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Risk Management

Maria Iuliana DASCALU

Risk is our Business

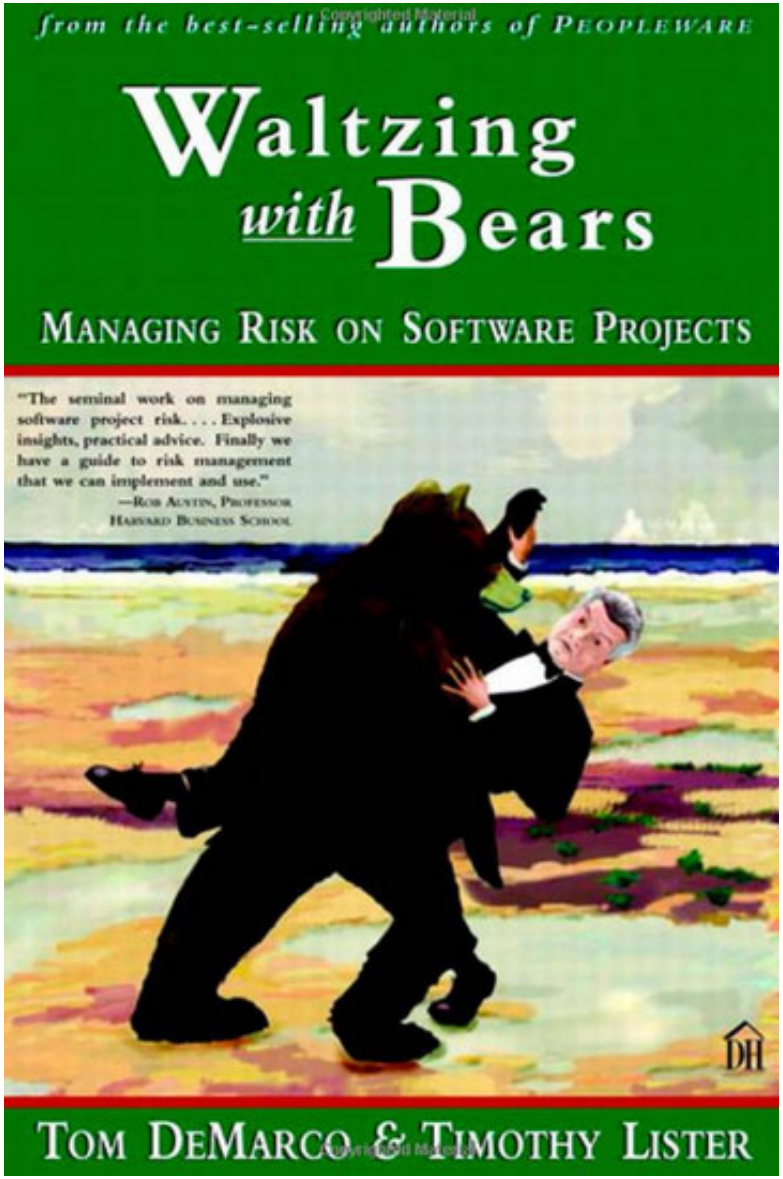
- https://www.youtube.com/watch?v=gIU3HrCCT2k

Objectives of the current presentation

- Risk management

  "If a project has no risks, don't do it. Risks and benefits always go hand in hand."

- http://www.systemsguild.com/pdfs/BearSample.pdf



A paradox

As a member of the Airlie Council, a Department of Defense (DoD) advisory group overseeing government software acquisition practices, I sometimes sit in on risk management briefings. I was particularly interested to see how one project that I'd been following from afar would deal with what I viewed as a truly daunting risk. Because it was building software to replace a Y2K non-compliant system, late delivery would be a real disaster. And I had heard that the code to be delivered was nearly six times larger than anything the contractor had ever been able to build in the time allocated for the project. The daunting risk was that the project would be late and leave the organization with no workable alternatives.

When the project manager produced a list of his key risks, I was surprised to find that not one of them had to do with schedule. In fact, the major risk in his estimate was "PC performance," the fear that the current configuration would not have enough horsepower. "But hey, don't worry about that one," he told us. "We have a plan for that, a beefed-up configuration." I quickly came to understand that if he didn't have a plan for how to counteract a risk, then he ignored it.

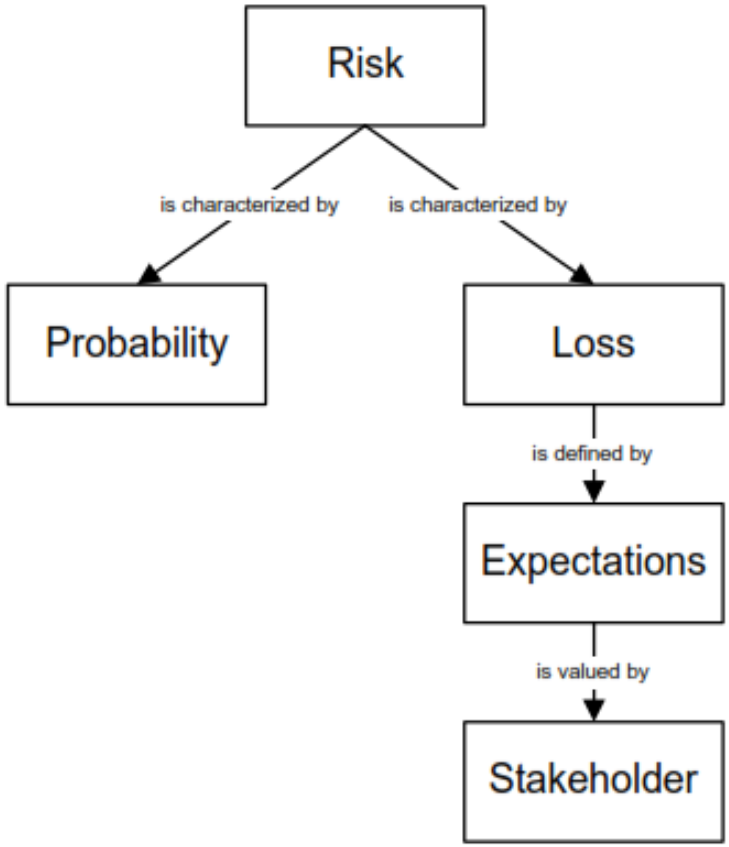
Why do we need risk management in systems/ software engineering?

