A Rapid Review (RR) of
Criteria for Selecting SE Tools

What?

A rapid review is a type of knowledge synthesis. The purpose is to compiler and present research results from literature to practitioners.

Why?

Researchers: insight into real problems

Practitioners: solutions from academia

Overall:
- mutual understanding
- common terminology
- first step towards future collaboration

Who?

Researchers: Elizabeth, Per
Search and synthesize literature

Practitioners: Patrik, Ericsson
- Provide industrial insight and relevance to research focus
- Validate RR results

Both: communicate the results.

When?

Startup in **June-20**
Execute during **Q3'20**

Agenda

- Results from initial search & selection
- Initial list of criteria from literature
- Initial list of criteria from Ericsson
- Plan & RQs
- AOB

Initial Search: ALL (select*) AND TITLE (tool*) AND TITLE-ABS-KEY ("software engineering tool") OR TITLE-ABS-KEY ("CASE tool")

Include articles

- present or evaluate **criteria for assessment and/or selection of tools** for industrial software engineering
- discuss **selection, assessment or evaluation** of SE tools (including CASE tool)
- empirical investigations of **experience** of introducing or using a tool.
- borderline or when unsure of relevance of article content, until later screening steps.

Selection based on	# hits
Search	147
Title	88
Abstract	58
Full paper	30

Exclude articles

- merely describe **design and/or implementation of specific tools**
- solely evaluate the impact of tools on productivity etc **without investigating explanatory factors**
- on **non-software** tools and/or tools in an **non-industrial software engineering context**
- not scientific articles, e.g. presentation slides
- Initial version replaced by extended articles

Search 1: Type of papers

Domains
- safety critical RT - Avionics, military
- Web programming, data warehouses

SE discipline
- CASE – entire SE process
- OO design - modelling
- Configuration management
- Testing

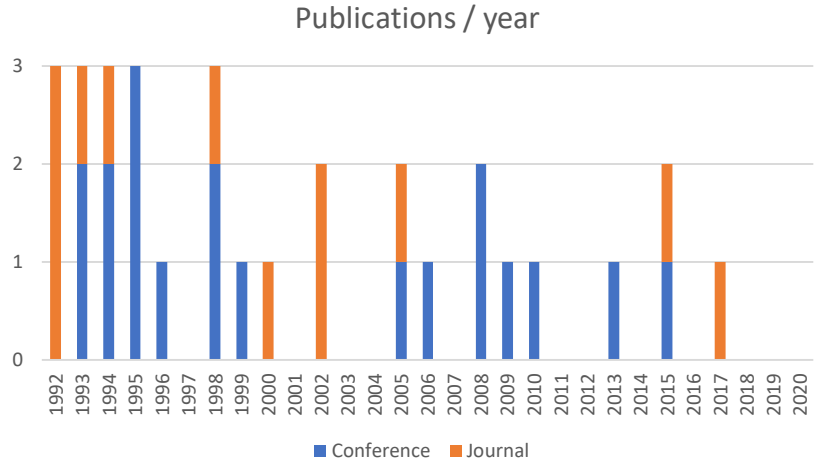
SE areas: agile, GSD, large-scale, MDD, OSS, SME, SPL

Type of research: Tool evaluations, Case study/survey of tool introduction, Tool design, Literature review

Type of publication: 17 conference articles, 13 journal publications

Search 1: Overview

Main focus	# of articles
Evaluation of tool selection	3
Process /Method for tool selection	12
Selecting tool for an environment	1
Selection criteria	8
Specific tool evaluation	6



