RE-Pract 2018 Survey: Coding Instructions – Supplement

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To Be Done

Variable 6: Primary Working Area

Answers to Code:	29
Variable Type:	List-Supplementing Short Text (for Variable 5)
Variable Question:	Which of the following roles describes your primary working area best? (Respondent answered “Other (please specify)” on Variable 5)

Options shown for Variable 5:

- Requirements Engineer
- Business Analyst
- Architect
- Tester / Test Manager
- Project Manager
- Developer
- Product Owner
- Designer
- Other (please specify)

Summary of “Other (please specify)” after algorithmic coding:

	lfdn
v_6_coded	
Architect	3
Consultant	3
Context Roles	2
Designer	1
Manager	5
Multiple Roles	6
Process Designer	2
Researcher	7

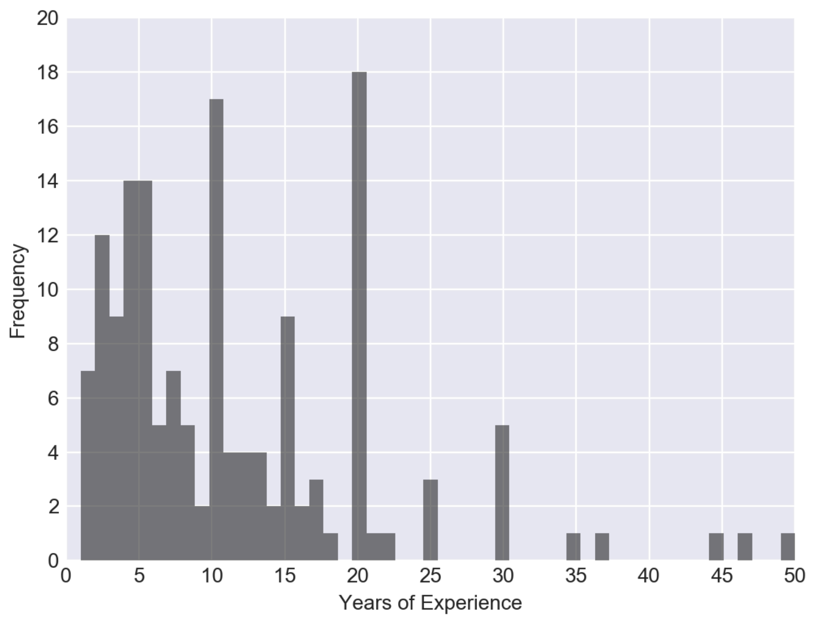
Code used to produce this result:

```python
def code_var_6(series):
    coded_series = []
    for value in series:
        value = value.lower()
        val = None
        if re.search('lecturer|phd\scandidate|researcher|r&d', value):
            val = 'Researcher'
        elif re.search('consultant', value):
            val = 'Consultant'
        elif re.search('systems?\sengineer', value):
            val = 'Architect'
        elif re.search('processes', value):
            val = 'Process Designer'
        elif re.search('design', value):
            val = 'Designer'
        elif re.search('marketing|iso\s\d+', value):
            val = 'Context Roles' # this was: 1 Marketing, 1 Regulator
        elif re.search('manag|cto', value):
            val = 'Manager'
        elif (re.search('different|changing|both|depend(?:s|ing)|combin',
                        value) or (len(re.findall(',', value)) > 1)):
            val = 'Multiple Roles'
        else:
            raise Exception(f'Difficulty Coding Entry: {value}')
        coded_series.append(val)
    return coded_series
```

Variable 11: Years of Experience

Answers to Code:	154
Variable Type:	List-Supplanting Short Text
Variable Question:	How many years are you working in your primary working area?