- The development of a new complex system requires acquiring knowledge about advanced devices/processes.
- The final purpose of SE processes is to develop a reliable smart product at an affordable cost.
- Unpredictable events can be encountered in any moment of the system life cycle, events that can produce performance shortfalls, changes in the over-all cost and schedule of the project which develops the complex system.

Risks and issues

- Risk
  - "An uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives."

- Issue
  - "A matter in question or in dispute, or a point that is not settled and is under discussion or over which there are opposing views or disagreements"



(Riskit method)

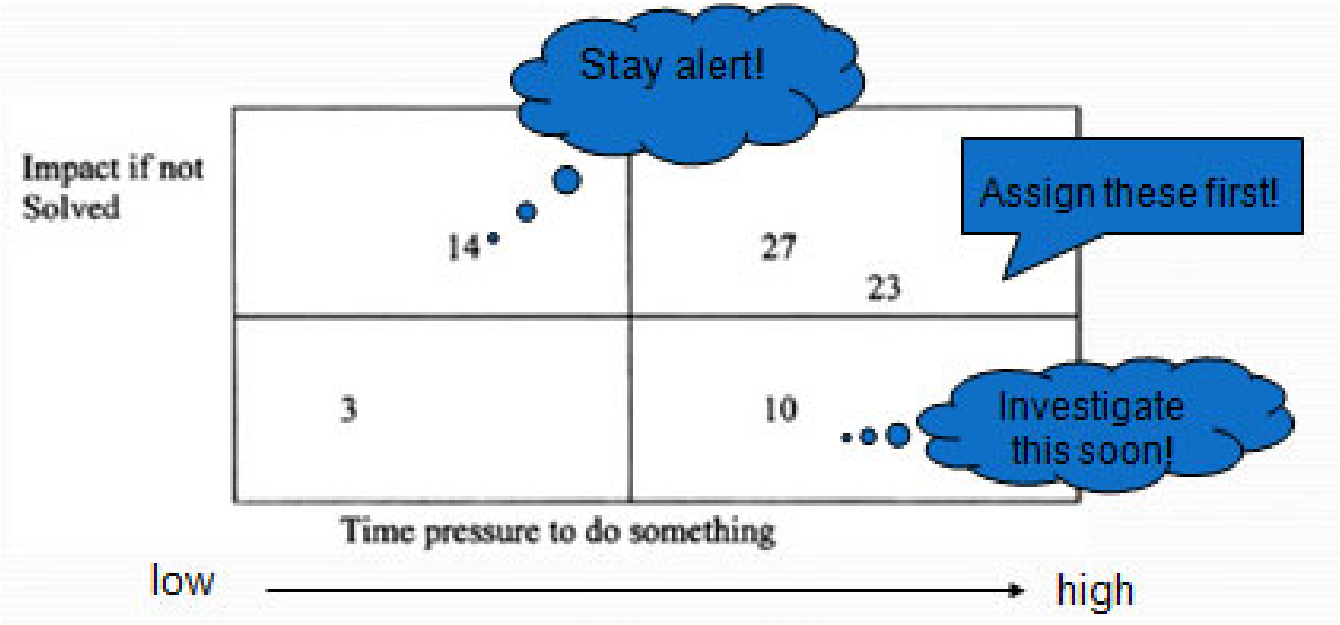
http://www.jyrkikontio.fi/attachments/File/riskittr.pdf

Is it a risk or an issue?

- Issues imply some risk until they are resolved
- Risks can become issues when the probability indicates action is needed
- http://www.differencebetween.net/language/difference-between-risk-and-issue/#ixzz2icev4kai

Prioritizing/Assigning Issues

- Group/Prioritize issues by
  - Impact if not solved
  - Time pressure to do something



Keep records: The Issue Log

- Description of the issue
- Issue category/type
- Priority
- When identified
- Responsibility
- Expected resolution date
- Progress description/current status
- Final decision/resolution

Issue Follow-up

- Schedule periodic issue reviews
  - Team meetings
  - Status reports
- Take Action
  - Communicate results! Check your Communications Plan!
  - Update tasks/milestones
  - Make needed investments
  - Manage scope expectations

Risk Management

- The process by which potential risks to a business are identified, analyzed and handled, along with the process of balancing the cost of protecting the company against a risk vs. the cost of exposure to that risk

The Risk Management Process

- Risk identification
  - Determining which risks are likely to affect a project
- Risk qualification and quantification
  - Evaluating risks to assess the range of possible project outcomes
- Risk response development
  - Taking steps to develop appropriate action plans
- Risk response control and monitoring
  - responding to risks over the course of the project

Risk Identification

1. *Requirement:* What exactly is it that the system has to do?
2. *Match:* How will the system interact with its human operators and other peer systems?
3. *Changing environment:* How will needs and goals change during the period of development?
4. *Resources:* What key human skills will be available (when needed) as the project proceeds?
5. *Management:* Will management have sufficient talent to set up productive teams, maintain morale, keep turnover low, and coordinate complex sets of interrelated tasks?
6. *Supply chain:* Will other parties to the development perform as hoped?
7. *Politics:* What is the effect of using political power to trump reality and impose constraints that are inconsistent with end-project success?
8. *Conflict:* How do members of a diverse stakeholder community resolve their mutually incompatible goals?
9. *Innovation:* How will technologies and approaches unique to this project affect the eventual outcome?
10. *Scale:* How will upscaling volume and scope beyond past experience impact project performance?