STANDARDS

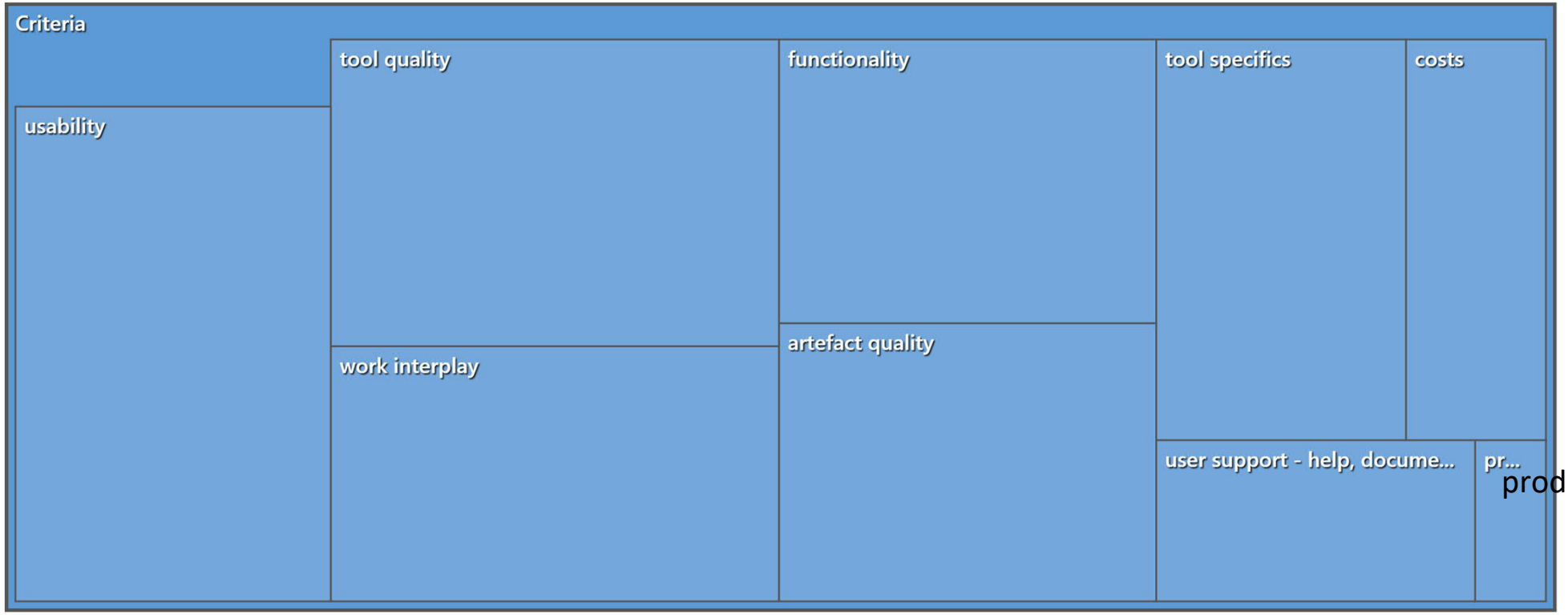
1994-1995-2008-: ISO/IEC 14102:2008

Information technology — Guideline for the evaluation and selection of CASE tools

2015-2017-: ISO/IEC 20741:2017

Systems and software engineering — Guideline for the evaluation and selection of software engineering tools

Search 1: Criteria



ISO/IEC 14102 Information technology – Guideline for the evaluation and selection of CASE tools

ISO/IEC 20741 Systems and software engineering – Guideline for the evaluation and selection of software engineering tools

