Japan Construction Information Center

# Activities of JACIC for supporting CIM

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# JACIC Foundation

Japan Construction Information Center

## ○ Purpose and activities （Established on 1985/11/15）

**Smooth execution of construction projects**

Research, Development, Improvement, Operation, Maintenance,
Information Service and Promotion on Application of
Information Technology in Civil Engineering
（Both Owner and Contractor receive services）

## ○ Activities for CIM

Research and Development・Promotion and Spreading on CIM
Participate in Steering group of the CIM Technical Investigative Commission

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# 3 Key Points for CIM implementation

- Basic information on 3D geometry of object, time and cost for implementation
- Attribute information of the object
- Advanced design, e.g. embedded sensors for future maintenance work

# Expected effect of CIM implementation

① Utilization of information (Visualization of design)

② Optimization of design (Ensuring of consistency)

③ Advanced construction (Computerized construction), Quick decision making

④ Advanced efficient maintenance

⑤ Unification and integration of structure information

⑥ Environmental performance evaluation, Structural analysis

Parallel utilizing or parallel revising of shared information including 3D-object

More creative and effective review between stakeholders will be possible

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# The CIM Technical Investigative Commission

## ○ Established in 2012.7

## ○ Goal of the Committee

Investigate various technical issues by using 3D objects, for the purpose of realizing CIM which leads to new construction management system.

## ○ Member

11 organizations, including JACIC

Economic Research Association, Japan Civil engineering Consultants Association, Construction Research Institute, Japan Institute of Country-ology and Engineering, Advanced Construction Technology Center, National General Contractors Association of Japan, Japan Federation of survey and Planning Associations, Japan Geotechnical Consultants Association, Japan Construction Machinery and Construction Association, Japan Federation of Construction Constructors, Japan Construction Information Center

## ○ Relation with government

- Cooperation with the " The CIM System Investigative Commission " of MLIT
- Reporting and recommending the outcome of the investigation to MLIT

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# Outcome of the Technical Investigative Commission in 2012

- Study of future vision of CIM
- Evaluation of the trial work by MLIT

  Verification on the efficiency and quality improvement

  Recommendation about the technical development items or criteria which should be reviewed in future

・Study of attribute information to be applied to product model

・List up of current status and issues about measuring technology and computerized construction

・Survey of advanced cases

etc.

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# Future vision of CIM

・CIM Manager（ Administrator of product model ）

Plan ～ Design ～ Construction ～ maintenance ・・・ Long-term information management of more than 50 years

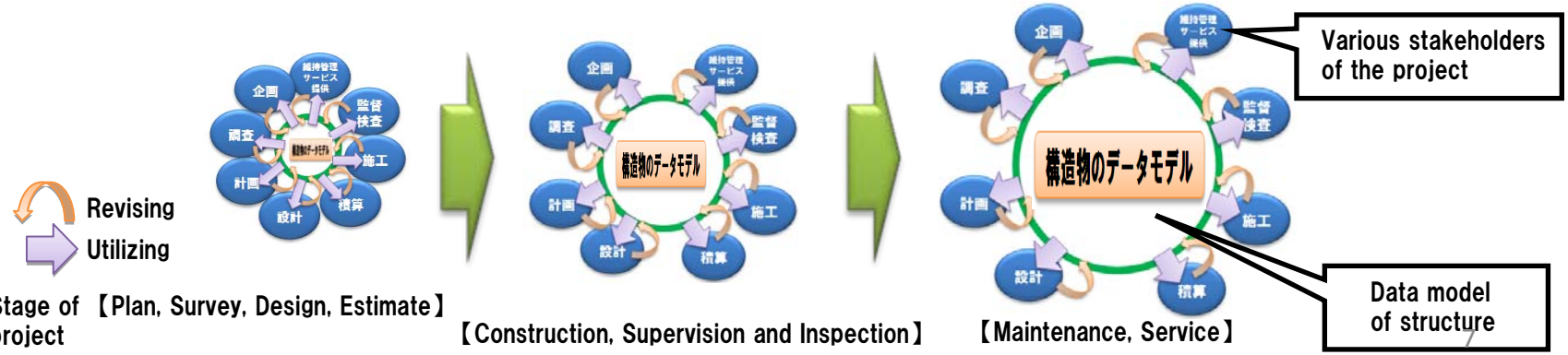
・National infrastructure model

The common model for the basic skeleton of national infrastructure ・・・ Road, River, Sewerage, etc.

