Accelerating in a world of chaos

by using Enterprise Architecture with the concept Antifragility

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A thesis submitted in fulfilment of the requirements
for the degree of Master of Enterprise IT Architecture (MSc)

Antwerp Management School
Belgium
September 5, 2021

”It is quite perplexing that those from whom we have benefited the most aren’t those who have tried to help us (say with ”advice”) but rather those who have actively tried - but eventually failed - to harm us.”
- Nassim Nicholas Taleb

”A consistency proof for [any] system can be carried out only by means of modes of inference that are not formalized in the system itself.”
- Kurt Gödel

”Reality is created by the mind.
We can change our reality by changing our mind.”
- Plato

”But he who neither thinks for himself nor learns from others, is a failure as a man.”
- Hesiod

”The only constant is change.”
- Heraclitus

Thesis Information

Title:	Accelerate in a world of chaos by using Enterprise Architecture with the concept of Antifragility
Language:	British English
Reference Style:	APA Reference Style 7.0
DOI:	tbd
DOI Reference:	tbd
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Thesis Project

GitHub:	https://github.com/JRBliekendaal/master-thesis/

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Keywords

agile, agility, resilient, resiliency, robust, robustness, antifragility, antifragile, enterprise architecture, it architecture, architecture governance, architecture principles, enterprise engineering, public sector, independent software vendor, organisational design

Acknowledgements

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Accelerating in a world of chaos

by using Enterprise Architecture with the concept Antifragility

René Bliekendaal

Abstract

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1. Introduction

Speed of change
Only constant is change

The world of Volatility, Uncertainty, Complexity and Ambiguity (VUCA) (Bennett & Lemoine, 2014) requires a new approach. Disintermediation, globalisation, market upheaval, disruption, and technological advance all combine to produce an effect that is difficult to mitigate, impossible to predict, and arduous to detect (O'Reilly, 2019, p. 885).
The challenge

In this thesis, the researcher defines how and with which Enterprise Architecture (EA) concepts EA can be used to steer an Independent Software Vendor (ISV) towards being antifragile in the Public Sector Market.
or
In this thesis, the reseacher defines how the enterprise architecture function can be used to steer an isv towards bwing antifragile in the public sector market.

Research combined social sciences, philantrophy, information and communication technology, business studies, phylosophy,
Bu using the lens of the Systems Theory, methods, theories and others are can also be applicable on other systems. Example a method for a software system could also be applicable for an organisational system.

1.1. Context

The researcher is working as a Chief Architect for an ISV specialised in delivering software and services to the local governments in The Netherlands, such as the municipalities, the provinces, and the regional water authorities. The local governments embraced the digital transformation, and because of this the pace of change is increasing rapidly **(NEEDS REF)**.

1.2. Structure of the thesis

In chapter 1 the context of the research is set, the core concepts of EA and antifragility are introduced together with the contextual boundaries of ISV and the Public Sector Market. The chapter 1 is closed with a probem statement and the belonging research questions.

In chapter 2 based on literature the theoretical background is given on the research. The contextual boundaries of ISV and the Public Sector market are defined. The concepts of EA, antifragile, and other relevant concepts such as "system", "organisation", and "stressor" are researched and defined in detail. Chapter 3 explains the used methodology for the research.

1.3. Introduction of the contextual boundary of "Public Sector"

Remark. Needs a formal introduction.

There is a difference in delivering products and services to the public sector and the private sector. The expected values are different in the public sector than that of the private sector. The top five private sector core values are Profitability, Accountability, Expertise, Reliability, and Effectiveness, while the top five public sector core values are Accountability, Effectiveness, Intercorruptibility, Reliability, and Lawfulness (van der Wal et al., 2008). Profitability is only a value for the private sector. It does not exist as a value for the public sector. The public sector demands or even initiates changes without noticing the needed investments to execute these changes.

1.4. Introduction of the contextual boundary of "Independent Software Vendor"

Remark. Needs a full introduction.

1.5. Introduction of the concept "Enteprise Architecture"

Enterprise Architecture (EA) is a discipline for proactively and holistically leading enterprise responses to disruptive forces by identifying and analysing the execution of change toward desired business vision and outcomes. EA delivers value by presenting business and IT leaders with signature-ready recommendations for adjusting policies and projects to achieve targeted business outcomes that capitalise on relevant business disruptions (Gartner, n.d.).

