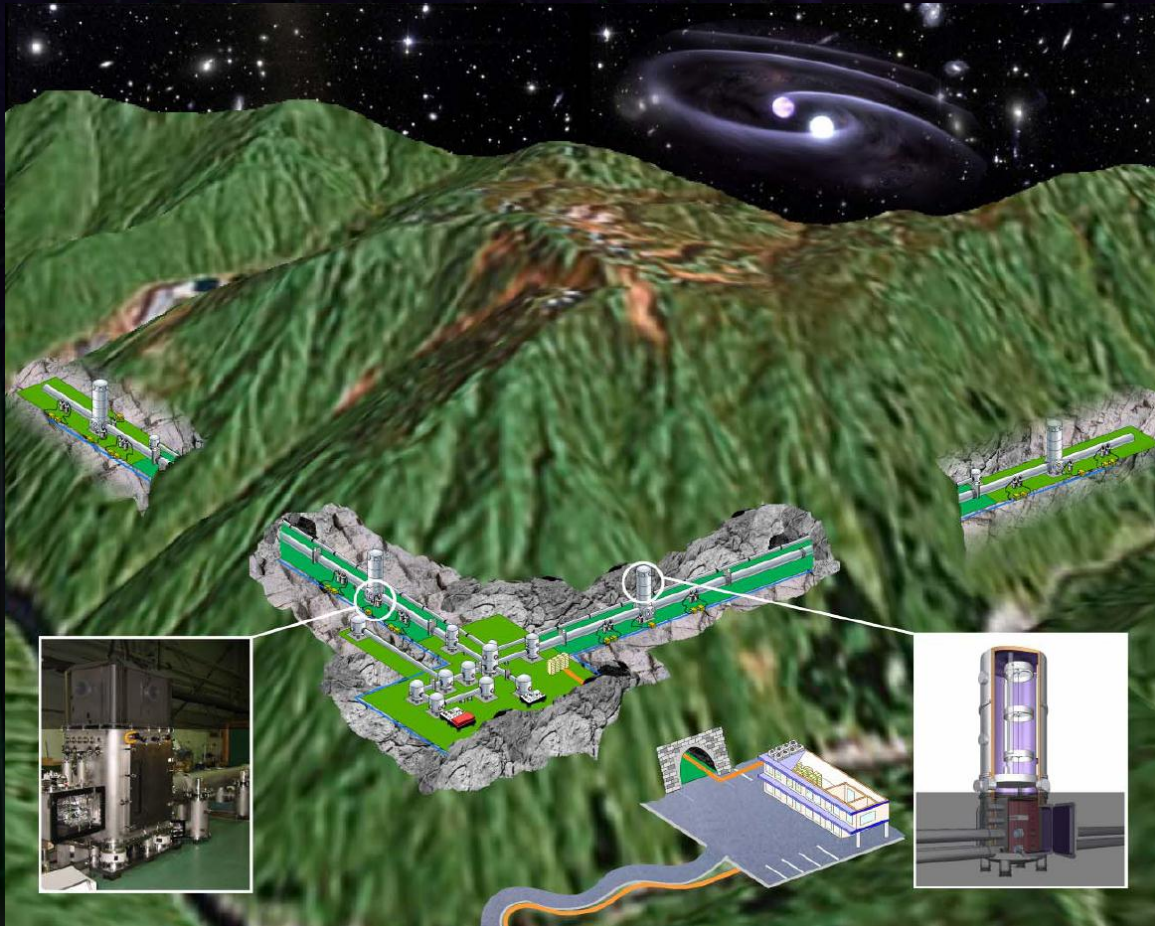


KAGRA Risk Management



Masaki Ando
(National Astronomical
Observatory of Japan)

Risk Management

- Potential risks are important information for the project management.
 - Careful progress evaluation for major risk factors.
 - Back-up plans to minimize project delay.
 - Effective distribution of project resources.
 - Clarify and remind risks → good mitigation?
- 'Necessity is the mother of invention'



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

Risk Management Activities

- Collect risk information from subsystems (Feb. 2012 -).
- Summarize them and present at PAB (Feb. 23).
- Some suggestion from PAB members.



- Visit 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.