General Categories of Risks

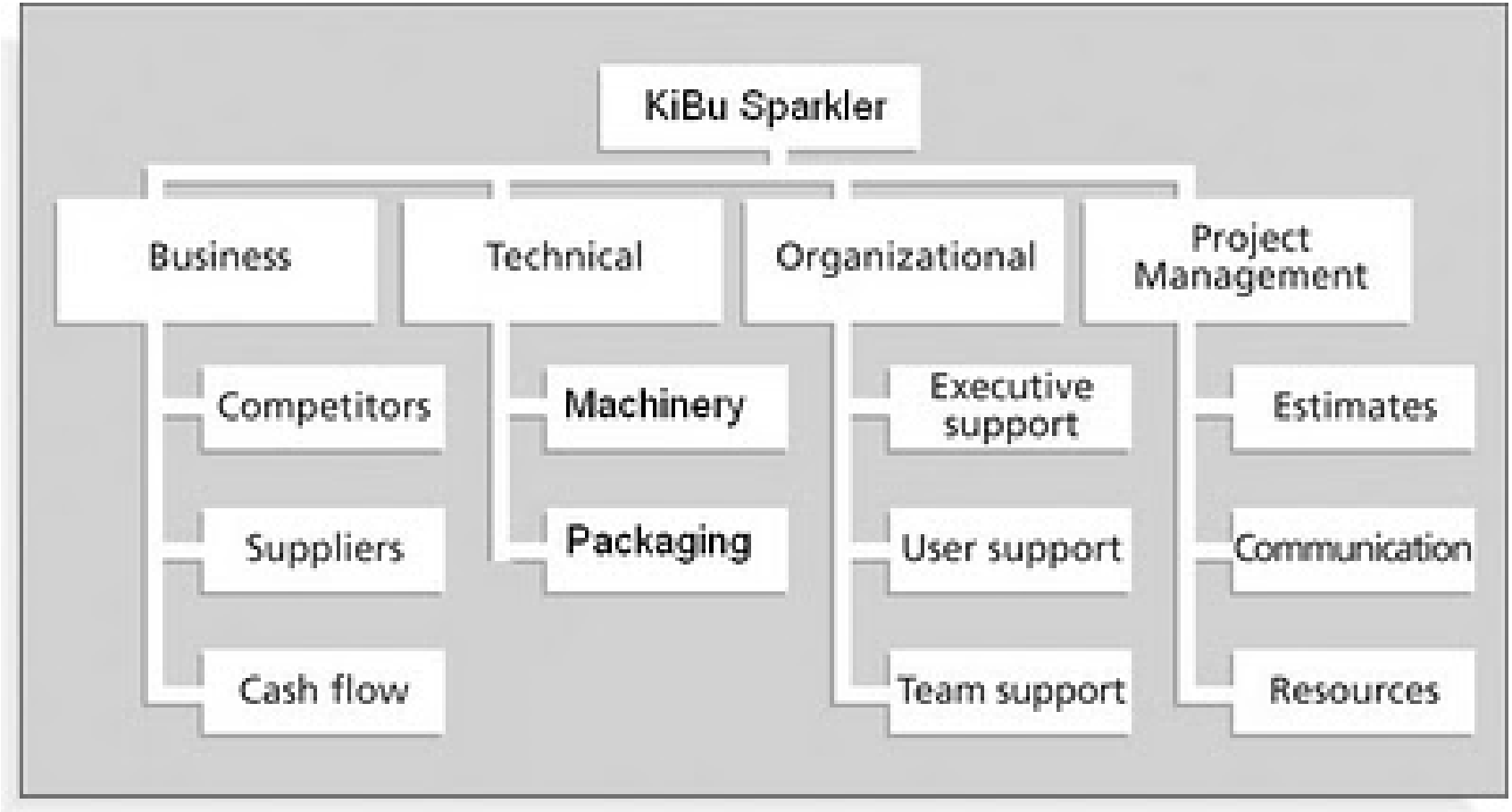
- Economic risks
- Legal risks
- Terrorist/criminal attack risks
- Technical risks
- Organizational risks
- Project management risks

- Project Size
- New technology
- Integration with other systems

- lack of political support
- Inadequate or variable resource commitments
- lack of trainers/ support staff
- possible rejection of the system
- poor procedures or enforcement
- ineffective use by users

Risk Breakdown Structure

- "A source-oriented grouping of project risks that organizes and defines the total risk exposure of the project. Each descending level represents an increasingly detailed definition of sources of risk to the project." (Dr. David Hillson, "The Risk Breakdown Structure as an Aid to Effective Risk Management," PMI Europe, 2002)



Risk Qualification

- What probability has this risk?
  - High: Will probably happen
  - Medium: Might happen
  - Low: Probably won't happen, but could
- What is the impact on schedule/cost/quality?
  - High: Likely to cause significant impact to schedule/cost/scope/quality
  - Moderate: Has potential to cause impact to schedule/cost/scope/quality
  - Low: Has limited potential impact to schedule/cost/scope/quality
- What risk/impact levels are too low to justify further consideration?

