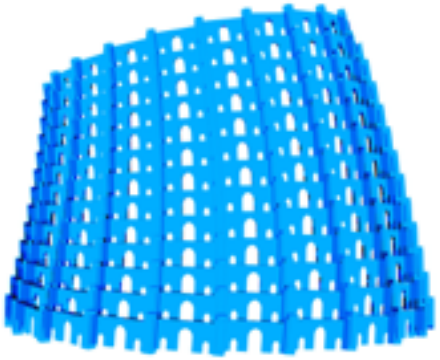
UNIVERSITÄT KOBLENZ · LANDAU

Developer Experience with the Django Web Framework



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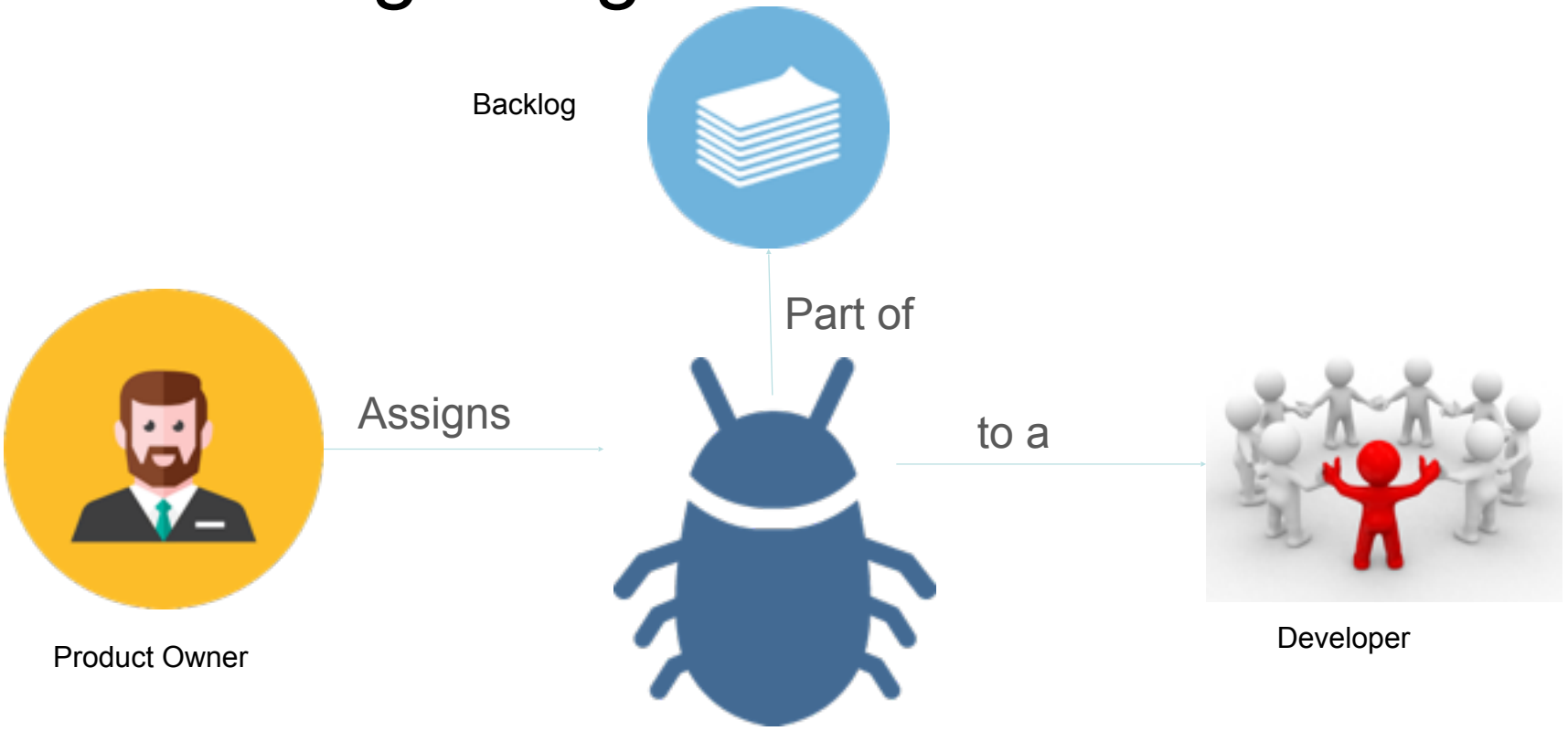
Agenda