White (2018) states that the organisation's business requirements guide EA — it helps layout how information, business and technology flow together. EA has become a priority for businesses trying to keep up with new technologies such as the cloud, Internet of Things (IoT), machine learning and other emerging trends that will prompt digital transformation.

1.6. Introduction of the concept of "Antifragility"

Taleb (2008) describes a black swan as an event that 1) is so rare that even the possibility that it might occur is unknown, 2) has a catastrophic impact when it does occur, and

3) is explained in hindsight as if it were actually predictable. For extremely rare events, Taleb argues that the standard tools of probability and prediction, such as the normal distribution, do not apply since they depend on large population and past sample sizes that are never available for rare events by definition. Extrapolating, using statistics based on observations of past events is not helpful for predicting black swans, and might even make us more vulnerable to them. In his book Antifragile, Taleb (2013) states that the way to survive a black swan event is to be antifragile.

Most people answer that the opposite of fragile is robust, resilient, solid, or something of the sort. However, the resilient, robust (and company) are items that neither break nor improve, so you would not need to write anything on them — have you ever seen a package with robust in thick green letters stamped on it? Logically, the exact opposite of a fragile parcel would be a package on which one has written, please mishandle or please handle carelessly. Its contents would not just be unbreakable but would benefit from shocks and a wide array of trauma (Taleb, 2013).

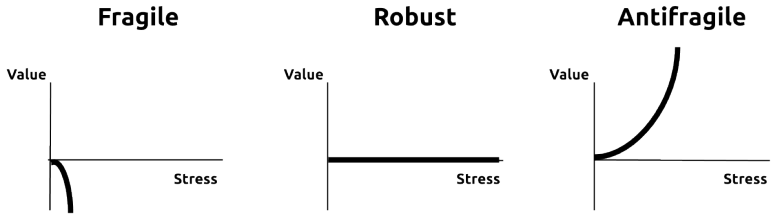

Figure 1.1.: EAAL: Triad (Botjes, 2020)

1.7. Problem statement

1.8. Research questions

1.8.1. Main research question

EA facilitates an organisation in assessing the impact of change and making recommendations for target states that support business objectives. EA guides an organisation in changing. EA can help organisations in changing into a state of antifragility. However, what are the success factors of enterprise architecture to accomplish antifragility?

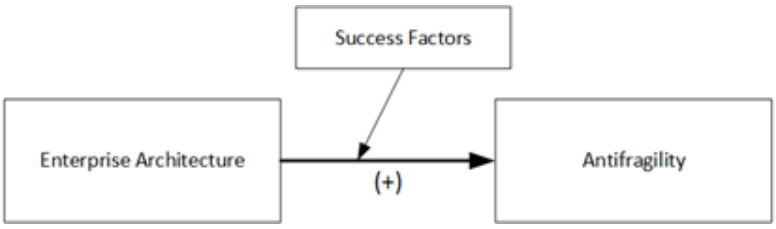

Figure 1.2.: Research Model

What are, for an Independent Software Vendor, the success factors of Enterprise Architecture for antifragility in the public sector market?

1.8.2. Sub-questions

1. Sub-question 1
2. Sub-question 2

2. Theoretical background

2.1. What is a system?

Remark. Place standard definitions at this spot of the thesis.

2.1.1. Open vs Closed systems

Complex adaptive system (CAS)

Quote from AMS011: (Turner & Baker, 2019)
"The whole is different from the sum of its parts and their interactions" [61] (p.77) Though emergence, the whole cannot be reduced to the original parts, the whole is considered a new entity or unit. The whole is "qualitatively different from their parts ... The cannot be meaningfully compared-they are different" [61] (system holism)
CAS is going against the second law of thermodynamics.

2.1.2. Linear and non-linear systems

2.1.3. Complexity Theory

Quote from AMS011:
The interactions within organisations are complex and can be explained better through the lens of complexity theory and CAS than by the other theoretical system approaches (Turner & Baker, 2019, p. 15).