TMT Risk Management

- Visit P. Grey (TMT sub-PM, Risk management leader) to hear about the TMT risk management (March 5).
 - Risk registers
 - * Total risk registers <200. Risks in project management included.
 - * Categorize the risk registers in sub-system, 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.
 - * Review of risks triggers follow up technical discussions.
 - Web-based system developed in the TMT collaboration.
 - * allows real-time new risk entries & edits.
 - * All project staff have usernames, are encouraged to submit new risks & comment on existing risks.

TMT and KAGRA

- We found that our concept is similar, but TMT is more systematic.
 - As simple as possible. Three ranks in seriousness.
 - Regular risk meetings ~ every 3 months.
 - Web-based system developed in TMT.
- ⇒ We got a kind of confidence on our direction. We should import good point from TMT
 - Risk management meetings.
 - Registered information in each risk.

KAGRA Risk Register

- KAGRA Risk Management.

- Total ~150 risks (~10 risks for each subsystem)
- Risk ID, Item, Explanation, Impact, Updated date, Mitigation/Back-up plan, and Quantitative evaluation

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 $R = P \times S$.

- Summarized in a simple Excel file.
- First version summarized.
- Register and discussions by sub-groups and SEO.
- One risk meeting.

KAGRAリスク要因 (KAGRA Risk Factors)

2012.3.12

| 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 | S | R | Selection | | | 情報元 Source |
|-------|-----|----------------------|------------|--|--|--|---------------------------|-----------------------|----------------|-----------|----|----|---------------------|
| | | | | | | | Probability of Occurrence | Degree of Seriousness | Degree of Risk | M | KS | SM | |
| 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。 | 留連地の安定度・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。 | | | 0 | | | | SEO |
| TUN-2 | 1 | TUN | 避難経路の確保 | ス-ndからの避難経路が確保されていない。 | ■大きな危険。 | | | | 0 | 10 | | 10 | Int.Rev.v2012 |
| 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。 | | | 0 | 10 | | | Uchiyama Feb. 14 |
| TUN-4 | 1 | TUN | 防振用掘削位置ず | 防振用の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。 | | | 0 | | | | Uchiyama Feb. 14 |
| FCL-1 | 2 | 施設 Facility | | | | | | | 0 | | | | |
| VAC-1 | 3 | 真空 Vacuum (VAC) | 真空リーク | 真空系のリーク | 干渉計安定度・感度の低下。ダクトにリークが起きた場合には、真空復帰に1ヶ月以上を要する。 | ダクトに取り付けられたイオンポンプ等は真空を破ることなく交換可能なように、バルブを取り付けておく。 | | | 0 | | | | Int.Rev.v2012 |
| VAC-2 | 3 | VAC | イオンポンプの寿命 | Ion pump replacement is once per 5 years when operated at 10-7 Pa. If a ion pump gauges may run due to contamination for first one year operation, then the probability will increase. | not serious; replacing without breaking atm vacuum. | | | | 0 | | | | Sato Feb. 14 |
| VAC-3 | 3 | VAC | ゲージの故障 | Errosion of gasket and electric feed-through may happen; probability is unknown although humidity test has shown no erosion. | not serious; replacing without breaking atm vacuum. | | | | 0 | | | | Sato Feb. 14 |
| VAC-4 | 3 | VAC | ガスケット等 | View port crack or fracture may happen; the probability is much higher in a window of 200 mm in diameter, or more. | serious if the erosion takes place in the atm. one month is necessary for recovering vacuum. | | | | 0 | | | | Sato Feb. 14 |
| VAC-5 | 3 | VAC | 窓板等の破損 | Window crack or fracture may happen; the probability is much higher in a window of 200 mm in diameter, or more. | serious. one month is necessary for recovering vacuum. | 修復後再度真空引きを行う。 | | | 0 | | | 10 | Sato Feb. 14 |
| VAC-6 | 3 | VAC | 大規模真空リーク | 大きな真空リーク。 | 干渉計安定度・感度の低下 | 緊急時復旧によるゲージバルブの閉鎖 真空サブグループによる使用材料・部品の査定、場合によっては、試験・測定を予め行う。 | | | 0 | | | 10 | Int.Rev.v2012 |
| VAC-7 | 3 | VAC | 真空内部品の材料 | 真空槽内に置かれる部品材料からの、ガス放出・発塵・油性成分干渉散による鏡の汚染および管内の圧力上昇 | | | | | 0 | | | | Sato Feb. 18 |

Summary

- We are summarizing risk factors
 - Basic information for the project management.
- First version was finished. Presented by subsystems in the previous external review (April 2012).
- Continuous update and remind are important.