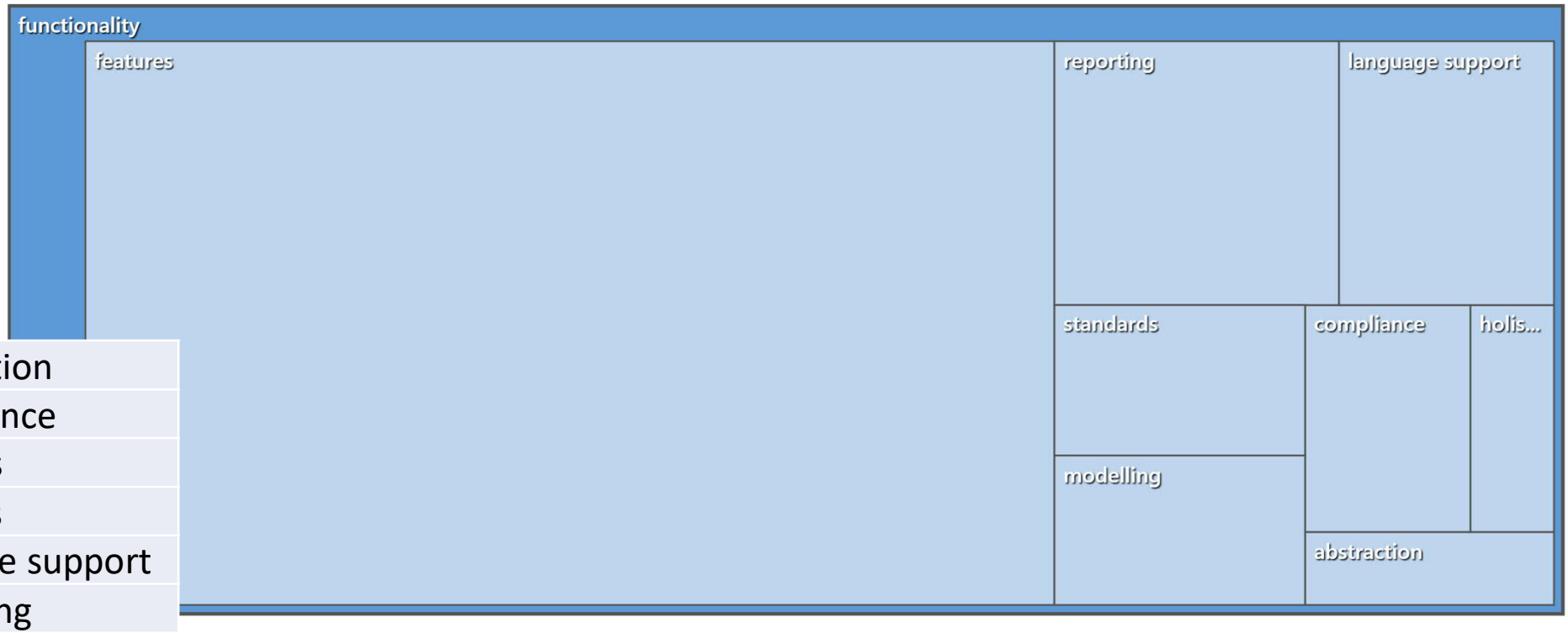
9 CASE tool characteristics
9.1 Functionality - characteristics related to life-cycle processes.
9.1.1 Characteristic: Management Process
9.1.2 Characteristic: Development Process
9.1.2.1 Subcharacteristic: Modeling
9.1.2.2 Subcharacteristic: Construction
9.1.3 Characteristic: Maintenance Process
9.1.4 Characteristic: Documentation Process
9.1.5 Characteristic: Configuration Management Process
9.1.6 Characteristic: Quality Assurance Process
9.1.7 Characteristic: Verification Process
9.1.8 Characteristic: Validation Process
9.2 Functionality - characteristics related to CASE tool usage.
9.2.1 Characteristic: Environment in which the CASE tool operates.
9.2.2 Characteristic: CASE tool integrability.
9.2.3 Characteristic: Aspects of the CASE tool's application
9.3 General quality characteristics
9.3.1 Characteristic: Functionality
9.3.2 Characteristic: Reliability
9.3.3 Characteristic: Usability
9.3.4 Characteristic: Efficiency
9.3.5 Characteristic: Maintainability
9.3.6 Characteristic: Portability
9.4 General characteristics not related to quality
9.4.1 Characteristic: Acquisition

10.3.2 Functional suitability characteristics
10.3.3 Performance efficiency characteristics
10.3.4 Compatibility characteristics
10.3.5 Usability characteristics
10.3.6 Reliability characteristics
10.3.7 Security characteristics
10.3.8 Maintainability characteristics
10.3.9 Portability characteristics
10.4 General characteristics not related to quality
10.4.1 Overview
10.4.2 Acquisition process characteristics
10.4.3 Implementation characteristics
10.4.4 Support indicators characteristics
10.4.5 Evaluation or certification characteristics

ISO/IEC 9126 *Software engineering — Product quality*.

Replaced by **ISO/IEC 25010:2011**.

