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[12,   . 31], [12,   . 148],   ,   -

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[14,   . 55] «   -   —   ,

».[14,   . 55]

1.1.2. -

(. [12, c. 148],

[10, . 17], [13])   :

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[20, . 27],

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[12, . 30 - 31], [20, . 30]

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[12, . 31]　　　　　　　　　«　　　　　　　　　　　　　　-

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1.2.2.

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[20, . 14]   ,

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,   [10, . 27].

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[20, . 15], --

— *BPMN (*), *EPC*

(c).

. , [20, .

15], :,

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. SADT (Structured

Analysis and Design Technique) IDEF (Integration Definition for Functional

Modeling).

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[20, . 17] c

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- . - -

UML (Unified Modeling Language).

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[20, . 18] -

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BPMN (Business Process Model and Notation),

ARIS (Architecture of Integrated Information Systems), EPC (

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1.3.2.

. [16]

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, [16, . 15]

$C = (P, T, I, O)$, 4- :

1. P;

2. T;

3. I;

4. O.

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. [16, . 18]

$G = V, A$, -

$v_i \in V$ $a_i \in A$. V

P ( )

T ( ).

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1.3.3. -

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BPMN. BPMN - ,

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OMG BPMN.   BPMN   -
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                                    ,   -
                    .   [62,   . 26]
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                        BPMN,   ,
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            —   .
                                                                                          -
                                    :[62,   . 30]
        1.   (flow objects);
        2.   (data);
        3.   (connecting objects);
        4.   (swimlane);
        5.   (artifacts).

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YAWL   *YAWL (Yet Another Workflow Language)*

          (Aalst)   (Hofstede)   2003

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          [77],

          ,   YAWL

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                    [77, c. 3]   :

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          YAWL,   [77, . 10],   -

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                  YAWL

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YAWL   (.   1.3.2   . 14).

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1.4.1.

WfMC [35, . 9]

(Workflow) ,

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(workflow engine).

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[22, . 31 -- 35], workflow-

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Workflow-   .   -

Workflow,

[7,   . 127],   ,   ,

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Workflow,   [7],

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Workflow-   .

workflow   -   ,   -

Cunningham LLP   Zagiel S.A.,

[30], [23].   Canningham LLP

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. Zagiel S.A.

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1.4.2.   -

.   BPM-   [1]   -

-              (, BPMS)   «   -

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•   PMBOK Guide [50,   . 33]   -

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[8, c. 91 - 93]),   :

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[18]   [4],   ,

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                              —   [39],   -

      [73], [37],

            [24].

2.1.3.

                              (agility)   -   ·

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, [58], [46], -

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[39] .

workflow, .

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[76]

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c (. [66], [67])

workflow -

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[28] -

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eTOM [2] — SCOR [3]

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, APQC [33].

2.2.

2.2.1.

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Gartner Inc. (. [48])   Forrester Research [47])   2009 – 2013
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[48], [47],

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The Forrester Wave [75], [72], [32], [31],
Gartner Magic Quadrant [52], [53], [54], [55].

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          ,   : PegaSystems, IBM, Appian, Progress Software,
Metastorm —   -
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                    ,   : Fujitsu, EMC, Global360, Bosh Software Innovations

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: Appian BPM Suite[27], OpenText MBPM [65], Cordys BPMS [64], Pegasystems BPM [68], Fujitsu Interstage BPM [43], Tibco Active Matrix BPM [74];

: jBPM [56], BonitaBPM [29], Taverna Workflow [60], Activiti BPM [25], Pegasus [70], Intalio BPMS [51].

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, , OpenText (Cordys BPMS,

MBPM), Appian. , , OpenText

Appian ,

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(Taverna Workflow,

Pegasus),

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(jBPM, Activiti)

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2.2.4.

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jBPM   Activiti   ,   -

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[79] —   ,

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TOGAF.   TOGAF 9

[44]

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Appian   OpenText MBPM,

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VERAM [21],   GERAM.

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3.1.4.

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TOGAF.