1. Motivation
2. Framework
3. Methodology
4. Explanation of filters
5. Example rules
6. Case study

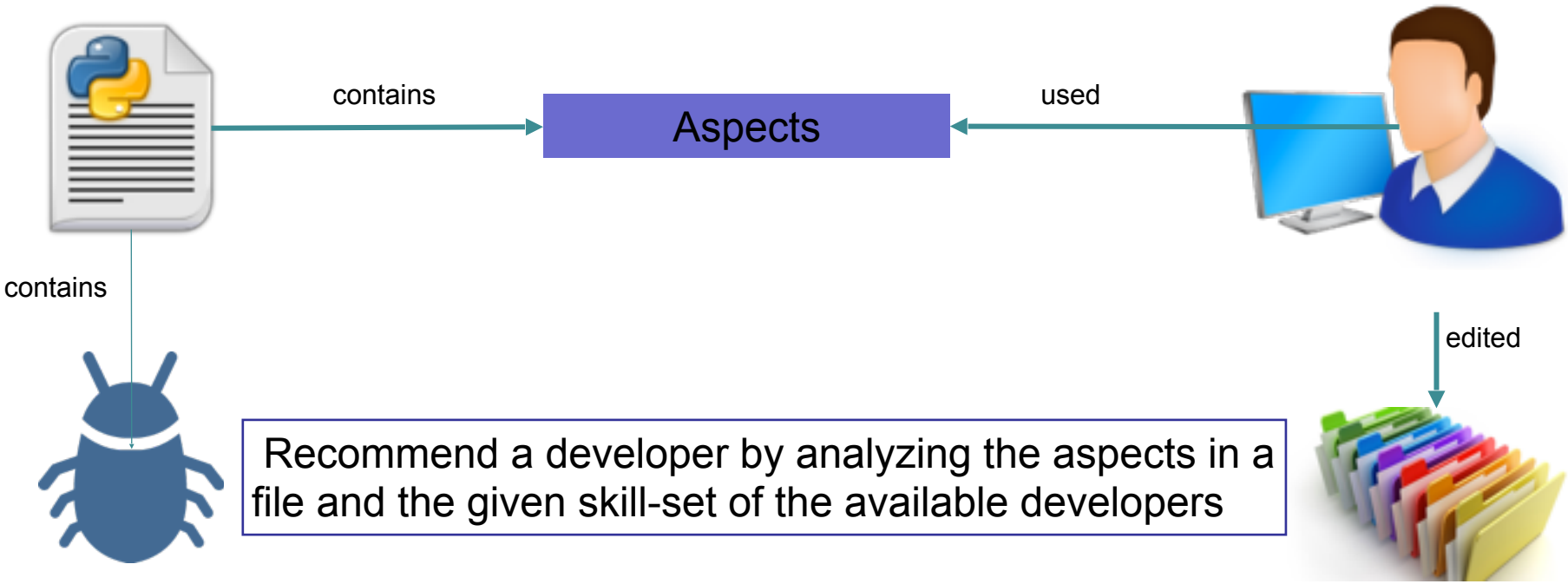
Bug assignment is not trivial



Which contributor has the skill-set to fix a certain bug in a reasonable time ?

Recommand an expert

Find the developers with the skill-set matching to the aspects of a file



Issues of the approach

- What are aspects of a framework?
- How to find and identify those aspects?
- How can the skill-set of a developer be computed?

Web frameworks

Frameworks are used in a lot software projects

Some frameworks help to build web applications

Django is a popular python web framework

Django is popular and widely used

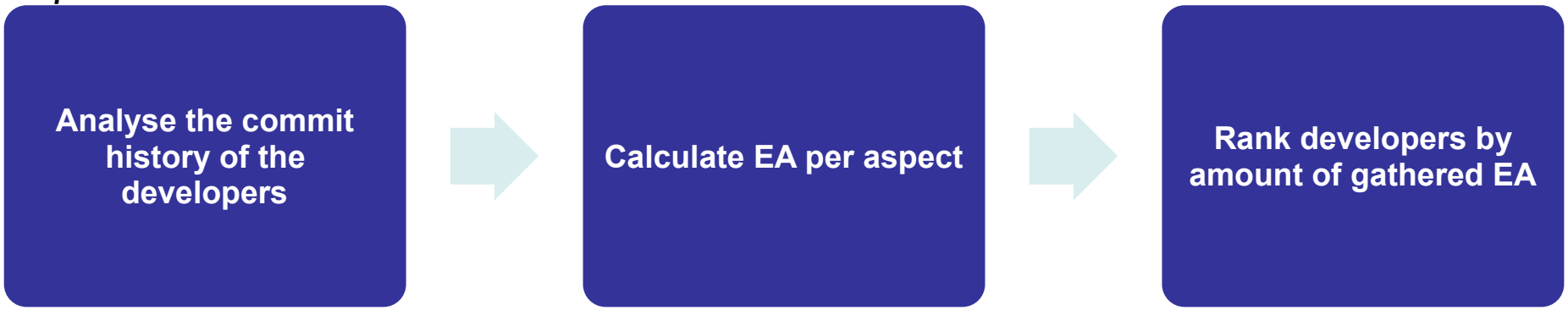
„Django makes it easier to build better Web apps more quickly and with less code.“

