# Seoul's Clean Construction System for Efficient Public Administration & Transparent Construction Management

SEOUL METROPOLITAN GOVERNMENT

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Empowered lives.
Resilient nations.

## A Resource Book for Practitioners

United Nations Development Programme & Seoul Metropolitan Government

October 2016

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# FOREWORD

## 1. Assistant Mayor of Seoul

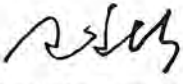
The Republic of Korea has made a tremendous transition from being one of the poorest countries in the 1950s to becoming one of the most advanced economies in the world. We rose from the ashes of the Korean War through the journey of democracy building, and overcame enormous domestic challenges of corruption and institutional building. At the heart of Korea's development story were Seoul's innovative solutions to such difficulties. In this historical context, I am delighted to share the Seoul Metropolitan Government's anti-corruption Clean Construction System through this publication.

Since Mayor Park Won-soon took office, information disclosure and citizen engagement have provided the fundamental basis of Seoul's policy directions. The Seoul Metropolitan Infrastructure Headquarters' Clean Construction System has ensured a more efficient management of Seoul's public construction projects, and promoted a more transparent construction sector by disclosing real-time information on most of its public construction projects, thereby allowing citizens to learn about the work being carried out in their neighbourhoods.

In this context, sharing Seoul's Clean Construction System is equivalent to sharing Seoul's fundamental values and visions for governance. It is for this reason that this publication and our joint project with UNDP to share this system with partner countries around the world represent a meaningful partnership for me, and for Seoul.

The key to the effective elimination of corrupt practices is the establishment of a systematic and standardized electronic public construction business management process and its implementation. In this regard, we are sharing Seoul's Clean Construction System as a practical means of enhancing the efficiency, transparency and accountability in public construction management in various countries.

I want to take this opportunity to thank UNDP and the UNDP Seoul Policy Centre in particular for an outstanding partnership with Seoul. Our current partnership on sharing the Clean Construction System has been made possible through the continuous support from and hard work of the UNDP Seoul Policy Centre. I would also like to appreciate the excellent work of the UNDP Country Offices in our partner countries, who took up the important task of packaging, translating, and channeling information about our system in their national languages. Last but not least, I would like to thank Mr. Balazs Horvath, Director of the UNDP Seoul Policy Centre, as well as the staff members of the UNDP Seoul Policy Centre and Seoul Metropolitan Infrastructure Headquarters who have worked tirelessly to make this publication possible.



**In-seok Koh**

Assistant Mayor of Seoul & Head of the Seoul Metropolitan Infrastructure Headquarters

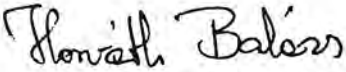
## 2. Director of the UNDP Seoul Policy Centre (USPC)

Around the world, we see a common challenge of increasing efficiency and transparency in public construction management. This task is related to the sustainable development goals (SDGs) 9, 11 and 16 in the 2030 development agenda, which the international community adopted last year. Seoul's experience in implementing an effective administration system based on practical technical solutions can indeed help in substantially reducing the risk of corruption and changing underlying attitudes and work approaches over time. In this vein, we have produced this publication to share the key technical details on Seoul's Clean Construction System, along with policy lessons learnt and recommendations for implementation. This information is shared not only for existing partner countries, but also for many other countries that may benefit from this reference book.

Since January 2015, the UNDP Seoul Policy Centre has worked hand-in-hand with the Seoul Metropolitan Government to capture, package, translate and share the experiences and lessons learnt from the Seoul Government's Clean Construction System under the Development Solutions Partnership (DSP) programme. Through this programme, our Centre facilitates triangular development cooperation between Korea and partner countries through UNDP's global network and country-level presence.

Our Centre cooperated with the Korean Ministry of Foreign Affairs to organize the 2015 Seoul Debates, where we recognized a real demand for effective solutions such as Seoul's Clean Construction System. In December that year, we therefore co-organized with the Seoul Government the International Workshop on Public Construction Transparency that brought together some 70 experts from more than 20 countries. Afterwards, in response to a strong demand from workshop participants, our Centre undertook a competitive selection process to provide follow-up advisory and seed funding support to select countries in three continents.

As Director of the UNDP Seoul Policy Centre, I am proud that our Centre provides inputs and facilitation for sharing the innovations and experiences embodied in Seoul's Clean Construction System. We are grateful to UNDP Country Offices for assuming similar roles as facilitators in partner countries. I take this opportunity to thank Mr. In-seok Koh, Assistant Mayor of Seoul, as well as Mr. Youngjun Jang and Ms. Myong-ja Choi in the Seoul Metropolitan Infrastructure Headquarters, who have been the bedrock of our partnership and worked tirelessly with our Centre to finalize this publication. I would also like to express my sincere appreciation towards the Korean Ministry of Foreign Affairs for supporting our Centre and our work on Development Solutions Partnerships.



**Balázs Horváth**

Director of the UNDP Seoul Policy Centre

# CONTENTS

# Introduction & Background

- The Republic of Korea has had a remarkable development trajectory. In less than sixty years, a country devastated by civil war was able to transform itself into one of the world's most developed nations. Its success story is one that many developing countries are eager to learn from.

- At the same time, the growth-centered construction boom came with a few problems of its own. Shoddy construction practices and the absence of a sound maintenance system resulted in the collapse of the Seongsu Bridge in Seoul in 1994, which took the lives of approximately 50 people. A year later in 1995, illegal land use alteration and building extension caused the collapse of the Sampoong Department Store, which led to more than 1,500 casualties.

- These disasters highlighted the importance of a robust maintenance and repair system and to address Korea's challenges in public construction, the government enacted the Special Act on the Safety Control of Public Structures, and established the Korea Infrastructure Safety and Technology Corporation, which conducts safety inspections on decrepit facilities and repairs those not meeting safety standards.

- In this context, the Seoul Metropolitan Government (SMG) has made continuous efforts to find an effective way to prevent the practice of shoddy construction work in the industry. Ultimately, the SMG came up with the Anti-Corruption Clean Construction System (CCS) that sought to infuse the country's advanced IT industry innovations into the construction process. Construction work processes could now be managed, operated, and opened to the public through a series of interlinked systems.

- Introduced by the SMG in 2012, the CCS consists of One-PMIS (for construction project management and operation), Construction Information Disclosure System ("Allimi") (for disclosure of information on construction projects) Subcontractor Payment Management System (sPMS) (for automated subcontractor payment system), and Electronic Human Resource Management system (E-HRM) (for management of construction work force and benefit services).

# Chapter 1

## Stages of Public Construction Project Management

# **Chapter 1.** Stages of Public Construction Project Management

| Steps | Procedure | Actor | Related Laws |
|---|---|---|---|
| Planning | Project conception | Ordering body (central and local government) | • Construction Technology Promotion Act<br>• National Finance Act<br>• Local Finance Act<br>• Act on Public-Private Partnerships in Infrastructure |
| | ↓ Feasibility study | Ministry of Strategy and Finance<br>Korea Development Institute | |
| | ↓ Basic project outline | Ordering body | |
| ↓ | ↓ | | |
| Designing | Procurement & contracting | Ordering body & Public Procurement Agency | • National contract law<br>• Local contracts law<br>• Construction Technology Promotion Act<br>• Building Act<br>• Environment related laws<br>• Fire Services Act |
| | ↓ Preliminary design (supervision) | Construction technology service company<br>(design and supervision) Architectural design office | |
| | ↓ Detailed design (supervision) | Construction technology service company<br>(design and supervision) Architectural design office | |
| ↓ | ↓ | | |
| Construction | Contracting | Ordering body & Public Procurement Agency | • National contract law<br>• Local contracts law<br>• Construction Technology Promotion Act<br>• Framework Act on the Construction Industry<br>• Industry Safety and Health Act |
| | ↓ Supervision | Construction technology service company | |
| | ↓ Construction | Construction company (general, specialized) | |
| | ↓ Evaluation | Ordering body & relevant companies | |
| ↓ | ↓ | | |
| Maintenance | Post-construction management (safety inspections) | Korea Infrastructure Safety and Technology Corporation<br>Safety diagnosis company | • Framework Act on the Construction Industry<br>• Special Act on the Safety Control of Public Structures |
| | ↓ Maintenance | Maintenance management company | |

Note : Out of the process of public construction projects consisting of the planning, designing, construction and maintenance stages:

▭ represents the construction stage

# Breakdown of the "Construction Phase"

| Steps | Step-by-step work |
|---|---|
| Land acquisition & compensation | • Acquire private lands for incorporation into the city by force and purchase contracts<br>• Purchase state-owned land or negotiate a free use agreement |
| Contract evaluation | • Evaluate validity of the cost assessment based on detailed design |
| Project order | • Order project based on the estimated price from the contract evaluation<br>• Estimated order price: the sum of the net cost (i.e. material cost, labor cost, and other expenses), profit and taxes (VAT) |
| Contracting | • Post bid-notices and select through Korea's national e-procurement system on the Public Procurement Agency website (G2b)<br>• Award contract after capacity evaluations (starting with the lowest bidder) |
| Commencement | • Submit a commencement report as per the requirements on the contract document (including work schedule, as well as safety, environment and quality management plans) |
| Design change | • Report on changes from the original design (such as the increase or decrease of construction quantities and/or change of overall project plan)<br>• Adjust down payment or change construction period if necessary |
| **Construction management** | • **Management of quality, construction, process, safety and environment** |
| Work completion, inspection, and milestone payments | • Inspect work and award payments on completed project components (i.e. milestone payments on completed work) |
| Construction project evaluation | • Evaluate construction (from the time when the construction progress reaches 90% of the completion target, until the end of Feb of the following year)<br>• Evaluation factors include the following: overall quality, processes and progresses, construction, safety, environment, construction completion, cost savings and property damages |

Note : Out of the process of public construction projects consisting of the planning, design, construction and maintenance stages:

▭ represents the general project management stage through One-PMIS ⋮⋮⋮ represents the progress management stage, consisting of periodic progress report writing (daily, weekly and monthly)

## Pre-Construction Planning Stage (project conception, feasibility study, and basic project outline)

- Before starting the actual construction, it is crucial to evaluate the business case and prepare a project outline based on the consideration of multiple factors: project needs, linkages to urban management plans and other related government plans and laws, foreseeable risks, site conditions (surface and sub-surface), proposed scale and estimate costs, as well as expected outcomes.

- Next, the actual project development is directed based on a comprehensive assessment of feasibility studies covering the economic, financial, and technical dimensions, as well as the social and environmental aspects of the project. This planning phase also includes the development of the project management plan and the selection of the best possible options based on a comparative analysis of several available alternatives.

- Before allocating the construction budget, a thorough evaluation of investment proposals per project component is undertaken, including an assessment of possible overlaps and synergies with relevant national and subnational development plans (mid-/long-term). This process ensures that project investments remain healthy and productive.

- As the last step of the planning phase, the ordering body (i.e. the Seoul government) releases an official notice of the finalized project plan, and determines the appropriate project execution method in consideration of the project's scale and characteristics.

## Design Stage (development of preliminary and detailed designs & traffic and environmental impact assessment)

- The Preliminary Design is created based on feasibility studies and basic plans, and contains drawings and specifications. It reflects the optimal option as determined by preliminary research, analysis, and a comparative review of the following components of the buildings/facilities: size, layout, structure, estimated period and methodology, and estimated costs. Preliminary Designs are designs submitted for official approval of various projects. During this stage, technical data required for the Detailed Design, such as the design standards and conditions, is also gathered.

- The Detailed Design is based on the Preliminary Design, but contains a more detailed analysis and comparative review of the following factors: size, layout, structure, estimated period and methodology, and estimated costs. It involves the creation of key documents for the actual construction and maintenance management such as drawings, floor plans, specifications, construction statements, as well as building structure and repair bills.

- In this Design stage, the ordering body commissions an impact assessment in order to predict and analyze the expected impact of the construction projects on the volume, flow, and safety of traffic in the affected areas. Based on this assessment, traffic improvement measures are then devised to minimize any related problems. Similarly, the ordering body commissions an environmental impact assessment, prior to the establishment of its construction business plans, which identifies and assesses the project's potential impact on the environment. Afterwards, necessary measures are taken to ensure that environmentally friendly arrangements are made for the creation of a safe and clean living environment for citizens.

## Pre-Construction Planning Stage (project conception, feasibility study, and basic project outline)

- Most construction projects that the ordering body commissions are large-scale projects (e.g. roads, railways, and bridges) that often come in conflict with private properties. In such cases, the Seoul Government undertakes necessary negotiations with the landowners and/or takes legal steps to acquire the necessary properties in exchange for appropriate compensation. This is an important step for securing the physical space required for the actual construction.

- In Seoul, the Government undertakes deliberation of the cost estimation based on the working design of the project, prior to placing an actual project order. The deliberation seeks to identify and to prevent excessive cost estimates that may take place—for example, due to the difference between the design drawings and quantities, calculation errors of unit prices, or over-estimates of necessary construction materials. Through this pre-order deliberation mechanism, the estimated price of the order usually ends up being about 8-10 percent less than the original cost estimates.

- After the project order is released, procurement takes place through Korea's national e-procurement system (i.e. KONEPS). Here, the bidding and selection information are all publicized online through the e-procurement website. Korea's e-procurement system, used in all of Seoul's construction projects, not only helps to enhance the transparency of Seoul's public procurement and contracting processes, but also reduces the workload of contract managers. The winner of the competitive bidding process is awarded the contract after passing the screening/evaluation process, which is based on certain eligibility standards (e.g. the company's project execution capabilities, performance history, and credibility).

## Construction Stage (Commencement—One-PMIS Registration—design change)

- Once the project contract is awarded, the contractor is required to submit his or her work commencement reports as prescribed by the contract documents. All commencement reports must include the following:

  - Appointment report of the on-site construction engineers
  - Work schedule (for process/progress reporting)
  - Safety, environment, quality management plans
  - Resource mobilization plans (material and labour inputs per process)
  - Site pictures (before commencement)
  - Other items as specified by the contract manager

- Within 7 days of submitting the construction commencement report, the contractor must register users and upload key documents (e.g. work schedule) on Seoul's One-PMIS. Thereafter, the contractor undertakes project management and progress reporting through One-PMIS. (This use of One-PMIS is specified in Seoul's construction contracts as a special obligation and is guided by Seoul's One-PMIS manual.)

- During the construction process, the developer (i.e. Seoul) may allow reasonable changes in the original construction design in case of unexpected events, increases or decreases in construction qualities, or changes of overall project plans. However, the developer does not allow for fundamental changes to the design to take place, to the extent that the original objective and characteristics of the project change completely. In such cases, the construction manager must place a new order with a brand-new design.

## Construction Stage (milestone payments—completion—evaluation)

- During the construction process, the contractor can request partial (milestone) payments for completed segments of the project. The developer then deliberates on the requests, together with professional construction supervisors, based on a desk review as well as site inspection. If the completed work is done in accordance with the original design and satisfies the quality standards, the developer will approve the request and make the pending payments.

- When the construction is fully completed, the developer undertakes a final inspection and thoroughly assesses whether the completed work matches the final designs and fulfills all contractual agreements. If the evaluation concludes that the work has been successfully completed, the developer releases the remaining (final) payment.

- In accordance with Korea's Construction Technology Promotion Act, construction developers in Korea must conduct "construction evaluations" for projects exceeding 10 billion South Korean Won in total costs, from the time when the construction progress reaches 90 percent until the end of February of the year following the project completion. Construction project evaluation criteria consist of the following main categories: ① quality management ② process management ③ construction management ④ safety management ⑤ environment management ⑥ degree of construction completion ⑦ cost savings ⑧ property damages. (under each of these categories, there is a further list of evaluation items.) Evaluation results are then submitted to Korea's Ministry of Land, Infrastructure, and Transport, which manages all the construction project evaluation reports in the country.

# Maintenance Stage (safety checks and repair)

- In the case of Seoul's construction projects, the contract specifies the period of warranty liability (for repairs after completion of construction projects). In addition, Korea's national contract law specifies the terms of warranty liability for each type of construction. As per these legal liabilities, the contractor must obtain a letter of warranty from the repair guarantee organization and submit it to the ordering body. In case of repairs, contractors are obliged to make the payment to the ordering body (i.e. Seoul Government) based on the following calculations: by multiplying the "contract amount" by the "repair management deposit rate" as specified in the contract.

- If the contractor is requested by the ordering body to perform repairs within the terms of the warranty liability but does not (or fails) to comply with the request, the corresponding amount from the repair management deposit will be reverted to Seoul's assets. With a letter of warranty from a repair guarantee organization, Seoul can also send the repair request directly to that organization.