・The style of Information sharing

From “ pass ” to “ sharing ” the information

By utilizing or revising the data model which evolves or matures as time goes by, Realize the collaborative work or parallel work through information sharing



# Evaluation of the trial work

◎ Verification on the effect or quality improvement

○ merit
- Visually easy-to-understand, making consensus with stakeholders smooth
- Reduction of labor and prevention of mistakes when design changes etc.

○ problems to be solved
- Cannot confirm the basis of quantity calculation
- Modeling of complex structure needs too much time etc.

◎ Recommendation about the technical development items
- Development of 3D product model for civil engineering
- Review of criteria on design
- Study on maintenance method using 3D model etc.

◎ Recommendation on the system and criteria
- Flexible operation of system and criteria on supervision, inspection, and electronic delivery
- Human resource development and training
- Making “ incentive ” for industry etc.

# Activities of JACIC

## ◎ Investigation of CIM

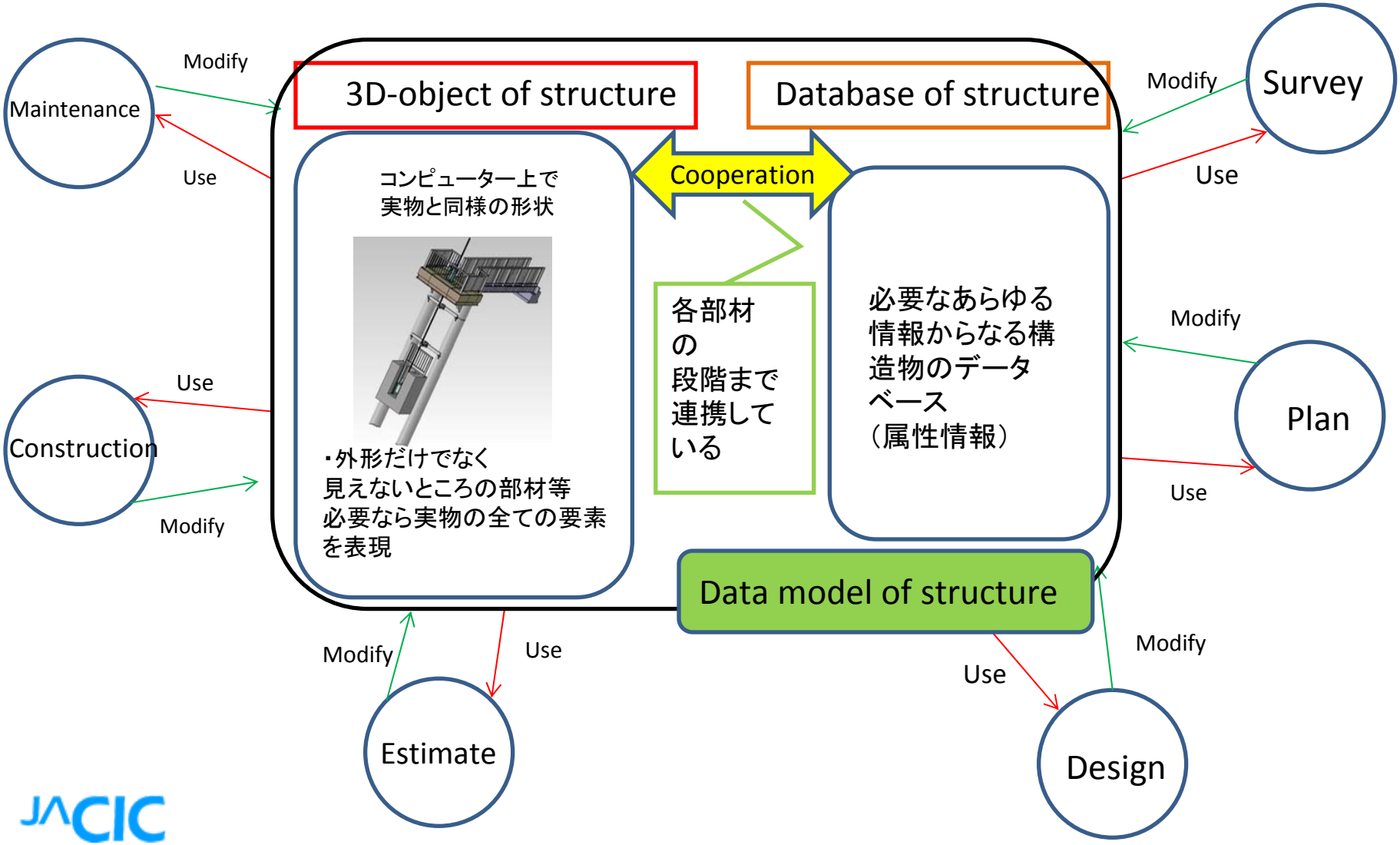
- ○ We have established “ CIM Project Team ” in 2012, and just begun basic research on CIM
  - ・By using the actual 2D drawings of procurement by public sector, we are (will be) making 3D model, studying construction plan, verifying the effect of 3D model, recommending the functional development of 3D software, and verifying the possibility of front-loading
  - ・We will develop the information sharing system for 3D data model, list up the issues on the cloud or sharing parts of drawing in future
- ○ Survey of overseas examples
  - ・Join JSCE investigation team to U.S.
- ○ Entrusted research on CIM

