

Factors affecting Technical Debt Raw data from a systematic literature map

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Factors affecting Technical Debt
Raw data from a systematic literature map
(Documento de trabajo)

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Marzo de 2014

Technical Debt Reading List.

Results from a Systematic mapping study

ABSTRACT

This document presents the complete list of references that have been short listed during the systematic review process carried out during the months of April-September 2012.

The objective of the systematic review was to identify current research trends in technical debt and to explore the relationship between technical debt measures and agile software development.

This documents includes 352 references that are categorized according to their relevance to technical debt research.

Technical Debt Reading List.

Results from a Systematic mapping study

TECHNICAL DEBT READING LIST: RESULTS FROM A SYSTEMATIC MAPPING STUDY

This document is intended as a reading list for technical debt research. It details the 352 articles that have been reviewed during the a systematic review performed by Alberto Villar from April 2012 until July 2012.

This report is the second intermediate result of an ongoing literature mapping project. After each iteration new knowledge has been developed.

This iteration was commissions in order to explore the software metrics and factors that could affect a projects' technical debt..

Results of this systematic review have been sent to publication outlet and are being considered.

The references are organized according to a classification criteria driven by their application on the subject of Technical debt.

The following exclusion criteria were defined:

- The topic did not relate to software development (D_NET)
- The article is not accessible with the authors subscription level (NA)
- The article was filtered by authors after reading the abstract (D_PA)
- The article was filtered by author after reading the full paper (D_PL).
- Filtered because the registry did not represent a full paper (D_ITOC).
- Repeated papers were also filtered (REP).

The following table summarizes the filtering process.

Keywords

Keywords have been enhanced from last iteration to encompass de full software development lifecycle:

- "technical debt";
- "design debt";
- "analysis debt",
- "requirements debt",
- "testing debt",
- "configuration management debt",
- "process debt",
- "architecture debt",
- "architectural debt",
- "people debt",
- "documentation debt",
- "code quality debt".

Search Engines

The search was carried out during the month of August 2013 in ACM; Springer; IEEE; SciVerse; and Citeseerx.

Summary of results

Table 1 Summary of references related to technical Debt research

| D_NET | NA | D_PA | D_PL | D_ITOC | REP | Total |
|-------|----|------|------|--------|-----|-----------|
| 0 | 27 | 2 | 0 | 9 | 20 | 58 |

Technical Debt Reading List. Results from a Systematic mapping study

| | | | | | | |
|-----------|-----------|----------|----------|-----------|-----------|------------|
| 4 | 8 | 0 | 0 | 0 | 1 | 13 |
| 2 | 3 | 1 | 5 | 12 | 1 | 24 |
| 0 | 7 | 0 | 0 | 8 | 1 | 16 |
| 36 | 3 | 5 | 3 | 2 | 4 | 53 |
| 42 | 48 | 8 | 8 | 31 | 27 | 164 |

Factors affecting technical debt

The following table presents the factors that have been identified in the literature. Factors have been classified according to their relevance to the different stages of a software development lifecycle/

Table 2 Factors affecting technical debt in software process

| Factores | code | Life cycle | Factores (N_AD - N_TD_A) | N_T D_I | N_T D_C | N_N om | Total |
|---|--------|----------------|--------------------------|---------|---------|--------|-------|
| deterioro de la arquitectura | F_DA | AYD | 4 | 0 | 0 | 0 | 4 |
| deterioro del código /diseño | F_DC | AYD, Impl | 3 | 0 | 1 | 0 | 4 |
| Falta de transparencia hacia otros stakeholders | F_FTR | TODO | 1 | 0 | 0 | 0 | 1 |
| short-term versus long-term goals (nivel código y diseño) | F_ST_C | AYD, Impl | 1 | 2 | 3 | 0 | 6 |
| short-term versus long-term goals (nivel arquitectura) | F_ST_A | AYD, Impl | 0 | 0 | 0 | 0 | 0 |
| short-term versus long-term goals (nivel general) | F_ST_G | TODO | 2 | 3 | 1 | 1 | 7 |
| cambios rápidos en tecnologías | F_CRT | TODO | 2 | 0 | 0 | 0 | 2 |
| nuevos requerimientos en entornos legados | F_NRL | Requerimientos | 1 | 0 | 0 | 0 | 1 |
| requerimientos mal definidos y/o cambiantes | F_REQ | Requerimientos | 0 | 3 | 1 | 0 | 4 |
| cambios en el equipo | F_CEQ | TODO | 1 | 0 | 0 | 0 | 1 |
| falta de tiempo / budget | F_FTT | TODO | 1 | 1 | 2 | 0 | 4 |
| falta de fondos para realizar los cambios necesarios | F_FFOT | TODO | 1 | 0 | 0 | 0 | 1 |
| falta de conocimiento/experiencia | F_FEX | TODO | 1 | 1 | 1 | 2 | 5 |
| mal control de versionado | F_SCM | SCM | 1 | 1 | 1 | 0 | 3 |
| poco esfuerzo y poca motivación | F_PEM | TODO | 0 | 1 | 1 | 0 | 2 |
| insuficiente testing | F_ITE | TEST | 0 | 2 | 4 | 2 | 8 |
| excesivo testing manual | F_T | TEST | 0 | 1 | 2 | 0 | 3 |