- **Quick development**
- **Reassuringly secure**
- **Exceedingly scalable**

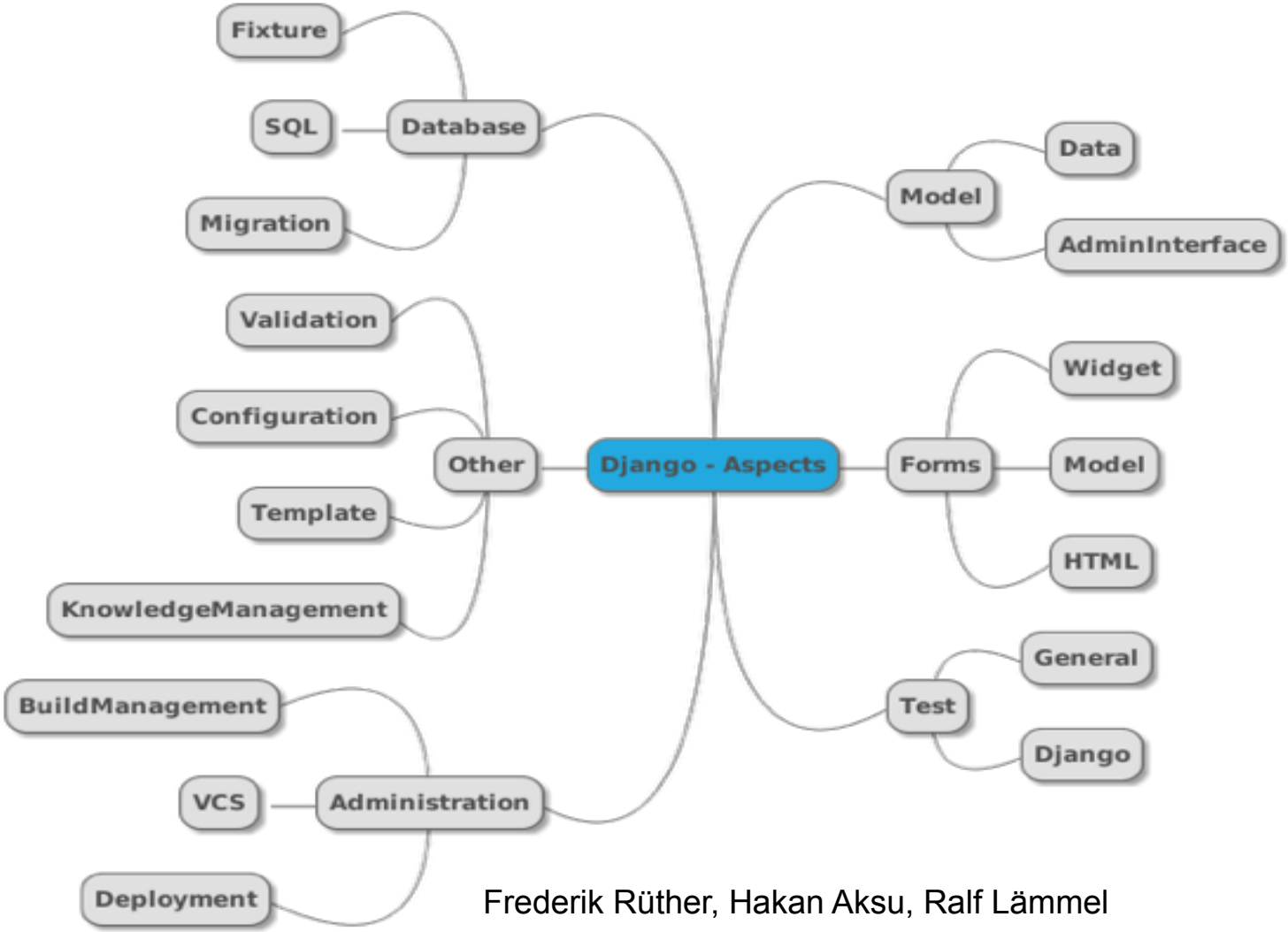
Methodology

„Experience atoms are elementary units of experience. Experience, we assume, is the direct result of a persons activity [...]. The smallest meaningful unit of such changes is an EA“

By Mockus and Herbsleb, Expertise browser: a quantitative approach to identifying expertise



Aspects of Django



Two approaches were used to find aspects

Django tutorial and the widely used django-oscar project were used as input

Django tutorials

- Django tutorials are used as input
- Mentioned Classnames, functions, files and directories are counted
- Keep most mentioned

Django project

- List imported packages
- Retrieve aspects from most used imports if possible

Categorize based on the similarity of the classnames, the namespace or module they are part of, or a near by position in the tutorial.