## ◎ Dissemination of CIM

- ○ Lecture at the several seminars
- ○ Contribution of articles introducing CIM for magazine or papers

# Parallel-use　Parallel-modify

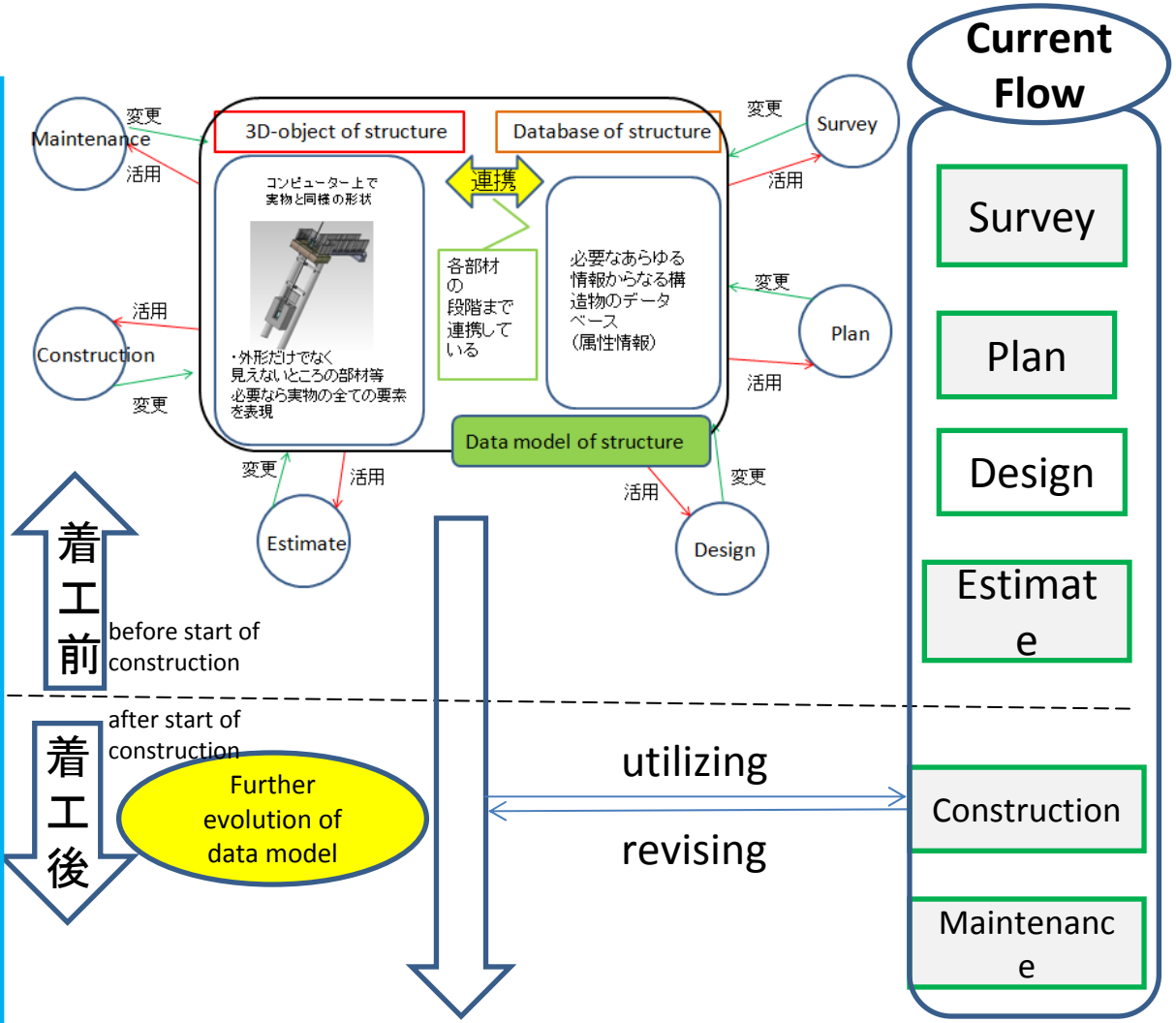
## (Concurrent Engineering )



