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# Agile

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1.2.2.		.....	9
1.2.3.		.....	13
1.2.4.		.....	20
1.3.	-	.....	23
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1.3.2.		.....	25
1.3.3.	-	.....	29
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1.6.	-	.....	35
1.6.1.		.....	36
1.6.2.	-	.....	39
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	.....	69
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	<b>OMG BPMN v.2.0</b> .....	72
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1.1.

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[1, . 30 -- 31],

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[1, . 31]

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[2, . 27],

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### 1.2.1.

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[8, .6] ,

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PMBOK Guide [9, . 3], -

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[10, . 41],

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 PMBOK [11, . 8], , -  
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 [10, . 45],  
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 PMBOK 5 [9],  
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[1, . 181]

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1.2.2.

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PMBOK [9]

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[12, . 46]

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[13, c. 91 -- 93]:

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51897-2011 [14]

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[13, . 102],

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(equirisk contour method) --- -

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(probablistic event analysis, PEA) ---

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**ABC** --- ,

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>> [13, . 340].

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[13, .

342 -- 355]

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*PERT.*

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[13, . 330 -- 336])

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[13, . 357 -- 370]  
(milestone plan).

1.2.3.

[13, . 34]

[15, . 21 -- 23]

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, [15], [13].

/ 12207-99 [16]

(life cycle model) << , ,

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( . 19.102-77 [17])

( 34.601-90 [18]).

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[19],

XP, Scrum, Crystal

Agile

agile

agile-

VersionOne

[20], 2011 -- 2012 . 48%,

30%;

2012 . (48%)

**Agile**

[21], *Agile* ( )

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agile

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## Agile.

## Agile

， 2001 17

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（K. Beck） （A. Cockburn）.

Agile [22] :

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2. .
3. .
4. .

， [22]， Agile

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1. -
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2. , Agile, -
3. -
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8. .
9. , -
10. .
11. ,
12. .

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 Agile. ,  
 [23, . 3], :  
 (Scrum) ---  
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 [24], -  
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 •  
 •  
 (Extreme Programming, XP) ---  
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 , , , •  
 [25], XP -  
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 • -  
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 [12, . 110], -  
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[26, .57 -- 58]



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— (e-mail, . .)

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[26, . 57 -- 58]).

### 1.3. —

#### 1.3.1.

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9000 [27].

9000

( 9001 [28]),

( 9004 [29]),

[27], [28],

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### 1.3.2.

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 [30,  
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 - ( . : [31, . 4.8])  
 PDCA (Plan -- Do -- Check -- Action).

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 [31].  
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 . [31, . 205 -- 216],  
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## 1.3.3.

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[4, .52]

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: [4, .181]

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#### 1.3.4.

ITIL [33, . 39]

[32, . 48 -- 49]

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 --- (*Kaizen*).  
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 << : >> [34]  
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 . [34]  
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 << c >> [34],  
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(Toyota) [35], Nippon Steel Corp., Honda Motor Corp., Suzuki Motor Corp., Takagi Seiko [36].

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[34], :

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**TQC** ( ) ---

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**TPM** ( ) ---

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 . 69).

**1.4.** -

**1.5.**

**1.6.** -

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 - . [2, . 14]  
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1.6.1.

2006 . - -

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, [5, . 27].

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[2, . 15], - -

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- c ;
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2004 . BPMN,

BPMN 2.0 Object

Management Group (OMG) . [37]

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- ,

- , , [2, . 71 -- 81] -

(  $EPC$  (c) )  $BPMN$   
( - ).

, [2, . 15]  
, . . -  
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.

. SADT (Structured Analysis and Design  
Technique) IDEF(Integration Definition for Functional Modeling.)

- -  
[2, . 17] c -  
, - -  
- . -

UML (Unified Modeling Language).

- -  
[2, . 18]  
, - ,  
. -  
, - , -

BPMN (Business Process Model and Notation, ARIS (Architecture of  
Integrated Information Systems).

[38] -  
, -  
, ,  
, [38, . 15]  $C = (P, T, I, O),$

4- :

1.  $P$ ;

2.  $T$ ;

3.  $I$ ;

4.  $O$ ;

, . . . -

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. , ( . : [\[39\]](#))

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[\[38](#), . 18]

$G = V, A$ ,

$v_i \in V$

$a_i \in A$ .

$V$

-

$P ( \quad ) \quad T ( \quad )$ .