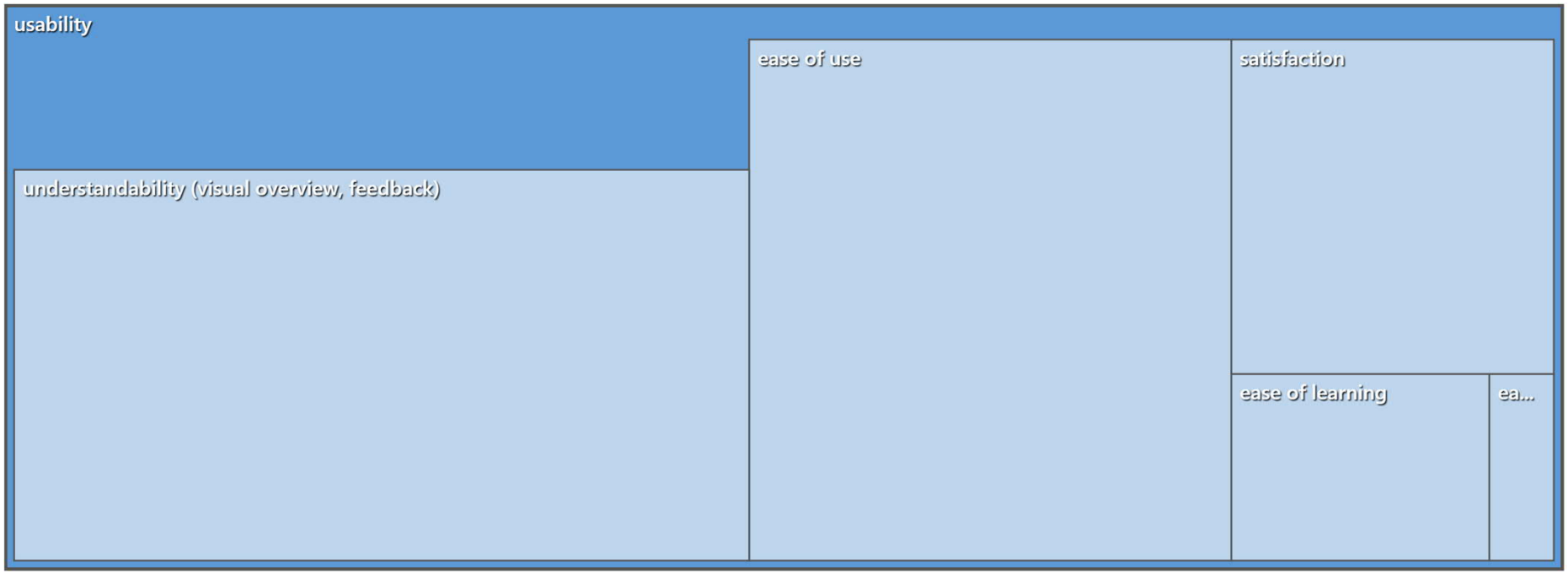
Search 1: Functionality



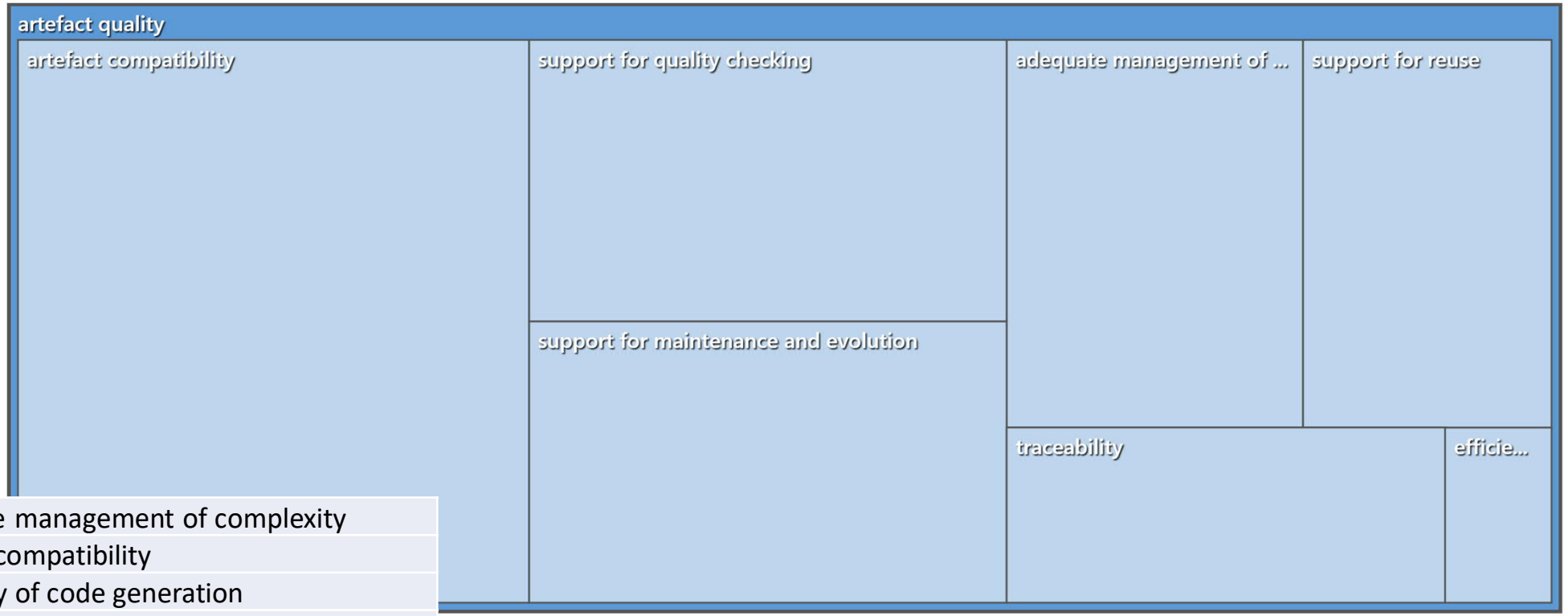
- abstraction
- compliance
- features
- holistics
- language support
- modelling
- reporting
- standards