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Подсистема кооперации

Проектировать бизнес-деятельности

Решать конфликты выполнения процесса

Улучшать качество процессов

Член виртуальной команды

Член виртуальной команды

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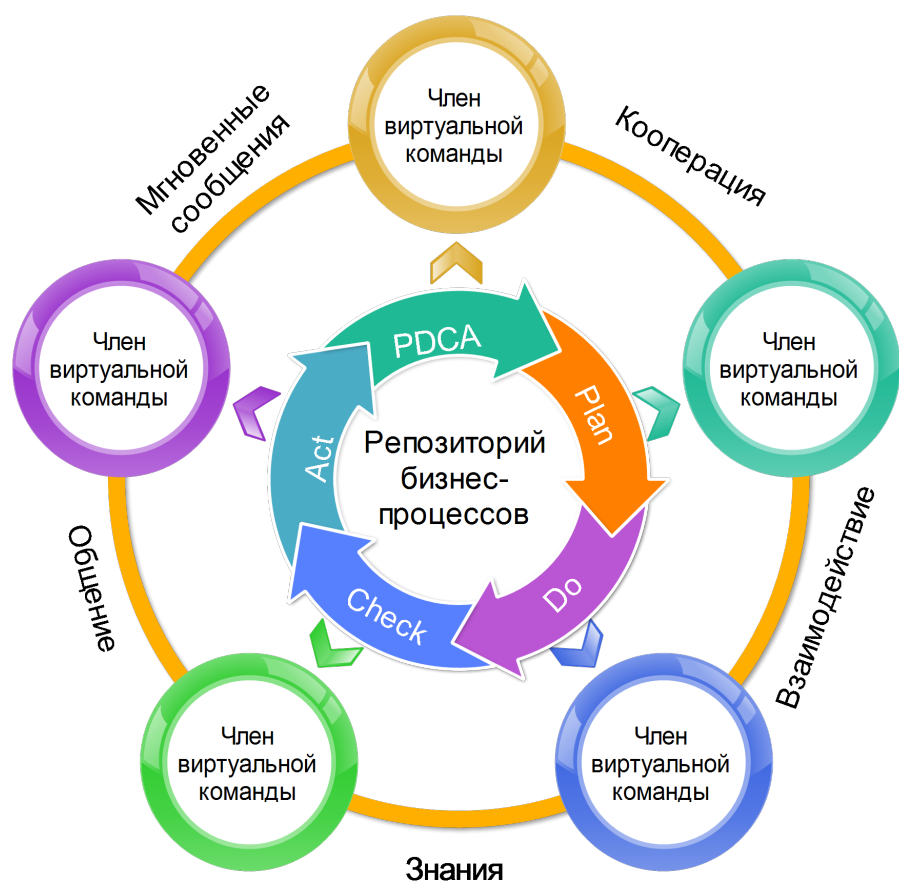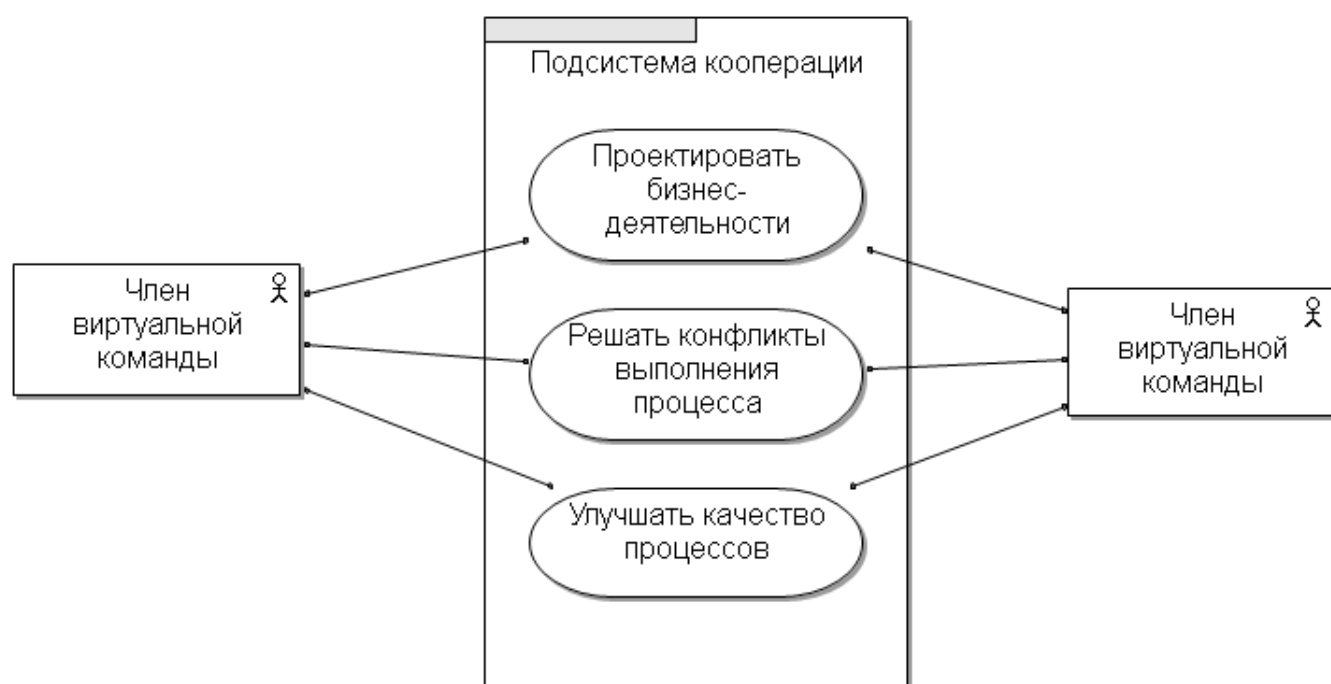
3.2.2.