Risk Quantification

Probability / Impact	High=3	Medium=2	Low=1
High=3	9	6	3
Medium=2	6	4	2
Low=1	3	2	1

Components of Risk

- The likelihood/probability (that a given component will fail to meet its goals)
- The impact/criticality (of a specific failure to the overall success of the project which develops the complex system)
- In most projects, risk is quantified in exact values, in crisp terms, but, unfortunately, the reality contradicts those forecasts: to get truly useful information in estimating risk experts should analyze a distribution, not a punctual value.

Example of a Risk Matrix with Intervals

Risk Identifier					
Likelyhood					
5	5	10	20	40	80
4	4	8	16	32	64
3	3	6	12	24	48
2	2	4	8	16	32
1	1	2	4	8	16
	1	2	4	8	16
	Impact				

Score	Risk
1 - 6	Low
7 - 14	Moderate
15 - ++	High

Likelihood

Value	Conditions
High	• Significant extension from past designs • Multiple new and untried components • Complex components and/or interfaces • Marginal analytical tools and data
Medium	• Moderate extension from past designs • Components complex but not highly stressed • Analytical tools available
Low	• Application of qualified components • Components of medium complexity • Mature technologies and tools

Impact

Value	Description
High	• Major degradation in performance (50–90%) • Serious safety problem
Medium	• Significant degradation in performance (10–50%) • Short losses of operability • Costly operational support
Low	• Minor degradation in performance (>10%) • Occasional brief delays • Increased maintenance

Okay, We Listed the Risks—Now What Do We Do About Them?

Ways to address risks

- Avoid them: eliminate up front
- Mitigate them: minimize anticipated impact
  - Contingency plans
- Transfer them
- Contain them/accept them: accept real or potential impacts

Keep records: The Risk Log

- Can be combined with the Issue Log
  - Similar format, but flag which items are issues and which are risks!
    - Description
    - Category/type (from Risk Breakdown Structure)
    - Responsibility or ownership
    - Priority (high/medium/low or numeric assessment)
    - Response approach (Avoidance, Mitigation, Transfer, Acceptance)
    - Specific actions to be taken
      - Triggers for contingency plans
    - Effects on time/cost/scope/quality

Samples of Risk Log

Autori: Dascalu Maria-Iuliana

Date 15/5/2007

Project Mngr Popescu Andrei Project Name Centru de calificare/ recalificare

PROJECT RISK MANAGEMENT PLAN

	Identification							Qualitative Analysis				OPTIONAL Quantitative Analysis				Response Strategy			
Priority	Status	ID #	Date Identified / Project Phase	Functional Assignment	Threat/Opportunity Event	SMART Column	Risk Trigger	Type	Probability	Impact	Risk Matrix		Probability (%)	Impact ($ or days)	Effect ($ or days)	Strategy	Response Actions including advantages and disadvantages	Affected WB $ Tasks	Responsibility (Task Manage
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)		(13)	(14)	(15) =(13)x(14)	(16)	(17)	(18)	(19)
1	Active	F1R1	01.07.2007 / Managementul proiectului	Management	Control ineficient	Din cauza controlului in detaliu, se neglijeaza controlul de ansamblu; sustinerea cursurilor deplinde de constructia cladirii, asa ca orice intarziere in prima parte va putea fi greu recuperata.	Control slab, determinat de complexitatea proiectului ce cuprinde cel putin doua subproiecte (constructia cladirii, sustinerea cursurilor)	Quality / Scope	Moderate	Moderate	Probability: VH, H, M, L, VL; Impact: VL, L, M, H, VH; X	0 / 0 / 0,5 / 0 / 0	50%	20.000	10.000	Avoidance	Cresterea timpului acordat fazei de management a proiectului prin disponibilitate maxima din partea managerului de proiect sau angajarea unui asistent de proiect	CREC.1.5. Controlul proiectului	Popescu Andrei(project m
2	Retired	F1R2	01.07.2007 / Managementul proiectului	Management	Estimare temporara eronata	Nu se iau masuri la timp in ceea ce priveste intarzierile de pe parcurs.	Estimare eronata in partea de constructie, fapt ce duce la amanarea datei fixate de incepere a cursurilor	Schedule / Cost	Moderate	Moderate	Probability: VH, H, M, L, VL; Impact: VL, L, M, H, VH; X	0 / 0 / 0,5 / 0 / 0	50%	5000	2.500	Mitigation	In stabilirea termenelor pentru subproiectul de constructie managerul de proiect va colabora cu inginerul in constructii. Orice abatere pe parcurs va incerca sa fie reparata din timp, nu propagata.	CREC.4.2.Constructie terminata	Popescu Andrei (project m
3	Retired	F1R3	01.07.2007 / Managementul proiectului	Management	Estimare a costurilor eronata	S-au facut planuri bugetare cu un cost mult mai mic pentru mana de lucru.	Subestimarea costurilor de constructie a cladirii destinate sustinerii cursurilor	Cost	Moderate	Moderate	Probability: VH, H, M, L, VL; Impact: VL, L, M, H, VH; X	0 / 0 / 0 / 0 / 0	50%	15000	7.500	Mitigation	Pentru stabilirea costului subproiectului de constructii se formeaza o echipa formata din manager de proiect, economist si inginer constructor.estimarile se vor baza pe studiu de piata in ceea ce priveste costul materialelor, al echipei de muncitori si al inchirierii	CREC.4.1.Constructie laboratoarelor	Popescu Andrei(project m

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Risk title:	Project name:
Risk owner:	Last updated:
Team:	
Date submitted:	

Description of risk:

Statement of basic cause:

Consequence if risk is realized:

Risk type:

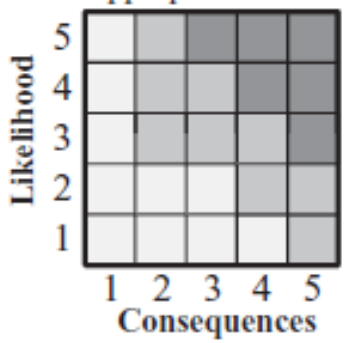
☐ Technical

☐ Schedule

☐ Cost

☐ Other

Place X, 1, 2, … in the appropriate cells.



