KAGRA Risk Management

Masaki Ando
(National Astronomical Observatory of Japan)

Risk Management

- Potential risks are important information
  for the project management.

  - Important for careful progress evaluation.
  - Basic information for effective allocation of resources.
  - To clarify and to remind risks
    → Back-up plans or mitigation
    to avoid or to minimize delay.
    'Necessity is the mother of invention'

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Technical and schedule risks for each subsystem
are being summarized up by SEO.

Risk Management Activities

- Collected risk information from subsystems (Feb. 2012 -).
- Summarized them and presented at PAB (Feb. 23).
  → Suggestions from PAB members.

- Visited P. Grey (TMT sub-PM, Risk management leader) to hear about the TMT risk management (March 5).
- Risk meeting by subsystems + SEO (April. 2).
- Report at the External Review (April 17)
- Asking subsystems to update the risk information.

KAGRA Risk Register

- KAGRA Risk Management.
  - Summarized in a simple Excel file.
  - Risk registers mainly by sub-group chiefs.
  - Total ~120 risks (~10 risks for each subsystem)
  - Risk ID, Item, Date,
    Explanation, Impact, Mitigation/Back-up plan,
    Quantitative evaluation P, S, R
    (Probability, Seriousness, and Degree of Risk)
    Remark by SEO
  - Risk meeting
    Only one risk meeting
    → Still with biases by personal impressions.

KAGRA Risk Register

- Quantitative evaluation P, S, R

Probability P

0 The probability is extremely low and will almost never occur.

1 The probability is not large and will probably not occur.

2 The probability is around 0.5.

3 The probability is large and will probably occur.

Seriousness S

0 It will not affect the successful completion of the project.

1 It will to some degree affect the successful completion of the project.

2 It will to some degree endanger the successful completion of the project.

3 It will result in the failure of the project.

Degree of risk

R = P x S.