jBPM Activiti.   -

(.   2.2.2   . 30)

jBPM   Activiti.

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Activiti.   Activiti

(BPMN 2.0 XML),   -

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jBPM

-       ,   -

jBoss Drools,   XML   jPDL.   Activiti,

[25],

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Alfresco [26],

-                        .

Activiti   Apache,   -

,   [41],

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Activiti.   Activiti   -

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(Activiti Modeler, Activiti Designer)

-                      (Activiti Engine).   . 3.3   -

Activiti.

Компоненты проектирования бизнес-процессов	Компоненты выполнения бизнес-процессов	Компоненты управления бизнес-процессами
Activiti Modeler		Activiti REST
Activiti Designer	Activiti Engine	
Activiti Kickstart		Activiti Explorer
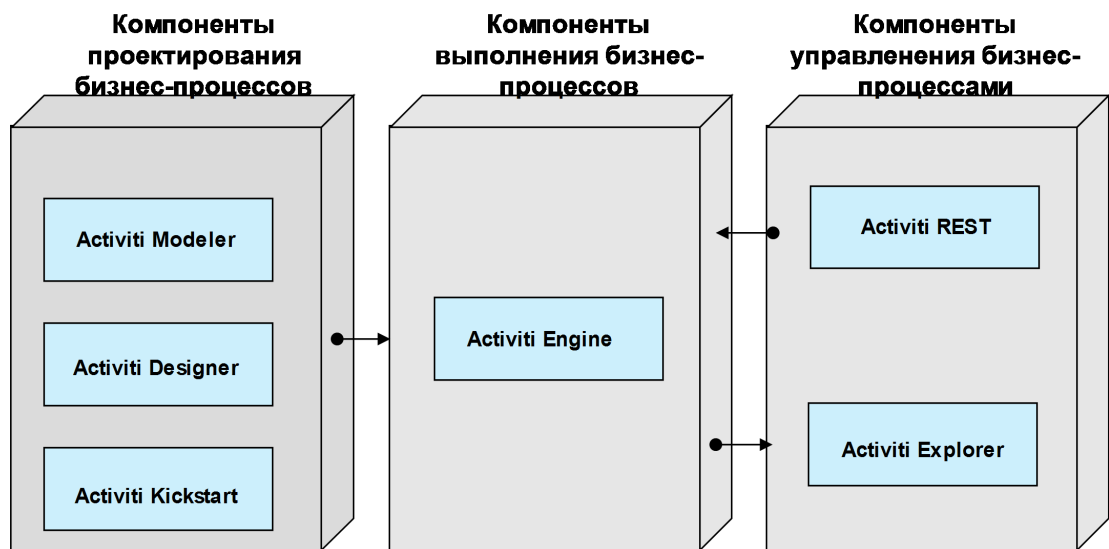
. 3.3. "   Activiti [25]

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Eclipse IDE.   -

BPMN 2.0 XML.

BPMN XML,

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git.　　　　git,　　　　　　[63], [69],

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XMPP.

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XMPP

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Openfire. XMPP -

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[42],

OpenFire [71].

OpenFire -

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LDAP,

. Openfire Open Source Apache,

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1.   BPM. BPMS (-   ,   ). URL: http://abpmp.org.ru/resource/bpm-glossary. ????