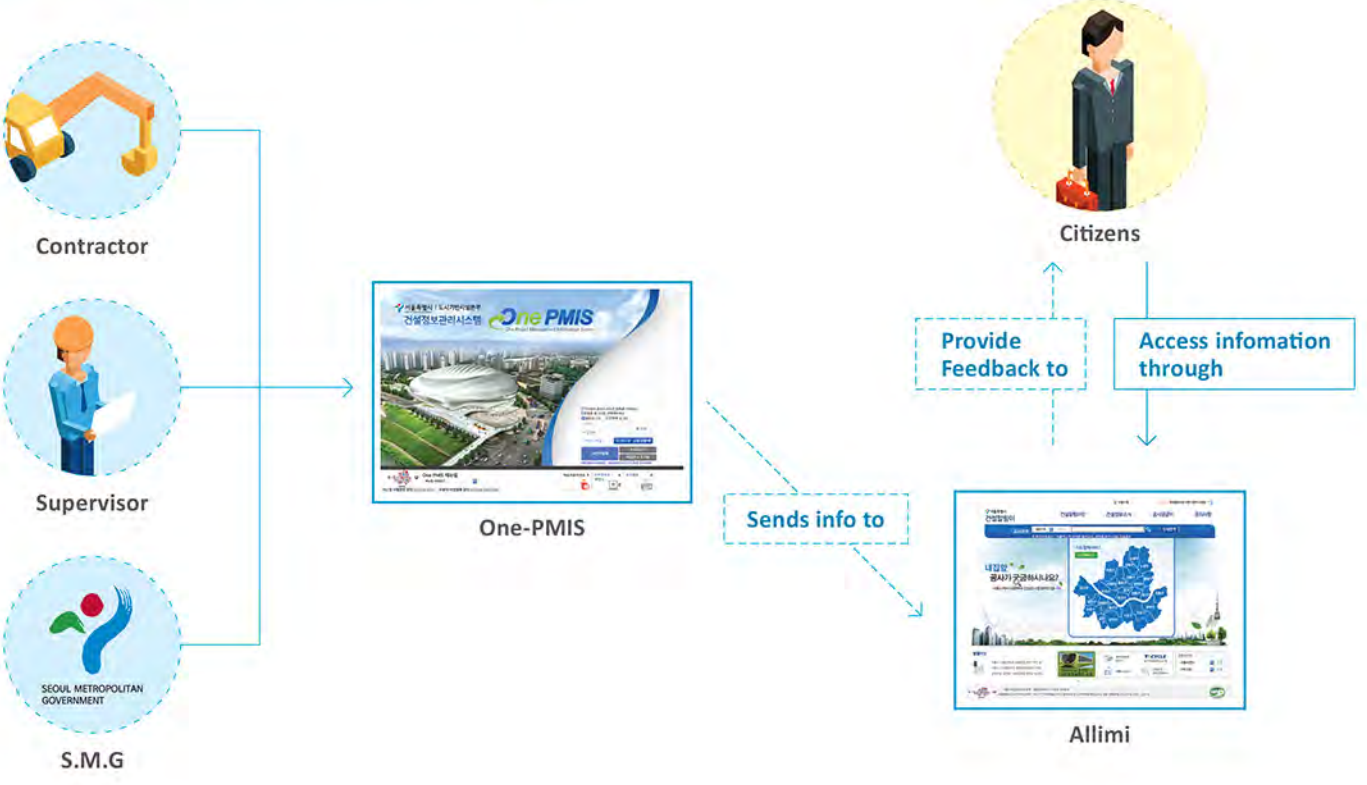
- According to Korea's Special Act on the Safety Control of Public Structures, regular safety inspections must be performed during the maintenance stage after the completion of construction. Safety inspections are categorized into 'Detailed Inspection' and 'Detailed Safety Inspection.' A specific timeline of safety inspections depends on the current safety level of the facility.

# Chapter 2

## Overview of One-PMIS & the Construction Information Disclosure System ("Allimi")

# **Chapter 2.** Overview of One-PMIS & the Construction Information Disclosure System ("Allimi")

## One-PMIS & Allimi and User Connection Diagram



# Overview of One-PMIS & Information Disclosure System ("Allimi")

## Overview of One-PMIS

- Seoul's One Project Management Information System (One-PMIS) for construction projects facilitates the systematic and efficient management of construction projects. It enables users to monitor the real-time status of construction materials, workers, and equipment being used.
- While conventional paper-reporting requires repeated editing of documents and the storage of a large volume of documents produced over the course of a project, One-PMIS can reduce the amount of unnecessary paperwork by enabling ongoing registration/uploading, editing and storage of various documents directly on its server through the Internet. This ensures that project participants share the most up-to-date data amongst themselves in a highly efficient manner.
- In Seoul's experience, One-PMIS has increased the efficiency in the business and management processes and ultimately contributed to the creation of more transparent reporting lines between the managing body (i.e. responsible teams in Seoul government) and contractors.
- Parts of the data in One-PMIS are automatically sent to the Construction Informer (Allimi) site (as per the specific open data criteria) for public information.
- Furthermore, all information accumulated in One-PMIS is analyzed and incorporated into Seoul's big data, generating valuable statistical data that can help the development of policies and measures for the improvement of public construction in Seoul.

# Overview of One-PMIS & Information Disclosure System ("Allimi")

## Overview of Seoul's Construction Information Disclosure System ("Allimi" in Korean)

- Seoul's "Allimi" was created as a venue for open data and online communication with citizens on Seoul's public construction projects. In Korean, the word "Allimi" means "to inform" or "to notify".

- Allimi provides comprehensive sets of information on Seoul's construction projects (over a designated value). A digital map based on Seoul's Geographic Information System (GIS) allows the Allimi to provide citizens with project overviews, along with accurate visual information on the construction sites, including: the exact locations of construction sites, project period, total and breakdown of project costs, progress rates, work status, as well as periodically-updated worksite photos. Drawing from this publicly available information, citizens can send their remarks or ask questions about specific construction projects and receive real-time answers via Seoul's social network services (e.g. Facebook, Twitter).

- To date, Allimi has disclosed information on 2,600 public construction projects in Seoul, each of which covers 14 types of information drawn through a real-time transmission of information stored in the One-Project Management Information System (One-PMIS): ① Construction period; ② budget; ③ scale; ④ progress rates; ⑤ weekly progress reports; ⑥ construction photos; ⑦ key project participants; ⑧ contact information of project managers (i.e. the ordering body, the contractor companies, and engineering supervision companies); ⑨ primary as well as sub-contract details and payment status; ⑩ changes in the overall project design; ⑪ extension of construction periods; ⑫ on-site monitoring briefs from citizens; ⑬ penalty points imposed on contractors; and ⑭ project approval documents.

- In 2015 alone, 164,419 people used the Allimi through its website, and another 5,867 people accessed it through the mobile application.

  On 16 June 2016, Seoul's 'Allimi' received the Human Technology Award in Korea, in recognition of its contributions to information sharing, public interest, and creation of value in society. The award was based on a voluntary assessment of various public initiatives by a group of journalists, academic researchers and civil society experts. In this context, the award, along with the increasing number of Allimi users, shows the appreciation that citizens have towards the public disclosure of construction information through Allimi.

# Overview of One-PMIS & Information Disclosure System ("Allimi")

## Categories of Information shared through Allimi

| 1 Construction overview | 2 Contract details | 3 Payment status | 4 Photos of construction sites |
|---|---|---|---|
| Project name, construction time period, completion status, information on the ordering body, supervisor, and prime contractor | Contract value of the prime contracts and subcontracts | History of actual payment from the developer to the prime contactor, as well as from the prime contractor to the subcontractor | Photos taken for weekly reports |

| 5 Web Camera | 6 Information on stakeholders | 7 Other relevant information | 8 List of penalties and sanctions |
|---|---|---|---|
| People can observe web camera images in real time (for construction project exceeding 10 billion KRW in total value)- discontinued since June 2015 | Name and position of those in charge of the construction (i.e. ordering body, supervisor, prime contractor, subcontractor) | Documents and reports on construction plans, design changes, and changes to the project period | List of penalties and sanctions imposed on the supervisors, contractors and workers |

# Overview of One-PMIS & Information Disclosure System ("Allimi")

## Categories of Information ① Construction Overview


1. Total Construction Period
2. Elapsed Construction Period
3. Construction status
4. Completion status
5. Name of the project
6. Contact SMG by Facebook / Twitter
7. Register for the site-visit
8. Construction location
9. Construction time period
10. Construction scale
11. Contact information of the SMG public inspection offical
12. Contact information of the supervisor
13. Contact information of the contractor
14. Construction cost and contract value

# Overview of One-PMIS & Information Disclosure System ("Allimi")

## Categories of Information ② Contract Details


1. You may access info on the contract details (of prime contractors and subcontractors)
2. Prime contractor status
   - 3. Contract Phase
   - 4. Prime contractor name
   - 5. Contractor value
   - 6. Time period
7. Subcontractor status
   - 8. Subcontractor name
   - 9. Contract phase
   - 10. Contractor value
   - 11. Time period

# Overview of One-PMIS & Information Disclosure System ("Allimi")

## Categories of Information ③ Payment Status


1. You may access info on the status of payments to prime contractors and sub-contractors
2. Prime contractor payment status
   3. Prime contractor's name
   4. Contract Phase
   5. Contractor value
   6. Payment value
   7. Payment date
8. Subcontractor payment status
   9. Sub-contractor's name
   10. Contract name
   11. Contractor value
   12. Payment value
   13. Payment date

# Overview of One-PMIS & Information Disclosure System ("Allimi")

## Categories of Information ④ Photos of Construction Sites (drawn from weekly reports)


1. You may access photos of the construction sites here. Click the image to enlarge the photo.
2. Name of the photo

# Overview of One-PMIS & Information Disclosure System ("Allimi")

## Categories of Information ⑤ Information on Project Stakeholders

| 1 구분 | 2 소속명 | 3 참여구분 | 4 이름 |
|---|---|---|---|
| 발주처(주무기관) | 도시기반시설본부 | 부장(도시기반시설본부) | 김영수 |
| 발주처(주무기관) | 도시기반시설본부 | 과장(도시기반시설본부) | 박용택 |
| 발주처(주무기관) | 도시기반시설본부 | 담당(도시기반시설본부) | 김동현 |
| 발주처(주무기관) | 도시기반시설본부 | 담당(도시기반시설본부) | 노순재 |
| 감리단 | (주)이산 | 책임건설사업관리자(건설사업관리단) | 김용균 |
| 감리단 | (주)이산 | 건설사업관리자(건설사업관리단) | 김한경 |
| 감리단 | (주)이산 | 건설사업관리자(건설사업관리단) | 김영태 |
| 원도급사 | (주)한라 | 현장대리인(시공현장) | 김철홍 |
| 원도급사 | (주)한라 | 공무직(시공현장) | 김도연 |
| 원도급사 | (주)한라 | 공무직(시공현장) | 강혜인 |
| 원도급사 | (주)한라 | 공사(시공현장) | 최봉수 |
| 원도급사 | (주)한라 | 공사(시공현장) | 신명철 |
| 원도급사 | (주)한라 | 공사(시공현장) | 한성수 |
| 원도급사 | (주)한라 | 관리(시공현장) | 이영빈 |

1. Category of Stakeholder
2. Name of Organization
3. Title in the Organization
4. Name
5. Ordering body
6. Supervising team (e.g. consulting engineers)
7. Prime contractor

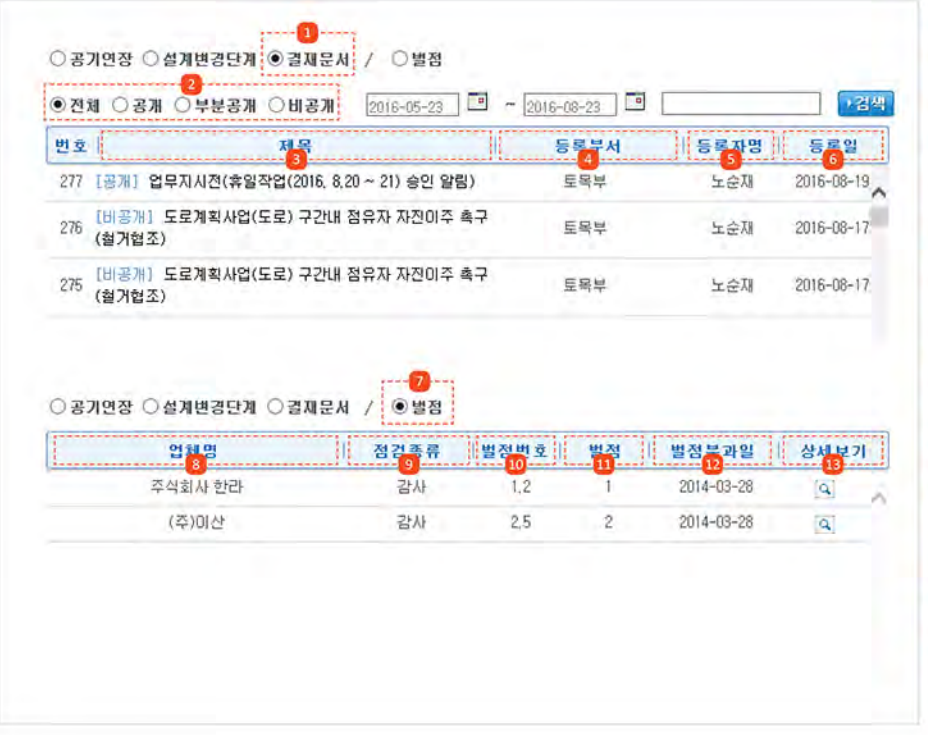
# Overview of One-PMIS & Information Disclosure System ("Allimi")

## Categories of Information ⑥ Other Relevant Information & List of Sanctions 1


1. You may access other relevant information here (from the beginning of the construction to the completion)
2. Extension of construction period
3. Phase of changes
4. Explanatory statement of the change (details)
5. Expected completion date (before the change)
6. Expected completion date (after the change)
7. Extension period (in days)
8. Attachment
9. Date of registration
10. Design changes
11. Name of the uploaded documents
12. Data preview
13. Data download

# Overview of One-PMIS & Information Disclosure System ("Allimi")

## Categories of Information ⑥ Other Relevant Information & List of Sanctions 2




1. Approved documents
2. All results; Open to public; Partially open to the public; Classified
3. Name of the document
4. Registering department
5. Name of the register
6. Date of registration
7. Penalty on the contractor
8. Contractor's name
9. Type of penalty
10. Penalty number
11. Demerit points
12. Decision date
13. For more details

# Overview of One-PMIS & Information Disclosure System ("Allimi")

## Categories of Information ⑦ Inquiries, complaints, suggestions from the citizens ("Ask the assistant mayor"section)


1. "Ask the assistant mayor"
2. Questions, complaints, suggestions from citizens
3. Manager's answer
4. Click to post your inquiry and comments

# Chapter 3

## One-PMIS Workflow

# **Chapter 3.** One-PMIS Workflow

| | Stage | User Classification | Implementation Period |
|---|---|---|---|
| 1 | User registration, Project registration, Connection of users to a project | Contractor, supervisor, and ordering body (Seoul) | After signing of a construction contract |
| 2 | Project plans & timelines (work schedule write-up) | Contractor | Upon submission of the project commencement report |
| 3 | Project management (Progress reporting ▶ Approval ▶ Validation) | All | Daily, Weekly, Monthly |
| 4 | Work directives sent by Seoul & work reports sent by contractors and supervisors | All | On a rolling basis |
| 5 | Document registration and search | All | On a rolling basis |
| 6 | Performance evaluation (in the aspects of design, construction and supervision) | Ordering body (Seoul) | Upon 30%, 60% and 95% completion |
| 7 | Registration of as-built drawings in One-PMIS | Contractor | After the final inspection |

# One-PMIS Workflow

## Description of Each Stage of One-PMIS Usage (1)

- **Stage[1]:** Users consist of the contractor, supervisor and ordering body/developer (i.e. Seoul government).
  One-PMIS is linked with Korea's national (government) procurement system that contains all contract data. Therefore, the basic project information (e.g. name, down payments, and scheduled completion date) from the e-procurement system is automatically transferred to and registered onto One-PMIS. Users of the One-PMIS then enter additional information (e.g. location on the GIS map, project objectives, construction overview, and construction size) to complete the registration. Lastly, users are connected to their respective projects.

- **Stage[2]:** The contractor registers a work schedule as approved by Seoul.

- **Stage[3]:** The contractor manages the projects and submits progress reports on a regular basis (daily, weekly, and monthly) via One-PMIS. The progress reports contain information on the amount of work completed, and the number of workers, materials and equipment being used in each component of the construction work during the designated period.

  Note: For construction projects in Korea, off-line progress reporting is already required by law. In this context, Seoul is further contributing to the systematization of progress reporting on its projects through the digitalization of reports via One-PMIS. Once the project supervisor approves a progress report on One-PMIS, Seoul (as the developer/ordering body) is able to review and validate that progress report via One-PMIS.

# One-PMIS Workflow

## Description of Each Stage of One-PMIS Usage (2)

- **Stage[4]:** One-PMIS enables users to officially issue instructions (i.e. project directives), based on the contractors and supervisors who submit their action reports online.

- **Stage[5]:** One-PMIS provides sufficient data storage space for the contractor, supervisor and developer (i.e. Seoul government). Therefore, users are able to register and search up various types of data at any time. As such, One-PMIS provides a useful venue for online and up-to-date information sharing.

- **Stage[6]:** Evaluation is carried out by Seoul's officials at three points of the construction process (upon 30%, 60% and 95% completion). One-PMIS accumulates all the data of these evaluations of Seoul's construction projects. Over time, this data becomes a valuable asset, for assessment records are permanently stored, and many other users can refer to these records for reference (for instance, to find good models and draw lessons for improvement).

- **Stage[7]:** After the final inspection of the completed buildings/facilities, the contractor registers the as-built drawings in One-PMIS. Seoul then validates the drawings and releases the final payment.

# Chapter 4

## Structure of One-PMIS: Main Menus and Categories

4-1. Project Overview

4-2. Progress Management

4-3. Progress Reporting

4-4. Safety Management

4-5. Project Document Management

4-6. History and Record Management

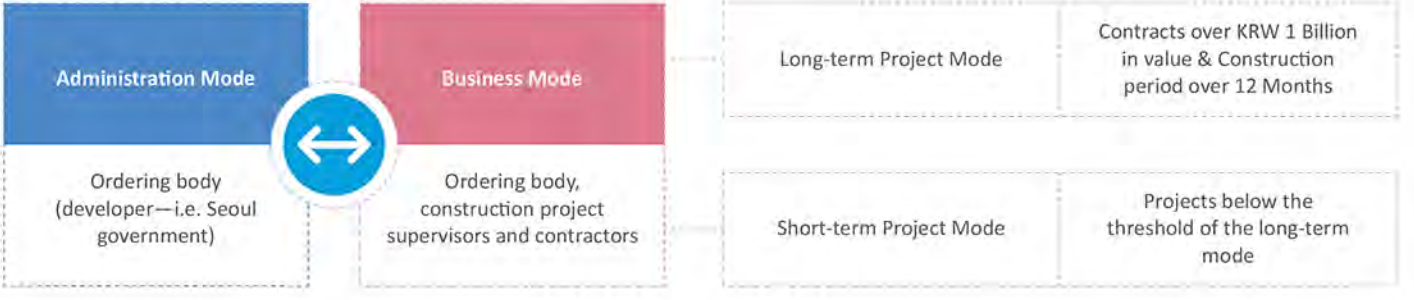
4-7. Search and Notice

# **Chapter 4.** Structure of One-PMIS: Main Menus and Categories

- Seoul's One-PMIS for public construction provides services with customized categories and menus, depending on the types of projects as well as users. It is first divided into "Administration Mode" and "Business Mode," depending on the user type. The Business Mode is further divided into "Long-term Project Mode" and "Short-term Project Mode" based on the project size and the period.