Visual summary of responses after algorithmic coding:



Code used to produce this result:

```python
def code_var_11(series):
    coded_series = []
    replace_dict = {'years?\.?|y(?!\w)|about': '',
                    'six':'6',
                    'one':'1',
                    ',':'.',
                    '\+|>':''}
    this_year = 2018
    for value in series:
        value = value.lower()
        val = None
        try:
            val = float(value)
        except:
            val = value
            for k, v in replace_dict.items():
                val = re.sub(k, v, val)
            try:
                val = float(val)
            except:
                if re.search('since\s(\d{4})', val):
                    val = 2018 - float(re.search('since\s(\d{4})', val).group(1))
                elif re.search('\d+', val):
                    val = sum([float(x) for x in re.findall('\d+', val)])
                else:
                    raise Exception(f'Difficulty Coding Entry: {value}')
        coded_series.append(val)
    return coded_series
```

Variable 16: Class of System

Answers to Code:	12
Variable Type:	List-Supplementing Short Text (for Variable 15)
Variable Question:	What class of systems is in scope of your project(s)? (Respondent answered “Other (please specify)” on Variable 15)

Options shown for Variable 15 were:

- Software-intensive embedded systems
- (Business) information systems
- Hybrid / mix of embedded systems and information systems
- Other (please specify)

Summary of “Other (please specify)” after algorithmic coding:

	lfdn
v_16_coded	
(Business) information systems	5
Hardware	3
Hybrid / mix of embedded systems and information systems	4

Code used to produce this result:

```python
def code_var_16(series):
    coded_series = []
    for value in series:
        value = value.lower()
        val = None
        if re.search('all.*?above', value):
            val = 'Hybrid / mix of embedded systems and information systems'
        elif (re.search('c(?:ustomer|onsumer)|online|information', value) # infosys
            or re.search('(?<!\w)erp(?!\w)', value)): # infosys, special (and doubtful ;-))
            val = '(Business) information systems'
        elif re.search('machine|infrastructure|processor', value):
            # or would you want to class these as hybrid?
            val = 'Hardware'
        elif re.search('aeronautics|railway', value): # guessing this one
            val = 'Hybrid / mix of embedded systems and information systems'
        else:
            raise Exception(f'Difficulty Coding Entry: {value}')
        coded_series.append(val)
    return coded_series
```

Variable 19: Industry Sector

Answers to Code: 154

Variable Type: List-Supplanting Short Text

Variable Question: What is the industry sector in which you are most frequently involved?

Summary of responses after coding:

v_19_coded	lfdn
Academia	2
Aeronautics	7
Automation	3
Automotive	21
Consulting	2
E-Commerce	3
Education	7
Energy	4
Financial Services	20
Hardware	5
Healthcare	10
ICT	21
Infrastructure	6
Multiple Sectors	19
Public Sector	11
Software	5
Tourism	1
Transportation	7

Code used to produce this result:

```python
def code_var_19(series):
    coded_series = []
    for value in series:
        value = value.lower()
        val = None
        if (re.search('mixed|varies(?!\w)|several|ecosystem|(?<!\s)services(?!\s)',
                      value)
            or (len(re.findall(',', value)) > 1) or re.search('and', value)
            and not re.search('oil.*?gas|bank.*?fin|ins.*?bank|aero.*?defen|well.*heal', value)):
            val = 'Multiple Sectors'
        elif re.search('university|research|academi', value):
            val = 'Academia'
        elif re.search('aero|avi(?:on|at)', value):
            val = 'Aeronautics'
        elif re.search('automation', value):
            val = 'Automation'
        elif re.search('automotive', value):
            val = 'Automotive'
        elif re.search('consult', value):
            val = 'Consulting'
        elif re.search('e\-?commerc|online', value):
            val = 'E-Commerce'
        elif re.search('educati', value):
            val = 'Education'
        elif re.search('energy|(?:oil|gas)(?!\w)', value):
            val = 'Energy'
        elif re.search('financ|banki|insuran', value):
            val = 'Financial Services'
        elif re.search('semiconductor|robotics|computer\sengin|industrial\ssys', value):
            val = 'Hardware'
        elif re.search('medic(?:al|ine)|heal?th|wellness', value):
            val = 'Healthcare'
        elif re.search('railway|building|pipelines', value):
            val = 'Infrastructure'
        elif re.search('government|public\s(?!transport)|defen[cs]e', value):
            val = 'Public Sector'
        elif re.search('software|saas', value):
            val = 'Software'
        elif re.search('transport|logis\w|marine', value):
            val = 'Transportation'
        elif re.search('tourism', value):
            val = 'Tourism'
        elif re.search(('commun|telecom|(?<!\w)ict(?!\w)|(?<!\w)it(?!\w)|(?<!\w)iot(?!\w)|'
                       +'intranet|electron|network|information'), value):
            val = 'ICT'
        else:
            raise Exception(f'Difficulty Coding Entry: {value}')
        coded_series.append(val)
    return coded_series
```