.

$\mu$

.

-

,

.

:

$\mu : P \rightarrow N$ ,

$C, \mu$ .

-

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### 1.6.2.

[5, . 27],

( 2006 .):

**DFD (Data Flow Diagram) ---**

( - ).

**SADT (Structured Analysis and Design Technique) ---**

**ERD (Entity-Relationship Diagram) ---**

"

**STD (State Transition Diagram) ---**

---

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-

UML (Unified

Modelind Language), . , . . .

UML ,

, : [5, . 60]

(use case diagrams) --- -

;

(class diagrams) --- -

;

(statechart diagrams) ---

;

(activity diagrams) ---

;

(interaction diagrams) --- -

(sequence diagrams) -

;

(collaboration diagrams) -

;

(component diagrams) --- -

;

(deployment diagrams) --- -

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**BPMN****BPMN**

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**BPMN**

( .

. [72](#)).**OMG BPMN.****BPMN**

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[\[40](#), . 26]

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*BPMN*,

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:[40, . 30]

1. (flow objects);
2. (Data);
3. (connecting objects);
4. (swimlane);
5. (artifacts).

( ,

. .). BPMN , /

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**YAWL***YAWL (Yet Another Workflow Language)*

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(Aalst)

(Hofstede) 2003

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[41],

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YAWL

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[41, c. 3]

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YAWL,

[41, . 10]

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(extended workflow nets, EWF-nets).

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1.2

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37).

YAWL

-

(workflow patterns).

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YAWL

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Workflow.

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**1.6.3.**

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**BPEL****XPDL****WF-XML****1.7.****1.7.1.**

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BPM CBOK &lt;&lt;

-

&gt;&gt; [42],

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ABPMP (Association of Business Management Professionals).

ABPMP CBOK [42, . 24]

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ABPMP CBOK [42, . 28],

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**DocFlow Workflow ---**

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BPTrends [44, . 429]

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- . 76).
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### 1.7.2.

ITIL [33, . 84], -

<< , , , , ( )

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- ( )

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IT Gartner[45],

c - ( . Business Process Management Suite),

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BPM- [46] -

- ( ), << ,

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. BPMS

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- << -



>> (Handbook on Business Information Systems) [47]

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: [47, . 100 -- 101]

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	289	,	-
	c-	[48],	
20		-	-
:			
	(design model, DesM) ---		
	.		
		(discover model from event	
	data, DiscM) ---		-
	.		
	(select model for collection, SelM) ---		
	.		
	(merge models, MerM) ---		
	.		
	(compose models, CompM) ---		-
	.		
	(design configurable model, DesCM) ---		-
	,	.	
	(merge models into configurable model, MerCM)		
---			-
	.		
	(configure configurable model, ConCM) ---		-
			-
	.		

(refine model, RefM) ---

-

.

(enact model, EnM) ---

.

(log event data, LogED) ---

-

.

(monitor, Mon) ---

.

(adapt while running, AdaWR) ---

,

.

(analyze performance based on model,

PerfM) ---

-

.

(verify model, VerM) ---

-

.

(check conformance using event data, ConfED)

---

.

(analyze performance using event data, PerfED) ---

.

(repair model, RepM) ---

-

.

(extend model, ExtM) ---

-

,

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(improve model, ImpM) ---

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## 1.8.

*WfMC.*

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### 1.8.1.

WfMC

(workflow management system)

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,

(workflow engine).

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[49, . 9].

,

ITIL [33,

. 65]

.

WfMC e WfMC Reference Model [49].

(workflow) -

,

,

.[49, . 8].

-

(Process Definition),

,

WfMC - ---

,

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[49, . 10]. [50, . 126] workflow

( ) ,

- . Workflow -

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- .

[51].

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[51, . 31 -- 35].

1. workflow- -

--- (cases) ,

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:

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- .
- ( ) ---
- 
- 
- ,
- 
- ,
- .
2. (*task*) ,
- ,
- .
- ( ).
- ,
- ( ) .
- .
- (work item) (
- ) ,
- (activity)
- ,
3. (*process*) ,
- .
- ,
- workflow,
4. (*routing*)
- ,
- ,

### 1.8.2.

### Workflow-

Workflow,

[50, . 127],

Workflow

Workflow,

[50],

, , -  
 . .