2. eTOM Business Process Framework. URL: http://www.tmforum.org/ businessprocessframework/1647/home.html. ????

3. SCOR - Supply Chain Council. URL: http://www.supply-chain.org/scor/. ????

4.   . .   . .   - (   ).   :   -   , 2005. 260 .

5.   . .   . .   . .

        //   . 2003. 4.   . 89 –93.

6.   . .   .   :   , 2001. 336 .

7.   . .   . .   :   .   :   , 2007. 336 .

8.   .   . I.   -   :   <<   -   >>, 2004. 400 .

9. e   .   .   :   , 2007. 370 .

10.   . .   ,   ,   -   .   :   , 2006. 240 .

11.   . .   -   .   : -   -   , 2009. 120 .

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21. *A. Zwegers J. Versterager M. Tolle*. VERAM: Virtual Enterprise Reference
    Architecture and Methodology. 2003.

22. *Aalst Kees Max van Hee Wil van der.* Workflow Management. Massachusetts, London: The MIT Press Cambridge, 2002. 363 .

23. *Adams John.* A SMOOTHER FLOW OF WORK // Bank Technology News. 2012. 25, 8. . 22 –25.

24. *AIIM .* Adaptive Case Management. 2010.

25. *Alfresco .* Activiti BPM Platform // [ ]. <http://www.activiti.org/>. (17.12.2013).

26. *Alfresco .* Alfresco // [ ]. <http://www.alfresco.com>. (18.12.2013).

27. *Appian .* BPM Suite // [ ]. <http://www.appian.com/bpm-software/bpm-suite.jsp>. (17.12.2013).

28. *Barros O.* Business process patterns and frameworks: Reusing knowledge in process innovation // Business Process Management Journal. 2007. 13, 1. . 47 –69.

29. *Bonitasoft .* Bonita BPM Suite // [ ]. <http://www.bonitasoft.com/>. (17.12.2013).

30. *Bragonier Dwayne.* WORKFLOW IN A NEW AGE // CA Magazine. 2013. 146, 7. . 30 –34.

31. *C. Clair D. Miers.* The Forrester Wave: Dynamic Case Management, Q1 2011. 2011.

32. *C. Richardson D. Miers.* The Forrester Wave: BPM Suites, Q1 2013. 2013.

33. *Center American Productivity & Quality.* PCF - Process Classification Framework // [ ]. <http://www.apqc.org/process-classification-framework>. (14.12.2013).

34. *Charvat Jason*. Project management methodologies: selecting, implementing, and supporting methodologies and processes for projects. Hoboken, New Jersey: John Wiley & Sons, Inc., 2003. 264 .

35. *Coalition Workflow Management*. Workflow Management Coalition. Terminology & Glossary. Hampshire, United Kingdom: Workflow Management Coalition, 1999. Issue 3.0. 65 .

36. *D. Duarte N. Snyder*. Mastering virtual teams: strategies, tools, and techiques that succeed. New York: Jossey-Bass Inc., 2001. 256 .

37. *Davenport T.* Process Management for Knowledge Work // Handbook on Business Process Management. Berlin, Heidelberg: Springer, 2010. . 17 –36.

38. *Davenport Thomas H.* Process Innovation: Reengineering Work through Information Technology. Boston, MA, USA: Harvard Business School Press, 1993.

39. *Druker P.* Knowledge-Worker Productivity: The Biggest Challenge. 1999.

40. *Force IFIP-IFAC Task.* GERAM: Generalised Enterprise Reference Architecture and Methodology. 1999.

41. *Foudation The Apache Software.* Apache License, Version 2.0 // [ ]. <http://apache.org/licenses/LICENSE-2.0.html>. (18.12.2013).

42. *Foundation XMPP Software.* XMPP Software list // [ ]. <http://xmpp.org/xmpp-software/>. (19.12.2013).

43. *Global Fujitsu.* Interstage BPM Suite // [ ]. <http://www.fujitsu.com/global/services/software/interstage/solutions/bpmgt/bpm/>. (17.12.2013).

44. *Group The Open*. The Open Group Architecture Framework (TOGAF). 2009.

45. *H. Smith P. Fingar.* Business process management: the third wave. 2003.

46. *Hugos M.* Business Agility. Sustainable Prosperity in a Relentlessly Competitive World. 2009.