Risk reduction plan

Action/milestone event.	Date	Success criteria	Risk level if successful L	C	Comments
1.					
2.					

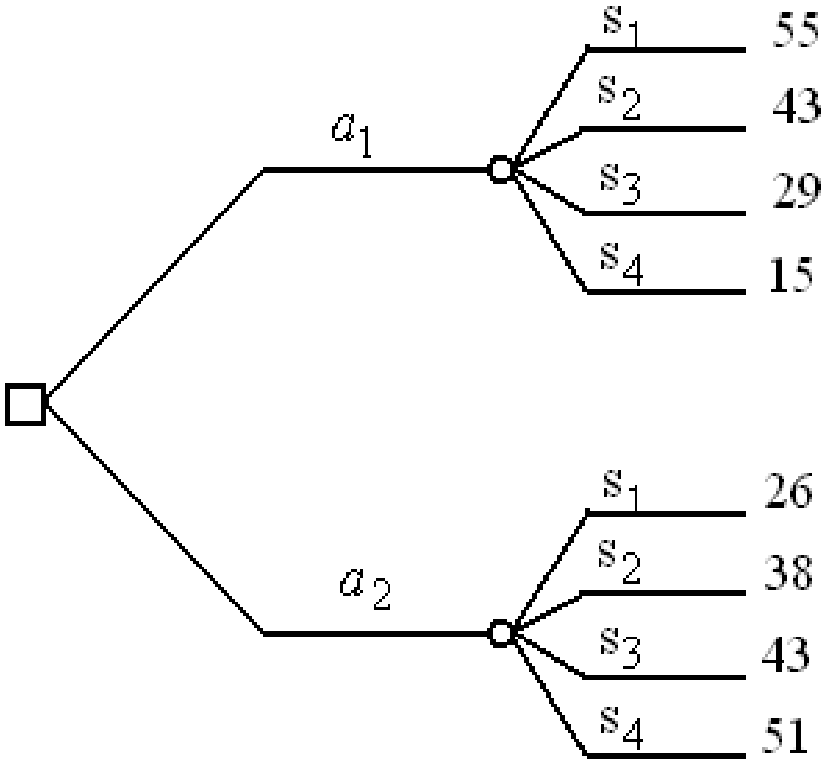
Risks Modeling Methods

- Analytic methods: require a set of assumptions, especially related to the probability distributions

- Simulation methods: require a large number of "trials" to approximate an answer