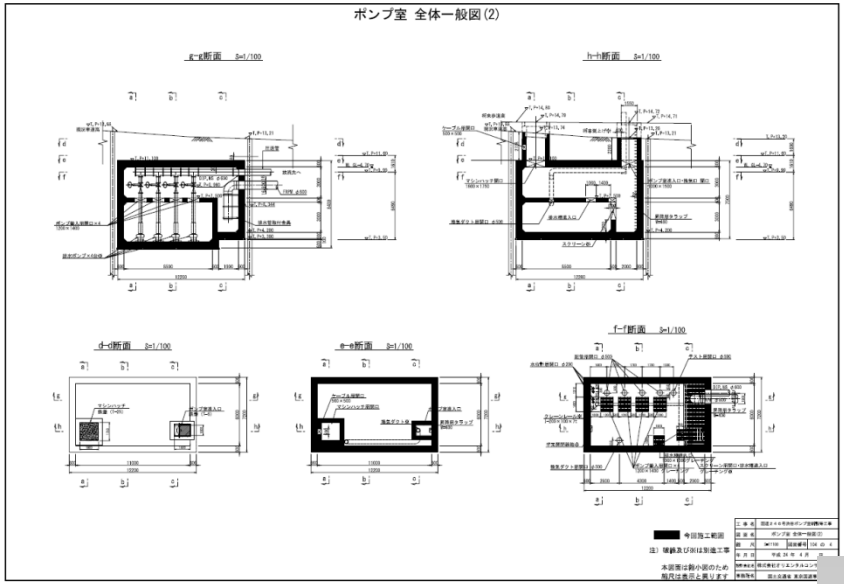
# The necessity of front-loading

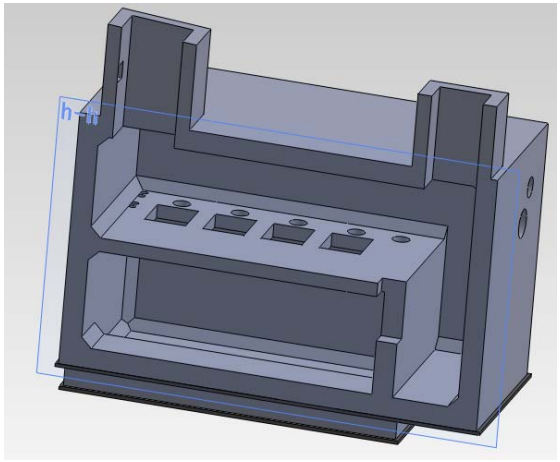
- フェイズ1(コンセプト立案)
  - 「何」を「誰」が造るかを決める。
- フェイズ2(基準設計)
  - 予算要求が出来る
  - 住民を含め合意形成ができる
    - 「規模」が決められている
    - 「構造(構造解析)」が決まっている
    - 「年間スケジュール」が決められている
    - 施工方式等が決められ「概算金額」が算定できる
    - 「周辺への影響」(環境、景観)が評価できる
- フェイズ3(詳細設計)
  - 予定価格を決めることが出来る。