Consider the concept of the Platonic fold, [7] which tells us that the act of modeling the world simplifies it to the point where any decisions made based on that model are misinformed due to details omitted for the sake of hiding complexity. This is also called 'Hidden Intelligence Syndrome" [8]. When humans build complex systems, they tend to fail, often catastrophically, because of Platonic folding. The solution to the Platonic fold requires accepting complexity as something we can neither predict nor control, along with accepting the limitations of modeling and risk management. Instead of pursuing correctness in these areas, we should aim to build systems that are antifragile to fluctuations in the VUCA elements (i.e., the system becomes stronger as the business environment warps and changes with time). (O'Reilly, 2019, p. 885)

Remark. Must eleborate more on this.

2.1.4. Viable Systems Model

Viable Systems Model (VSM)

2.1.5. Organisation as a System

2.2. Independent Software Vendor

2.3. Antifragile

- Randomness
- Variability
- Hormesis / Mithridatisation (by taleb) / Antidotum Mithridatium

It is important to realize that the degree of fragility of a system is often a function of its internal structure. The ability of a system to change under stress is governed by the interconnectedness of its parts, how strongly they are tied to each other, and how much change ripples through the system (O'Reilly, 2019, p. 886).

"Define antifragility as a property of a system" (Jaaron & Backhouse, 2014). Kastner (2017) created a framework for designing an antifragile organisation: Antifragile Organisation Design Framework. The framework consists out of 4 main principles:

- **Self Organisation.** Decentralisation can be seen as a strategy for organisational survival (Brafman & Beckstrom, 2007).
- **Ownership.** Result based and 'Skinin the game'.
- **Diversity of cells and organisational learning.**
- **DNA - Shared purpose, values and culture.**

Decentralised Systems, using self organising capabilities might not only survive disruptions but could even psorsper (Brafman & Beckstrom, 2007).The only real difference with Complex Adaptive System and antifragile of Taleb (2013) is that with antifragile stressors, disruptions, errors, volatility, randomness, chaos and uncertainty are seen as 'desired events' in order to strengten and evolve the system (Jaaron & Backhouse, 2014).

2.3.1. Volatile, uncertain, complex, and ambiguous

Volatile, uncertain, complex, and ambiguous.

2.3.2. Relation between antifragile, fragile, robust, resilient, and agile

antifragile with fragile, robust, resilient, and agile.

2.3.3. Resilience

Martin-Breen and Anderies (2011, p. 5-7) distinguishes three types of resilience:

- **Engineering Resilience.** Bounce back faster after stress, enduring greater stresses, and being disturbed less by a given amount of stress.
- **Systems Resilience.** Maintaining system function in the event of a disturbance. Systems resilience has been applied in governance and management, where it is often called robustness.
- **Resilience in Complex Adaptive Systems.** The ability to withstand, recover from, and reorganise in repsonse to crisis. The function is maintained by the system structure may not be. The main differentiator is the adaptive capacity or adaptability of the system.

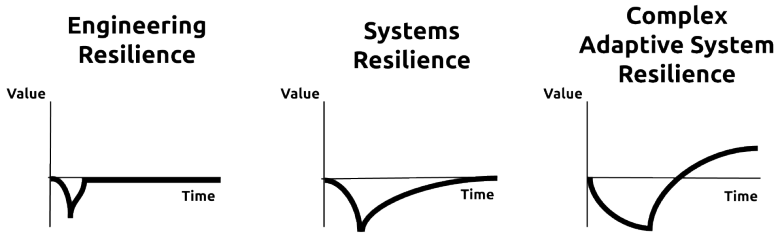

Figure 2.1.: EAAL: Three types of resilience (Botjes, 2020)

Remark. for systems resilience Kastner loc 327 contains three references that have to be used for reference on robustness.

Three key sytems properties contribute to its resilience (Martin-Breen & Anderies, 2011, p. 9):

- Diversity and Redundancy
- Modular Networks
- Responsive, regulatory feedbacks.

For resilience one not only needs to answer the questions "Resilience of what?" and "Resilience to what?", but also "Resilience for whom?" (Lebel et al., 2006, p. 21). One can apply basic critical systems design principles to spot ways to maintain any system's function in the event of a crisis (Martin-Breen & Anderies, 2011, p. 10):

- Maintain a diversity of mechanisms to provide identical functions.
- Make sure networks (social or otherwise) are modular enough so damange or "infection" of one portion does not immediately propogate to all others.

- Maintain or establish feedbacks to, in the simplest case, establish fail0safe mechanisms in case of malfunction.