Variable 8345 et seq: Positive Reasoning

While performing the validation, please watch for responses we might quote in our publications.

Summary of responses after algorithmic coding:

		Tag
level_1	**level_2**	
		31
NotAnswered		1
reason	**originality**	5
	plausibility	34
	relevance	63
source	**experience**	6
	opinion	12

Regular expressions used to produce this result:

```
posexes = {
    'reason:relevance':
        ('problem|challeng|experienc|issue(?!s)|concern|need(?!s)|dilemma|'+
        'relevan|essential|critical|crucial|importa|difficult|(?:^|\W)we\W|fundamental'),
    'reason:plausibility':
        'could|might|help(s|ful)?(?!\w)|improves?(?!m)|(?<!\sto\s)better',
    'reason:originality':
        'literature|gap|interesting',
    'source:experience':
        '(?:^|\W)my\W.*?(?:experience|work)',
    'source:opinion':
        '(?:^|\W)my\Wopinion(?!:)|believ|think|feel',
}
```

Variable 8780 et seq: Negative Reasoning

While performing the validation, please watch for responses we might quote in our publications.

Summary of responses after algorithmic coding:

		Tag
level_1	**level_2**	
		36
NotAnswered		1
reason	**notconvincing**	26
	notefficient	5
	notimportant	18
	notinteresting	5
	notoriginal	3
	notrealistic	7
	respondentattitude	1
	toocomplicated	6
	toospecialized	7
	toosubjective	1
	toovague	3
rejection	**questionnotunderstood**	3
	ratingnotnegative	1