## Workflow

- [[50](#), . 131 -- 133]

:

(build time),

, , -  
 - .  
 ,  
 - .

(run time),

, , -  
 .  
 - , -  
 ,  
 .

### 1.8.3.

, , -  
 YAWL, , "  
 -  
 --- .

( ) .



workflow [41]

20-

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" -

" ,

,

10 -- 39] :

(Sequence) --- ,

.

(Parallel split) --- -

,

(Synchronization) --- -

.

(Exclusive choice) --- ,

.

(Simple merge) ---

.

(Multi-choice) --- , -

,

.

(Synchronizing merge) ---

( -

),

.

(Multi-merge) ---

,

.

(Disctimator) ---

,

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.

(Arbitrary cycles) ---

,

.

(Implicit termination) ---

,

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.

(Multiple instances without

synchronization) ---

-

.

,

(Multiple

instances with a priori design time knowledge) ---

-

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.

,

(Multiple instances

with a priori runtime knowledge) ---

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, (Multiple instances without  
a priory runtime knowledge) --- -

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.

(Deffered choice) --- , -  
,

.  
.  
(Interleaved parallel routing) ---

, , -  
,  
.

(Milestone) --- -  
,  
.

(Cancel activity) --- , -  
.

(Cancel case) ---

, .  
,  
,  
, -  
, , -

(framework)

#### 1.8.4. Workflow-

*Workflow.* -

workflow

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Cunningham LLP, Toronto, CA Magazine [52].

, [53],

Cunningham LLP,

(B2B), , ,

workflow,

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"Bank Technology

News" [54], workflow-

Zagiel S.A.,

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Infonomics [55]. -

495 AIIM

2008 -- 2009 . ,

26%

, 34%

, 24% BPM.

64%

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(26 %).

(36 % )

, . ,

workflow

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1. . : .  
 : , 2006. . 528.
2. . . . : . :  
 - , 2013. . 118.
3. Davenport T. H. Process Innovation: Reengineering Work through Information Technology. Boston, MA, USA: Harvard Business School Press, 1993.
4. . . :  
 . : , , 2006. . 287. . . .  
 .
5. . . , , -  
 - . : , 2006. . 240.
6. . . - -  
 . : : , 1997. . 224. . . .  
 .
7. . : " 2005. . 608.
8. Wysocki R. K. Effective Project Management. Traditional, Agile, Extreme. 6th edition edition. Indianapolis: John Wiley & Sons, Inc., 2012. P. 710.
9. Institute P. M. A Guide to the Project Management Body of Knowledge (PMBOK Guide) - Fifth Edition. Project Management Institute, 2004. P. 388.
10. . . - : , 1996. . 610.
11. Institute P. M. A Guide to the Project Management Body of Knowledge (PMBOK Guide) - Third Edition. Project Management Institute, 2004. P. 388.

12. Charvat J. Project management methodologies: selecting, implementing, and supporting methodologies and processes for projects. Hoboken, New Jersey: John Wiley & Sons, Inc., 2003. P. 264.
13. << - >>, 2004. . I. . 400.
14. 73:2009 . .-. . . . 2011.
15. . . . - : , 2006. . 400.
16. 12207-99 . . . . 1999.
17. 19.102-77 . . . . 1977.
18. 34.601-90 . . . . 1990.
19. . . .  
URL: <http://msdn.microsoft.com/ru-ru/library/vstudio/dd997578%28v=vs.100%29.aspx> ( : 06.12.2013).
20. VersionOne. Annual State of Agile Development Survey. 7th edition. VersionOne, 2012.
21. Ambler S. Disciplined Agile Software Development: Definition. 2007. URL: <http://agilemodeling.com/essays/agileSoftwareDevelopment.htm>.
22. Beck K., Beedle M., van Bennekum A. et al. Manifesto for Agile Software Development. 2001. URL: <http://www.agilemanifesto.org/iso/ru>.
23. Cobb C. G. Making Sense of Agile Project Management: Balancing Control and Agility. Hoboken, New Jersey: John Wiley and Sons, Inc., 2011. P. 264.