- **Administration Mode:** This mode is only for the use of the Seoul Government. In this mode, the system is designed to facilitate the operation of Seoul's various roles as ordering body (i.e. developer). The program allows the government to access information on all construction projects under its jurisdiction, rather than limiting it to information on specific projects only.

- **Business Mode:** In this mode, One-PMIS is customized for specific projects and is available for use by the ordering body, construction project supervisors and contractors. (Seoul officials can use the Administration Mode as well as the Business Mode without any restrictions once logged into the system.) The Business Mode is divided again into "Long-term" and "Short-term Construction Mode" depending on the project's contract amount and the construction time period.

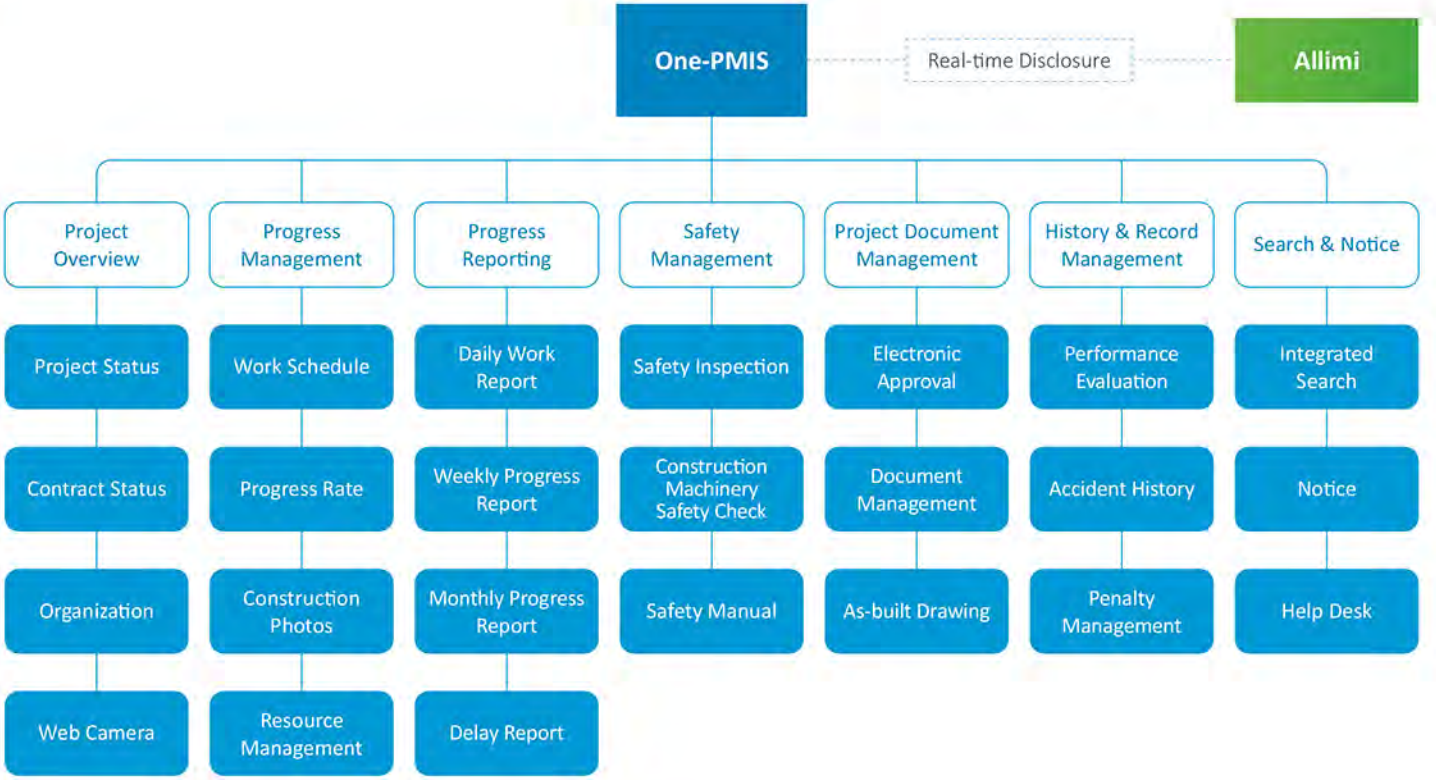


# Structure of One-PMIS: Main Menus and Categories

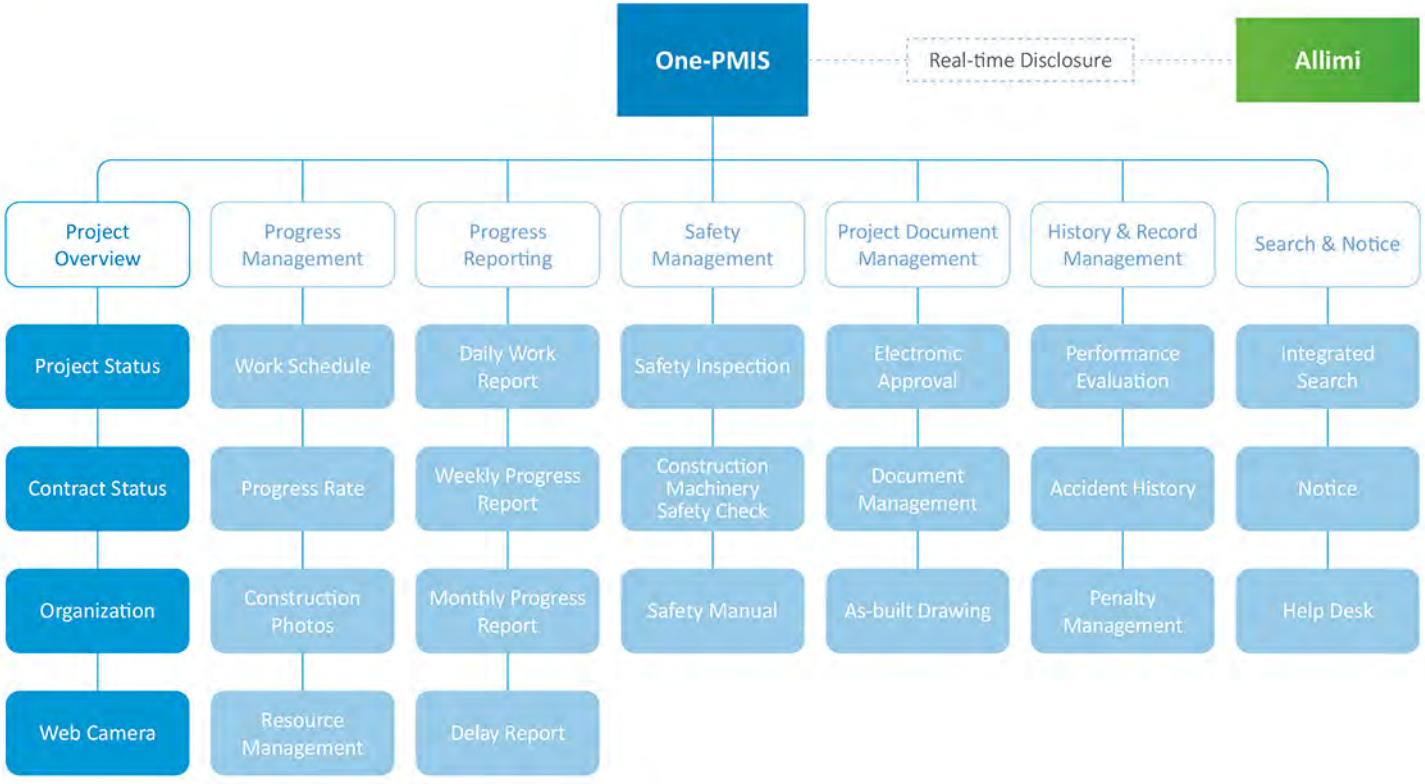
- Seoul has structured the One-PMIS for public construction in ways that optimize the system according to the characteristics of each user and project, thereby increasing user convenience. Clear divisions in the system designed for each type of user and project reduce system errors and increase protection against security breaches.

- **Please note:** For the purpose of sharing the Clean Construction System internationally, the Seoul Government has simplified the One-PMIS structure for the benefit of the international audience. (Releasing all the existing system categories and menus at once may not only present an excessive amount of information, but also create confusion for external partners.) In this context, 7 main categories and 24 menus in total have been selected. In the following explanation, the details and functions of each of the categories and menus are explained sequentially.

# Structure of One-PMIS: Main Menus and Categories



# Structure of One-PMIS: Main Menus and Categories



# Project Overview

## Project Status → Open to Citizens through "Allimi"

- This menu provides an overview and summary of each of Seoul's public construction projects. Seoul Government can locate each construction site on a digital map.
- For each construction project, basic procurement information is provided in One-PMIS through an automatic system linkage to the Korean Government's nationwide e-procurement system (i.e. KONEPS). Afterwards, the ordering body (i.e. Seoul government) is required to input additional data (such as the location of the construction site, project scale, contracting method, and project participants) manually into One-PMIS. All information provided can be updated or modified at any time.

## Contract Status → Open to Citizens through "Allimi"

- Seoul Government can monitor and manage construction contracts and payment details (e.g. the contract amount, contract period and sub-contracting status).
- Additional financial information on each construction project (including subcontracts and subcontract payment records) is pulled into One-PMIS through an automatic system linkage with the Seoul Government's e-Financial Management System (called "e-HOJO" in Korean) as well as with Seoul's automated subcontract payment management system (sPMS).

# Project Overview

## Organization → (Partially) Open to Citizens through Allimi

- This is the menu for the integrated management of all project participants registered in One-PMIS. When a user is registered in One-PMIS and matched to a specific project, the user is automatically displayed on the project page under this menu. At least three responsible actors of the project (i.e. the ordering body, supervisor, and contractor) are shown, while additional persons can be added for display. The ordering body (i.e. project-managing government official) can designate three individuals in charge of each project to be shown on the Construction Allimi site, which allows for citizens to see those responsible, along with their contact information.

## Web Camera → (Previously open to Citizens through Allimi, but public access now discontinued)

- Seoul has installed an average of two web cameras at each of its public construction sites to enhance the ability of the ordering body to manage various project sites. Seoul's construction project managers can thereby view real-time images of each site, which allows the managers to save time in site monitoring.

- The web cameras installed at present are equipped with zoom-in and zoom-out functions, along with left-right, and up-down movements. The high-quality images taken with these recently manufactured web cameras help increase the transparency of site management and relieve eyestrain for the monitoring persons in the ordering body.

- When One-PMIS was first introduced, Seoul released real-time images of these web cameras to the public through automatic transmission to the Construction Allimi site and received positive feedback from citizens. However, the national government decided to discontinue this particular service in June 2015, due to concerns of infringements of personal information through these images.

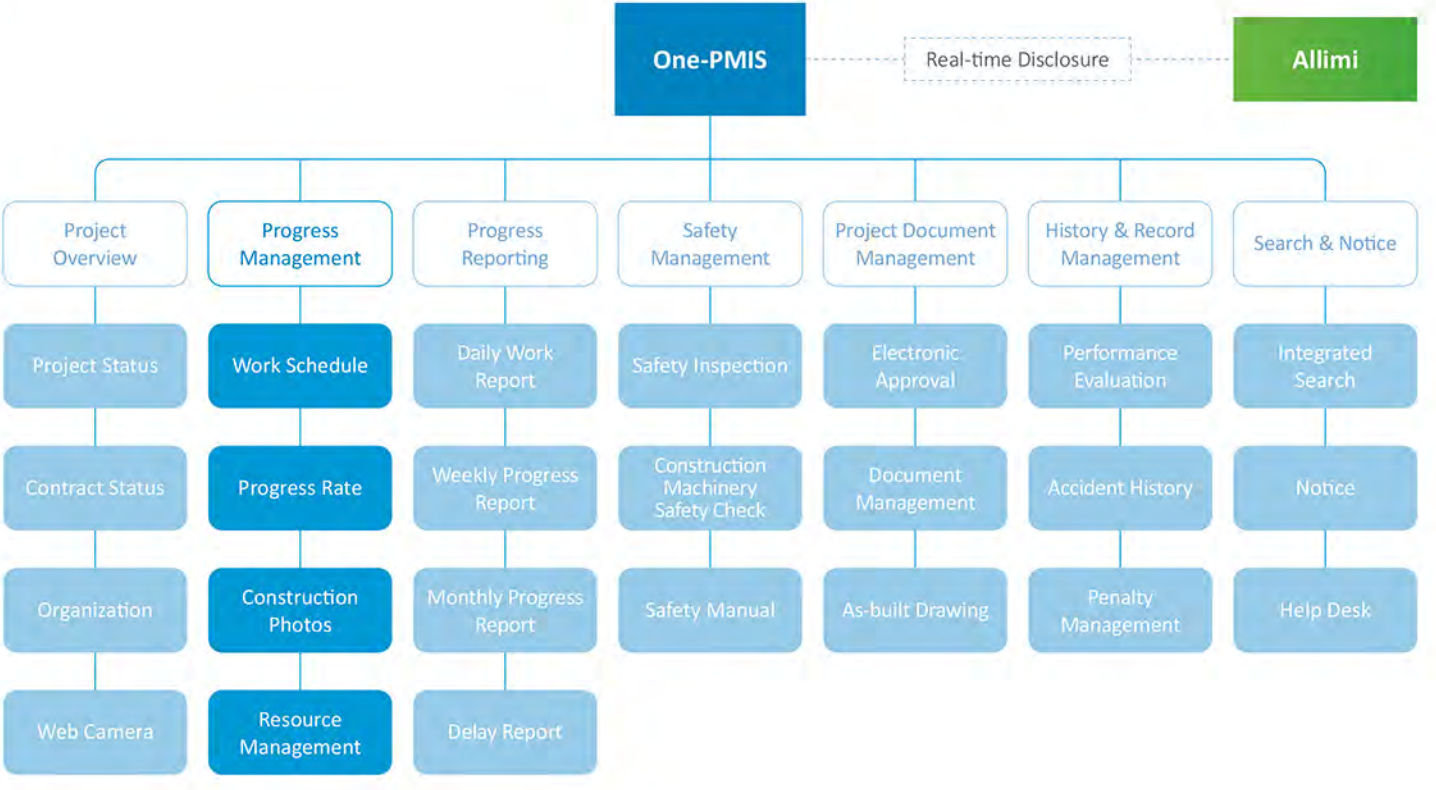
# Project Overview

## Real-time Web Camera Images transmitted via One-PMIS

# Project Overview

## Web-Camera Images of Seoul's Construction Sites

# Progress Management



# Progress Management

## Project Work Schedule (construction process planning)

- The contractor begins his or her project management in One-PMIS after submitting a construction commencement report. The first step of project management is to upload and register the project work schedule. The contractor has to input the work schedule for each step of the construction process (per month), in accordance with contract conditions and specifications. This menu can be converted into an excel file format for user convenience. The following table is an example of a project work schedule uploaded in One-PMIS.

| Code | Work Name | Unit | Design Quantity | Amount | Weight (%) | 2016 | | | | | | | | | 2017 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Apr | May | June | Jul | Aug | Sept | Oct | Nov | Dec | Jan | Feb | March |
| | Total | | | | 100 | 12.0 | 14.0 | 8.5 | 7.7 | 9.6 | 12.0 | 18.5 | 5.2 | 2.0 | 2.2 | 3.5 | 5.2 |
| AA01 | Earth Work | ㎥ | | | 10 | | | | | | | | | | | | |
| AA02 | Tunneling Work | ㎥ | | | 20 | | | | | | | | | | | | |
| AA03 | Concrete Work | ㎥ | | | 12 | | | | | | | | | | | | |
| AA04 | Pavement Work | ㎡ | | | 15 | | | | | | | | | | | | |
| AA05 | Drainage Work | m | | | 8 | | | | | | | | | | | | |
| AB01 | Machine Equipment | Unit | | | 13 | | | | | | | | | | | | |
| AB02 | Instrument | Unit | | | 0.5 | | | | | | | | | | | | |

## Progress Rate

- In this menu, various representations (such as graphs, etc.) and visual effects are used to show the status of each work process (i.e. completion rate as per the work schedule) of the relevant project. For the project as a whole as well as per construction process, the system displays the status in three categories: on time, slightly delayed, and significantly delayed. This labeling helps the ordering body's project managers to monitor the work progress quickly and easily.

| Over 100% | • (on time) | 100% ~ 90% | • (slightly delayed) | Under 90% | • (Delayed) |
|---|---|---|---|---|---|

# Progress Management

## Progress Photos (for each process) → Open to Citizens

- For Seoul's public construction projects, it is mandatory for the contractor to register the relevant project photos in One-PMIS when submitting his or her progress reports (daily, weekly, and monthly). For system efficiency, Seoul has set a maximum number and size of photos that can be uploaded. As a rule, the contractor should only register the latest photos showing specific work status. This enables the ordering body to check the construction progress with visual evidence. Here, the photos uploaded in weekly reports are released for public access through Construction Allimi, so contractors need to pay particular attention to these weekly photo updates.