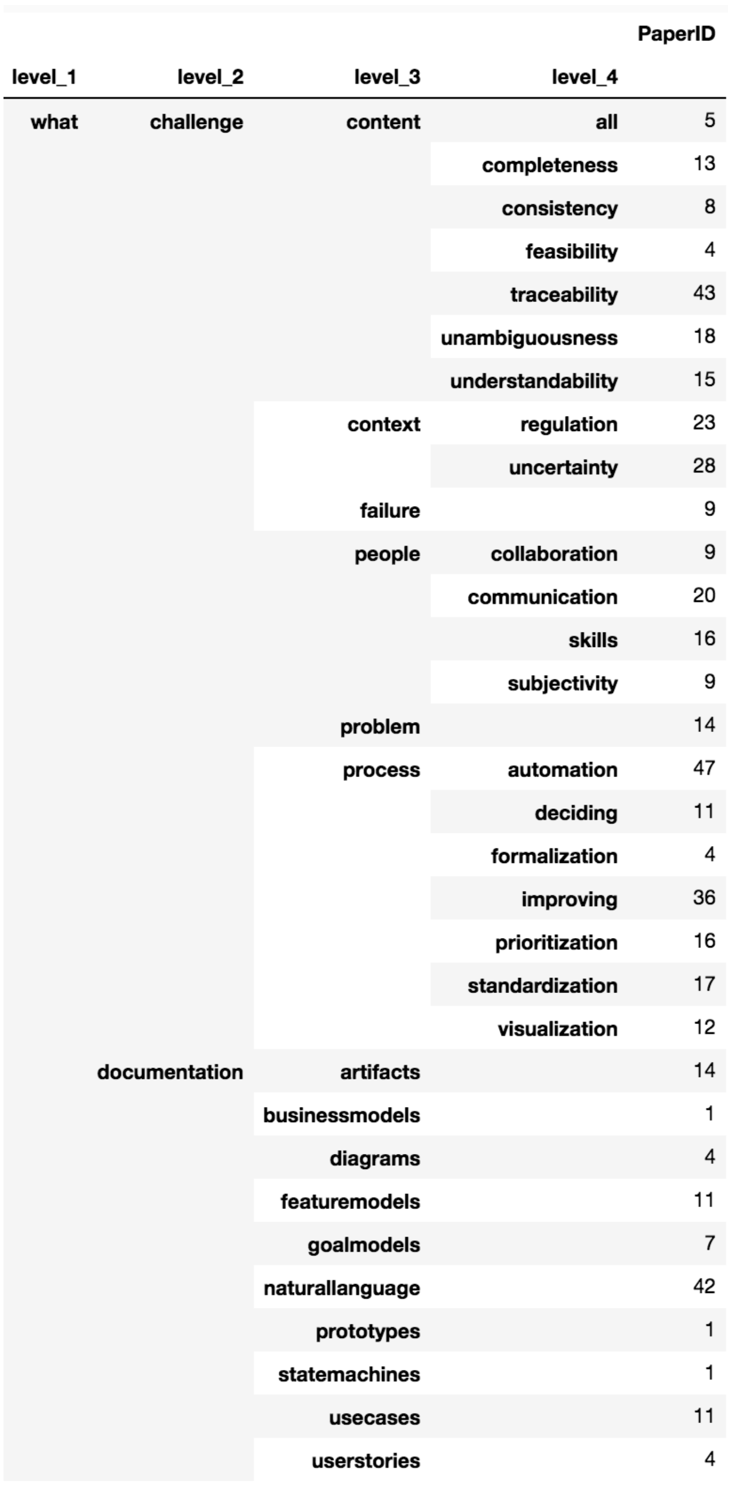
Regular expressions used to produce this result:

```
# nb some refer to problem some to solution some to question itself
negexes = {
    # not that 'not important' refers to absolute and relative (=prioritization) importance reasonings
    'reason:notimportant': ('not?\W.{,50}(?:impor|relev|need|necess|frequ)|'
                + 'distract|decr.*?relev|not?\W.{,20}(priori|essent)|not.*?big.*?prob'),
    'reason:notefficient': 'effort',
    'reason:notinteresting':  '(?:not?\W.{,10}|un)interest',
    # not that 'not convincing' statements are quite diffuse - critique of assumptions, critique of procedures, ...
    'reason:notconvincing':
            ("(?:n't|not?)\W.{,10}?(?:conv|impr)|not?\W.{,30}?(help|use)|(?:n'?t|not?)\W.{,10}sense|"
                +"pointless|worse|harm|waste|fail|simplistic|obscure|impractical|not?\W.*?good|"
                + "(?:(?:ca|do)n'?t|not?)\W.{,10}work|"
                +"(?:not?\W|don'?t|can'?t|can\s?not).{,30}(?:value|benefit)"),
    'reason:notoriginal': 'already',
    'reason:notrealistic': 'to.{,5}(?:theoretic|acad)|skill|scenario|real-w',
    'reason:toocomplicated': "(?:not\W|n't).*?\Wund|to.{,5}technical", # ie not understood
    'reason:toospecialized': 'to.{,10}specif|particular|special.*?domain|limit|should.*?wider|narrow',
    'reason:toovague': "fluffy|don't know.*?use|not.*?understood",
    'reason:toosubjective': 'subjecti',
    'reason:respondentattitude': 'attitude',
    'rejection:ratingnotnegative': 'not?\W.*?lower',
    'rejection:questionnotunderstood': 'not?\W.*?underst.*?quest|sorry'
}
```