One can maximize efficiency over all of these variables; however, such optimisation assumes full working knowledge of the system.

Remark. Enterprise architecture can be used to give this full working knowledge of the system.

The term resilience (including all three examined concepts) focuses on the avoidance of harmfull stressors and failure; and uncertainty and volatility. Moreover, these are even constructed to reduce vulnerability as much as possible (Martin-Breen & Anderies, 2011).

Remark. add extra references from Kastner to this cite.

2.3.4. Antifragile Systems Design

Antifragile Systems Design (ASD) (O'Reilly, 2019, p. 886-888) requires an organization to move as one toward solving the problem of complexity, which means changing the perspective from "us vs. them" (IT vs. business) to simply "us" (business). Business leaders, business/ enterprise architects, and software architects all need to engage with the process to make it work. This requires a new approach from both architects and business leaders (O'Reilly, 2019, p. 886).

Remark. Bridge to Business & IT Alignment of COBIT/EGIT (De Haes et al., 2020)? Is this a condition before you can start with antifragile? Mention it high level but exclude the application of COBIT in the research.

Architects need to work with the business to describe the VUCA environment, translate the impacts on the software decomposition, and even assist in business level mitigations (O'Reilly, 2019, p. 886).

Remark. Is this only about software systems or also other systems like an organisation? Can it be generalised?

O'Reilly (2019, p. 886) states that the four important principles for the design of an antifragile system, as described by Hole (2016, p. 35-39), are of great importance for ASD.

1. **Modularity.** Consisting of seperate, linked components.
2. **Weak Links.** A low level of interconnectedness between components.
3. **Redundancy.** The presence of more than one component to cope with failure.
4. **Diversity.** The ability to solve a problem in more than one way with different components.

The process of ASD constist out of four steps:

1. **VUCA Analysis.**

2. **System Decomposition - Flow First Design.**
3. **Design Testing.**
4. **Modified Failure Mode Effects Analysis (FMEA)**

Remark. Needs some extra explaination per item

Going forward, architects should consider the following actions (O'Reilly, 2019, p. 889):

- **Practice VUCA Analysis on the initiative's Business Model.**
- **Become an expert in system decomposition.**
- **Learn different methods for system decomposition.**
- **Learn to use modified FMEA to improve system designs.**

2.3.5. Residuality Theory

Resilient systems are, by definition, able to survive disruption and eventually regain function. Beyond resilience is the idea of antifragility – that systems actually learn from their exposure to stress and become stronger because of it (Taleb, 2013) (O'Reilly, 2020, p. 876). Residuality theory reveals a system as actually being made up of a stack of shadows which we cannot see without turning various lights on and off. We do this through a stressor analysis (O'Reilly, 2020, p. 877).

Remark. The stack of shadows is related to "the darkness principle" (Richardson, 2004, p. 78) from complexity theory. This can be replaced with the original source!

2.4. Enterprise Architecture

2.4.1. Three schools of Enterprise Architecture

There are three schools of Enterprise Architecture (Lapalme, 2012):

- **Enterprise IT Architecting.** Inputs are business strategy and objectives.
- **Enterprise Integrating.** It is grounded in systems thinking. It has a holistic view. The link between strategy and execution. Inputs are business strategy and objectives.
- **Enterprise Ecological Adaption.** Fostering organisational learning by designing all facets of the enterprise, including the relation to its environment.

2.4.2. Steering mechanisms

2.5. Public Sector market

2.5.1. Differences with the Private Sector Market

2.6. What is a stressor?

"Stress is knowledge (and knowledge is stress)." (Taleb, 2013, p. 54)