24. Rouse M. What is scrum? 2007. URL: <http://searchsoftwarequality.techtarget.com/definition/Scrum>.
25. Jeffries R. What is Extreme Programming? 2001. URL: <http://xprogramming.com/book/whatisxp>.
26. Hill G. M. The Complete Project Management Office Handbook. Boca Raton, Florida: Auerbach Publications, 2008. P. 685.
27. 9000-2001 . . . . .  
. 2001.
28. 9001-2008 . . . . . 2001.
29. 9004-2010 . . . . . -  
. 2010.
30. e . . . . . , 2007. . 370.
31. J.M. Juran A. G. Juran's Quality Handbook. 5th edition edition. McGraw-Hill, 1999.
32. / . . . . . , . . . . .  
. , 2007. . 384.
33. itSMF. ITIL. itSMF Russia, 2011. .  
. itSMF Russia.
34. . : .  
 : , 2004. . 274. .  
.
35. Kaizen --- Toyota Production System Guide. URL: [www.blog.toyota.co.uk/kaizen-toyota-production-system](http://www.blog.toyota.co.uk/kaizen-toyota-production-system) ( : 20.11.2013).

36. A. Brunet S. N. Kaizen in Japan: an emperical study // International Journal of Operations and Production Management. 2003. Vol. 23. P. 1426--1446.
37. Group O. M. Business Process Modeling Notation (BPMN) Specification. 2006.
38. . . . : , 1984. . 264. . . .
39. . . . : , 1994. . 396. . . .
40. Group O. M. Business Process Model and Notation (BPMN) Version 2.0. 2011. . <http://www.elma-bpm.ru>.
41. W. van der Aalst A. t. H. YAWL: Yet Another Workflow Language (Revised Version). Queensland University of Technology, Brisbane, 2003.
42. of Business Process Management Professionals A. ABPMP BPM CBOK. Guide to the Business Process Management Common Body of Knowledge. Association of Business Process Management Professionals, 2009. P. 236.
43. . . . - : . . . : - , 2005. . 319.
44. Harmon P. Business Process Change. A Guide for Business Managers and BPM and Six Sigma Professionals. Second edition edition. Morgan Kaufmann, 2007. P. 550.
45. Gartner IT Glossary. Business Process Management Suites (BPMSs). URL: <http://www.gartner.com/it-glossary/bpms-business-process-management-suite> ( : 29.11.13).
46. BPM. BPMS ( - , ). URL: <http://abpmp.org.ru/resource/bpm-glossary> ( : 29.11.13).

47. M. El-Mekawy N. A., K. Shahzad. Modeling and Managing Business Processes // Handbook on Business Information Systems / Ed. by M. S. A. Gunasekaran. Singapore: World Scientific Publishing Co., 2010. P. 943.
48. van der Aalst W. A Decade of Business Process Management // Business Process Management / Ed. by E. K. A. Barros, A. Gal. Berlin: Springer-Verlag, 2012. P. 350.
49. Coalition W. M. Workflow Management Coalition. Terminology & Glossary. Issue 3.0 edition. Hampshire, United Kingdom: Workflow Management Coalition, 1999. P. 65.
50. . . . . .  
: . . . : , 2007. . 336.
51. Wil van der Aalst K. M. v. H. Workflow Management. Massachusetts, London: The MIT Press Cambridge, 2002. P. 363.
52. Bragonier D. WORKFLOW IN A NEW AGE // CA Magazine. 2013. Vol. 146, no. 7. P. 30 -- 34.
53. Cunningham LLP's Products and Services Page. URL: <http://www.linkedin.com/company/cunningham-llp/products> ( : 01.12.2013).
54. Adams J. A SMOOTHER FLOW OF WORK // Bank Technology News. 2012. Vol. 25, no. 8. P. 22 -- 25.
55. Miles D. BUSINESS PROCESS MANAGEMENT --- WHAT IS THE PAYBACK AND WHAT IS THE ROI? // Infonomics. 2010. Vol. 24, no. 1. P. 24 -- 25.