http://www.systemsguild.com/riskology

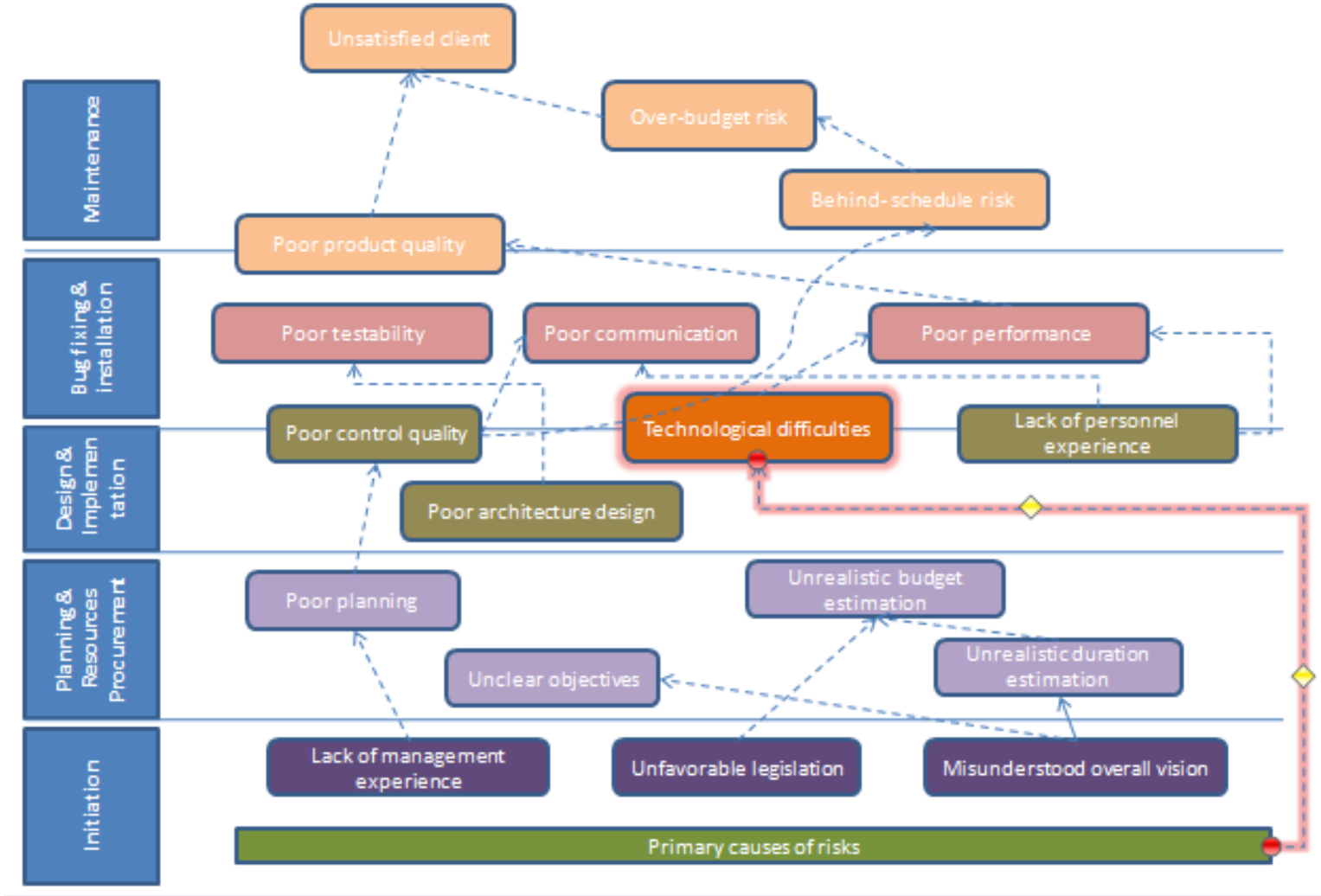
Risk Analysis using Decision Trees



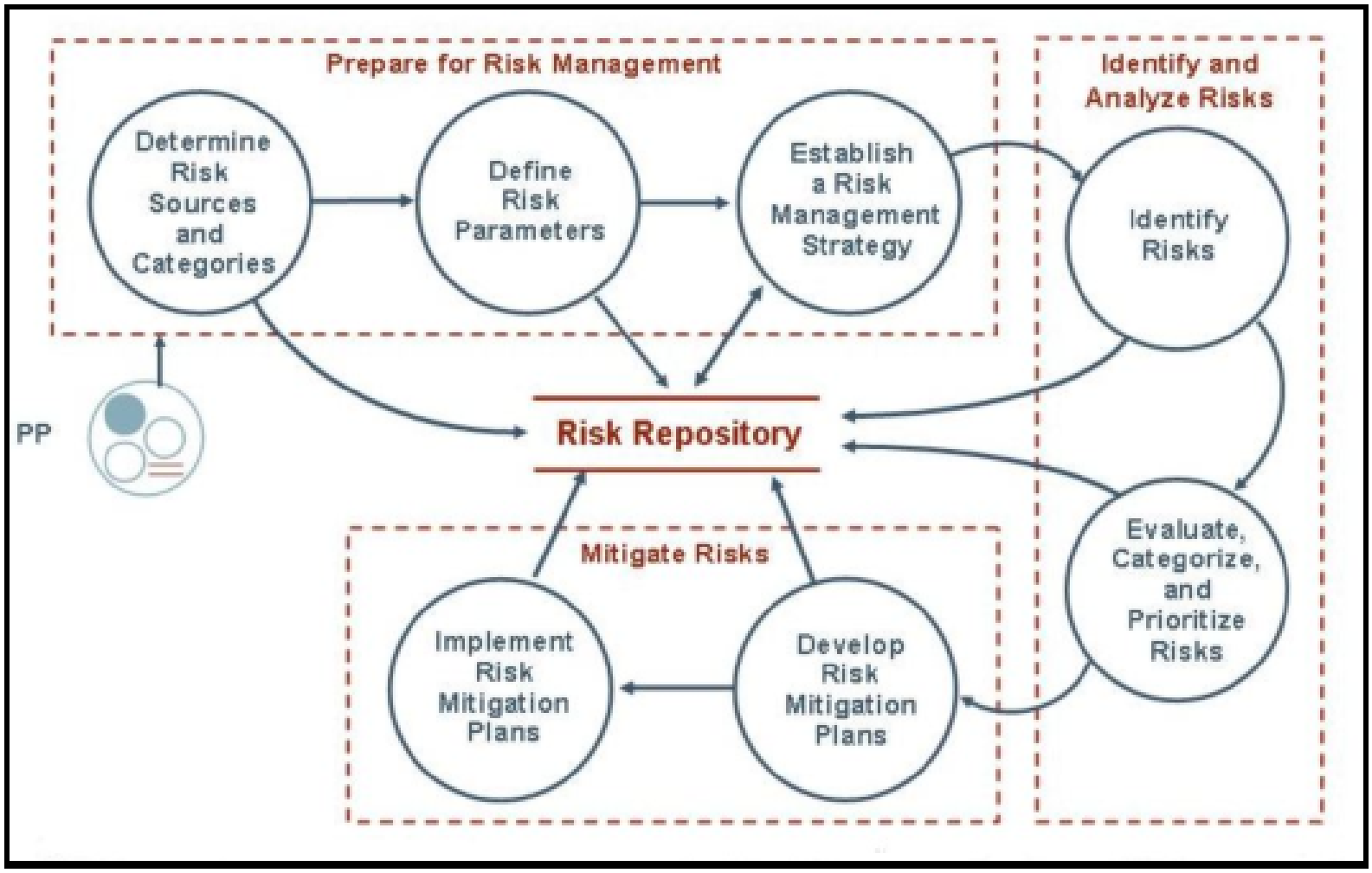
EMV(a1) = 0,4(55) + 0,1(43) + 0,3(29) + 0,2(15) = 38.0
EMV(a2) = 0,4(26) + 0,1(38) + 0,3(43) + 0,2(51) = 37.3

Variant a1 is chose.

