**ICT**

Information and Communication Technologies

**IM**

Information Management

**IS**

Information Systems

**HCI**

Human-Computer Interaction

**UE**

User Engagement

**UX**

User Experience

# Apendix II: Proposed dissertation chapters

1. Introduction
2. Literture review
   1. I draw on well-established theories relating to **motivational**  
      **behavior** (e.g., self-determination theory and uses and gratifications  
      theory), **technology adoption and usage** (e.g., the technology  
      acceptance model and the unified theory of acceptance and use of  
      technology), and the **subjective user experience** (e.g., flow and play  
      theories).
3. READ
4. CHER
5. DIMA
6. Discussion
7. Conclusion