    - 部材等の細部まで設計されている。
    - 施工方式が確定し、施工手順が確定している
- フェイズ4(実行設計)
  - 施工計画、施工体制、スケジュールを決める
- フェイズ5(施工)
  - 実施(施工)
- フェイズ6
  - 管理

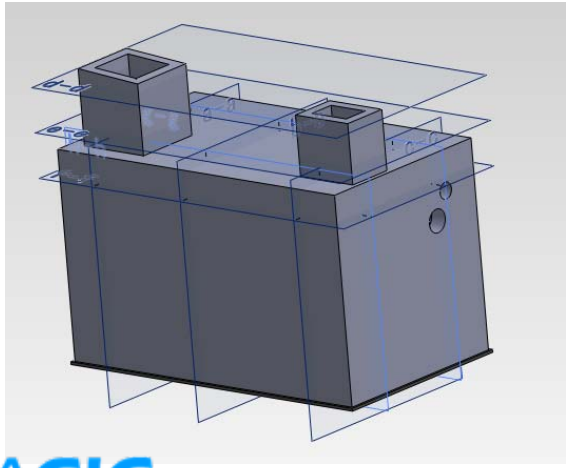
上記フェイズ分けは「統合プロジェクト推進法」における
フェイズ分けを土木事業に仮に当てはめてみたものである

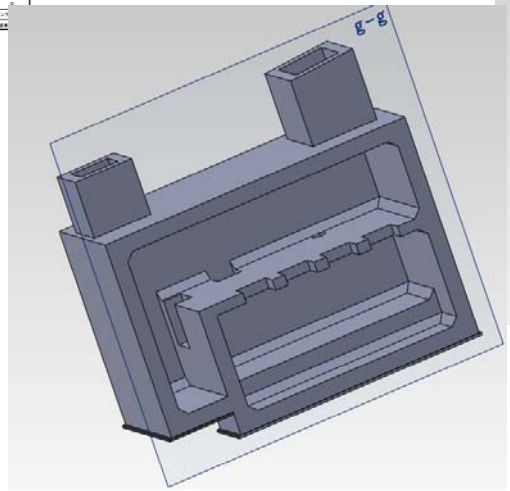


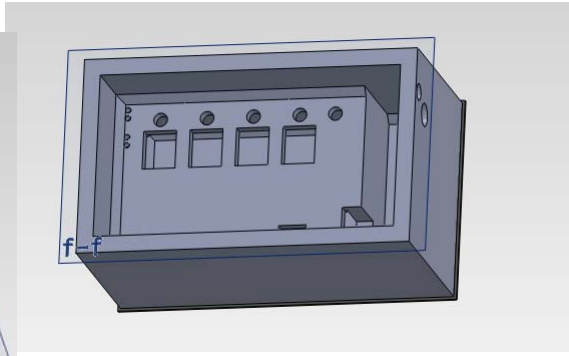
# Making 3D model corresponding to actual drawing