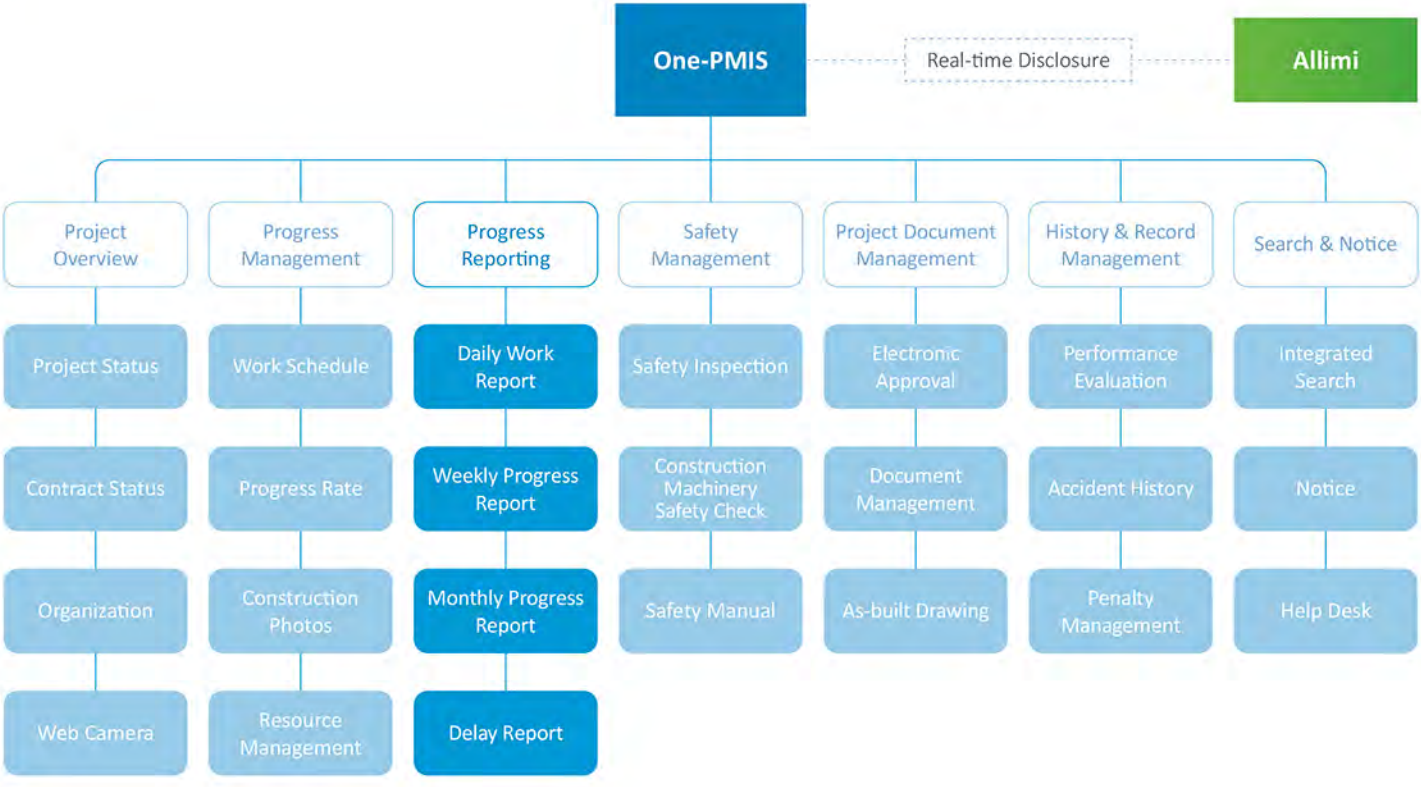
## Resource Management

- Construction projects use three main types of resources: manpower, equipment, and material resources. In Seoul's One-PMIS, the resource input status is managed separately on the progress reports (daily, weekly, and monthly) registered through the system. This enables users to undertake a more systematic monitoring of their project resources and allows them to later reproduce this data in meaningful ways.

| Resource Type (units) | Manpower (Person) | Equipment (Unit) | Material (Ton) | Input in the previous month | Input in the current month | Total inputs |
|---|---|---|---|---|---|---|
| | ① Staff | ① Excavator | ① Reinforcing Bar | | | |
| | ② Ordinary Laborer | ② Dump Truck | ② Ready Mixed Concrete | | | |
| | ③ Technician | ③ Bulldozer | ③ Asphalt Concrete | | | |
| | ④ Other Workers | ④ Others | ④ Others | | | |
| Total | | | | | | |

※ Each resource type is further divided into four categories in the reporting matrix.

# Progress Reporting



# Progress Reporting

## Korea's Progress Reporting System of Construction Projects

- In the Republic of Korea, the progress reporting of construction projects is well systematized and institutionalized through the Construction Technology Promotion Act, supervised by the Ministry of Land, Infrastructure and Transport. As per this national law, contractors are legally obligated to send to the ordering body (i.e. developer) their daily, weekly, and monthly progress reports throughout the construction process. Empowered by this legislated system, developers in Korea can utilize the progress reports submitted by contractors as essential tools for their project and site management.

- In Seoul's construction projects, contractors' progress reports are now being submitted online via One-PMIS, either through the uploading of paper reports or through the direct input of required information in the system. In the near future, Seoul plans to ensure full digitalization of all progress reports through direct input in One-PMIS. It has further institutionalized the use of One-PMIS in progress reporting, as a matter of law, by adding a special article on the mandatory use of the system in new construction contracts.

## Recommendation for other countries

- As per the lessons learnt from Korea, it is recommended to enact (or ensure the effective implementation of) an umbrella law (to be applied across the entire construction sector) that introduces and obligates systematic progress reporting in the construction sector—as accomplished by Korea's Construction Technology Promotion Act. Through such legislation, the government can first seek to establish a solid system for offline progress reporting by contractors, and then move towards an online report system. In order to ensure realistic implementation, policies should be introduced, keeping pace with the institutionalization process of an online construction management system (like Seoul's One-PMIS), as well as the increasing utilization rates of such a system.

# Progress Reporting

## Daily, Weekly, and Monthly Progress Reports → (Partially) Open to Citizens

- Upon the signing of a contract, the contractor is required to send the ordering body a construction commencement report and register his or her project implementation schedule (work plan for each process). Afterwards, the contractor must submit daily, weekly, and monthly reports via One-PMIS, detailing the progress of each component of the construction. The reports are sent to Seoul upon approval by the project supervisor(s).
- In order to ensure the accuracy and authenticity of the submitted reports, Seoul has institutionalized an electronic approval system that confers legal liability upon the report-approving persons in each step of progress reporting. Once the reports are submitted to the ordering body, neither the contractor nor the project supervisor can modify the content at their own discretion. In Seoul's experience, this step-by-step online approval system has made reports increasingly trustworthy.

## Seoul's Standard Template of Daily Work Reports

· Site: 00 Construction Project

· Date: 10 May 2016

· Weather: Min. 10°C - Max. 21°C

| Contractor ( responsible approver ) | Supervisor ( responsible approver ) |
|---|---|
| Kim | Cho |
| 10 - 5 - 16 | 10- 5- 16 |

1. Overall Project Progress Rate

| Previous Day | | | Today | | | Total | | |
|---|---|---|---|---|---|---|---|---|
| Target | Results | Difference | Target | Results | Difference | Target | Results | Difference |
| | | | | | | | | |

2. Progress Rate by Project Component

| Component | Previous Day | | | Today | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | Target | Results | Difference | Target | Results | Difference | Target | Results | Difference |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

3. Work Details

| Done on Previous Day | Done Today |
|---|---|
| | |

4. Status of Material Input

| Material Name | Unit | Previous Day | Today(estimated) | Total |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |

5. Status of Manpower Input

| Name | Unit | Previous Day | Today(estimated) | Total |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |

6. Status of Equipment Input

| Equipment Name | Unit | Previous Day | Today(estimated) | Total |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |

7. Special Notes

| Description |
|---|
| |

# Progress Reporting

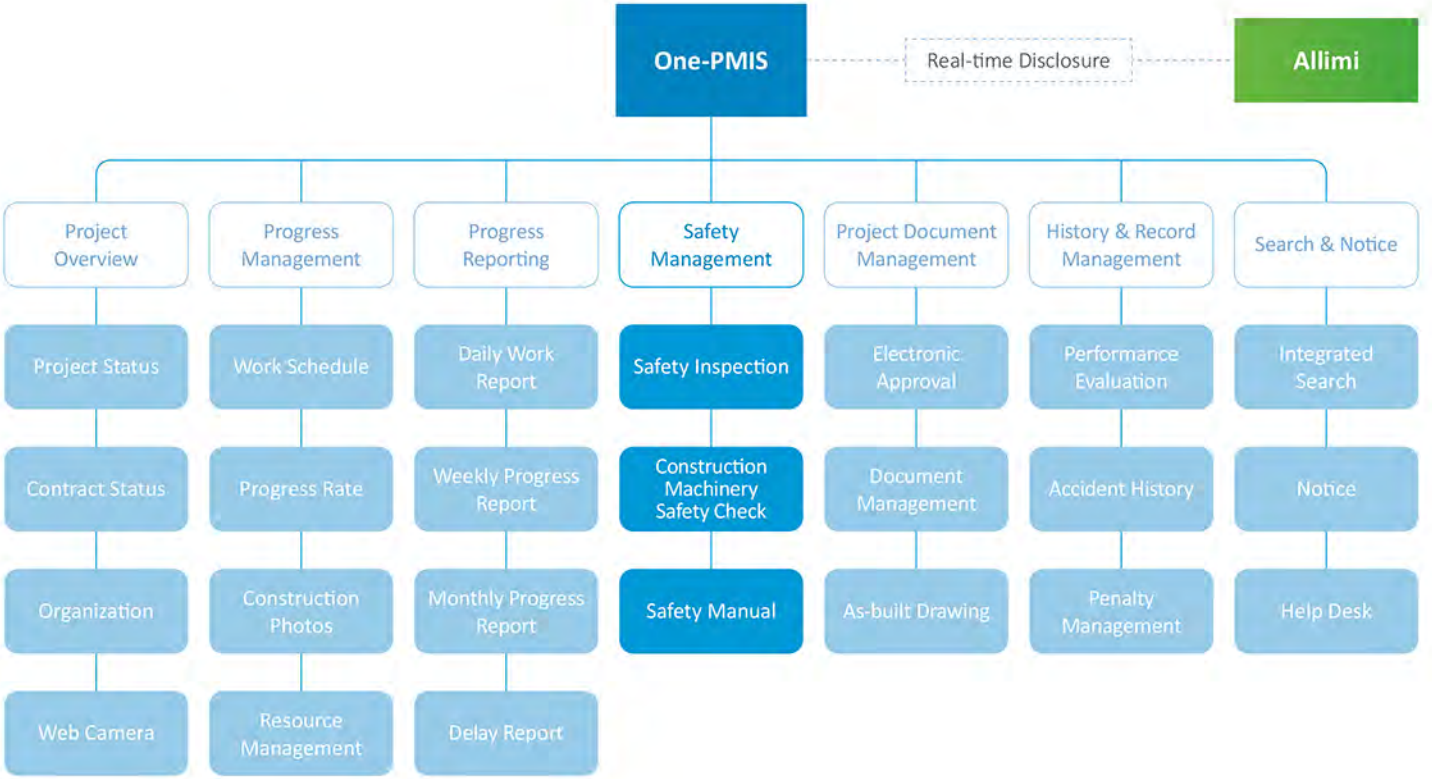
- Progress reports display quantitative indicators showing the status of the project's progress for each component of the construction work in comparison to the final targets within a specified time period. Seoul's daily, weekly, and monthly reports registered in One-PMIS have the same basic format. The only difference among these types of reports is the reporting timeframe. As of now, Seoul releases to the public only the weekly progress reports through an automated transmission of approved reports to the Construction Allimi site.

## Reports on Delays

- In Korea, when the monthly progress rates show more than a 10% delay compared to the target, or when the accumulated progress rates show more than a 5% delay in total, the project supervisor has specific responsibilities, as detailed in the Construction Technology Promotion Act. The supervisor must give the contractor appropriate instructions on how to analyze and address causes of the delay. Then, the supervisor must review the appropriateness of the contractor's analysis and actions undertaken. Lastly, the supervisor needs to submit to the ordering body a report that accounts for the delays and proposes remedial measures.

- Building upon this legal system of delay reporting, the Seoul Government has installed a menu in One-PMIS dedicated to reports on delays. Now, via One-PMIS, Seoul's contractors and its supervisors can immediately give or receive an alert with reasons for the delay and an explanation of the remedial measures that are to be undertaken. These delay reports are compiled and permanently stored in One-PMIS. In this manner, the reports can be used as valuable sources of information when devising preventive or remedial measures for delays that incur in future projects.

# Safety Management



# Safety Management

## Safety Inspection

- Ensuring safety is essential in public construction management. In Korea, there are a number of laws and regulations concerning the construction sector, which obligate responsible authorities to undertake various safety checks. Separate regulations are also in place, specifying the responsible actors, frequency, and methods of those safety checks. The contractors and supervisors are thereby required to implement safety checks as prescribed. Depending on the results of a safety check, relevant authorities can take appropriate measures, ranging from instructing corrective actions to imposing penalties on responsible contractors and supervisors.

- Building upon this overall safety check system, Seoul's One-PMIS includes a Safety Management menu, which facilitates systematic and timely transfers of information concerning safety of public construction projects by allowing the formerly offline safety check process to become digitalized.

- Once the safety inspector registers the safety check results of a specific project on One-PMIS, the results are automatically sent to the ordering body (i.e. the Seoul officials in charge of the particular project). The ordering body then reviews the information and notifies the contractor of his or her safety inspection results.

- The contractor then undertakes necessary actions and registers information concerning his or her corrective actions on One-PMIS. Upon review and approval by the project supervisor(s), this information gets sent back to the ordering body. After deliberation upon the appropriateness of the reported actions undertaken by the contractor, the ordering body can either notify the safety inspector of satisfactory results, or ask the contractor to take further actions for approval.

- One-PMIS allows all of such information registration and approval processes to be performed online, thereby increasing the timeliness of safety management. It also helps accumulate important data from various projects in one repository, which can be utilized later for Seoul's safety management and relevant policy development.

# Safety Management

## Construction Machinery Safety Check

- In recent years, Korea has seen an increase in its accident occurrence rate, due to the ever-increasing size and complexity of construction sites. Seoul has therefore taken a major interest in strengthening the safety management of construction machineries used in construction sites. In this context, Seoul created a specialized menu for the "Construction Machinery Safety Check" in its One-PMIS in order to ensure a more efficient and systematic safety management of its main construction machinery deployed at its project sites.

- With this feature, Seoul now requires contractors (including subcontractors) to use One-PMIS to register basic information of their construction machineries deployed at the sites. It also requires contractors and supervisors to rigorously manage the safety check history for each construction machine throughout its life cycle. When a machine fails to meet safety standards, its usage at project sites is strictly prohibited.

- In order to fulfill such stringent safety management requirements, Seoul's contractors also need to ensure that they obtain the official safety and maintenance records of their main machineries from nationally certified safety inspection agencies, both before and throughout their usage at Seoul's construction sites. (In case a machine leaves the designated construction site for usage elsewhere for a length of time, the contractor must obtain the safety check record once more in order to use that machine at the site again.) Contractors are also required to take prompt actions to get their machines checked by safety inspection agencies throughout the construction process.

- With such features embedded in the "Construction Machinery Safety Check," Seoul's One-PMIS is now systematically establishing an online database of all the main construction machinery deployed in Seoul's construction sites, which shows patterns of their usage as well as their key vulnerabilities/check points per type.

# Safety Management

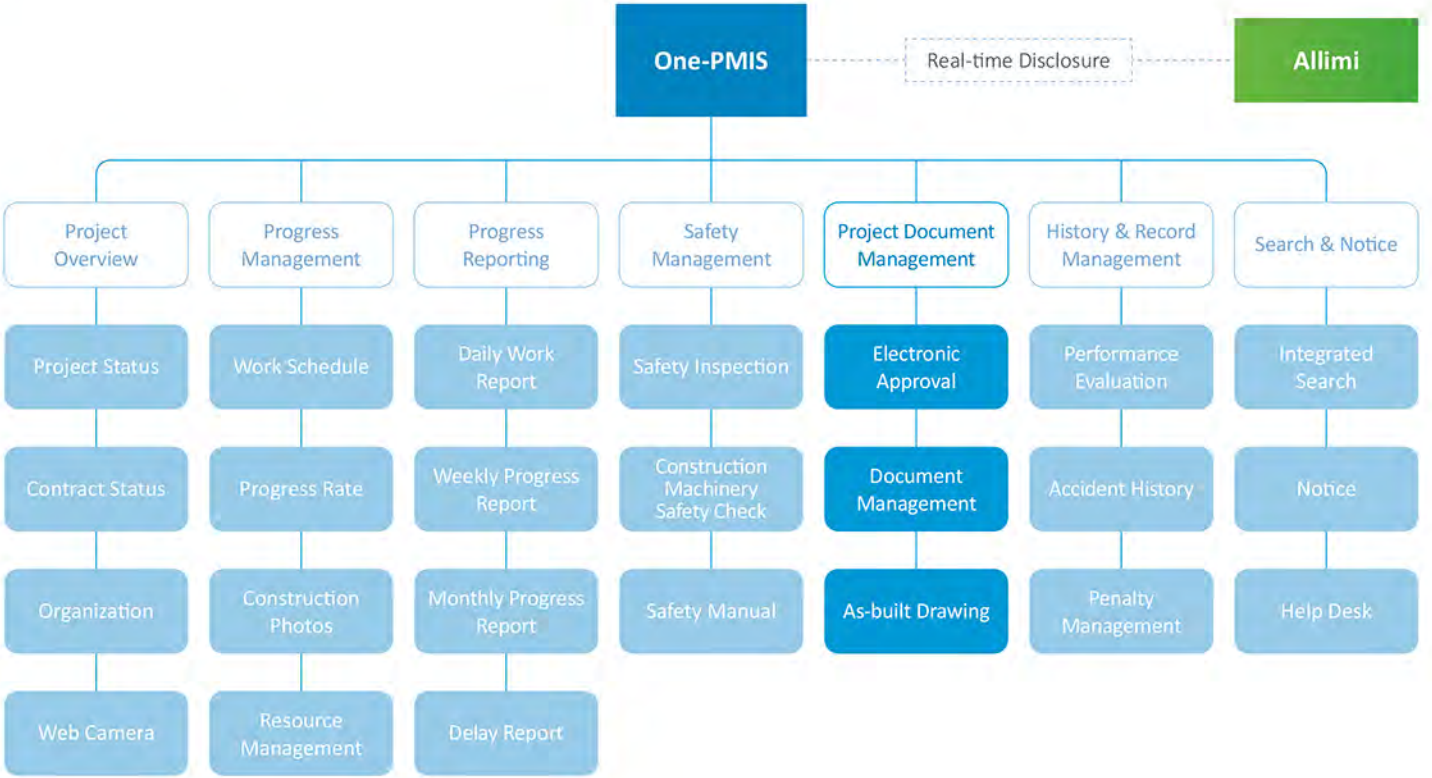
## Safety Manual

- With One-PMIS in place, the ordering body (i.e. Seoul's project managers) now registers many kinds of safety manuals and efficiently shares important references with its contractors and supervisors. Safety manuals uploaded and shared via One-PMIS include general manuals distributed by the national government, specific manuals created by the Seoul Government, as well as translations of exemplary manuals from foreign countries.

