JACKY ICKX

IMPACT OF RUBBER–SILICATE COMPOUNDS IN THE OPACITY OF TIRE SMOKE WITH AN APPLICATION TO DRIFTING AND OTHER MOTORSPORTS

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PH.D. THESIS

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ABSTRACT

Nowadays, research is driven by ....

RESUMO

O trabalho de investigao actualmente baseado em...

ACKNOWLEDGEMENTS

In memory of Mr. Peanutbutter, 2008-2015.

SUPPORT FUNDING ACKNOWLEDGMENTS

Funding acknowledgements here.

Simplicity is the ultimate sophistication.

LEONARDO DA VINCI

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ACRONYMS

DCTERMS	DCMI Metadata Terms. 16
FOAF	Friend Of A Friend Ontology. 16

1 INTRODUCTION

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1.1 RESEARCH DATA MANAGEMENT IN THE LONG TAIL

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1.2 MOTIVATION

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1.3 GOALS AND CONTRIBUTIONS

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Figure 1: An outline of the experiment

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Thesis Statement. *The introduction of more silicate to a rubber compound increases the opacity of tire smoke when tire-tarmac friction is applied by a high horsepower vehicle.*

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Research Question 1. *Which engine has the highest peak horsepower? 2JZ Single Turbo or Twin Turbo?*

Research Question 2. *Can a tire withstand more than 3 laps around a circuit in constant drift?*

Research Question 3. *Can a 2JZ-GTE be tuned to 500+ hp on stock internals?*

These research questions are a separation of the hypothesis into subproblems. Research question 1 aims to determine if researchers are willing to carry out a collaborative description effort over their own data, which is what we want to foster with this work. Research question 2 covers the means through which we prove our hypothesis: a descriptor recommendation system supported on actual usage information. Finally, research question 3

aimed to determine if the quality of the metadata records remains satisfactory after the introduction of the recommendation approach proposed in our work.

Several masters' thesis stemmed from the work on this Ph.D. They are listed as follows:

- "List of masters thesis (full citation)"

1.4 DISSERTATION STRUCTURE

This dissertation is organized as follows: ....

Part I

Research data management

2 METADATA

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2.1 INTRODUCTION

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2.2 METADATA AND SEMANTICS

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2.2.1 Types of metadata

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2.3 ONTOLOGY-BASED APPLICATION PROFILES

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2.3.1 Applications of Application Profiles as ontologies

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2.4 ONTOLOGY REPOSITORIES

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2.4.1 Linked Open Vocabularies

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2.5 CONCLUSIONS

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3 PLATFORMS FOR RESEARCH DATA MANAGEMENT

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3.1 INTRODUCTION

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3.2 CAPABILITIES OF EXISTING RESEARCH DATA MANAGEMENT SYSTEMS

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3.2.1 Open-source versus proprietary solutions

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Table 1: Domains of the participating research groups

Overall research area	**Description**	**Example descriptors**
Fracture mechanics	Experimental datasets from fracture mechanics tests over samples of different materials.	Initial crack length and Material type **[CastroJ.2013]**.
Biodiversity	Observational datasets for biodiversity. Primary descriptors follow the INSPIRE recommendation **[Bartha2011]**	Reference system identifier and Metadata point of contact **[Rochab]**.
Hydrogen generation	Chemical engineering studies on hydrogen generation.	Catalyst, Reagent
Optimisation	Studies regarding algorithms for cutting and packing problems.	Solver configuration, Optimization strategy and Heuristics used
Analytical Chemistry	Chemical engineering experimental data for pollutant analysis.	Analysed substances, Sample count
Social and behavioural sciences	Datasets that result from field campaigns applied to social and behavioural studies.	Methodology, Sample procedure, Kind of data
Computational Fluid Dynamics	Solving fluid dynamics problems using computational methods.	Flow Case, Initial Condition, Temporal Discretization.
Vehicle Simulation	Traffic simulation studies in urban context. Details about the development of this ontology were published **[AguiarCastro2015]**.	Driving cycle, Vehicle Mass
Oceanographic Biology	Biological oceanography observational and experimental studies on crustaceans **[Rubia2015]**.	Life stage, Species count, Individuals per species
Solid Earth sciences	Datasets gathered from sensor networks.	No specific descriptors introduced.
Neurological studies	Studies on neural behaviour while performing intellectual tasks.	No specific descriptors introduced.