3. Research Methodology

3.1. Research Model

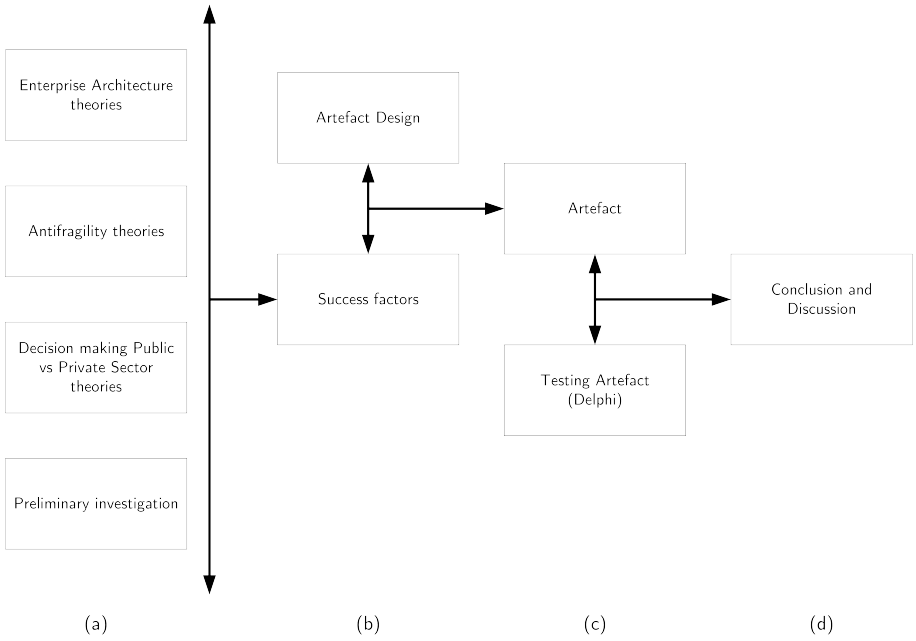

Figure 3.1.: Research Model

3.2. Delphi Group

For the Delphi Group participants see appendix D

What about the sample size? Normally Delphi is about 100+. What about this research. How large should the sample size be for a qualitative result?

3.3. Quality of the Research (old example text)

The research was qualitative. The information is based on qualitative information gathered by the researcher from employees of the organisation. However, with the research

approach and transparency, the research can be validated, can be repeated, so it is reliable and reducible. With the use of managerial models and methods like Lean, Value Stream Mapping with supporting tools like NEN-ISO/IEC 25011 and ServQual got a nonbiased result.

- **The validity** of the research is dependent on the right use of the right models and the right methods. The researcher conducted research on which models, frameworks and tools to use. The results and the rationales around the choice of theories, models, frameworks and tools are stated in chapter 4. The sources used for determining the theories, models, frameworks and tools are from scientific and expert sources.
- **The reliability** is about the influence of possible errors. For the research, the researcher used methods like triangulation, and sources from scientific reports and expert literature. The number of interviews was too small for the right statistical outcome. To enlarge the reliability of the interviews, the researcher used the same framework of themes for his semi-structured interviews. The transcriptions are placed in the appendixes for transparency. The information gathered with the interviewees is compared with the other interviewees.
- **The repeatability** is about getting the same results when the research is conducted again. The researcher uses his research design and research approach, as stated. All the steps taken are put into the research design. If this research design is followed, the same results should follow.
- **The reducibility** is about the outcome of the research can be deducted step by step. By using the research model, and the structure of the thesis, every step is reducible.
- Think about Replication
- Recker types
- OpenScience
- Howto falsify?
- Rigourness

> Open Science Open Access For Replication and transparency.
> (Recker, 2013, p. 16)

Replicability
Falsification
Independence
Precision

The research is using the FAIR Principles[1]

- Findable
- Accesible
- Interoperable
- Reusable

3.4. Literature research

For the literature research two methods are used. The first method is (foward and backward) snowballing already found literature. The second method is the use of scientific (online) libraries. The used libraries are:

- Web of Science
- Research Gate
- Google Scholar

A predefined collection of search strings is used for the search with scientific libraries.

3.4.1. Search strings

The following search strings are used for finding literature with the scientific libraries. Not only the full concept name is used but also the abbreviations (eg. Independent Software Vendor and ISV).

Enterprise Architecture	
Search String 1	Search String 2
Search String 3	Search String 4
Antifragile	
antifragile robust agile resilient	Search String 2
Search String 3	Search String 4
Independent Software Vendor	
Independent Software Vendor antifragile	Independent Software vendor resilient
Independent Software Vendor Public Sector	Independent Software Vendor Enterprise Architecture

[1] https://www.go-fair.org/fair-principles/

Public Sector

Difference public and private sector	Public Sector antifragile
Public Sector resilient	Search String 4

Enterprise Architeture & Antifragile

Search String 1	Search String 2
Search String 3	Search String 4

Enterprise Architect & Antifragility

Public Sector Market & Independent Software Vendor

3.4.2. Criteria for admission of literature

It is essential that the literature must help to develop the knowledge necessary to conduct the research. But before the literature can be used the quality of the literature must be evaluated. For evaluating the literature on the usability for this research the criteria accuracy, authority, objectivity, currency, and coverage is used[1].