**Safety Manuals Registered on One-PMIS** ( As of May 2016 )

- Safety Management Manual
- Safety and Health Management Manual for the Public Ordering Bodies (i.e. public developers)
- Risk Analysis and Evaluation Manual by Types of the Construction Work
- Safety and Health Manual for preparedness against Storms and Floods
- Basic Guidelines for Construction Safety
- Reference on Major Construction Accident Cases and Prevention Methods
- Accident Prevention Training Materials for newly hired construction workers
- Safe Work Practices for Tunneling Construction
- Safe Work Practices for Construction Projects
- Industrial Safety and Health Standards (Cartoon illustrations)
- Safety Manual for Foreign Workers
- Philippines' National Industrial Safety and Health Standards

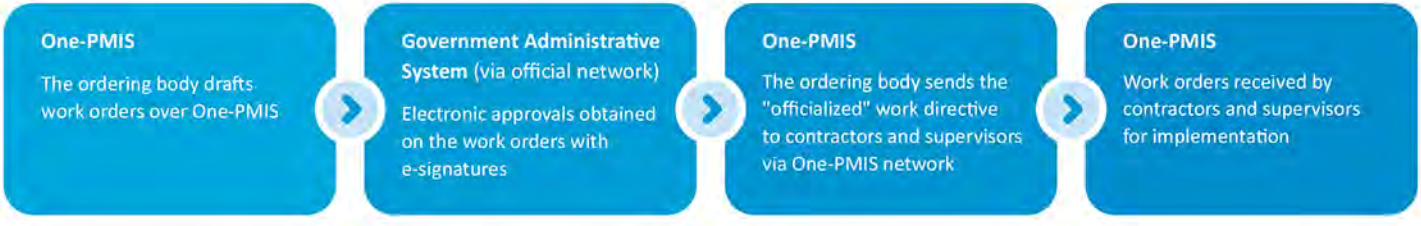
# Project Document Management



# Project Document Management

## Electronic Approval

- One-PMIS offers a scientific and systematic process management system, allowing for the digitalized input and sharing of a large amount of data among relevant participants in a public construction project.
- In addition, yet another notable function that makes One-PMIS an attractive and powerful tool is its linkage to the internal administration system of Seoul Metropolitan City through an electronic approval system for its work directive documents.
- This function was introduced because Korea's current laws and regulations do not recognize documents created and registered through One-PMIS as "official government documents." This is due to the different levels of system security in the country: whereas the dedicated Internet network of public institutions has a strong security firewall, the general internet network that One-PMIS uses has a relatively lower security level, as it is open to a wide range of users involved in construction projects.
- In order to address this situation, Seoul designed One-PMIS in the following way. When Seoul as an ordering body drafts work directives for its construction projects through One-PMIS, it uses Seoul Metro City's official Government administrative network to receive electronic approvals (with an electronic signature) on those drafts. Within Korea's e-government system, such electronic signatures made over the government network confer official authority to those documents as "public (government) documents."
- Only after the electronic signatures are registered on those documents, will Seoul's ordering body send their work directives to the contractors or supervisors via One-PMIS. This allows the ordering body's project work directives registered in One-PMIS to have official authority.



# Project Document Management

## Document Management → (Partially) Open to Citizens

- In the process of construction, the contractor, supervisor, and the ordering body create numerous documents. These entities generate either electronic files (digital documents) or paper documents, depending on the nature of the documents and the preferences of the person managing the documents.
- One-PMIS offers sufficient storage space on its database to allow users to store their documents by project. In addition, it provides a user-friendly search function for more efficient sharing of the documents. The main types of documents stored in One-PMIS include the following.

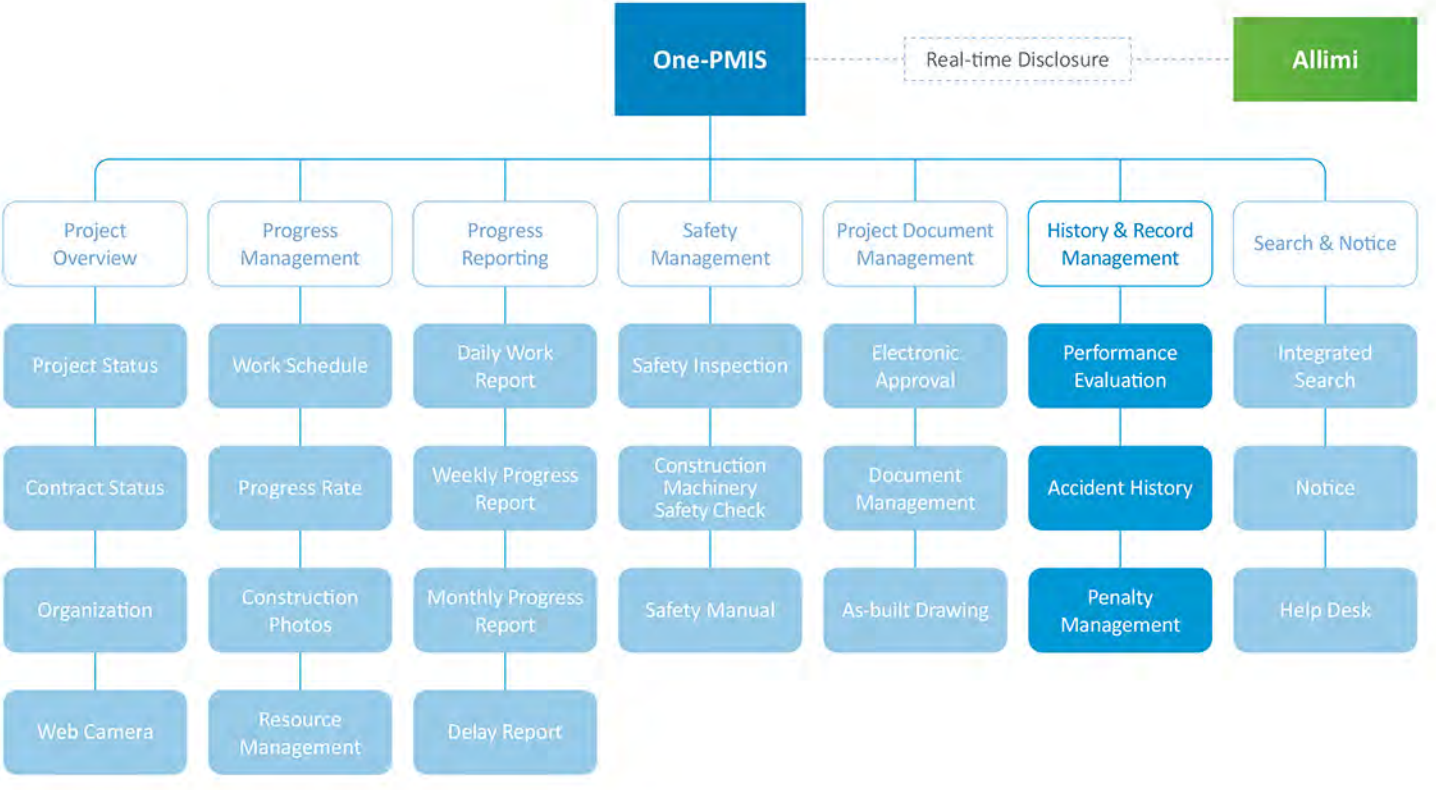
- Construction Specifications
- Design Drawings
- Quality Management Plans
- Contents of Design Challenges
- Construction Plans
- Traffic Management Plans
- Safety Management Plans
- Policies of Construction Period Extension
- Detailed Drawings of Construction
- Instrument Reports
- Environment Management Plans
- Inspection Documents for Completed Construction projects

# Project Document Management

## As-Built Drawing

- In public construction projects in Korea, the following eight types of infrastructure facilities that exceed a certain project scale (size) are categorized as "legal facilities": bridges, tunnels, water and sewage facilities, riverbanks, retaining walls, harbors, buildings, and dams. When dealing with projects categorized as legal facilities, the ordering body and the maintenance agents are required to keep the original as-built drawings as per the Public Records Management Act. The duplicates are to be sent to government-affiliated organizations, which would then manage all the as-built drawings according to the Special Act on the Safety Control of Public Structure.
- Through One-PMIS, Seoul, as the ordering body, has succeeded in establishing an electronically integrated management system for as-built drawings of its projects. Before the introduction of One-PMIS, as-built drawings of construction projects were managed by several entities and departments in a complicated and diffused manner. With One-PMIS now storing and managing all the as-built drawings, Seoul is able to prevent the loss of as-built drawings and effectively manage its facility maintenance work.
- After Seoul carries out its inspection on the completed buildings/facilities, the contractor must register the as-built drawings on One-PMIS under this menu. Seoul then deliberates and releases the payment to the contract after verifying the authenticity of the as-built drawings on One-PMIS.

# History & Record Management



# History & Record Management

## Performance Evaluation

- The ordering body can evaluate the performance of the companies and technicians participating in its construction project on One-PMIS. The evaluation on One-PMIS does not electronically replace the official evaluations of the actual design, supervision, and construction work as prescribed by Korea's relevant laws. Nevertheless, One-PMIS provides a convenient tool for the responsible managers to assess the performance of these actors within the online project management system.

- The subjects of evaluation are designers, contractors, and supervisors (companies as well as individual technicians). In order to ensure the propriety and reliability of evaluation, Seoul has introduced the following step-by-step approach for the evaluation:

| Subject | Evaluators (by evaluation sequence) |
|---|---|
| Designer | by Contractor (1st) › by Supervisor (2nd) › by Ordering body (final) |
| Contractor | by Supervisor (1st) › by Ordering body (final) |
| Supervisor | By the Ordering body (final) |

- The evaluation is made from a combination of multiple-choice questions (24 questions for the designer, 31 questions for the contractor, and 41 questions for the supervisor) and some short-answer questions. The evaluation is conducted three times in total over the course of the construction process (upon 30%, 60% and 95% completion).

- With this evaluation system, Seoul has ensured that all relevant actors in the construction projects pay greater attention to the quality of their work throughout the process. It also uses the evaluation material as reference data for selecting competent companies and technicians for its future projects.

# History & Record Management

## Accident History

- In response to two construction accidents in July 2013, the Seoul Government established a systematic accident history management system on One-PMIS. When an accident occurs at a construction site, the contractor is now obligated to report the accident immediately to the ordering body. Furthermore, the contractor must register all accident details on One-PMIS, once investigations on the cause of accident as well as remedial actions are completed.
- If the contractor attempts to hide the accident by not reporting it to the ordering body, Seoul imposes penalties on the contractor according to pertinent laws and regulations. Furthermore, Seoul minimizes the likelihood of cover-ups by cross-checking the accident reports against the information on the victim's industrial disaster insurance compensations, as provided by government-affiliated agencies.
- The accident records and details registered on One-PMIS constitute an important database, for they accumulate information on numerous types and cases of accidents, as classified by project size, stage, season, and so forth. Seoul can then use this valuable data to develop various policies and measures for accident prevention in the future.
- The accident records on One-PMIS are also used by Seoul in the contracting process. Design and supervision companies with a history of accidents registered on One-PMIS are disadvantaged in the bidding process.

# History & Record Management

## Search Results of Accident History in One-PMIS by Project

### Accident Information

| | | | |
|---|---|---|---|
| Project Name | | Location of Project | |
| Ordering body | | Supervisor | |
| Contractor | | Designer | |
| Date of Commencement | | Date of Completion | |
| Date of Accident | | Project Budget | |
| Description of Accident | | | |

### Information of Accident Victim

| Classification of Victim | Job of the Victim | Service Period | Type of Accident | Causal Factors | Accident Summary |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |

# History & Record Management

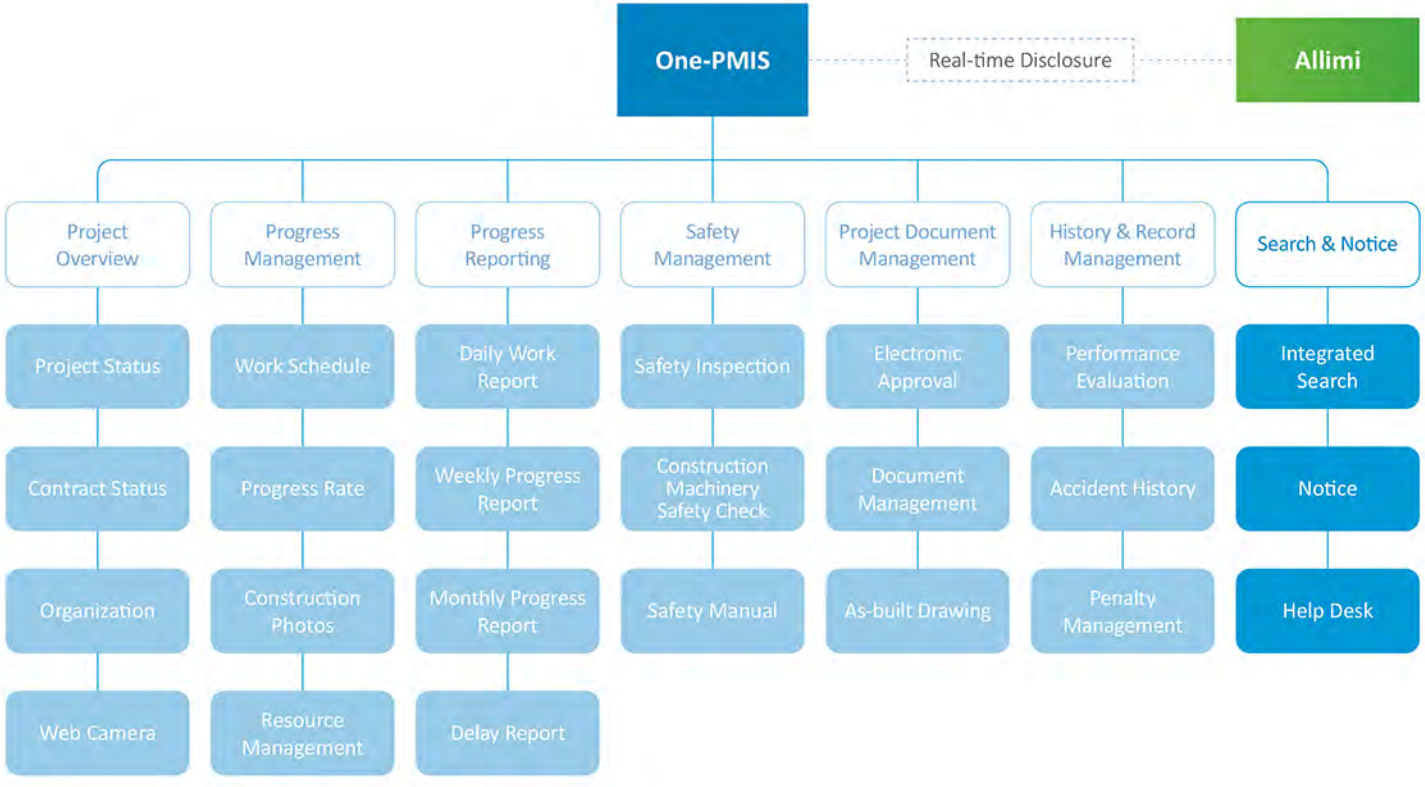
## Penalty Management → Open to Citizens

- In Korea, based on the Construction Technology Promotion Act, the ordering body can impose "penalty points" on its responsible project contractors (including design, construction, as well as supervision companies) in the case of faulty constructions (both actual and expected). The ordering body can also impose penalty points in the case of losses and damages incurred as a result of significantly erroneous estimations of demand in the feasibility study for a construction project, regardless of whether such errors were made due to negligence or with intent.

- Penalty points are imposed on responsible companies. The specific point value is calculated by a standard scoring system, depending on the degree of liability, as well as the degree of defects and damages incurred. Every six months, the ordering body sends a record of such penalty points to the Ministry of Land, Infrastructure and Transport. The Ministry then calculates the "cumulative average penalty points" for each company by taking the sum of penalty points for the past two years and dividing it by two. The resulting points become the official penalty scores of the responsible company. These penalty scores act as a disadvantage to the company in the future, as they can be reviewed and considered during the overall bidding and selection processes of subsequent projects.