Search 1: Usability

ease of learning
ease of use
ease of validation
satisfaction
understandability (visual overview, feedback)



Search 1: Artefact quality



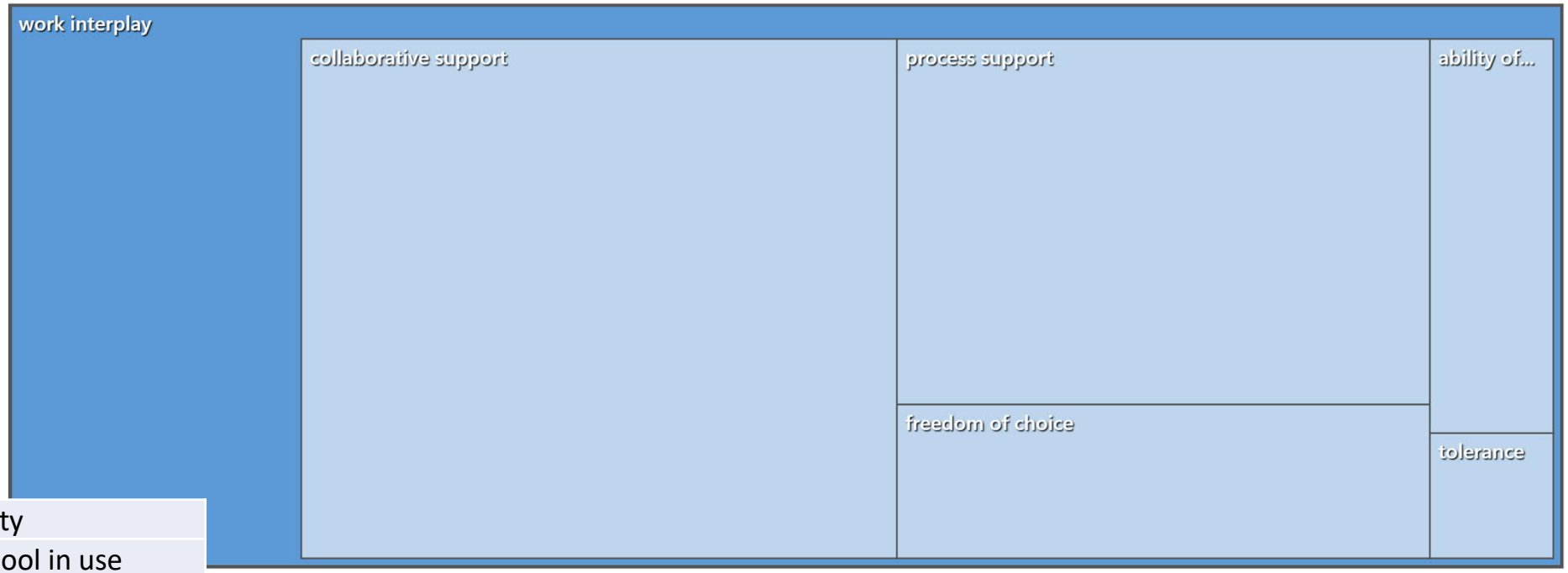
adequate management of complexity
artefact compatibility
efficiency of code generation
support for maintenance and evolution
support for quality checking
support for reuse
traceability