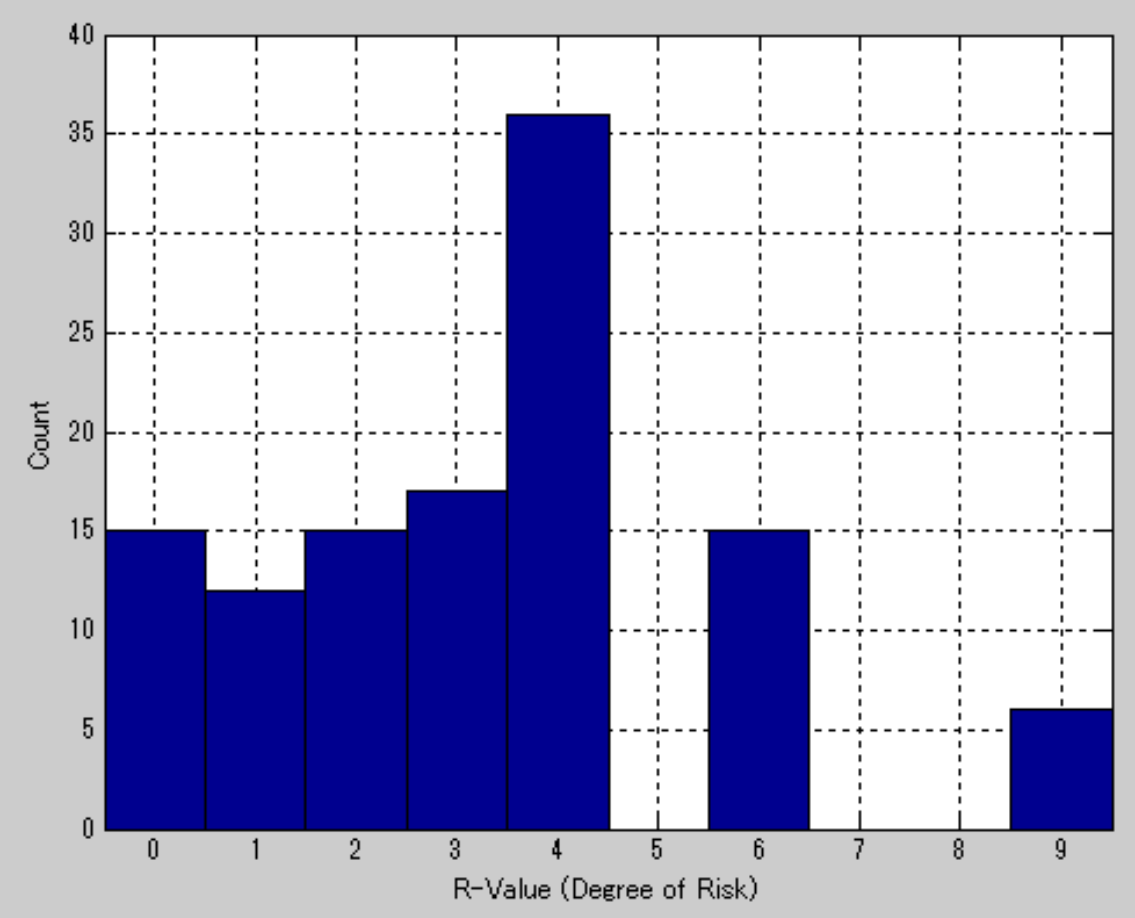
Screenshot of Risk Register

KAGRAリスク要因　　2012.8.13

仮ID	No.	サブシステム Subsystem	項目 Item	説明 Explanation	インパクト Impact	対応 Design/back-up plan	P Estimated Probability	S Degree of Seriousness	R Degree of Risk	Selection MA	Selection KS	Selection SM	情報元 Source
TUN-1	1	トンネル Tunnel (TUN)	静寂環境	期待しているほどの静寂環境が得られない。地面振動や多量の地下水による音響雑音、大気環境など。	望遠鏡の安定度・感度の悪化。	各サブシステムの性能向上。防音設備等の充実。	1	3	3				Uchiyama Aug. 6 2012
TUN-2	1	TUN	避難経路の確保	X-endからの避難経路が確保されていない。	重大な危険。		2	3	6	10		10	Uchiyama Aug. 6 2012
TUN-3	1	TUN	掘削完成遅れ	掘削完成遅れ	全体スケジュールに影響有り。	掘削業者がすべての責任を持つ。	2	3	6	10			Uchiyama Aug. 6 2012
TUN-4	1	TUN	防振用縦穴位置ずれ	防振用の縦穴掘削位置が設計値からずれる。	全体設計に影響有り。	測量を正確に行う。防振グループは余裕のある設計を行っておく。	1	3	3				Uchiyama Aug. 6 2012
FCL-0	2	施設 Facility	静寂環境	信号取得系機器やエアコン・クリーンブースの音が雑音源になる	感度を犯す雑音源になる	できるだけ、振動・騒音の少ない機器の選定、と隔離	2	3	2				Miyoki Aug. 8, 2012
FCL-1	2	FCL	電気環境	よいグラウンドが取れなくて、ハムが大きく残り、データ品質を落とす。	データ品質を落とす。		3	4	3				Miyoki Aug. 8, 2012
FCL-2	2	FCL	クリーン環境	鏡のロスを増やす	鏡の予定性能が出ない。感度悪化。	興研のferinaを利用したブースの利用	3	3	3				Miyoki Aug. 8, 2012
FCL-3	2	FCL	温度・湿度環境	高湿度・高温環境が、機器類の故障を誘発する	維持コストの増大・Duty Factorの低下を招く	特に腕部は、除湿機能付きボックスに格納	3	5	3				Miyoki Aug. 8, 2012
FCL-4	2	FCL	ネットワーク	ネット転送速度の維持・冗長性	データが転送できず、データがあふれる。最悪取りこぼす。	二重化できるところはする	1	5	1				Miyoki Aug. 8, 2012

Statistics

- Total risk registers : 116, Avg. of 'R' : 3.3,
  R≧6 risks : 21, R=9 risks : 6



Top Six Risks

※ With biases by personal impression.

- Cryogenics (CRY) : Budget
  - The budget for cryo-payload is not assigned yet.
  - Very serious. Cryogenic system will not be completed.
  → Budget request to the government.

New!

- Vibration Isolation (VIS) : Availability of Materials.
  - Production volume of Maraging steal for GAS filter is small.
  - The production lead time will be about 2 years.
  - Now, a company has a reserved stock, but hard to keep it because of non-healthy financial situation of that company.
  → Argent procurement is necessary.

Six-Largest Risks

※ With biases by personal impression.

- Main Interferometer (MIF) : Commissioning and Man Power.
  - There will be unexpected delay in commissioning.
    Lack of Man power will be crucial.
  - Very serious. Schedule will not be kept.
  → Detailed commissioning plan.
    Careful test before installation.

- Auxiliary Optics (AOS) : Cleanliness and Schedule.
  - Clean environment during installation.
  - Contamination of optics, Increase of scattered light.
  → Careful planning and preparation for installation.

Subsystem Details

	Subsystem	Entry	Avg(R)	Sum(R)	R≧6
1.	TUN	4	4.5	18	2
2.	FCL	5	2.4	12	0
3.	VAC	8	1.1	9	0
4.	CRY	26	4.2	108	5
New! 5.	VIS	5	4.4	22	1
6.	MIR	6	3.8	23	0
7.	LAS	6	4.2	25	2
New! 8.	MIF	21	4.1	87	5
New! 9.	IOO	5	0.4	2	0
New! 10.	AOS	10	4.5	45	3
11.	AEL	3	---	---	---
New! 12.	DGS	8	2.8	22	2
13.	DMG	3	2.0	6	0
14.	DAS	---	---	---	---
15.	GIF	---	---	---	---
0.	PM	---	---	---	---

Large risk factors (R≧6)
- Man power, Budget, Schedule
- Material availability (VIS, CRY)
- Environment (CRY, AOS, AEL)
- Damage (LAS, AOS, DGS)
- Mirror quality (MIF)
- Scattered light (AOS)

※ With biases by personal impression.
Numbers will be changed easily.

Summary

- We are summarizing risk factors
  → Basic information for the project management.

- Continuous update and remind are important.
  → Being discussed and updated in subsystem visitings.
  Need risk meetings ???

It is important to 'predict unexpected problems'.

TMT Risk Management

- TMT risk management.
  - Web-based system developed in the TMT collaboration.
    * All project staff have usernames, are encouraged to submit new risks & comment on existing risks.
    * Allows real-time new risk entries & edits.
  - Risk registers
    * Total risk registers <200. Risks in project management included.
    * Categorize the risk registers in sub-system, construction phase.
    * Three ranks in 'severity', 'probability' and 'overall risk'.
    * 'Mitigation' includes prevention and back-up plan.
  - Regular risk meetings in every 3-months.
    * New risk entries are evaluated and approved.
    * Follow-up technical discussions.

TMT and KAGRA

- Visiting P. Grey was very helpful for us.
  - Similar concept
    * As simple as possible. Total number <200.
    * Simple rating in possibility, seriousness, and total risk.
  - TMT is more systematic.
    * Web-based risk-register system developed in TMT.
    * Regular risk meetings ~ every 3 months.

⇨ We got a kind of confidence on our direction.
Imported good points from TMT