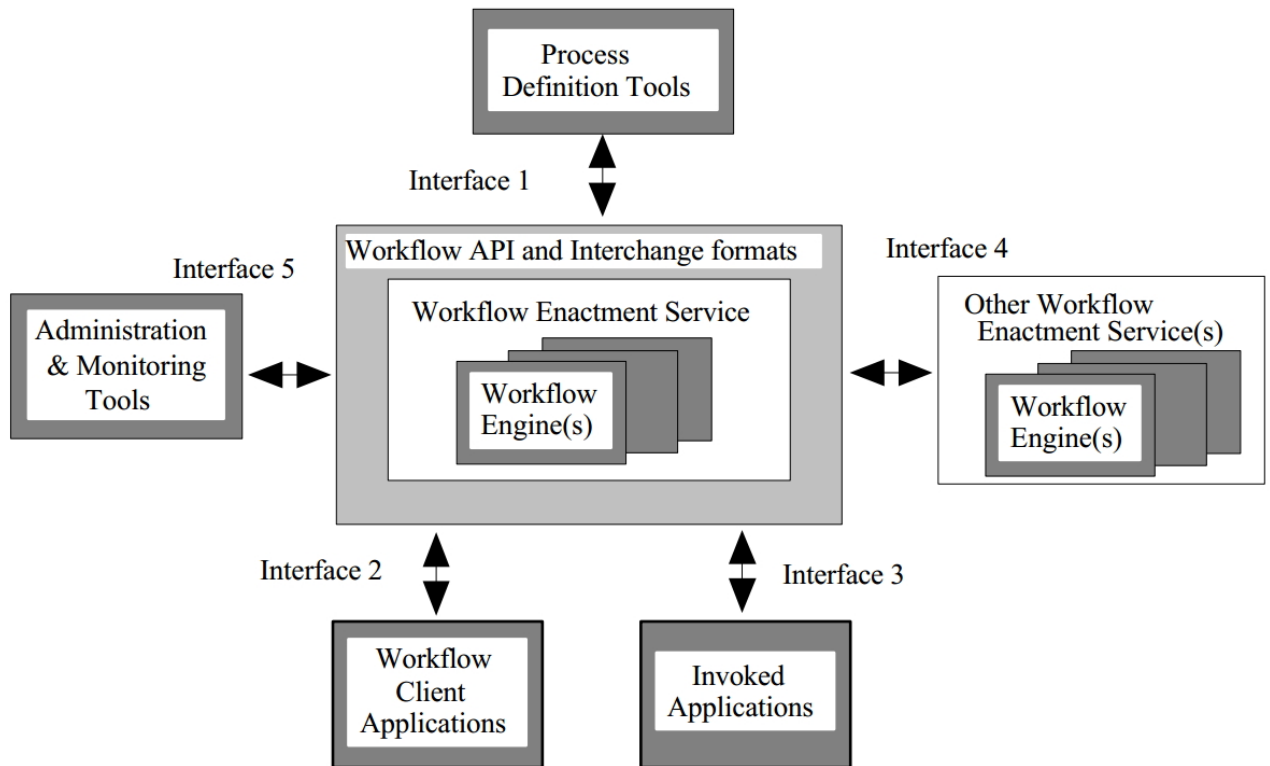
. 1. "

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[30, . 97]