3.5. Used infrastructure and tooling

For selecting the suitable instruments for the research, the Open Science Framework[2] is used. The Open Science Framework consists out of 4 stages in a research project. Those stages are: "Search and Discover, Design Study, Collect and Analyse, and Publish Reports." The Open Science Framework proposes specific infrastructure and tools per stage. The transparency in the used infrastructure and tools increases the quality of the research. It increases the replication factor, findability, accessibility, interoperability, and reusability.

3.5.1. Thesis creation

The student used his corporate laptop (Dell Latitude 7200 2-in-1[3]) with Windows 10 Professional installed for creating the thesis. The thesis is created with the markup language LaTeX[4]. The used typesetting environment is TexLive[5] with the document type of "Report" from KOMA-Script[6]. TexStudio[7] is the used LaTeX Editor. It supports syntax-highlighting, has an integrated viewer, reference checking and numerous wizards.

[1] https://libguides.library.cityu.edu.hk/litreview/evaluating-sources/
[2] https://www.cos.io/products/osf
[3] https://www.dell.com/en-us/work/shop/dell-laptops-and-notebooks/latitude-7200-2-in-1-laptop/spd/latitude-12-7200-2-in-1-laptop
[4] https://www.latex-project.org/
[5] https://www.tug.org/texlive/
[6] https://ctan.org/pkg/koma-script
[7] https://www.texstudio.org/

For the creation and administration of references BibLaTeX[1] is used with the reference manager JabRef[2] with the citation style of APA 7th Edition[3] and with web browser integration. The files are stored on a personal Dropbox[4] that is used by GitHub Desktop[5] to synchronise with a public GitHub repository[6]. GitHub[7] is used for source control but also for reviewing and discussing the topics with the (Co-)Promotor and the planning of the master thesis project. The thesis source files are copied to an Amazon S3 Blob[8] for backup. The backup rotation is seven versions. Cloudberry Explorer Freeware for Amazon S3[9] is used for backup. Grammarly[10], with the paid subscription service, checks the thesis for spelling, grammar, style, and plagiarism. The used goals for Grammarly are audience=knowledgeable, formality=formal, and domain=academic. Microsoft Visio Professional[11] is used to create figures. The GitHub repository contains all the sources.

3.5.2. Research administration

The research administration, which includes documentation containing privacy-sensitive information, like the name and contact information of the Delphi Group participants, is stored on a non-public GitHub Repository[12]. The private GitHub Repository is also for staging thesis parts that still need to be anonymised. For taking notes Leuchtturm1917[13] Notebooks are used with mechanical pencils of Faber-Castell[14] and pens from Sakura[15] with long-lasting ink.

3.5.3. Research execution

For the execution of the research, Microsoft Excel[16] is used for the administration of the literature research. For the administration of the literature research, the following headers are used: ID (for a unique ID per item), search terms used, scope, title, subtitle, author(s), year, type, BibLaTeX citation key, title relevance, abstract relevance, content relevance, found at, doi/isbn, url, date found, duplicate, date used, use for, and notes.

[1] https://ctan.org/pkg/biblatex/
[2] https://www.jabref.org/
[3] https://apastyle.apa.org/
[4] https://www.dropbox.com/
[5] https://desktop.github.com/
[6] https://github.com/JRBliekendaal/master-thesis
[7] https://github.com/
[8] https://aws.amazon.com/s3/
[9] https://www.msp360.com/explorer/windows/amazon-s3.aspx
[10] https://www.grammarly.com
[11] https://www.microsoft.com/en-ww/microsoft-365/visio/
[12] https://github.com/JRBliekendaal/master-thesis-administration
[13] https://www.leuchtturm1917.us/notebook-classic.html
[14] https://www.fabercastell.com/products/tk-fine-vario-l-mechanical-pencil-10mm-135900
[15] https://www.sakuraofamerica.com/product/pigma-micron/
[16] https://www.microsoft.com/en-us/microsoft-365/excel