Search 1: User support

help, documentation & training

quality of tool support

Search 1: Work interplay & Productivity



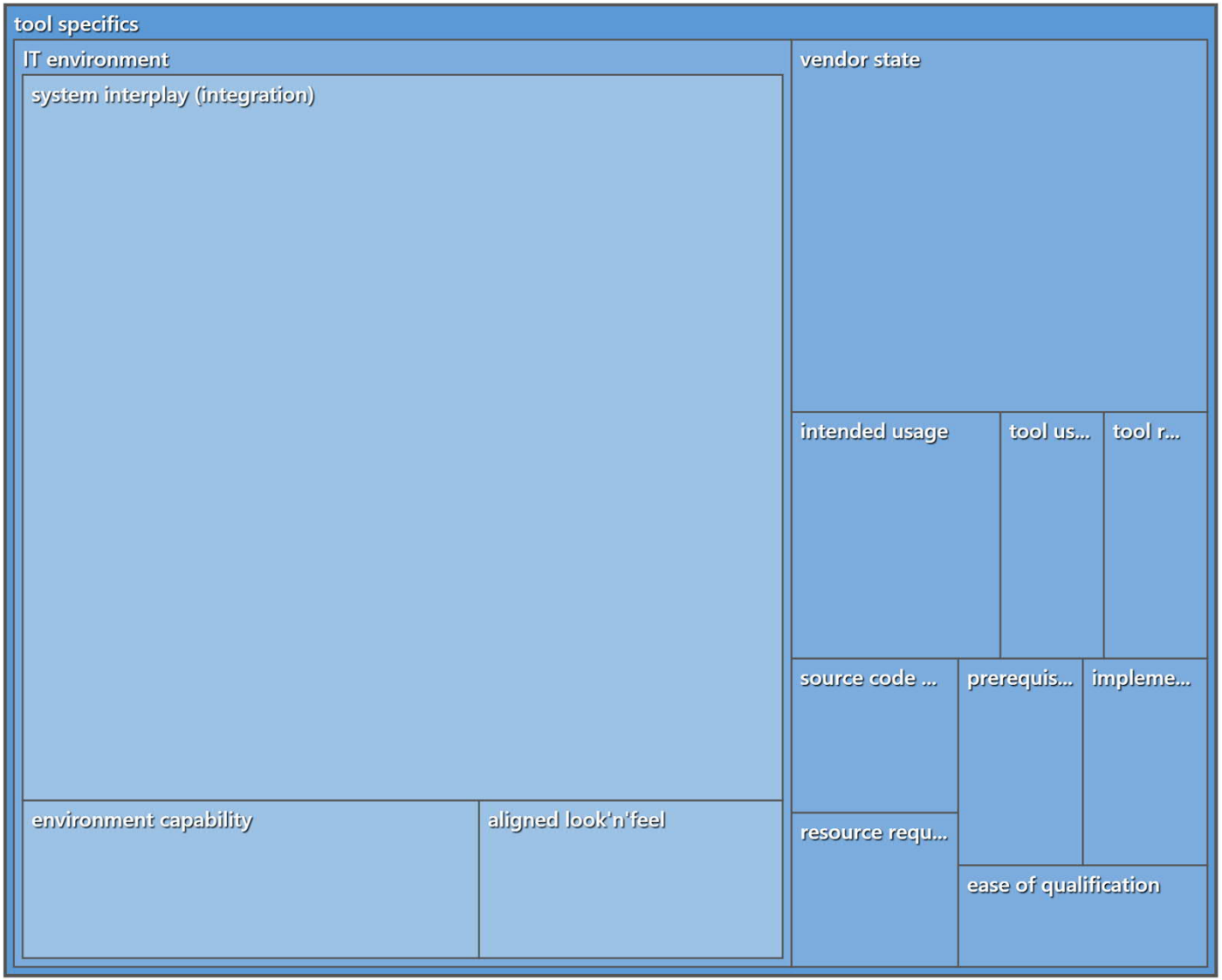
Productivity
ability of tool in use
collaborative support
freedom of choice
process support
tolerance

Search 1: Tool quality

adaptation
customizability
customizability\flexibility vs control
effectiveness
efficiency
installability
maturity\reliability
maturity\robustness
portability
power
security