IT Risks Evaluation Model using Risks Maps and Fuzzy Inference



Risk Management Standards



CL 5: Optimizing

CL 4: Quantitatively Managed

CL 3: Defined

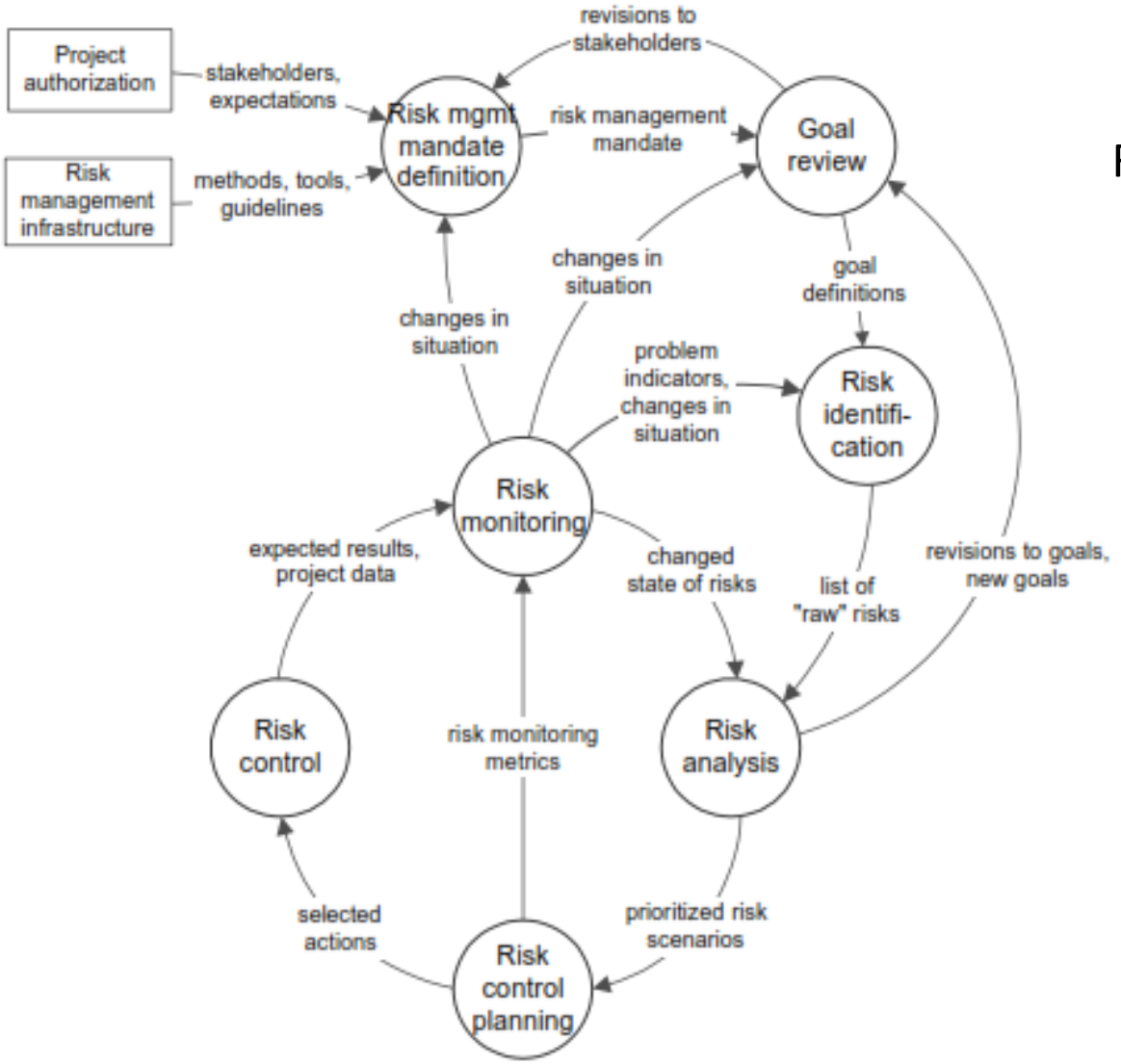
CL 2: Managed

CL 1: Performed

CL 0: Incomplete

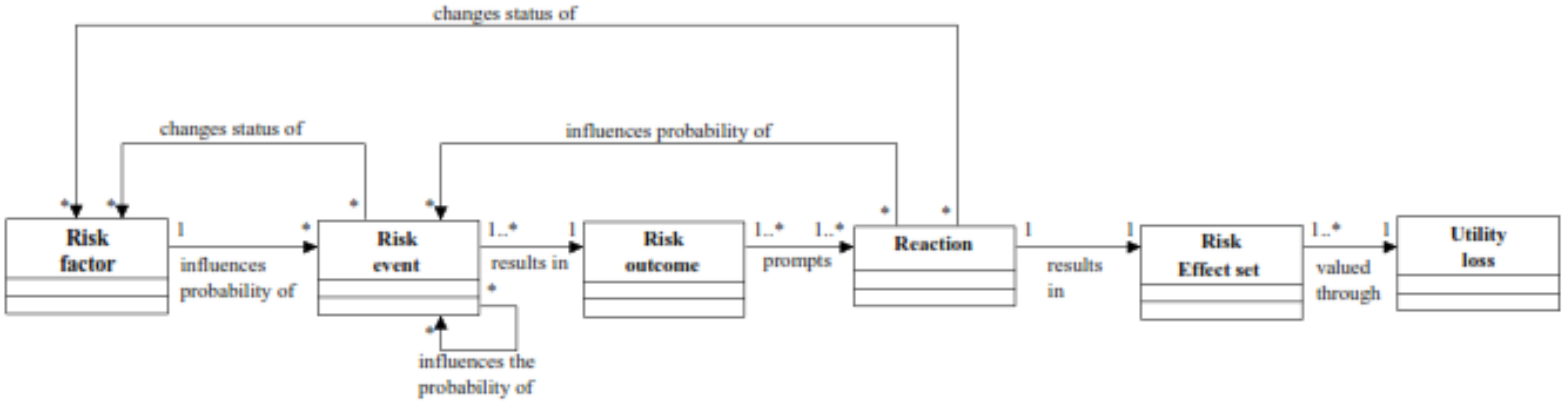
The Risk Management (RSKM) Process Area of CMMI