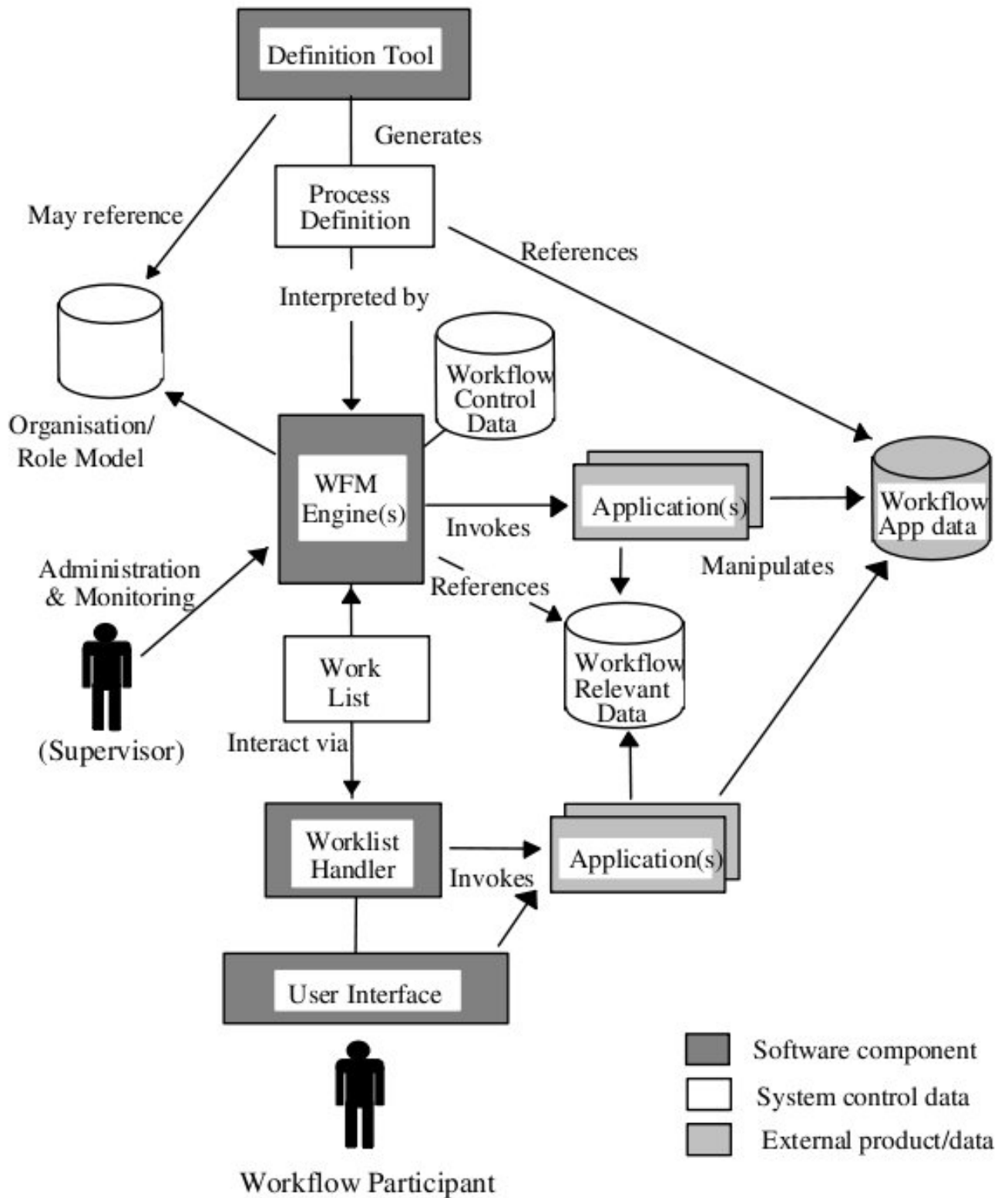
.1. - -  
[32, . 228]

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- . - . - . - ( ). , . . :	- . . . - ( ). - . .
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(Workflow Reference Model) [49, . 23]





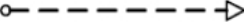

OMG BPMN v. 2.0

.1. OMG BPMN version 2.0 [40]

(Event)	<p>--- , -</p> <p>-</p> <p>.</p> <p>-</p> <p>( ) (</p> <p>).</p> <p>,</p> <p>.</p> <p>- ,</p> <p>:</p> <p>(Start),</p> <p>(Intermediate)</p> <p>(End).</p>	
(Activity)	<p>--- , -</p> <p>,</p> <p>- .</p> <p>,</p> <p>( ).</p> <p>,</p> <p>:</p> <p>(SubProcess) (Task).</p> <p>,</p> <p>.</p> <p>,</p> <p>,</p> <p>.</p>	






.1 ( )

(Gateway)	<p>-</p> <p>,</p> <p>,</p> <p>,</p> <p>,</p> <p>.</p> <p>-</p> <p>.</p>	
(Sequence Flow)	<p>-</p> <p>,</p> <p>.</p>	
(Message Flow)	<p>-</p> <p>,</p> <p>.</p> <p>BPMN</p> <p>( -</p> <p>- ).</p>	
(Association)	<p>( ,</p> <p>)</p> <p>,</p> <p>,</p> <p>( ,</p> <p>).</p>	

.1 ( )

(Pool)	<div> <div> <div>.</div> <div>,</div> <div>&lt;&lt;</div> <div>&gt;&gt; (B2B).</div> </div> <div> <div>.</div> <div>,</div> <div>&lt;&lt;</div> <div>&gt;&gt;.</div> </div> </div>	<div> <div>Name</div> <div></div> </div>
(Lane)	<div> <div>,</div> <div>(</div> <div>).</div> </div>	<div> <div>Name</div> <div>Name</div> </div>
(Data object)	<div> <div>,</div> <div>/</div> </div>	<div> <div></div> </div>

.1 ( )

(Message)	<p>business PartnerRole business PartnerEntry).</p>	
(Group)		
(Text Annotation)	BPMN	



. 1. "

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[44, . 429]