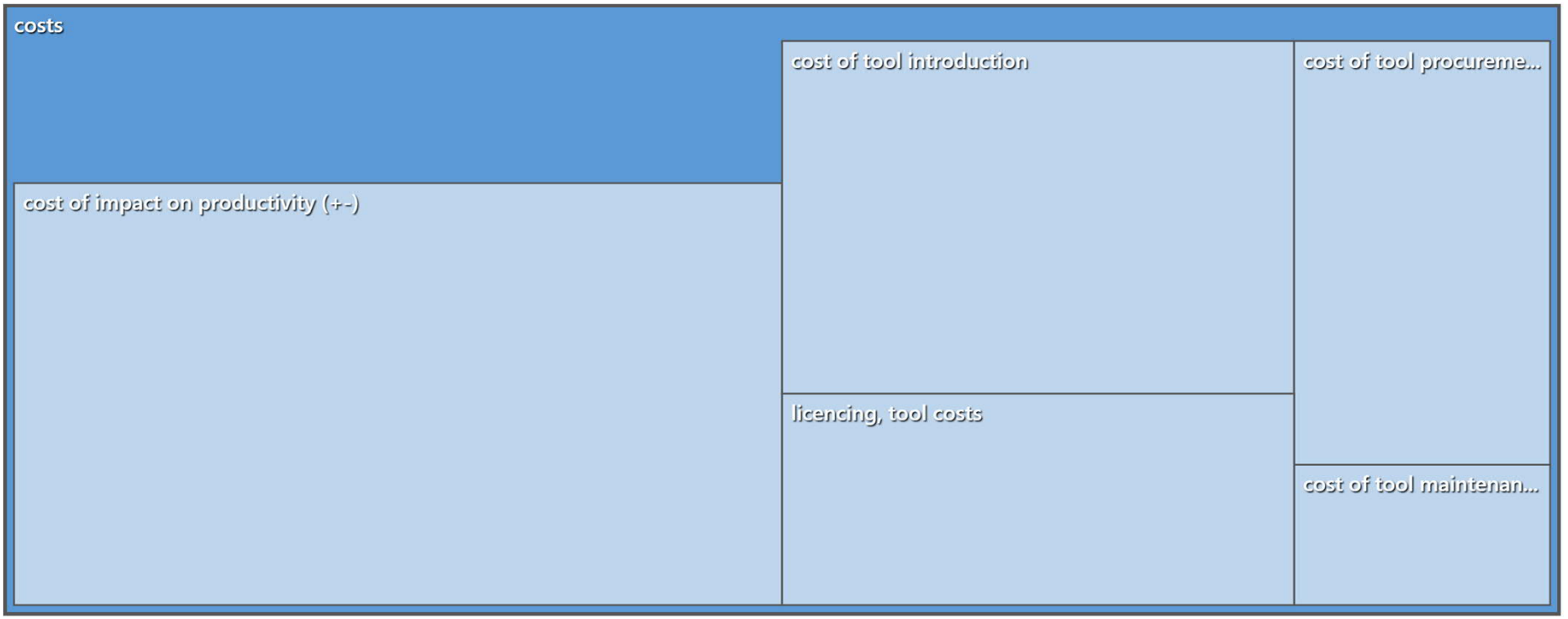
Search 1: Tool specifics

- ease of qualification
- implementation techniques
- intended usage
- IT environment\aligned look'n'feel
- IT environment\environment capability
- IT environment\system interplay (integration, OS)
- prerequisites
- resource requirements
- source code for tool - OSS
- tool recommendations
- tool user base - current & future
- vendor state



Search 1: Costs

cost of impact on productivity (+-)
cost of tool introduction
cost of tool maintenance
cost of tool procurement
licencing, tool costs



Plan

Time frame	Step	Activities for Researchers	Activities for Practitioners*
June-20	*Prepare review: **Scope***	*Define scope including preliminary research questions*	*Agree on scope and discuss research questions*
	*Define **research questions***	*Confirm research questions*	
	*Develop **work plan***	*Define work plan and keywords for searching.*	*Validate work plan, in particular times frames*
Aug-20	*Identify and select relevant research*	*Search for articles and apply selection criteria.*	*Validate relevance of selection by reading sample articles.*
Sept-mid-Oct-20	*Extract and synthesize data, Define criteria & Plan presentation*	*Construct **list of criteria** based on data.*	*Provide info regarding industrial relevance including **list of criteria used within company.***
Oct-20		*Meetings to discuss criteria and to plan presentation activities.*	

Scope: Criteria for selecting software engineering tools

Criteria and aims of tool selection: Productivity at individual, product and organisational level

Case Context

- Tools are selected in an organic fashion, and gradually spread within the organisation.
- Tool selection within Ericsson Dev Section

Research Questions

When selecting SE tools

1. **What criteria** are relevant for Ericsson to consider?
2. How can **cost and benefit** be considered and balanced?
3. How is the selection affected w.r.t. the aim to improve
    a. **overall productivity**?
    b. **product quality?**