Risk Management Standards



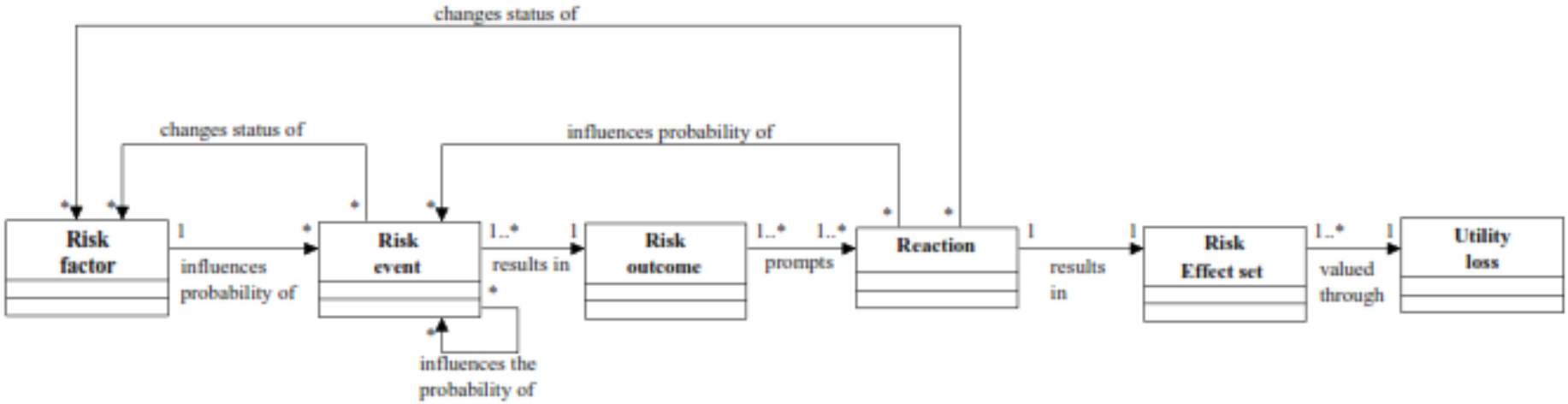
RISKIT

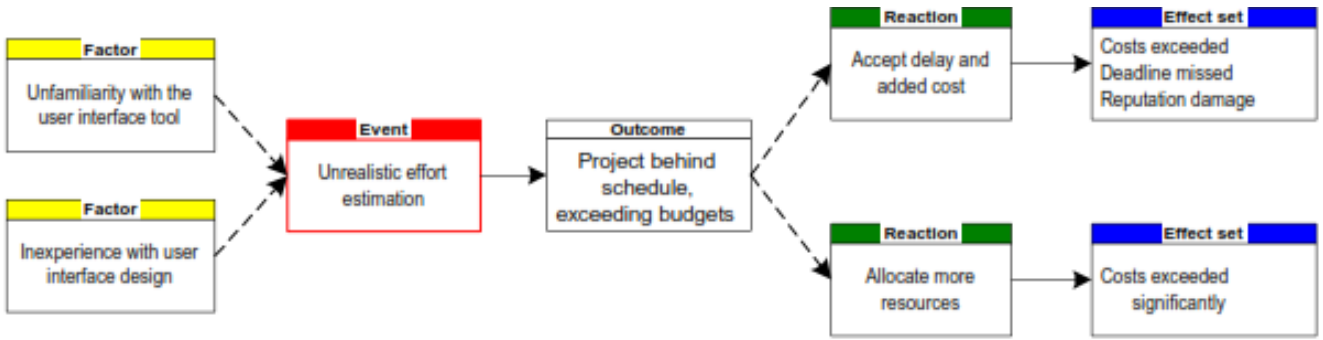
RISKIT



Risk factor	• inexperience of personnel • use of new methods • use of new tools • unstable requirements[2]
Risk event	• a system crashes • a key person quits • extra time spent on learning a method • a major requirements change
Risk outcome	• system out of operation • personnel and competence shortage • work behind schedule • new work required
Risk reaction	• system operational after delay, back up data restored • recruiting process initiated, staff reassigned
Risk effect	• added cost $50K • two-month calendar delay • some functionality lost • reputation as a reliable vendor damaged
Utility loss	• The perceived harm experienced by a stakeholder, e.g., the board of directors, CEO, or personnel

RISKIT


changes status of
changes status of
influences probability of
Risk factor
influences probability of
Risk event
results in
Risk outcome
prompts
Reaction
results in
Risk Effect set
valued through
Utility loss
influences the probability of


Factor
Unfamiliarity with the user interface tool
Factor
Inexperience with user interface design
Event
Unrealistic effort estimation
Outcome
Project behind schedule, exceeding budgets
Reaction
Accept delay and added cost
Effect set
Costs exceeded
Deadline missed
Reputation damage
Reaction
Allocate more resources
Effect set
Costs exceeded significantly

Conclusions

- Risk="An uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives." = > influences quality (next course!!!)

- http://www.youtube.com/watch?v=lrCOIRGpeeM

[You can't eliminate risk, but you can manage it intelligently.]

Material

- https://www.dropbox.com/sh/aad4rjm0gyrm7tg/AAD-64GX0Ue0tFsYNlD2lqKBa?dl=0