47. *Inc Forrester Research.* Forrester Research // [-]. <http://www.forrester.com/aboutus>. (17.12.2013).

48. *Inc. Gartner.* Gartner Inc. // [ ]. <http://www.gartner.com/technology/about.jsp>. (17.12.2013).

49. *Institute Project Management.* A Guide to the Project Management Body of Knowledge (PMBOK Guide) - Fifth Edition. 2004. 388 .

50. *Institute Project Management.* A Guide to the Project Management Body of Knowledge (PMBOK Guide) - Third Edition. 2004. 388 .

51. *Intalio .* BPM Suite // [ ]. <http://www.intalio.com/products/bpms/overview/>. (17.12.2013).

52. *J. Hill E. Deitert M. Kerremans M. Cantara.* Magic Quadrant for Business Process Management Suites. 2007.

53. *J. Hill M.Kerremans D. Plummer M. Cantara.* Magic Quadrant for Business Process Management Suites. 2009.

54. *J. Sinur J. Hill.* Magic Quadrant for Business Process Management Suites. 2010.

55. *J. Sinur J. Hill T. Jones W. Schulte.* Magic Quadrant for Intelligent Business Process Management Suites. 2012.

56. *JBoss Red Hat.* Community jBPM Suite // [ ]. <http://www.jboss.org/jbpm/>. (17.12.2013).

57. *K. Swenson N. Palmer.* Taming the Unpredictable. 2011.

58. *L. Sanchez R. Nagi.* A review of agile manufacturing systems // International Journal of Production Research. 2001. 39, 16. . 3561 –3600.

59. *M. El-Mekawy N. Ahmed K. Shahzad.* Modeling and Managing Business Processes // Handbook on Business Information Systems. Singapore: World Scientific Publishing Co., 2010. 943 .

60. *Manchester University of.* Taverna Workflow Management System // [-]. <http://www.taverna.org.uk/>. (17.12.2013).

61. *O. Barros C. Julio.* Enterprise and process architechture patterns // Business Process Management Journal. 2011. 17, 4. . 598 –618.

62. *OMG .* Business Process Model and Notation (BPMN) Version 2.0. 2011. . http://www.elma-bpm.ru.

63. *Opensource .* Distributed Git - Distributed Workflows // [ ]. <http://git-scm.com/book/Distributes-Workflows>. (19.12.2013).

64. *Opentext .* Cordys BPM Suite // [-]. <http://www.cordys.com/bpms-business-process-management-suite>. (17.12.2013).

65. *Opentext .* OpenText MBPM (formely Metastorm BPM) // [ ]. <http://www.opentext.com/What-We-Do/Products/Business-Process-Management/B (17.12.2013).

66. ADEPT2. Next Generation Process Management Technology. // . 2007.

67. *P. Dadam M. Reichert.* From ADEPT to AristaFlow BPM Suite: A Research Vision has become Reality // Business Process Management Workshops. 2010.

68. *Pegasystems .* BPM Suite // [ ]. <http://www.pega.com/business-process-management-suite>. (17.12.2013).

69. *Potter S.* Git // The Arhitecure of Open Source Applications. 2011.

70. *Project The Pegasus*. Workflow Management System // [   ]. <http://pegasus.isi.edu/>. (17.12.2013).

71. *Realtime Ignite*. Openfire real time collaboration server // [   ]. <http://igniterealtime.org/projects/openfire>. (19.12.2013).

72. *Richardson C.* The Forrester Wave: Bussiness Process Management Suites, Q3 2010. 2010.

73. *T. Davenport S. Jarvenpaa*. Knowledge Work Process // Sloan management review. 1996.

74. *Tibco* . Active Matrix BPM Suite // [   ]. <https://docs.tibco.com/products/tibco-activematrix-bpm-2-2-0>. (17.12.2013).

75. *Vollmer K.* The Forrester Wave: Itegration-Centric Bussiness Process Management Suites, Q4 2008. 2008.

76. *W. Aalst T. Baster*. Adaptive Workflow // Enterprise Information Systems. 2000. . 63 –70.

77. *W. van der Aalst A. ter Hofstede*. YAWL: Yet Another Workflow Language (Revised Version). Queensland University of Technology, Brisbane, 2003.

78. *Wysocki Robert K.* Effective Project Management. Traditional, Agile, Extreme. Indianapolis: John Wiley & Sons, Inc., 2012. 6th edition. 710 .

