Everything for the Users, Nothing by the Users

Lessons Learnt From a Heterogeneous Data Mapping Languages User Study

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Introduction

Why usability?

• Declarative mapping rules
• Faster and more flexible process
• Less time and resources
• Some exiting languages claim to be user friendly
  • YARRRML and ShExML
• Others to be easy to learn by semantic web experts
  • SPARQL-Generate

Final goal: to ease users’ workflow

Not quantified
Introduction

More on Why usability? The recent change of perspective

• Semantic Web community used to center on new features and technical improvements
  • Historical analogy -> Enlightened Despotism
    • “Everything for the users, nothing by the users”
• Recent trends claim to develop more user-centric approaches
  • Understand users
  • Improve their productivity
• A huge analysis tool to decide future actions on a topic
Introduction

Our usability experiment

• TTBOMK, only our recent study [1] has tackled this aspect for heterogeneous data mapping languages

• We briefly summarise and explain it

• From its outcomes we envisage next actions in the community

• To better understand and address users’ problems

Brief Experiment Description
Brief experiment description

Language selection criteria

• Languages which goal is to be user friendly
• SPARQL-Generate, YARRRML and ShExML
• Why not to include RDF-based syntax approaches?
• Verbosity (solutions are much longer)
• Therefore, similar syntax in terms of verbosity

Not fair and a bias from the beginning!!!
Brief experiment description

Methodology

• Mixed-method approach
  • Quantitative (objective variables measure: behavioural and performance metrics)
  • Qualitative (subjectives variables measure: users’ perceptions)
    • Qualitative results can give a better understanding of quantitative results
• 20 students (randomly assigned to languages) of MSc in Web Engineering
  • Semantic web course (RDF, SPARQL, ShEx, etc.)
  • Task 1: Generate mapping rules given inputs and a desired output
  • Task 2: Modify the previously generated mapping rules to match a new output

First-time users with some background knowledge
Results & Highlights

Statistical results

• Statistical analysis (hypothesis testing) with pair-wise comparisons
  • Task 1 - Quantitative analysis
  • Significant differences on:
    • Elapsed seconds (ShExML and YARRRML)
    • Completeness percentage and precision (ShExML and SPARQL-Generate)
  • No significant differences on:
    • Keystrokes (no difference in language verbosity)
    • Left & Right button clicks, mouse wheel scroll and meters traveled by the mouse (Similar web playground)

⚠️ We’ll come back later to this
Results & Highlights

Statistical results

• Task 1 - Qualitative analysis
  • Significant differences on:
    • General satisfaction & Easiness of use (ShExML and YARRRML)
    • Learnability & Mapping definition easiness (ShExML and both other languages)
  • Differences align with quantitative ones:
    • Difficulties in SPARQL-Generate -> Worse learnability and mapping definitions easiness
    • More time consumed with YARRRML -> Lower levels on general satisfaction and easiness of use
Results & Highlights

Statistical results

• Task 2:
  • No significant differences due to low sample sizes (6 for ShExML & 1 for YARRRML)
  • Modifiability: 5 by 83% of the ShExML users, 3 by the only YARRRML user
  • SPARQL-Generate users didn’t reach this task due to difficulties to finish the first one
Results & Highlights

Discussion

• SPARQL-Generate -> Its design is having a bad effect on first-time users -> Difficult to use and learn
• ShExML & YARRRML -> Where’s the difference?
  • Hypothesis: Difference in syntax
• Bad scores in the three languages -> Call to action!!!!
  • Language design lead to commit errors
  • Bad error reporting systems
  • No applicability
Actions To Take
Actions to take

Outputs from the experiment

• Take care of how new features are added and designed in languages
  • Avoid bad impact on usability and learnability
• Take care of badly scored variables in the three languages
• Applicability & Learnability on first-time users -> Adoption!!!
• Semantic Web community
  • Focused in new features and technical improvements
  • Need to develop more user-centric approaches (new and recent shift of paradigm)
Actions to take

Methodological tools

• Stronger methods to support our hypothesis and conclusions
  • In our study -> Statistical hypothesis testing, why?
    • Avoid erroneous conclusions
    • Corroborate that our findings were not obtained just by chance
    • Take into account the variance
    • Measure the evidence strength (effect size)
Actions to take

Methodological tools

• Example from our data
• Precision variable
  • ShExML mean: 0.495
  • YARRRML mean: 0.131
• Intuitively ShExML users are more precise
• Statistically they are not!!!
  • Why?

Variance!!!
Actions to take

More studies

- We only covered first-time users with some background knowledge
- More profiles -> Whole perspective
- We also have to compare visual and non-visual approaches
- Discern preferences by profiles
- Differences in syntax
- Experiments that come closer to users’ mental processes
  - One possibility: Cognitive models and frameworks
    - Deliver explanations to empirical studies
Conclusions
Conclusions

And take-home lessons

• Focus on users, understand them and take care of their needs (put them in the center)
• Recent trend in the Semantic Web community
• Example of an heterogeneous data mapping languages study and its outcomes
  • Take care of features design!
  • Do more experiments!
• Involve users!
• Use strong methodological and analysis systems (statistics are an ally not an enemy)
  • Learn from other scientific fields
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