- With One-PMIS, the Seoul Government is able to manage the penalty points more systematically than other ordering bodies (such as the central government and other local governments). As soon as it imposes penalty points, it registers the full record immediately on One-PMIS. As such, One-PMIS shows a real-time update of all the penalty points of its contractors. In addition, Seoul's penalty manager reports the penalty points registered on One-PMIS to the Ministry of Land, Infrastructure and Transport every six months.

# Search & Notification Function



# Search & Notification Function

## Integrated Search

- Lastly, Seoul's One-PMIS offers an integrated search function under its Search & Notice menu, based on the "big data" it has accumulated from all the information of its construction projects. Once a project is registered on One-PMIS, all the information registered throughout the construction process remains saved in the online database, even after the completion of the project. The system then allows users to make various types of searches and to locate whatever information they need from all the registered projects in an integrated manner.

- In Seoul's construction projects, this search function is utilized to facilitate effective management. For instance, the ordering body can readily access an up-to-date list of its projects according to specific criteria and download the real-time data in standard format. Such data is then used as a basis of various types of documentation and monitoring work.

**Search Results (Results shown in a downloadable format)**

| NO. | Project Name | Ordering body | Supervisor | Contractor | Total Project Amount | Contract Costs | Work Status | Progress Rate | Construction Start Date | Construction Completion Date | Web Camera | Location of the Site (District) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

# Search & Notification Function

## Notice

- This function allows all One-PMIS users to register and read notices. Seoul does not place any restrictions on specific content that can be posted under this menu. Users can therefore post whatever information they wish to share concerning projects. The menu also allows the notices to add file attachments. Once a notice is registered on One-PMIS, only designated persons with authorities are able to modify and/or delete it.

## Help Desk

- One-PMIS also has an online "help desk" in place. Here, the system manager's announcements related to the use of One-PMIS, inquiries from users, as well as the manager's responses to those inquiries are all registered and shared. For inquiries posted on the Help Desk, the registration date and status of response are displayed in real-time to all users. This encourages responsible managers to pay attention to incoming inquiries and continuously monitor the system.
- In particular, the virtual help desk facilitates effective trouble-shooting in One-PMIS management. When users post their complaints and requests for system improvements, the responsible managers consider those comments and utilize the feedback in their system upgrades. For the overall management of One-PMIS itself, the Seoul Government recognizes and highlights the supreme importance of ensuring users' convenience and meeting users' specific needs.

# Chapter 5

## Institutionalization of One-PMIS Use

# **Chapter 5.** Institutionalization of One-PMIS Use

## Seoul's approaches

- Widening the use of One-PMIS is critical to ensuring the effective management of construction projects in Seoul. It is also indispensable for securing the accuracy and reliability of public information disclosed through the Allimi website.
- At present, however, there is no specific law in place that requires relevant individuals to use One-PMIS. Nevertheless, the Seoul Government has been able to increase the rate of system use over time through continuous advocacy and training. Seoul currently recommends the use of One-PMIS for all of its construction projects whose total budget exceeds KRW 20 million or about USD 18,000.
- In addition, Seoul runs a monthly training program for its users and provides special programs whenever the system re-opens, is modified, or has new features. The operation support team set up by the government also ensures user support through the operation of a call center, offering remote support service as well as online manual service.
- At the same time, Seoul sees the need to formally institutionalize the mandatory use of One-PMIS among all of its project partners. Therefore, it is pursuing the enactment of local laws and regulations (ordinances) as a long-term measure. As a short-term measure, Seoul has decided (in May 2016) to add a dedicated clause into the "Special Conditions" section of its construction contracts, making the use of One-PMIS mandatory for contract-holders. (Note: In order to make changes in the general conditions section of construction contracts, Seoul requires a decision by the national government of Korea. However, Seoul can make changes in the "Special Conditions" section without approval from the national government.)

## Recommendation for Partner Countries and Cities

- Based on its experiences with One-PMIS, Seoul proposes that those who are considering creating their own versions of CCS push to enact a national law for the mandatory use of their own construction management system as part of their future reform efforts. Such formal institutionalization would minimize the difficulties one may encounter in enforcing its own construction project management system. It would also accelerate the implementation speed.

# Chapter 6

## Seoul' Guidance on Roles and Responsibilities of Construction Project Managers

# **Chapter 6.** Seoul's Guidance on Roles and Responsibilities of Construction Project Managers (1)

## Seoul's Guidelines for the Ordering Body (Summary)

- Article 1: The ordering body must comprehensively manage the entire range of planning, designing, order, supervision, construction, and evaluation for a construction project and must perform the tasks described in the following Articles.
- Article 2: The ordering body must check if construction supervision is fully performed based on the supervision service contract and direct full compliance therewith.
- Article 3: The ordering body must provide design drawings, documents, and reference data necessary for supervision and construction, in addition to resources such as materials, construction machinery, equipment and facilities specified as offerings in the supervision services contract.
- Article 4: The ordering body must set business contacts, identify problems, support settlements of civil complaints, and make suitable decisions throughout the entire construction process.
- Article 5: The ordering body must take measures for compensations in accordance with the expropriation of land and obstacles necessary for a construction project and must cooperate with national and local government or public agencies to obtain the relevant permissions and approvals therewith.
- Article 6: The ordering body must ensure that the supervisor satisfactorily examines documents, drawings, materials, construction machinery, and facility and staff members of the contractor, in order to enable the construction supervisor to fulfill its supervision contract.
- Article 7: The ordering body must make decisions on policy-related requirements raised by the supervisor in its reports on changes in design, requests for delay of completion schedule, site conditions, etc., in order to allow the supervisor to carry on its supervision service without impediments.

# Seoul's Guidance on Roles and Responsibilities of Construction Project Managers (1)

- Article 8: The ordering body must take specific measures when it is acknowledged that the consultation and supervision of external experts are required for construction projects that, for example, require special construction methods.

- Article 9: As a contracting party placing the supervision service order, the ordering body must supervise all tasks stipulated by the contract between the ordering body and the supervision service company.

- Article 10: With the exception of cases separately stipulated in related laws and regulations or specified in Article 1 herein, the ordering body must not infringe on the right of the supervisor by intervening or interfering in the works of the supervisor without valid reason.

- Article 11: Unless there is a special reason, the ordering body must allow the supervisor to secure a period of time necessary to perform its supervision tasks (e.g. the time to review design drawings and specifications) before the construction begins. In addition, the ordering body must allow the supervisor to carry on its construction supervision activities, including construction completion processing and preparation for post-construction management for a predetermined period of time after the completion of a construction project.

- Article 12: The ordering body must notify the Korea Association of Construction Engineering and Management (KACEM) of the contents of the supervision service contract and the placement of supervisors within seven (7) days after each of the below subparagraphs occur and according to the following classifications.

  a. when a supervision service contract is signed and amendment of the contract is made;
  b. when placement of supervisors has been made and changes in the supervisor placement occur (in case the original placement plan at the time of the contract has been changed or the supervisors in the initial plan submitted to the ordering body are replaced);
  c. when supervision services are completed; and,
  d. when the ordering body demands the replacement of a supervising company and the concerned supervising company accepts such a demand of the ordering body in order to proceed smoothly with construction that requires specialized technologies and experience of specialized construction methods.

# Seoul's Guidance on Roles and Responsibilities of Construction Project Managers (2)

## Seoul's Guidelines for Supervisors (Summary)

- Article 1: A construction supervisor (referred to hereafter as the supervisor) must perform construction supervision on behalf of the ordering body.
- Article 2: The supervisor must review adequacy of design before construction begins.
- Article 3: The supervisor must submit an evaluation report to the ordering body within seven (7) days of reviewing adequacy of a construction commencement notice.
- Article 4: The supervisor must evaluate the adequacy of subcontracts and submit the evaluation results to the ordering body within seven (7) days after the start of such evaluation.
- Article 5: The supervisor must inspect, manage, and verify if a contractor is fully performing all tasks in good faith according to the requirements stipulated in the construction contract for quality management, safety management, and environmental management plans.
- Article 6: The supervisor must receive the construction plan drawn in progress stages based on the criteria of construction specifications from the contractor thirty (30) days prior to the commencement of construction and complete the examination of such a plan within seven (7) days for approval.
- Article 7: The supervisor must receive detailed shop drawings from the contractor and complete the examination of such drawings within seven (7) days for approval.
- Article 8: The supervisor must thoroughly examine and manage the design, structure, and construction of temporary facilities.
- Article 9: When new obstacles are found during the construction period, the supervisor must report such findings to the ordering body as soon as possible.

# Seoul's Guidance on Roles and Responsibilities of Construction Project Managers (2)

- Article 10: When a specific stage of the process on the construction schedule is completed, the supervisor must perform inspection and measurement of the completed process following the guidance of an inspection and measurement checklist.

- Article 11: The supervisor must receive the process management plan from the contractor within thirty (30) days of construction commencement, examine such a plan for approval and report the results to the ordering body within fourteen (14) days of submission of the plan by the contractor.

- Article 12: The supervisor must check the construction progress on a regular basis (i.e. weekly or monthly) to identify any delays in the process by comparing the actual progress to scheduled progress.

- Article 13: If the contractor performs the construction in a different manner from that specified in the contract, the supervisor must be allowed to take measures against such construction by issuing reconstruction orders or by suspending the construction (partially or entirely) and must report such a situation to the ordering body.

- Article 14: When the monthly progress rate shows more than 10% of delay against the scheduled target (except when the accumulated progress rate is over 100% against the scheduled progress rate) or when the accumulated progress rate shows more than 5% of delay in total, the supervisor must give the contractor appropriate instructions to analyze, to address causes of the delay, and to prepare remedial measures and schedules for such activities.

- Article 15: The supervisor must review and examine the appropriateness of remedial measures for a delayed process and submit to the ordering body a report that accounts for the delays and proposes remedial measures

- Article 16: If the contractor submits a request for the delay of the completion schedule, the supervisor must validate the appropriateness of such a request and report the results to the ordering body with its review opinion attached.

- Article 17: The supervisor must check if a contractor is performing daily self-safety checks and must attend the site where the agency specializing in safety checks provides its safety check service, in order to verify if such checks are performed properly.

# Seoul's Guidance on Roles and Responsibilities of Construction Project Managers (2)

- Article 18: When an accident occurs at a construction site, the supervisor must give the contractor instructions to take necessary measures immediately and submit without delay to the ordering body a report that accounts for the details of such an account and its review opinion.
- Article 19: When the contractor requires changes in design, the supervisor must examine the request and make a decision within seven (7) days in the case of a simple design change or within fourteen (14) days in other cases, after the request is made.
- Article 20: When the contractor requests an adjustment of a contract amount due to price fluctuations, the supervisor must review it and submit to the ordering body a report with its review opinion attached within fourteen (14) days after the request is made.
- Article 21: When the contractor submits the request for inspection of a partially completed process or the request for completion inspection, the supervisor must review such requests promptly, perform inspections according to the designated inspection procedures, and in case of failure, instruct the contractor to perform reconstruction for re-inspection.
- Article 22: When any part of the reconstruction project fails in the inspection test, the inspector must instruct the contractor to take remedial measures or to perform reconstruction for re-inspection.
- Article 23: The supervisor must review the as-built drawings prepared and submitted by the contractor, verify that they were drawn as the actual construction was performed, and submit to the ordering body its review results with the as-built drawings.
- Article 24: The supervisor must receive the facility takeover plan from the contractor and inform the ordering body and the contractor of its review and acceptance results within seven (7) days after receiving such a plan. The supervisor must attend the location where the facility takeover is done between the contractor and the ordering body.
- Article 25: The supervisor must submit its supervision report to the ordering body within fourteen (14) days after its supervision service is completed.
- Article 26: The supervisor must prepare maintenance management guidelines and submit such guidelines to the ordering body within fourteen (14) days after construction completion.

# Chapter 7

## Key Lessons Learnt from Korea

# **Chapter 7.** Key Lessons Learnt from Korea

There can exist no perfect policy, and no matter how well policies are managed, the complete eradication of corruption will not be possible. Humans cannot be completely rational, and personal traits also influence corrupt practices. However, Korea's experience shows that an effective administration system with technical solutions can indeed help reduce risks of corruption and change underlying attitudes over time. In this regard, measures such as Seoul's Clean Construction System can help enhance the efficiency, transparency and accountability in public construction management, leading to greater safety, corruption prevention, as well as public engagement and trust. For the benefit of those wishing to introduce CCS-like approaches, key success factors, lessons learnt, and recommendations are summarised below.

## I. Key success factors of Seoul's Clean Construction System and Recommendations

In Seoul's experience, the CCS has been successfully introduced and utilized in its public construction work due to four main factors:

1. **Political will and drive from the top to build and enforce this system for transparency and efficiency has been critical.** Successes of initiatives like CCS depend on the decision-makers' willingness to push them forward, as challenges inevitably arise when changes to the traditional work background are introduced.

   The determination of decision-makers has been key to how Seoul and its project partners adapted to the changes in the work environment that came with the introduction of the CCS.

2. **Bottom-up solution-finding approaches and civil society consultations have facilitated the development, implementation, and upgrading of the system.** In Seoul's experience, the best ideas can come from citizens and users.

   First, Seoul's public officials in the Infrastructure Headquarters are staffed with specialists in relevant fields, such as in engineering, water, and electricity. These individuals are not contractors but are regular employees with official government status. For every public infrastructure project, whether it be small or large, the Seoul Government assigns specific officials in charge of each project. These officials must conduct regular visits to project sites, with the overall responsibility of the project's implementation, safety, and problem-solving. As such, Seoul is able to create an institutionalized feedback loop, whereby responsible officials bring back comments and requests from construction sites on One-PMIS and feed them directly into their policy and institutional responses. This system has enhanced the ownership and management accountability within Seoul.

# Key Lessons Learnt from Korea

Furthermore, civil society consultations have provided innovative ideas for the improvement of the system in Seoul. For example, the One-PMIS category on the "construction machinery safety management" was added as a result of consultative efforts to enhance safety in Seoul's projects after the two large construction site accidents in 2013.

In response to these accidents, the Seoul Metropolitan Infrastructure Headquarters (SMIH) established the Council for the Culture of Safety in order to prevent additional accidents. The council is composed of 5 executives from SMIH, as well as 13 external specialists, consisting of representatives from various groups, such as: safety-related organizations, the Construction Association, the Construction Supervision Association, Construction Equipment Association, the media, contractors, supervisors, subcontractors, field managers, and professors. These specialists provide feedback on Seoul's safety-related policies, and SMIH follows their recommendations by introducing amendments to existing policies or implementing new policies. The introduction of the "construction equipment management" section on Seoul's One-PMIS came from one of the policy consultation processes within the Council for the Culture of Safety.

3. **Dedicated staff and cross-sector teams for management of One-PMIS and Allimi have ensured holistic solution-finding approaches and accountable management of the system's introduction and upgrades.**

   In order to get the system up and running, dedicated teams in charge of development and operation are required, and they must have sufficient authority within the organizational chain of command. Without them, the policy may lose direction as decisions can easily be left inconclusive as a result of the lack of consultation between the system designer and developer. The Seoul Government created a cross-sectoral team in the Construction Management Department, which brings together data managers, construction engineering experts, policy specialists, and secondees from the system maintenance company in one division. Through this set-up, the Seoul Government has been able to institutionalize a cooperative working modality and has ensured a holistic problem-solving approach, which is necessary for the successful development and improvement of One-PMIS and Allimi.

4. **Ongoing reforms in Seoul's public administration system to bring about changes of attitudes and mindset among public officials have created an enabling environment for policy and system enforcement.**

   Transparent information management does not take place in a vacuum. Without a conducive mindset, no policies or promotional campaigns can bring about policy success. In Seoul's experience with anti-corruption, institutional mechanisms to change the mindset of government

# Key Lessons Learnt from Korea

officials for anti-corruption and open data have been key to the success of CCS. At the national level, all government employees in Korea are required to participate in an information disclosure mindset training program at least once a year; at the city-level, the Mayor of Seoul has led Seoul's administration under the banner of "innovation and cooperative governance," in which information disclosure, mutual sharing, and cooperation have served as the foundation of Seoul's policy directions.

Upon assuming office, the Mayor first created a dedicated information-disclosure department in charge of Seoul's public information service and introduced the so-called 'policy-nude project' to disclose and share all information on the city's policies with the public. When this new policy was introduced, some confusion and challenges arose. For example, some public officials expressed that the full disclosure of policy documents that they had just approved the previous day felt like going out into the streets with no clothes on.

Nevertheless, Seoul continued with the initiative, and as a result, the Seoul Government now discloses every piece of its policy information, aside from those legally prohibited, which enables the 10 million citizens of Seoul to access real-time information through the dedicated website. 4 years after the implementation of the information disclosure policy, the Seoul Government now even discloses the names of the City Planning Committee members and the minutes of their meeting without reservation.

## II. Overall lessons learnt from Seoul's Clean Construction System for enhancing transparency in public construction management

1. **Standardization of business and reporting processes is important to reducing corruption risks.** There is no perfect policy, and no matter how well policies are managed, the complete eradication of corruption will not be possible. Nevertheless, Seoul's experience shows that an effective administration system based on practical technical solutions can help reduce corruption risks and influence the underlying attitudes and work approaches over time. Key to the effective elimination of corrupt practices is the establishment of a systematic and standardized electronic process of public construction business management. In this regard, we recommend introducing approaches similar to Seoul's CCS as a practical means to enhance the efficiency, transparency, and accountability in public construction management.