Analysis of the repositories is based on rules

Rules

- take a commit with (meta-)data as argument e.g. the diff
- are made up of logical operations like *and, or, implies*
- return a skill and the amount of related experience atoms
- depend on filters that are used by logical operation

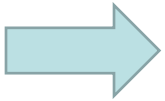
Filters define certain behavior

Filters can be combined with the help of logical operation. They are inspired by the work of *Teyton et. al*[2]

FilenameFilter	analyzes the filename to check if a condition is fulfilled
DirectoryFilter	checks if the commit took place into an interesting directory
ContentFilter	analyzes the content of the file without noticing the semantic structure of the code
ParseTreeFilter	semantic structure of the code is taken into account while analyzing
MethodFilter	The LOC changed in a method
InheritanceTreeFilter	The LOC changed in a class

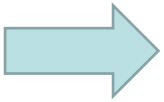
Examples of rules

Knowledge Management	Is a skill that is indicated by a commit to the directory **docs** or a change to the file **Readme.md**



DirectoryFilter*("docs")* **or** FilenameFilter(*"Readme.md"*) → **KnoweledgeManagement**

Model/ Data	A data model in Django is defined by the inheritance of the class model.

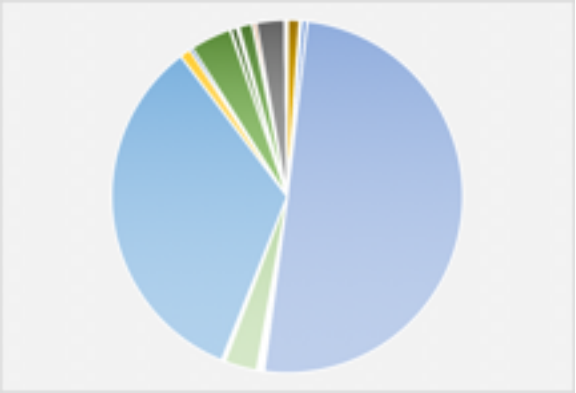


ContentFilter*("import django.db.Model")* **=>** InheritanceTree(*"Model"*) → **Model/Data**

Django-oscar is an active django project

Django-oscar: Oscar is an e-commerce framework for Django designed for building domain-driven sites.

- ➢ 6626 commits
- ➢ 154 contributers
- ➢ In development since december 2010



Distribution of commits by devlopers

The skill-set of the user David Winterbottom

Aspect	Category	Count	Unit	Proportion of collected aspects in per cent
VCS	Administration	134	LoC of the diff	88
HTML	Forms	1205	LoC in a class	55
Validation	Other	10	LoC in a function	11
Model	Forms	1827	LoC in a class	54
BuildManagement	Administration	300	LoC of the diff	66
DjangoConfiguration	Other	3005	LoC of the diff	88
Fixture	Database	4923	LoC of the diff	92
Templates	Other	27140	Count of elements	42
Django	Test	12703	LoC in a class	72
AdminInterface	Model	770	LoC in a class	82
Migration	Database	58	LoC in a class	14
Generell	Test	16091	LoC of the diff	67
Data	Model	20683	LoC in a class	61
KnowledgeManagement	Other	4962	LoC of the diff	57

Figure 2: Experience of David Winterbottom in the Django-Oscar project

Discussion of the results

- Even the dominant developer does not work equal on all parts
- Migration and validation are mainly done by other users

→ Collaboration and sharing of work exist

- Bugs related to fixture should be assigned to him
- Migration bugs should be fixed by other people

Related Work

1. *A. Mockus and J. D. Herbsleb*, „**Expertise browser: a quantitative approach to identifying expertise**," in Proceedings of the 22rd International, Conference on Software Engineering, ICSE 2002, 19-25 May 2002, Orlando, Florida, USA , 2002, pp. 503{512. [Online]. Available: http://doi.acm.org/10.1145/581339.581401
2. *C. Teyton, M. Palyart, J. Falleri, F. Morandat, and X. Blanc*, **„Automatic extraction of developer expertise,"** in 18th International Conference on Evaluation and Assessment in Software Engineering, EASE '14, London, England, United Kingdom, May 13-14, 2014 , 2014, pp. 8:1-8:10.
3. *Dominique Matter, Adrian Kuhn, and Oscar Nierstrasz*. **Assigning bug reports using a vocabulary-based expertise model of developers**. In Proceedings of the 2009 6th IEEE International Working Conference on Mining Software Repositories, MSR ’09, pages 131– 140, Washington, DC, USA, 2009. IEEE Computer Society.

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