Researchgate[1], Web of Science[2], and Google Scholar[3] are the main sources for searching for literature. PaperPanda[4] is used for hard to find literature. The literature administration is, together with the publicly available literature, stored in the repository of the master thesis. For non-public available literature, the administration contains the location where the literature is retrievable. All the literature is added to a bibLaTeX file for future reference. For traceability the entries in the bibLaTeX file contain the Unique ID in the notes field. JabRef is used to sort the references by using subgroups to support the workflow. The subgroups used are: "evaluate, rejected, and used." Only the literature in the subgroup used are transferred to the bibliography file of the thesis. This prevents cluttering. For working as paperless as possible all the literature, where possible, is in pdf or in ebook format. For reading Acrobat Reader DC[5] is used for reading the PDF, and an Amazon Kindle Oasis[6] for eBooks. With the Amazon Kindle the highlight feature is used. This is not stored on GitHub since the highlights are under copyright of the author(s).

For the execution of the Delphi Method, Meetingwizard[7] is used for questionnaires and the analysis of the questionnaires. The license for using Meeting Wizard is supplied by the Antwerp Management School.

[1] https://www.researchgate.net/
[2] https://app.webofknowledge.com/
[3] https://scholar.google.com/
[4] https://paperpanda.app/
[5] https://get.adobe.com/reader/
[6] https://www.amazon.com/dp/B07L5GJD99
[7] https://www.meetingwizard.nl/

4. Conclusion

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5. Discussion

5.1. Discussion on research

5.1.1. Public Sector

Is the public sector in The Netherlands the same as in the rest of the world? This needs further research and needs to be confirmed so that the outcome of this research is universally applicable.

5.2. Discussion on research quality

5.2.1. Size of Delphi Group

Is the size of the delphi group large enough to determine....

6. Blocks of text that can be used

6.1. Validation through an artefact

Because there is not much known on the applicability of antifragile on Enterprise Architecture, the success factors need to be validated to be true. To validate, the researcher will create an artefact. The Delphi Research Method is used to validate the artefact. By validating the artefact, the researcher can ensure that the success factors are valid with some degree of certainty.

6.2. CAS System Theory/Complexity sciences

Quote from AMS011:
"The whole is different from the sum of its parts and their interactions" [61] (p.77) Though emergence, the whole cannog be reduced to the original parts, the whole is considered a new entity or unit. The whole is "qualitativly different from their parts ... The cannot be meaningfully compared-they are different" [61] (system holism)

6.3. Relevant Laws

- Second Law of Thermodynamics
- Conways Law
- Metcalfe's Law

6.4. Discussion on Frameworks like TOGAF

When the third of the three different schools of Enterprise Architecture, Enterprise Ecological Adaption (Lapalme, 2012), is more suitable for a antifragile enteprise architecture and the residuality theory of O'Reilly (2021, p. 809) is advocating Post-Structuralism, then what is still the added value for frameworks like TOGAF, FEAF, ...

Remark. reference is not oreilly 2020 but 2021!!!

7. Chapter Template

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7.1. section title

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7.1.1. subsection title

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subsubsection title

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7.2. Building Blocks

7.2.1. table

What	When	Who	Why	How
X	1	1	2	3
Y	2	45	7	9
Z	0	0	1	7

Table 7.1.: Introduction Table

7.2.2. Picture

7.2.3. Glossary

```
\gls{antifragile}␣is␣not␣that␣\gls{fragile}\\
\Gls{antifragile}␣is␣not␣that␣\Gls{fragile}\\
```

Figure 7.1.: Placeholder

```
\gls{fragile} is not that \gls{antifragile}\\
\Gls{fragile} is not that \Gls{antifragile}\\
```

Gives:
antifragile is not that fragile
Antifragile is not that Fragile
fragile is not that antifragile
Fragile is not that Antifragile

7.2.4. Abbreviation

```
\acrfull{vuca}\\
\acrlong{vuca}\\
\acrshort{vuca}\\
```

Gives:
Volatility, Uncertainty, Complexity and Ambiguity (VUCA)
Volatility, Uncertainty, Complexity and Ambiguity
VUCA

7.2.5. Citing

```
\parencite{Bliek2017}
\parencite[p. 20]{Bliek2017}
\citeyear{Bliek2017}
\citeauthor{Bliek2017}
\parencite*{Bliek2017}
\textcite{Bliek2017}
\parencite{Doe2100,Bliek2017}
```