# Key Lessons Learnt from Korea

2. **Minimizing unnecessary personal contacts among project participants (i.e. informal reporting, private gatherings and dine-outs) can help reduce opportunities for corruption.** When hand-written documents and in-person visits are used to seek approvals and permissions during the course of the project, without a standardized reporting and business procedure set in place, inappropriate relationships may develop between the subcontractor, supervisor and contractor—e.g. such as over private gatherings or dine-outs. Minimizing those unnecessary personal contacts with expectations of favour can therefore become an important means of reducing corruption. Furthermore, systematic digital sharing of documents and information on all aspects of construction projects (including progress reports, status of material used at work sites, design modifications, and quality and safety management in real-time) help reduce the risk of corrupt practices, as system users tend to pay greater attention to the quality of their reports and supporting documents, mindful of the public monitoring.

3. **Providing real-time information is the key.** There is little use in the old-time approach of uploading one-time information for the public. As in the case of Seoul's CCS, Allimi provides a "live" source of information through its automatic linkage to One-PMIS, which channels all the work-process information and reporting among the Government, contractors, and project supervisors. Real-time information sharing means that stakeholders are able to cross-check each other, and that citizens and construction project stakeholders are able to benefit from the information; this provides a clear advantage over the "making" of one-time information for the sake of disclosure.

4. **Information disclosure to citizens can create an underlying culture of accountability and reduce social conflicts surrounding public construction projects.** The real-time and accurate provision of construction information can strengthen citizen monitoring of administrative processes and build a culture of accountability and transparency in the management of construction projects, since all participants are aware that much of the information is open to the public. Furthermore, in Korea's experience, the transparent disclosure of information has contributed to reducing the costs of social conflict. As democracy advances, more people tend to exercise their right to know. Because government secrecy goes against this right, it increases the costs of social conflict. Authorities can reduce these costs by building a voluntary information disclosure system and by offering information services to their citizens. This structure enables citizens to make their inquiries through an institutional channel, as in the cases of Seoul's Allimi and its related public inquiry and complaint-handling mechanisms.

# Key Lessons Learnt from Korea

5. **Ongoing system upgrades are just as important as initial development, and there has to be a multi-year budget allocated for this purpose.** There is no such thing as a perfect system, no matter how much preparation goes into the set-up. As seen in the table below, the Seoul Government has made ongoing investments for system optimization and upgrading of One-PMIS and Allimi since the initial establishment of the systems in 2011. Seoul makes system improvements based on the feedback and requests from users of One-PMIS, as well as from the general public. This ensures that the system remains relevant to the shifting environment and can address the new needs and demands of the users and the public. In this context, it would be important for those who wish to build a CCS-like system to allocate a multi-year budget for system maintenance and upgrades.

[ Table: Seoul's Expenditure for CCS development and maintenance/upgrades ]

*Note: CCS helps manage most of the public construction projects that the Seoul Infrastructure Headquarters manage with an annual budget of approx. 1.3 billion USD

| | 2011 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| Project | System establishment | Maintenance and system improvement | Maintenance and system improvement | Maintenance and system improvement | Maintenance and system improvement |
| Total Expenditure | 930 mil KRW (Approx. 793,000 USD) | 245 mil KRW (Approx. 209,000 USD) | 386 mil KRW (Approx. 330,000 USD) | 236 mil KRW (Approx. 201,000 USD) | 209 mil KRW (Approx. 178,000 USD) |
| Establishment | 700 | | | | |
| Maintenance | 230 | 195 | 324 | 194 | 209 |
| System Improvement | | 50 | 62 | 42 | |

# Key Lessons Learnt from Korea

## III. Recommendations for the introduction of One-PMIS and Allimi in other countries

1. Create an effective enforcement mechanism through legal as well as other means

In Korea, there is no specific law that enforces the use of One-PMIS.[2] In the absence of this law, the SMG has adopted non-legal and institutional approaches in order to institute the "culture of acceptance" and the "norm" of using One-PMIS among the stakeholders.

- Within Seoul Infrastructure Headquarters, the Construction Management Division, in charge of the One-PMIS management, did intensive work to educate and persuade all relevant divisions within the Headquarters office on the rationale and importance of using One-PMIS, as different divisions are in charge of contracting different types of public infrastructure projects and function as the gatekeepers of the One-PMIS. Once the divisions within the SMG IH took ownership of One-PMIS, information of One-PMIS spread to all of their stakeholders.
- Today, the division still has ongoing advocacy and training, both within the Infrastructure Headquarters and with external stakeholders. Continuous efforts are made to raise the awareness and unofficial commitment to the One-PMIS system and its underlying principles of information transparency and access.
- As a result of such sustained efforts, the Construction Management Division has managed to build a consensus among all divisions of the Seoul Infrastructure Headquarters concerning the use of One-PMIS. Contractors and private stakeholders have also come to accept the use of the system as a norm.
- At the same time, the Construction Management Division has encouraged relevant divisions to include special conditions in public procurement notices and construction contracts pertaining to the use of One-PMIS. This helps the stakeholders accept the use of the system from the very beginning.

[2] *Nevertheless, several national laws exist that provide the basis of One-PMIS and the Informer ("Allimi") system:*

- *Construction Technology Promotion Act*
- *Framework Act on the Construction Industry*
- *Industrial Safety and Health Act*
- *Public Records Management Act*
- *Privacy Act*
- *Official Information Disclosure Act*
- *Regulations for the efficient administrative operation*

# Key Lessons Learnt from Korea

Based on Seoul's experience, the following actions are recommended for countries seeking to create an effective enforcement mechanism for One-PMIS and Allimi.

- Mobilize strong political commitment from the senior management of the government institution leading the CCS. This will ensure that public officials in charge of public construction contracts become the willing agents of change, which will then spread to private entities.
- Look for relevant laws on promoting e-governance with clauses that can be creatively used as the bedrock for the development and implementation of One-PMIS. One does not have to wait until specific laws are in place. Pursue the non-legal education and norm-building approach as the SMG Infrastructure Headquarters has done.
- However, for systematic enforcement, seek to enact a legal instrument for the mandatory use of One-PMIS.
- In the meantime, use procurement notices and official contracts as a means to enforce the use of the system by private entities. Private contractors do not contest the norm if the obligation, although not legally mandated, is communicated to them right from the beginning; it becomes a standard procedure for the industry over time.

2. Put necessary human and financial resources for One-PMIS and Allimi management and maintenance

- In Seoul, One-PMIS and Allimi are under the management of the Construction Management Division, which consists of 8 officials (i.e. 1 director, 1 administrator (policy specialist), 2 civil engineers (site-managers), 2 data specialists, 1 communication specialist, and 1 IT/security specialist). The division also has 2-4 additional full-time staff working in the same office, who are secondees from the private company to which Seoul has outsourced technical maintenance work (i.e. programmers and designers). System monitoring is undertaken by everyone in the division.
- Recommendation for partner countries: build a team of at least 6 multi-sectoral staff in the responsible government institution for effective system management.
- Technical maintenance can be outsourced to a private company on an annual contract basis. For maximum results, it is best to house secondees from the private company within the construction information managing team within the government unit.

# Key Lessons Learnt from Korea

3. Adopt a phased approach for system development

- In the case that the full development of a system equipped with all the necessary functions through a single project is not possible, the next best option would be to develop it more gradually. In Phase 1, the system (Ver. 1.0) may only have the Allimi feature to manage and disclose selected types of information on the overall status of each project. This allows the project manager to monitor the process, and grants citizens access to certain information.
- In Phase 2, the system (Ver. 2.0) may have additional features, such as the One-PMIS, through which the main contractors can input key information and manage their reporting. This system can be then linked to an information disclosure system, like a portal, so that the information is available to project managers and residents alike.
- In Phase 3, the system can allow contractors as well as subcontractors to upload all project-related information directly in the fully functional system (Ver. 3.0), just like Seoul's current One-PMIS. The system will become a real-time, cooperative project management tool, and through an automatic linkage to the public information system, it can provide a real-time, fully digitalized construction information service to the public.

4. Create a standard data classification system and build a user-oriented system

A standard classification system is a prerequisite for the development of any system. Its adoption is required to ensure that standardized information is used during project execution. Therefore, partners are advised to develop and institute a user-friendly standard data classification system. In addition, the efficient operation of a new system is just as important as the initial adoption of a technical system, if not more so. For this reason, policy makers must develop a sustainable and practical institutional plan for efficient data management from the beginning, or any clean construction system will soon be flooded with unmanaged and inconsistent data. This will make the system fade away as an untrustworthy and irrelevant management system. Lastly, when authorities build a project management information system for construction projects, they must make efforts to to ensure that the system is contractor-oriented—that is, the system should work for the actual users in project field offices. Double entries must be screened, and any duplication of work should be prevented.

# Key Lessons Learnt from Korea

5. Create/strengthen offline venues of information-sharing and consultation with citizens to synergize with the online Allimi.

While online public information sharing is important and useful, it cannot replace the need for face-to-face information sharing and consultation processes. In undertaking construction projects, the Seoul Government holds information sessions for residents around the construction site indicated on the proposal. The public hearing and consultation activities are organized in close cooperation with 25 district offices in Seoul. As a result of the feedback from the residents, the Government amends the project plans. By listening to residents' voices and reflecting them right from the project design stage before the actual implementation of the project, Seoul can minimize public discontent or any additional design changes fuelled by public complaints later on in the project. In the case of significant opposition from residents, a project may be cancelled altogether.


*Above: Notices made in a public park, near the road improvement sites, with the contact information (with the names of the responsible persons) of the contractor as well as of the Seoul government office in charge of the project. Also provided is a hotline to report on corruption cases or delays in subcontract payments.*

Once the construction starts, Seoul puts up flyers and notices in and around the construction site, in order to clearly indicate the period of the project, contractors, subcontractors, as well as the contact information of the responsible Seoul official in charge of the project.

Citizens can then send their inquiries and complaints using the information provided on these notices, or through the 'Ask the Assistant Mayor' menu in Allimi, as well as through Seoul's general website and social network channels. The SMG also runs a 'citizen inspection' program that offers citizens opportunities to visit project sites before the construction commences. Applications for the inspection program are made through the Allimi website, and a total of 112 people have participated in the program over the past year (since June 2015).

# Key Lessons Learnt from Korea

6. Introduce targeted anti-corruption policies to create an enabling environment to prevent corruption

However effective the CCS may be, increasing administrative efficiency and transparency in public construction management cannot be achieved through a technical introduction of the system alone. Other policy and educational measures need to be introduced in conjunction with system introduction and upgrades. From Seoul's experience, specific policies on anti-corruption helped to achieve greater transparency in public construction management. Below are two examples of Seoul's anti-corruption policy measures that accompanied the introduction of the CCS.

a. Post-employment restrictions for public officials

In order to reduce the possibility of retired public officials getting jobs in private enterprises and negatively influencing their former affiliation through acts of solicitation or seeking favors, the employment of retired public officials is restricted by law (Public Service Ethics Act) and any violation of this law is punishable by fines or imprisonment. Restrictions apply to all public officials that are grade 4 or higher, and to officials in specific sectors (e.g. construction, civil engineering, environment, taxation) that are grade 7 or higher. Officials in this category may not be employed for three years following their retirement in companies or institutions related to any division or institution with which the official was affiliated for more than 5 years prior to retirement.

b. Reporting Center for Construction Subcontractors & the Subcontractor Tribune

Seoul observed that large construction companies sometimes utilize their dominant status to exploit competition among subcontractors to lower prices, undermining the rightful interest of subcontractors and leading to poor construction quality and safety hazards. Therefore, the Seoul government opened a 'Reporting Center for Construction Subcontractors' in 2011 to protect socially vulnerable subcontractors from various illegal and unfair activities. Since its opening, an average of 268 cases have been reported annually. Following investigation, if illegal subcontracting activities are exposed, punitive administrative measures, including correction orders and suspension of businesses, are taken as outlined by the 'Framework Act on the Construction Industry.'

# Chapter 8

## Supplementary Information & Recommendations for the Application of the Clean Construction System in Partner Countries

# **Chapter 8.** Supplementary Information & Recommendations for the Application of the Clean Construction System in Partner Countries

## Introduction

This final chapter is designed to provide more specific words of advice for those who are interested in introducing CCS-like systems in their own countries. The chapter was written after the USPC-SMG technical mission to three partner countries in July 2016, in consideration of the common questions raised by partners.

### I. Seoul's Phased Approach to One-PMIS

When introducing CCS, it may not be possible to introduce all the features of Seoul's CCS at once. In fact, Seoul itself has progressively updated the menu configuration of the One-PMIS.

1. When One-PMIS was first developed in 2012, the main menu only consisted of the 'Project Overview', 'Progress Management', 'Progress
2. Reporting', and 'Document Management' functions.
   In 2013, the 'Safety Management' and 'History Management' functions were added to the main menu in response to two large and fatal construction accidents.
3. In 2014, the system underwent a major upgrade to increase the user-friendliness, based on the feedback and requests from the system users. After the upgrading, the system was divided into Administration Mode and Project Mode, and the main page was redesigned.
4. Currently, the Seoul Metropolitan Government (SMG) is working to simplify the system further for increased user convenience by integrating several menus/screens.

- Implications for partner countries

  System development is not a one-time task. After initial system development, it is necessary to update/upgrade the system in accordance with the changing circumstances, conditions, needs as well as feedback from the users. Therefore, having too many functions at once with a complicated system structure from the beginning may not be the best approach, as this can result in low adoption rate among managers and users of the new system. For the successful implementation of CCS-like approaches, it is key to build a system that addresses the priority needs in public construction management.

# Supplementary Information & Recommendations for the Application of the Clean Construction System in Partner Countries

**Advice**: Undertake multi-stakeholder consultations with relevant government institutions as well as the civil society, and then select key menus and categories as per the particular priorities and needs identified out of the consultation. Equally important to consider is the technical capacity of the managing institution and the readiness of the system users. Thus try to start with an easy-to-use structure in the pilot stage, while leaving room for expansion of the system from the beginning.
Nevertheless, the initial system should be developed with a sufficient expansion capacity. For instance, the initial system may not have a direct linkage with the national e-procurement system. Yet, the system should be designed and built in view of the linkage in the future. Otherwise, it may cost more financial and technical resources to upgrade or even re-develop the system. Therefore, policy makers are advised to develop the "big-picture" for their CCS with a long term vision of their system functions and outputs, while narrowing down the initial set of menus and categories for the first phase.

## II. Technical Specifications of Seoul's One-PMIS

**A common question is whether Seoul's CCS is an open source and whether partner countries can technically "install" Seoul's CCS with little modification. The short answer is no, for the following reasons.**

1. The IT infrastructure and the technical system environment are markedly different from one country to another. Much of the hardware and software used in Seoul's One-PMIS are Korean, and thus, right from the beginning, the Seoul Metropolitan Government has recommended to all partners that it would be most cost-effective to build the system with domestic IT technicians using the national IT systems. Even if a Korean company builds a system that is the same as Seoul's One-PMIS, the maintenance and optimizing costs in future years will outweigh the initial benefits in the long-term.

2. Seoul's One-PMIS is not an open source (for security reasons), and all the explanatory notes in the system coding (which are thousands in numbers) are written in Korean. Therefore, it would be best for the partners to define what they want to manage and disclose through their specific PMIS and to build the system accordingly with the national technicians that best fits the specific IT environment.
The CCS resource book is therefore intended to provide sufficient information on CCS, in order to help generate ideas for referencing and design in partner countries.

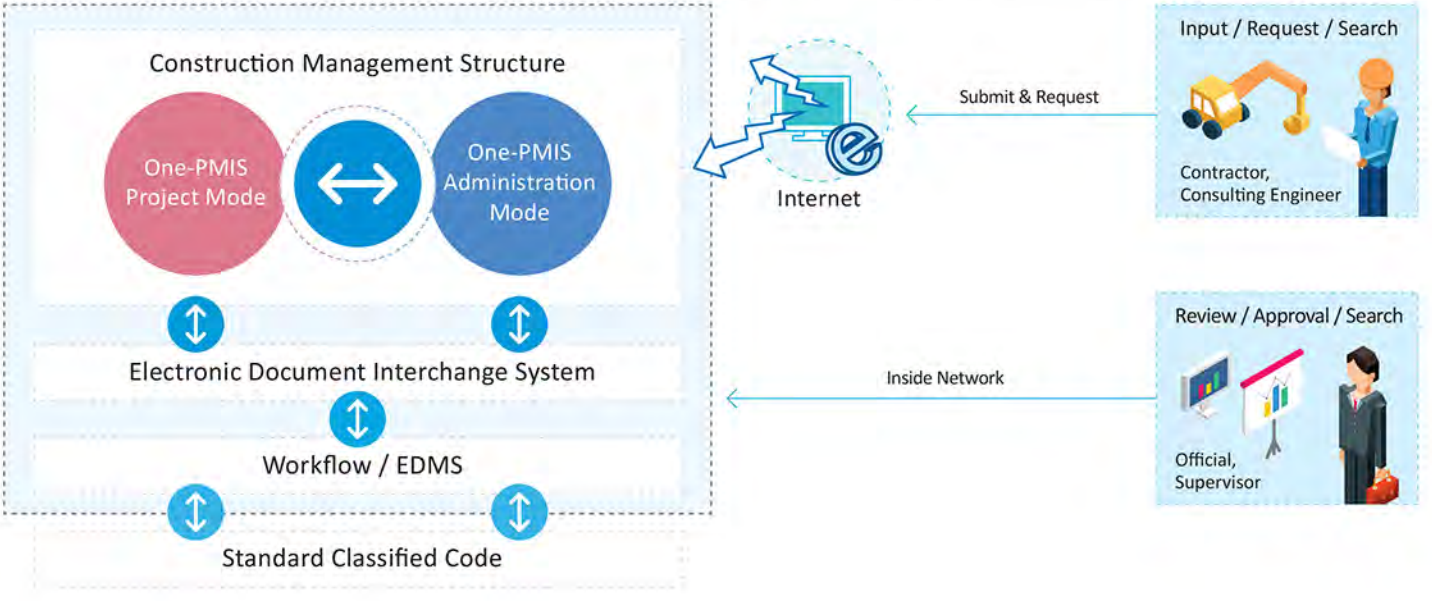
# Supplementary Information & Recommendations for the Application of the Clean Construction System in Partner Countries

3. As per the table below, Seoul uses the following system in its One-PMIS, which is the standard for the Korean government. If one uses Windows instead of Unix for the operating system, it would be cheaper and faster. But using Windows would be less stable and would create less expansion capacity in the system, compared to using Unix. That is why Seoul used Unix.