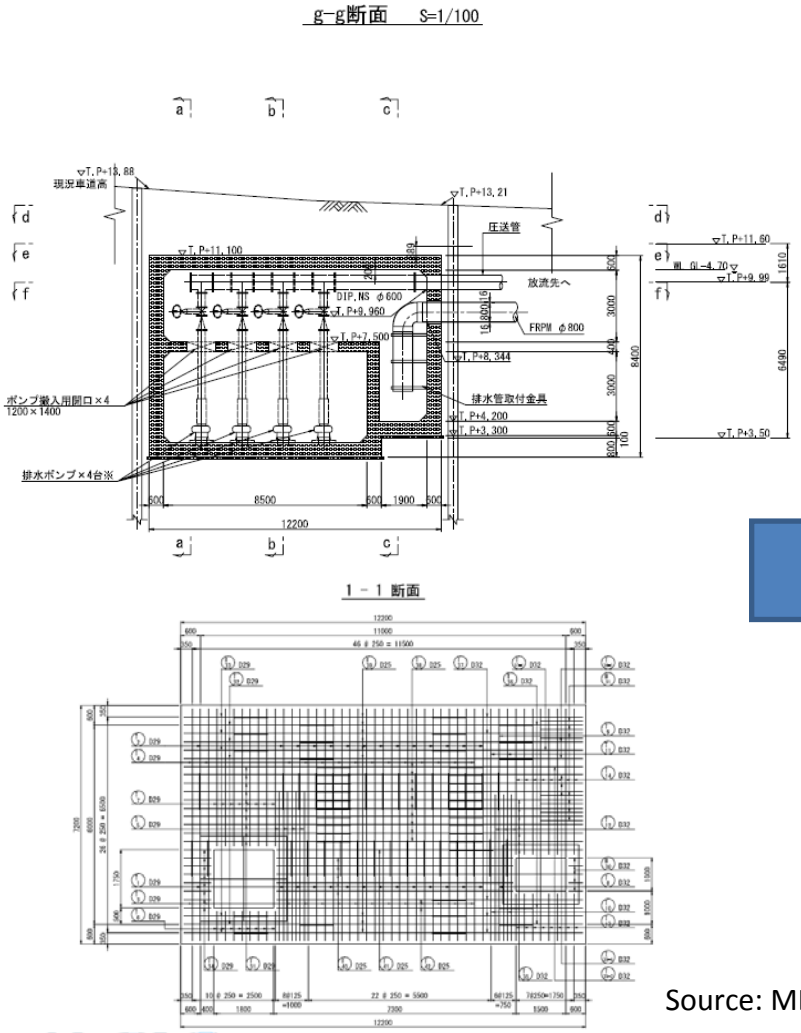



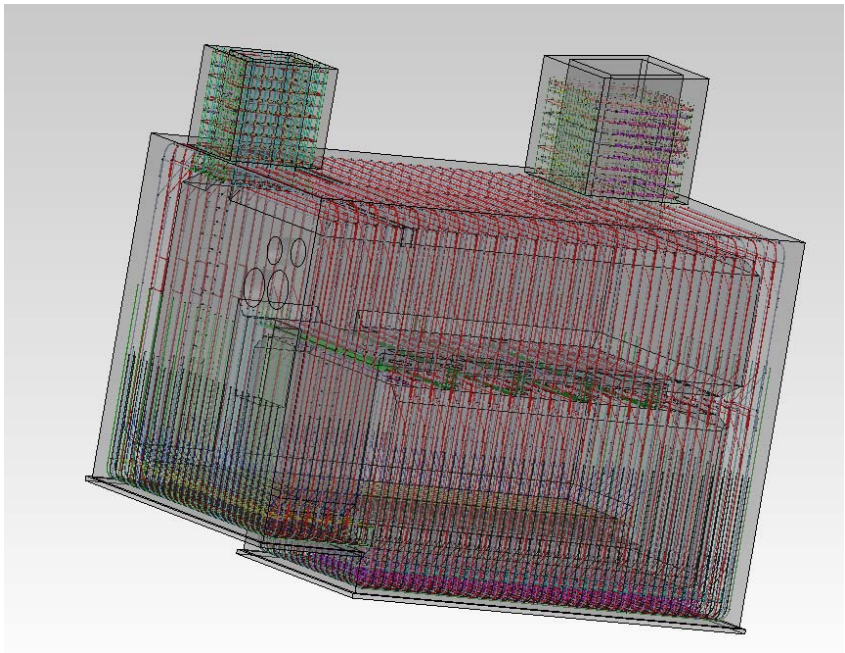




Source: MLIT

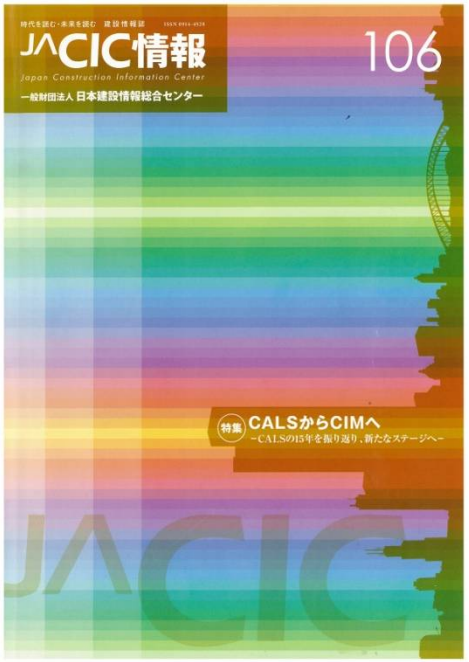
# Making 3D model corresponding to actual drawing



Source: MLIT

# Dissemination of CIM




JACIC journal No.106 featuring CIM
（Published 2012.7）

Lecture at the seminar organized by JSCE
（Sapporo 2013.7）

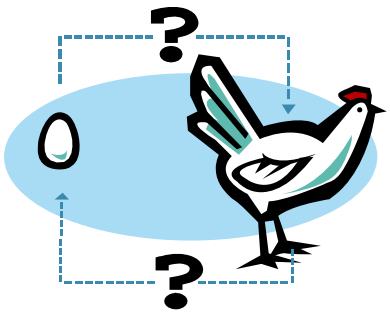
# Obstructing factor of promoting CIM

① Feeling

ICT-Allergy, Suspicion of “ It’s temporally ”, “Technological limit”

② Lack of experience

There are few who are skilled in the 3D-CAD



③ Usability

Human interface of 3D-CAD is not comfortable !

④ Performance and accuracy

Is quantity or structural calculation by 3D-CAD reasonable ?

⑤ Cost

Several million yen / license (Several tens of thousand U.S. dollars )

⑥ System

Principle of separation between design and construction

The estimate and technical standard are not yet corresponded to 3D

Publication of “ CIM Promotion Plan ”, Accumulation of data and experience by trial ⇨ Technical improvement and revision of the system based on them

# For the construction industry open to world

2020 Tokyo Olympic
Reconstruction from the Great East Japan Earthquake

Such long-term projects will continue in future

More and more world wide collaboration including procurement of materials and technology will be necessary

When “ CIM/BIM ” becomes common tool in the world,
“ international standard activities” gain more importance.