79. *Zachman J.A.* A framework for information systems architecture // IBM Systems Journal. 1987. 26, 3. . 276 –292.

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Изучите результаты

• Измерение эффекта
• Оценка полученных результатов

Планируйте изменений

• Сбор и анализ данных
• Планирование испытаний
• Выработка мер

Наблюдайте эффекты перемен

• Выявление эффекта
• Количественная оценка

Осуществите спланированные изменения

• Проведение испытаний
• Внесение изменений
• Желательно в малых масштабах

PDCA

PLAN

DO

CHECK

ACTION
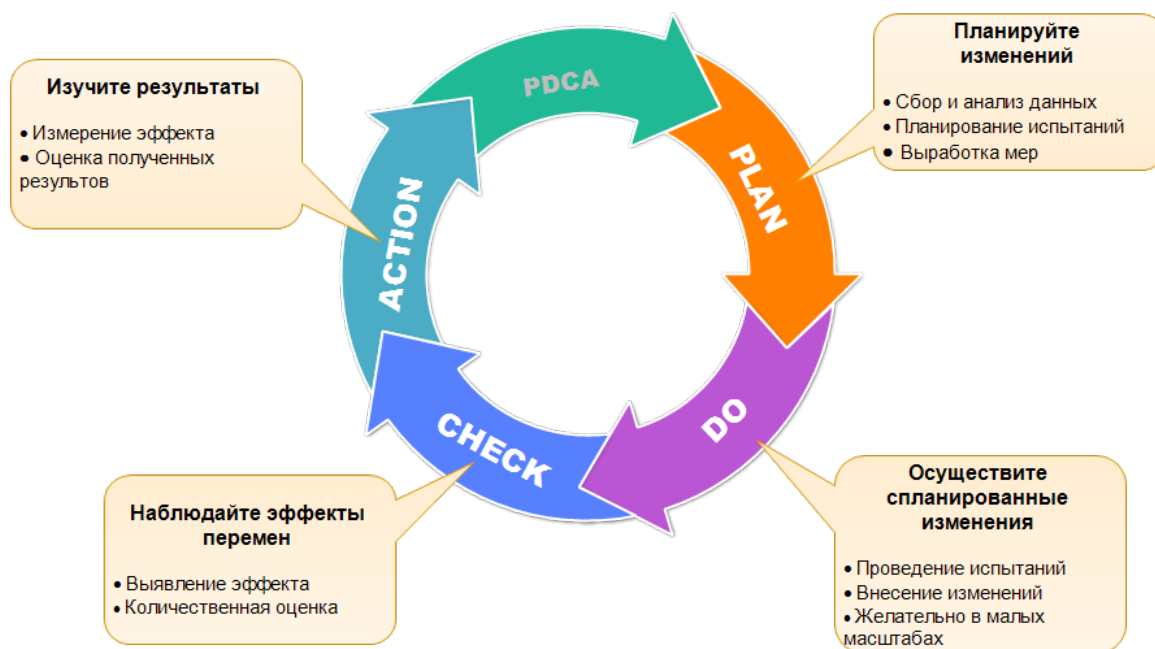
.   .1. "   -   [9,   . 97]

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	Des	Org	Ctrl	Res
Appian BPM Suite	9	8	9	7
OpenText MBPM	8	7	8	10
Cordys BPMS	10	8	6	9
Pegasystems BPM	10	9	10	9
Fujitsu Interstage BPM	7	7	6	5
Tibco Active Matrix BPM	6	10	9	9
jBPM	8	7	8	7
BonitaBPM	8	8	10	7
Taverna Workflow	5	10	6	7
Activiti BPM	7	6	7	5
Pegasus	5	10	8	8
Intalio BPMS	9	6	8	5

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	Des	Org	Ctrl	Res
Appian BPM Suite	8	5	8	6
OpenText MBPM	7	8	6	7
Cordys BPMS	3	10	3	1
Pegasystems BPM	4	10	5	9
Fujitsu Interstage BPM	8	5	8	8
Tibco Active Matrix BPM	0	1	2	0
jBPM	2	6	2	0
BonitaBPM	7	5	3	3
Taverna Workflow	3	2	4	0
Activiti BPM	0	2	0	2
Pegasus	1	0	1	0
Intalio BPMS	1	1	3	1

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