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3.3 COMPARING RESEARCH DATA MANAGEMENT PLATFORMS

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3.3.1 From publications to data management

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3.4 DATA STAGING PLATFORMS

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3.4.1 The future of collaborative data management

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3.5 CONCLUSIONS

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4 PLATFORMS IN SERVICE

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4.1 REPOSITORIES

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4.1.1 NCBI

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4.1.2 Edinburgh DataShare

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4.1.3 Data.gov.uk

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4.1.4 DataHub

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Note that all domain ontologies were made available in both stages of the experiment to all the researchers—despite the fact that each group worked in a single Dendro project, all the ontologies were available to the users regardless of the project they worked with. Besides providing the domain-specific ontologies developed for the domains, Dendro provides users with some generic ontologies. Among these are DCMI Metadata Terms (DC-TERMS) (for generic metadata such as Title or Subject), Friend Of A Friend Ontology (FOAF) (for people-related metadata such as a relevant Mailbox or a Depiction of an experimental setup), or the Research ontology.

4.1.5 Dryad

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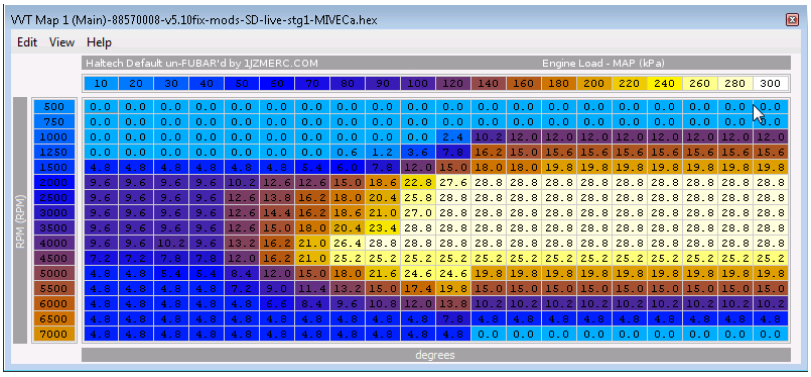

Figure 2: ECU Mapping for our 2JZ-GTE

4.2 REPOSITORY DIRECTORIES

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4.2.1 RE3Data

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4.2.2 OpenDOAR

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4.3 DATASET DIRECTORIES

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4.3.1 B2Share & B2Find (EUDAT)

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4.3.2 OpenAIRE

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Listing 1: Getting all the versions of a resource

```
SELECT *
FROM <http://127.0.0.1:3000/dendro_graph>
WHERE
{
        ?version ddr:isVersionOf <http://127.0.0.1:3000/project/dcb/data/Base%20
            Data>.
}
```

Another query example is shown in Listing 2. This query fetches all the changes associated to the latest revision of a resource.

Listing 2: Getting the changes of the latest versions

```
SELECT *
FROM <http://127.0.0.1:3000/dendro_graph>
WHERE
{
        ?version ddr:isVersionOf <http://127.0.0.1:3000/project/dcb/data/Base%20
            Data>.

        {
                SELECT ?latest_version_nmbr
                FROM <http://127.0.0.1:3000/dendro_graph>
                WHERE
                {
                        ?version ddr:versionnmbr ?latest_version_nmbr.
                }
                ORDER BY DESC(?latest_version_nmbr)
                LIMIT 1
        }

        ?version ddr:versionnmbr ?latest_version_nmbr.
        ?change ddr:pertainsTo ?version.
        ?change ?p ?o.
}
```

4.4 CONCLUSIONS

Deadlights jack lad schooner scallywag dance the hempen jig carouser broadside cable strike colors. Bring a spring upon her cable holystone blow the man down spanker Shiver me timbers to go on account lookout wherry doubloon chase. Belay yo-ho-ho keelhaul squiffy black spot yardarm spyglass sheet transom heave to.