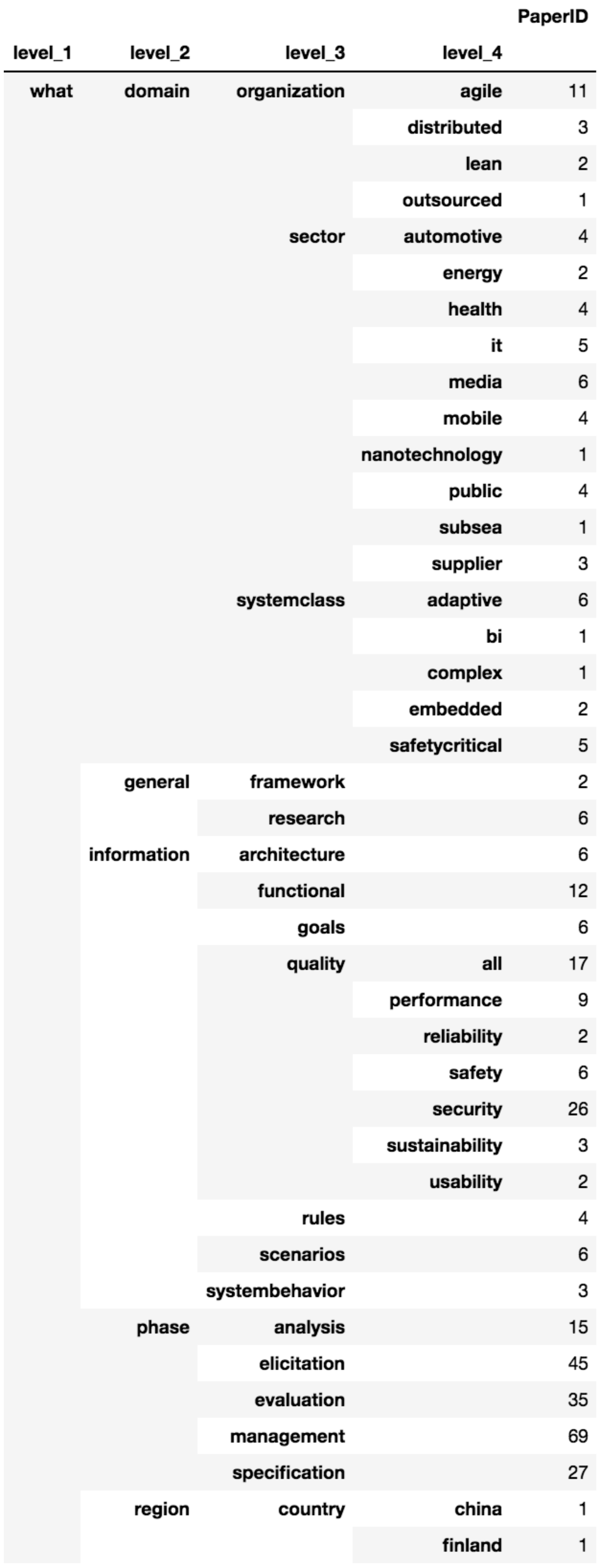
Paper Mapping: What?

Summary of papers after algorithmic coding:

As the code used to produce this result is quite voluminous, please see the Jupyter Notebook HTML for details regarding the rules used and the rationales behind individual facets or tags.



				PaperID
level_1	level_2	level_3	level_4	
what	challenge	content	all	5
			completeness	13
			consistency	8
			feasibility	4
			traceability	43
			unambiguousness	18
			understandability	15
		context	regulation	23
			uncertainty	28
		failure		9
		people	collaboration	9
			communication	20
			skills	16
			subjectivity	9
		problem		14
		process	automation	47
			deciding	11
			formalization	4
			improving	36
			prioritization	16
			standardization	17
			visualization	12
	documentation	artifacts		14
		businessmodels		1
		diagrams		4
		featuremodels		11
		goalmodels		7
		naturallanguage		42
		prototypes		1
		statemachines		1
		usecases		11
		userstories		4