JACIC would like to participate in such activities

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# Thank you for your attention

JACIC homepage

http://www.jacic.or.jp/jacic-hp/index.php

Reference

# Verification on the effect of trial work in 2012

## Summary of effect verification ( good effect or efficiency )

| Point of view | Summary of effect verification（ Extract ） |
|---|---|
| Constructor etc. | ・Visually easy-to-understand<br>・Prevention of misconception about design conditions<br>・To the use of quantity calculation or drawing output<br>・Prevention of inconsistent<br>・Consensus with stakeholders<br>・Reduction of labor and prevention of mistakes when design changes<br>・Easier extraction of the required cross-section than 2D |
| Public organization | ・Easy to understand the situation and the sense of entire scale<br>・Prevention of negligent construction on-site<br>・Sharing the recognition of construction step |

Reference

# Verification on the effect of trial work in 2012

## Summary of effect verification ( issue or problem)

| Point of view | Summary of effect verification（ extract ） |
|---|---|
| Constructor etc. | ・Cannot confirm the basis of quantity calculation<br>・Ensure the security of public organization when using remote communication tool<br>・Issues on the software program<br>・Dissemination, education of operator, Too early in terms of hardware and expenses for rebar-modeling<br>・3D data of flat ground survey data must be made in future<br>・Accuracy, work efficiency, and availability are influenced by the function of the tool |
| Public organization | ・Understanding about CIM and development of skills<br>・Cannot draw the drawings of rebar required when procuring<br>・Cost or awkward movement on data input<br>・Unification of data reduction method, etc.<br>・Issues on creating data, such that there is information not displayed<br>・Modeling of complex structure needs too much time to make |

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Reference

# Recommendation about the technical development items

Suggested the technical development items that were not described in the roadmap the System Review Committee drew （ described in red ）

| Phase | Items | Contents |
|---|---|---|
| Topographical and geological survey | Data | 測量データのデータ構造のあり方<br>地形･地質データのデジタル化<br>デジタル情報の精緻化 |
| | Ground model | The method of standardization for ground model |
| Design | 3D modeling | 3次元モデル作成ツールの開発<br>Development of 3D modeling tool for electrical equipment, communications equipment, and machine |
| | Expression rule of model | Development of 3D product model for civil engineering (IFC model for infrastructure) |
| | Parts | Standard parts collection published on the site |
| | Technical criteria | Review of criteria on design |
| | 構造計算 | 3次元設計計算ソフトの開発 |
| | Quantity calculated | Development of tools for checking quantity automatically calculated |
| | 属性情報 | コスト情報･環境負荷情報･その他属性 |
| Estimate | 数量計算 | 自動算出の精度確認･工事数量（工区割り）自動算出検討/開発 |
| | 積算 | 自動積算技術開発 |

Reference

# Recommendation about the technical development items

| Phase | Items | Contents |
|---|---|---|
| Construction | 着手前 | 仮設計画・施工計画への活用技術（属性情報）の検討 |
| | 施工中 | 情報化施工への連動、工事監理（計測、清算、検査など）の効率化 |
| | 完成時 | 施工時の計測・観測機器等の結果分析 |
| Maintenance | | 既存の計測・観測機器等の活用検討 |
| | | CIMの導入に向けた計測・観測機器等の開発 |
| | | 維持・管理に向けたデータ集計ツールの開発 |
| | | Study on maintenance method using 3D model |
| | | How to create 3D model of the existing facilities |
| | | Trial operation of 3D model of the existing facilities |
| Communication (Information sharing) | | Trial operation of communication method using 3D model |
| | | Development of CIM information sharing platform |

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Reference

# Recommendation (direction) on system and criteria

## Operation of criteria along the situation on-site

By the flexible operation, lower the hurdle on-site
Consider the actual situation so that the site is not to be confused

### ■supervision, inspection, electronic delivery

Avoiding the double work by flexible operation of current system and criteria

### ■Human resource development, training

Seminar, program
Development of software, Relation with the vendor

### ■Incentive

・Expansion of verification case
・If there is incentive, priorities as an investment target of industry rises
・For example, additional point of comprehensive evaluation in procurement, or additional point of performance rating

※ In 2012, the word “ CIM ” was added to TECRIS keyword (TECRIS : Technical Consulting Records Information Systems (by JACIC))