Gives:
(Bliekendaal, 2017)
(Bliekendaal, 2017, p. 20)
2017
Bliekendaal
(2017)
Bliekendaal (2017)
(Bliekendaal, 2017; Doe, 2100)

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Glossary of Terms

agile The ability to adjust before failure happens. 6

ambiguous tbd. 6

antifragile The ability to strive for and evolve under stress. 1–3, 5, 6, 8, 12, 21, 26

antifragility The state of being antifragile. 3, 4

complex tbd. 6

Failure Mode Effects Analysis is a Six Sigma technique that helps manage quality in a system by investigating how the system will cope with failure. 9

fragile The quality of being easily broken or destroyed. 3, 6, 21

fragility The state of being fragile. 6

resilient The ability to recover from failure. 3, 6

robust The ability to resist failure. 3, 6

uncertain tbd. 6

volatile tbd. 6

Abbreviations

ASD Antifragile Systems Design. 8

EA Enterprise Architecture. 1–4, 12

EAAL Extended Antifragile Attribute List. 3, 7

FMEA Failure Mode Effects Analysis. 9

IoT Internet of Things. 2

ISV Independent Software Vendor. 1, 2, 4, 12

VSM Viable Systems Model. 6

VUCA Volatility, Uncertainty, Complexity and Ambiguity. 1, 5, 8, 21

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Appendices

A. Personal Motivation

Personal story
- Why this subject
- Road to this subject
- Personal motivation
- Personal goals

B. Overview of Laws

The research references to several laws. This appendice gives a small explainatory overview of these laws.

- 2^{nd} Law of Thermodynamics
- Conways Law
- Metcalfe's Law

B.1. 2^{nd} Law of Thermodynamics

The '2^{nd} Law' was formulated after nineteenth century engineers noticed that heat cannot pass from a colder body to a warmer body by itself. It states that in any closed system the amount of order can never increase, only decrease over time. Another way of saying this is that entropy always increases.

B.2. Conways Law

B.3. Metcalfe's Law

C. Interview Participants

Who	Role	From
Christiaan Konstapel	Lead Enterprise Architect	Mileway
Y	2	tbd
Y	2	tbd

Table C.1.: Interview Participants

D. Delphi Group Participants

Who	Role	From
Jan Ploeg	Enterprise Architect	Centric Netherlands B.V. (ISV)
Y	2	Other ISV
Y	2	Municipality
Y	2	VNG-Realisatie
Y	2	Logius
Z	0	Academic

Table D.1.: Delphi Group Participants

E. Literature Selection

F. Research Log

Date	What
24/11/20	Initial research subject proposal to AMS
25/11/20	Initial research subject proposal sent to Hans Mulder & Yuri Bobbert
30/11/20	First meeting with Hans Mulder to explore the subject
12/02/21	AMS Master Project Coaching
10/03/21	Second meeting with Hans Mulder. Definitive Area of Research selected. The success factors of EA for Business Agility/Resilience/antifragility
11/03/21	Elaborated with COO on antifragility
14/03/21	Started research on the concept of antifragility
03/04/21	One Pager on the concepts Enterprise Architecture, Public Sector, Independant Software Vendor, and Antifragility
04/04/21	Deskresearch on concepts
10/04/21	Reading Taleb
25/05/21	Third meeting with Hans Mulder
20/06/21	Creating 5 pager
20/06/21	Sent 5 pager presentation for review to Hans Mulder
20/06/21	Sent 5 pager presentation for review to Dieneke Schouten (COO) and Maarten Hillenaar (CEO)
20/06/21	Promotor suggestion Roland Ettema, Martin Op 't Land, Bas van Gils or Hans Mulder
20/06/21	Sugestion of Hans Mulder as promotor with Edzo Botjes as co-promotor
21/06/21	Requested Maarten Hillenaar as Sponsor, Dieneke Schouten as Second Reader, Jan Ploeg as participant in Delphi, Christiaan Konstapel as interviewee
24/06/21	Presentation of Five Pager at Master Project Coaching AMS
29/06/21	Created thesis LaTeX skeleton
06/07/21	Meeting with Edzo Botjes to get acquainted
06/07/21	Edzo Botjes accepted co-promotorship
date	what
date	what
date	what
enddate	final version