				PaperID
level_1	level_2	level_3	level_4	
what	domain	organization	agile	11
			distributed	3
			lean	2
			outsourced	1
		sector	automotive	4
			energy	2
			health	4
			it	5
			media	6
			mobile	4
			nanotechnology	1
			public	4
			subsea	1
			supplier	3
		systemclass	adaptive	6
			bi	1
			complex	1
			embedded	2
			safetycritical	5
	general	framework		2
		research		6
	information	architecture		6
		functional		12
		goals		6
		quality	all	17
			performance	9
			reliability	2
			safety	6
			security	26
			sustainability	3
			usability	2
		rules		4
		scenarios		6
		systembehavior		3
	phase	analysis		15
		elicitation		45
		evaluation		35
		management		69
		specification		27
	region	country	china	1
			finland	1

Paper Mapping: How?

Please validate “How?” in conjunction with “With Whom?”. The validation file contains entries for both questions, and at least one row per paper.

Summary of papers after algorithmic coding:

level_1	level_2	level_3	PaperID
how	engineering	analysis	1
		method	162
		technology	52
	perspective	experience	38
		opinion	11
		philosophy	1
		review	14
	science	interrogation	43
		intervention	37
		observation	81

Code used to produce this result:

```
def assign_engineering(summary):
    level_1 = ':engineering'

    level_2 = [':analysis', ':technology', ':method']

    level_3 = {':analysis':    ['^a set of metrics'],
               ':technology': ['^a tool', '^a solution', '^a model',
                               '^a taxonomy', '^an ontology', '^a (:?modell?ing |specification )language',
                               '^a template', '(?<!\w)a blueprint', '^a (formal )?framework'],
               ':method':     ['^a method', '^a process', '^a.{,15}technique', 'training program']
               }
    return assign_tag(level_1, level_2, level_3, summary)

def assign_science(summary):
    level_1 = ':science'

    level_2 = [':observation', ':intervention', ':interrogation']

    level_3 = {':observation':   ['(:?(:?mult[illegible]case|field) study', '(:?data.|document.)driven study',
                                  'industrial evaluation', '^an analysis'],
               ':intervention':  ['experiment(?:s|\s)', 'project-based study',
                                  'workshop-based industrial study', 'action research'],
               ':interrogation': ['interview-based study|study based on.{,30}interviews',
                                  'questionnaire', '(?<!literature )(?:online.)?survey']
               }
    return assign_tag(level_1, level_2, level_3, summary)

def assign_perspective(summary):
    level_1 = ':perspective'

    level_2 = [':philosophy', ':opinion', ':experience', ':review']

    level_3 = {':philosophy': ['conceptual framework'],
               ':opinion':  ['^a discussion', '\svision', 'roadmap\s'],
               ':experience': ['experience report'],
               ':review': ['literature (:?survey|study|review)', 'state of the art report']
               }
    return assign_tag(level_1, level_2, level_3, summary)
```

Paper Mapping: With Whom?

Please validate “With Whom?” in conjunction with “How?”. The validation file contains entries for both questions, and at least one row per paper.

Summary of papers after algorithmic coding:

			PaperID
level_1	**level_2**	**level_3**	
withwhom	**laypeople**	**others**	1
		students	28
	professionals	**academics**	2
		practitioners	30

Code used to produce this result:

```python
def assign_all_withwhom(summary):
    level_1 = [':laypeople', ':professionals']
    level_2 = {':laypeople': [':students', ':others'],
               ':professionals': [':academics', ':practitioners']
              }
    level_3 = {':students': ['with students', 'with practitioners and students'],
               ':others': ['with crowd.?workers'],
               ':academics': ['with academics', 'with researchers',
                              'with students and academics'],
               ':practitioners': ['with practitioners', 'with students and practitioners']
              }
    tags = []
    for l1 in level_1:
        for l2 in level_2[l1]:
            if any([re.search(x, summary.lower()) for x in level_3[l2]]):
                tags.append('withwhom'+l1+l2)
    return tags
```