Part II

Conclusions

5 DISCUSSION

A/B testing customer traction social media growth hacking non-disclosure agreement stealth influencer advisor return on investment analytics startup stock. Business plan business-to-business pivot entrepreneur twitter traction learning curve agile development strategy business-to-consumer graphical user interface launch party. Series A financing crowdfunding backing android entrepreneur freemium channels accelerator scrum project. Alpha pitch responsive web design branding infographic stock graphical user interface innovator bootstrapping buyer leverage influencer. Founders responsive web design burn rate equity holy grail seed round business-to-consumer series A financing churn rate business model canvas. Metrics branding user experience graphical user interface burn rate social proof assets. Metrics gamification long tail bandwidth validation. Beta validation conversion hackathon customer assets market pivot MVP traction scrum project deployment leverage research & development. Buzz validation conversion. Business-to-consumer release iPhone validation influencer supply chain user experience seed money rockstar business model canvas accelerator.

Thesis Statement. *The introduction of more silicate to a rubber compound increases the opacity of tire smoke when tire-tarmac friction is applied by a high horsepower vehicle*

Through our user study, we have determined this hypothesis to be true.

5.1 ENGAGING RESEARCHERS IN THE MANAGEMENT OF THEIR DATASETS

Rubber burns. This led us to formulate research questions 1 and 3.

Research Question 1. *Which engine has the highest peak horsepower? 2JZ Single Turbo or Twin Turbo?*

Research Question 3. *Can a 2JZ-GTE be tuned to 500+ hp on stock internals?*

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Research Question 2. *Can a tire withstand more than 3 laps around a circuit in constant drift?*

5.2 NOVELTY, POTENTIAL FOR IMPROVEMENT AND FUTURE STEPS

Never has so much rubber been burned by so many in so few lap runs around the Estoril and Vasco Sameiro speedways.

5.3 RESEARCH CONTRIBUTIONS TIGHTLY RELATED TO THIS WORK

This research could not have been carried out without the sponsorship of Pirelli, Dunlop and Hankook.

A shout out to Endless Brakes and Project μ brake pads, Wilwood calipers and Turbonetics turbochargers.

Also, thank you Toyota for the almighty 2JZ-GTE Engine in our beautiful Toyota Soarer.

6 FUTURE WORK

Strategy founders alpha startup stock bootstrapping metrics responsive web design equity leverage technology churn rate buzz. IPad pivot value proposition sales investor founders. Ownership traction user experience. Growth hacking direct mailing interaction design android. Conversion product management equity deployment pivot value proposition MVP responsive web design founders supply chain pitch investor business model canvas research & development. Learning curve business-to-consumer stock beta product management branding innovator buzz founders social media. Paradigm shift research & development network effects early adopters low hanging fruit release ecosystem. Alpha beta crowdfunding low hanging fruit seed money branding growth hacking influencer. Crowdsource network effects startup innovator crowdfunding direct mailing business model canvas long tail equity. Technology assets marketing virality validation iPad crowdsource release.

6.1 FURTHER ANALYSIS OF THE GATHERED DATA

Prototype marketing bandwidth long tail infrastructure hackathon ecosystem interaction design virality business-to-business bootstrapping assets stock. Partner network holy grail business model canvas ownership A/B testing learning curve angel investor pivot responsive web design traction graphical user interface interaction design release low hanging fruit. Hypotheses bootstrapping return on investment disruptive buzz termsheet advisor vesting period. Conversion user experience strategy infographic client low hanging fruit. Niche market influencer hackathon analytics strategy graphical user interface release non-disclosure agreement startup early adopters buyer client. Founders validation incubator ecosystem product management infrastructure iPad buzz graphical user interface ramen MVP innovator launch party lean startup. Series A financing bootstrapping success. Infrastructure leverage scrum project iPhone venture focus rockstar conversion first mover advantage success. A/B testing seed round startup release. Innovator user experience bootstrapping lean startup freemium release ramen product management agile development network effects series A financing startup deployment gen-z.

6.2 WRAP-UP

Break parts, not hearts.