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| | EM | | | | | | | |
|---|-----------|-----------|---|---|---|---|---|---|
| mala integración y manejo de releases | F_R EL | SCM | 0 | 1 | 0 | 0 | 0 | 1 |
| compromiso en una dimensión en detrimento de otra | F_DI M | TODO | 0 | 1 | 0 | 0 | 0 | 1 |
| Like-to-like migration | F_LL M | TODO | 0 | 1 | 0 | 0 | 0 | 1 |
| bajo refactoring y rediseño | F_B RD | AYD, Impl | 0 | 0 | 5 | 0 | 0 | 5 |
| pobre codificación en etapa de desarrollo | F_C PD | AYD, Impl | 0 | 1 | 3 | 0 | 0 | 4 |
| gerenciameinto de proyectos caótico | F_G PC | TODO | 0 | 1 | 1 | 0 | 0 | 2 |
| time to market | F_T TM | TODO | 0 | 0 | 4 | 1 | 0 | 5 |
| obsolescencia tecnológica | F_O TN | TODO | 0 | 0 | 1 | 1 | 0 | 2 |
| cambio de estándares de calidad en el tiempo | F_C ES | TODO | 0 | 0 | 1 | 0 | 0 | 1 |
| nuevas oportunidades de negocio | F_N OS | TODO | 0 | 0 | 1 | 0 | 0 | 1 |
| costos de implementación / rework | F_CI R | AYD, Impl | 1 | 0 | 0 | 0 | 0 | 1 |
| pobre adherencia a estándares de desarrollo | F_A ES | AYD, Impl | 0 | 0 | 0 | 1 | 0 | 1 |
| adquisición de software legado | F_A SL | TODO | 0 | 0 | 0 | 0 | 0 | 0 |
| imprudencia | F_I MP | TODO | 0 | 0 | 0 | 0 | 0 | 0 |

Table 3

Papers regarding Technical debt research

- N_Nom: Are those papers that only mention technical debt.

Block, M. (2011). Evolving to Agile: A Story of Agile Adoption at a Small SaaS Company. 2011 AGILE Conference (pp. 234–239). IEEE. doi:10.1109/AGILE.2011.16

Correia, F. F. (2010). Supporting the evolution of software knowledge with adaptive software artifacts. Proceedings of the ACM international conference companion on Object oriented programming systems languages and applications companion - SPLASH '10 (p. 231). New York, New York, USA: ACM Press. doi:10.1145/1869542.1869588

Derby, E. (2009). Open Forum Three Encouraging Developments in Software Management ©. CrossTalk. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.177.8333>

Devedzic, D. D. and V. (2012). Incorporating the Ontology Paradigm Into Software Engineering: Enhancing Domain-Driven Programming in Clojure/Java. IEEE Transactions on Systems, Man, and Cybernetics, Part C (Applications and Reviews), 42(1), 3–14. doi:10.1109/TSMCC.2011.2140316

Kajko-Mattsson, M., Azizyan, G., & Magarian, M. K. (2010). Classes of Distributed Agile Development Problems. 2010 Agile Conference (pp. 51–58). IEEE. doi:10.1109/AGILE.2010.14

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Nottonson, K., & DeLong, K. (2008). Crawl, Walk, Run: 4 Years of Agile Adoption at BabyCenter.com. Agile 2008 Conference (pp. 116–120). IEEE. doi:10.1109/Agile.2008.84

Uy, E., & Ioannou, N. (2008). Growing and Sustaining an Offshore Scrum Engagement. Agile 2008 Conference (pp. 345–350). IEEE. doi:10.1109/Agile.2008.71

- N_TD_C: Are those papers whose scope on the Technical debt subject is limited to code.

AlGhamdi, J. S., & Muzaffar, Z. (2011). Metric suite for assuring the quality of ERP implementation and development. Advanced Communication Technology (ICACT), 2011 13th International Conference on (pp. 1348–1352). IEEE. Retrieved from [http://ieeexplore.ieee.org/xpl/articleDetails.jsp?tp=&arnumber=5746054&contentType=Conference+Publications&sortType=desc_p_Publication_Year&matchBoolean=true&pageNumber=2&searchField=Search_All_Text&queryText=\(.QT.technical+debt.QT.\)+OR+.QT.design+debt.QT.](http://ieeexplore.ieee.org/xpl/articleDetails.jsp?tp=&arnumber=5746054&contentType=Conference+Publications&sortType=desc_p_Publication_Year&matchBoolean=true&pageNumber=2&searchField=Search_All_Text&queryText=(.QT.technical+debt.QT.)+OR+.QT.design+debt.QT.)

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Bhasin, S. (2012). Quality Assurance in Agile: A Study towards Achieving Excellence. 2012 Agile India (pp. 64–67). IEEE. doi:10.1109/AgileIndia.2012.18

Bird, C. (2005). Top 10 tips for better agile. Information Professional, 2(6), 33–36. Retrieved from [http://ieeexplore.ieee.org/xpl/articleDetails.jsp?tp=&arnumber=5319779&contentType=Journals+Magazines&sortType=desc_p_Publication_Year&matchBoolean=true&pageNumber=4&searchField=Search_All_Text&queryText=\(.QT.technical+debt.QT.\)+OR+.QT.design+debt.QT.](http://ieeexplore.ieee.org/xpl/articleDetails.jsp?tp=&arnumber=5319779&contentType=Journals+Magazines&sortType=desc_p_Publication_Year&matchBoolean=true&pageNumber=4&searchField=Search_All_Text&queryText=(.QT.technical+debt.QT.)+OR+.QT.design+debt.QT.)

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