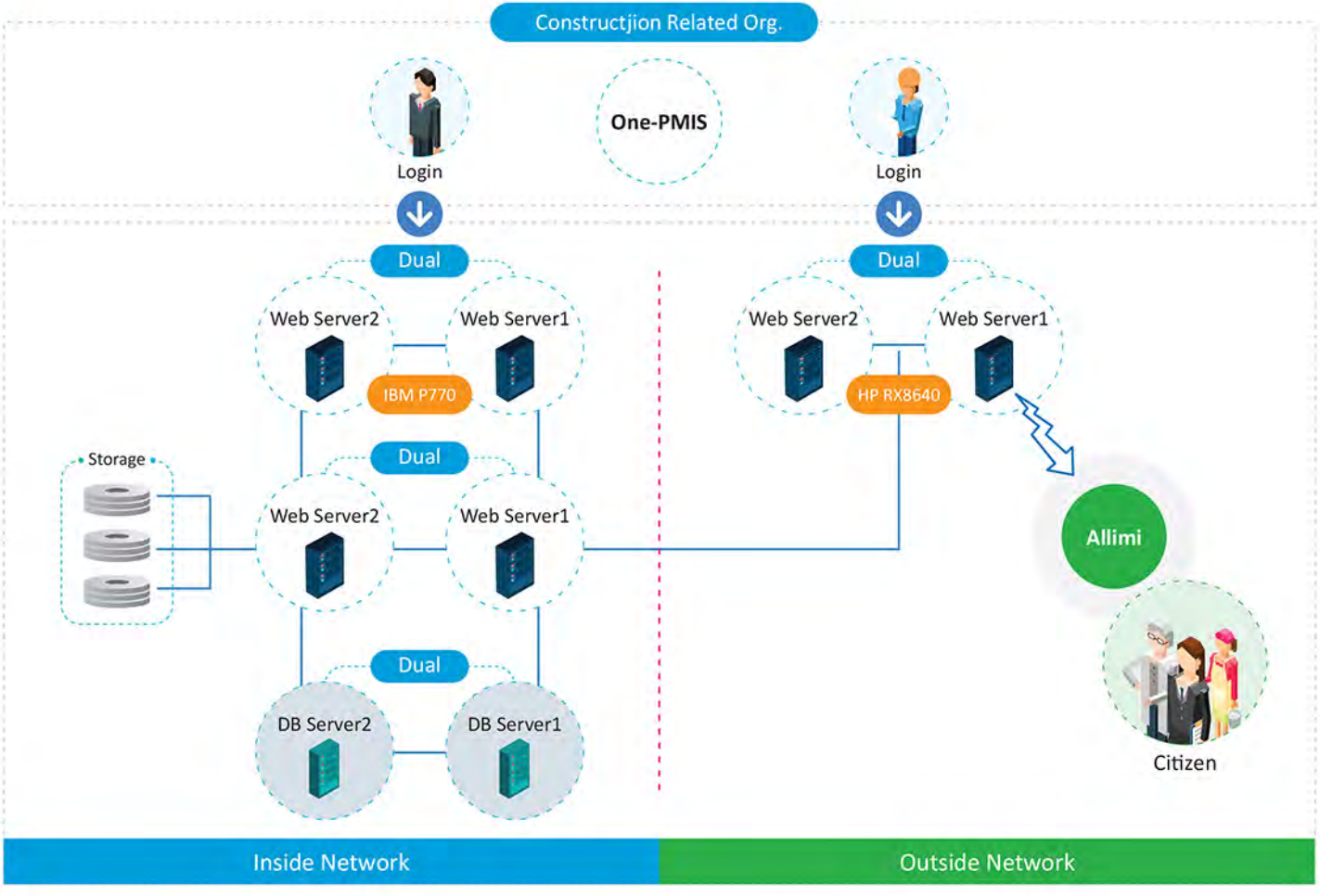
Applied S/W

| O/S | DB | Middleware | Language | Security | File Management |
|---|---|---|---|---|---|
| Unix | Oracle 10 | Web/Was Server | Java | Security Solution | Up-Load Solution |

4. As for the overall hardware and network structure of Seoul's One-PMIS, please refer to the following diagram.



# Supplementary Information & Recommendations for the Application of the Clean Construction System in Partner Countries



# Supplementary Information & Recommendations for the Application of the Clean Construction System in Partner Countries

## III. Suggestions for the PMIS development in partner countries

1. For the initial setup, it is advised to configure the PMIS menu with four basic functions: 'Project Overview', 'Progress Management', 'Progress Reporting', and 'Document Management.'

   - Based on Seoul's experience, these are the foundational components of the One-PMIS for efficient and transparent management of public construction projects. Other functions can be gradually added, as necessary, at later stages, as Seoul has done.

2. Right from the beginning of the system introduction, it is strongly recommended that the responsible government body with the necessary authority require progress reporting of construction projects to be computerized and undertake a full substitution of offline reports with online reports. To this end, policies and laws may first have to be revised or introduced.

   - This goes in line with the underlying lessons learnt from Seoul that the success of One-PMIS hinges on reducing the actual workload of its users. If offline reports are not fully substituted with the online reports, people will see that they have to work twice, and this will negatively affect the utilization of the system.

   - In Seoul's case, the Infrastructure Headquarters accepted the online reports as official reports and did not require additional offline reports, right from the very beginning of the One-PMIS introduction. This was key to successful implementation.

3. In terms of the format/template for the PMIS progress reporting, please consider the Seoul One-PMIS daily progress report template.

   - As explained in the CCS Resource Book in detail, Seoul's daily, weekly, and monthly progress reports all use the same template; these reports only differ in terms of the time period they each cover. This simplifies the reporting process for the users.

# Supplementary Information & Recommendations for the Application of the Clean Construction System in Partner Countries

4. When developing the PMIS, consideration should be given to how to clearly show the progress in an easy-to-understand format with quantifiable data.

- The progress rate calculation method should be as simple as possible in order to reduce the burden on users and increase convenience. One does not have to exactly follow Seoul's calculation method, but can instead develop whatever is most feasible and effective in its own circumstances.
- What matters the most is to have everyone complete the regular online progress reports using the sample template, and then release that information on the progress reports to the public via an Allimi-like portal.
- Also consider ways to show the overall progress status. For instance, Seoul uses color-coding to indicate the status to enable quick monitoring:

| | | | | | |
|---|---|---|---|---|---|
| Over 100% | • (on time) | 100% ~ 90% | • (slightly delayed) | Under 90% | • (Delayed) |

*More specifically....*

- In the initial stage, the progress reporting in PMIS is best configured to cover only the most common types of construction work (no more than ten types).
- At the micro-level, different contractors may manage the actual construction process in detail according to their standard business processes. Nevertheless, all contractors should employ the same method to display their key progress updates via PMIS. This is the key.
- For each type of the construction work, the system should ideally have the automatic calculation function for the progress rates, based on the data that users enter in the two fields: their planned input and actual delivery per type of work.

# Supplementary Information & Recommendations for the Application of the Clean Construction System in Partner Countries

| Type of Construction Work | 2016 | | | | | 2017 | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | |
| Earthwork | Planned input verses delivered input per type of construction work / per month | | | | | | | | | |
| Pavement Work | | | | | | | | | | |
| Drainage Work | | | | | | | | | | |
| Foundation Work | | | | | | | | | | |
| Structure Work | | | | | | | | | | |
| Demolition Work | | | | | | | | | | |
| Excavation Work | | | | | | | | | | |
| Landscaping Work | | | | | | | | | | |
| Others | | | | | | | | | | |
| Total | | | | | | | | | | |

5. Installation of web cameras is extremely helpful for efficient construction management and public information disclosure. Thus introducing the web cameras with the PMIS development is strongly recommended. This function enhances the monitoring efficiency and transparency in project management.

- The progress rate calculation method should be as simple as possible in order to reduce the burden on users and increase convenience. One does not have to exactly follow Seoul's calculation method, but can instead develop whatever is most feasible and effective in its own circumstances.

  ① First review the relevant laws in the country and establish guidelines on installing and operating web cameras.

# Supplementary Information & Recommendations for the Application of the Clean Construction System in Partner Countries

- In particular, conduct a legal review on whether installing web cameras at the construction site is in conflict with other laws such as laws concerning privacy.

② In the absence of relevant laws, public hearings may be held to gather public opinion and determine the policies on installation of web cameras for public construction project monitoring, as well as on the public disclosure of the real-time web camera images.

③ Depending on the needs and available budget, determine the scope of camera operation, the range of screen exposure, along with the web camera specifications (i.e. functions, resolution, network level, etc.)

④ Develop a "big picture", ahead of camera installations, as to what needs to be monitored with web-cameras at the project sites, and how to create an integrated monitoring mechanism for the construction projects with all the multiple images coming from various web cameras. (For further details, refer to the SMG-USPC webinar on One-PMIS for Seoul's examples.)

specifications of Seoul's One-PMIS Web Camera

| Project | Specifications |
|---|---|
| Format | Dome-type with unlimited high-speed rotation of 360 degrees |
| Pixel | 410,000 (Vertical 811 x Horizontal 508) or more (Note: web cameras with 2 million pixels are recommended) |
| Resolution | D1 class 720x480 650TV Line or above |
| Transmission Speed | Max. 30fps@720x480 or more (to display natural movement) |
| Minimum Intensity of Illumination | 0.00001 Lux or more (Note: There are separate specifications for night time and inside tunnels.) |
| Zoom | Optical: 43 times / Digital: 16 times or more |
| Focus | Auto focusing and automatic aperture |
| Others | - No. of simultaneous connection: 30 users min.<br>- Sending text messages and emails in case of any malfunction<br>- Record and save users' IP addresses<br>- Diagnosis on malfunctioning and restoration via remote access service |

# Supplementary Information & Recommendations for the Application of the Clean Construction System in Partner Countries

6. In the long-term, it is recommended that partner countries include the "resource management" category under their "Progress Management" menu.

- As discussed earlier in the CCS Resource Book, construction projects use three main types of resources: manpower, materials, and equipment. Systematic monitoring of project resources is essential since they determine the overall cost and quality of the construction.
- The daily input of workers, materials, and equipment should be managed and recorded in the Progress Reports (daily, weekly, and monthly).
- Seoul's One-PMIS can serve as a reference for establishing a resource management system in the responsible public construction management bodies in partner countries. However, the exact components in PMIS would have to be determined depending on partner countries' context. One can later reduce or expand the scope of the resource management section as appropriate to the particular needs and monitoring capacities.

Seoul's Resource Management Reporting Template in One-PMIS

| Resource Type (units) | Manpower (Person) | Equipment (Unit) | Material (Ton) | Input in the previous month | Input in the current month | Total inputs |
|---|---|---|---|---|---|---|
| | ① Staff | ① Excavator | ① Reinforcing Bar | | | |
| | ② Ordinary Laborer | ② Dump Truck | ② Ready Mixed Concrete | | | |
| | ③ Technician | ③ Bulldozer | ③ Asphalt Concrete | | | |
| | ④ Other Workers | ④ Others | ④ Others | | | |
| Total | | | | | | |

# Supplementary Information & Recommendations for the Application of the Clean Construction System in Partner Countries

7. Digitalization of the performance evaluation of project participants in PMIS can be helpful, and thus partner countries are advised to consider including this menu, at least in later stages, using some of the lessons learnt from Seoul's trial and errors in One-PMIS.

- The Construction Technology Promotion Act of the Republic of Korea requires performance evaluations of the companies and technicians participating in the construction projects (e.g. designers, contractors, supervisors). As per the same law, the Ministry of Land, Infrastructure and Transport is supposed to integrate and manage all the performance evaluation results at the national level.

- In reality, however, compliance with this performance evaluation requirement remains lax in Korea due to two main reasons:
  ① The current evaluation system is too complex, with different evaluation methods, timing and criteria in place for each project participant; ②There are no disciplinary measures or penalties in place to punish those who fail to conduct the performance evaluations.

- In light of these issues, Seoul has developed the Performance Evaluation section of the One-PMIS in a way that computerizes the evaluation process and encompasses all the assessment criteria prescribed by the Construction Technology Promotion Act in a user-friendly way.

- The performance evaluation completed online through One-PMIS is not mandatory by law and does not replace the official offline evaluations. Nevertheless, One-PMIS has succeeded in providing a convenient tool for Seoul to assess the performance of its project participants and to establish an online database for all the evaluations through the digitalization of evaluation results and records.
  *(Note: Seoul confers an official authority to the online performance evaluation conducted on One-PMIS by approving the online evaluation reports using the Seoul Government's official e-administration system.)*

- Based on the trials and errors Seoul has experienced in this area, the following approach is recommended for partner countries:

  ① Seek to enact or revise national laws concerning the performance evaluation, so that online evaluation via PMIS can actually replace the offline (paper-based) performance evaluation.
  - This will reduce the duplication of work and help with the buy-in among the PMIS users, in terms of conducting the online performance evaluation via PMIS.

# Supplementary Information & Recommendations for the Application of the Clean Construction System in Partner Countries

② Conduct multi-stakeholder consultations to develop customized performance evaluation criteria for PMIS.
- Seoul's evaluation questions (which can be shared upon request through USPC) can serve as an example, but the specific evaluation questions would need to be developed to address the specific needs and challenges.
- When developing the questions, it is recommended that the responsible institution undertake consultations with those who will conduct the evaluations, as well as those who will be subject to the evaluations later.

8. Based on Seoul's experience, it is recommended that PMIS include the "Management of Accident History" section as early as possible in its evolution process.

- As mentioned above, Seoul added this section to the One-PMIS, in response to the two major accidents that took place in 2013. For those countries that are currently experiencing a construction boom, it may be important to prepare for an increasing number of construction accidents, as Korea experienced in the past.

- In Seoul's experience, there are two effective measures to prevent construction accidents: 1) systematic and accurate analyses of the cause of accidents, followed by the development of tailored responses to prevent any recurrence; 2) penalization/punishment of those who are responsible for the accidents (e.g. restrictions to future bidding opportunities, imposition of fines, individual dismissals from office, etc.), so as to create a strong deterrence effect.

- In Seoul's CCS, the accident records and the details registered in the 'Accident History' menu on One-PMIS have built an important database for accident history, which in turn provided the means to implement the two prevention measures outlined above. It is therefore strongly recommended that PMIS include an 'Accident History' menu as well, as early as possible in its evolution process.

- Nevertheless, simply creating an 'Accident History' menu on PMIS would not automatically help prevent accidents. In order to make an effective use of the menu, relevant laws and concrete policy guidelines must be devised, based on studies and consultations, that clearly prescribe a series of actions to be undertaken by project stakeholders should an accident occur; and such follow-up needs to be implemented. In other words, policy and legal development needs to be undertaken alongside the system development; and the required follow-up actions need to be enforced.

# Supplementary Information & Recommendations for the Application of the Clean Construction System in Partner Countries

Seoul's action-flow in case of an accident at the construction project site

Accident occurrence ➔ Initial report of the accident ➔ Rescue of victims ➔ First-aid on the scene ➔ Clearing of the site ➔ Investigation of the causes of the accident ➔ Writing of the accident report ➔ Uploading and managing the report on One-PMIS ➔ Penalizing of the persons/companies responsible for the accident ➔ Sharing of the accident details and lessons learnt with others

## IV. Advice for the creation of a public information disclosure system like "Allimi"

1. It is best to create the Allimi as an open platform to provide information to all. In other words, the users (i.e. citizens) should not be required to login in order to retrieve information.
2. Before any technical development, the most important task is to identify what kind of information on public construction projects is meaningful, based on consultation with all stakeholders, including the citizens.
3. Before the technical development, it is also necessary to map out what types of information is already available for public disclosure. For instance, study how the contract/procurement information from an existing e-procurement system can be connected to and disclosed via Allimi, along with the information coming from various menus of the PMIS.
4. After specifying what types of information is to be released, design Allimi's information management system and the website/phone application.
5. It may not be possible to include all types of necessary information at once. But when designing the Allimi, take a long-term perspective by thinking ahead what types of information that partner countries and the managing institution in particular ultimately seek to share with citizens in the future, and design a platform that has the expansion capacity.

# Supplementary Information & Recommendations for the Application of the Clean Construction System in Partner Countries

6. Remember that the heart of Seoul's CCS is the automatic linkage of the real-time information between One-PMIS and Allimi, and between Allimi and other relevant systems (such as the national e-procurement system and Seoul's e-financial system). Right from the beginning, Allimi should adopt this method of automatic linkage, however limited scope of information it may have in the initial phase. Any separate and manual input of information on PMIS is strongly discouraged. All information in Allimi must be derived through system links.

7. Based on Seoul's experience, the following types of information may be most interesting to the citizens in partner countries:

**[Basic information]**

① Construction type, location, scale (size, budget, etc.)
② Construction period (including a timeline of key milestones)
③ Main entities as well as responsible managers involved (including contact information)
④ Expected benefits of the construction
⑤ Features of the construction work that may require inconveniences to the local residents

*Note:*
*Based on Seoul's experience, it is best to disclose a), b), and c) via the Allimi website from the initial phase.*

**[Specific information]**

① In case of changes in the construction period (e.g. delays) or in the construction design, what are the reasons/causes of such
② change?
What are the evidentiary documents that prove the validity of the reasons in a)

Note:
*- If Allimi provides a real-time, up-to-date basic information under a), b), and c) categories, citizens will be empowered to monitor the changes and ask questions concerning the changes. Such disclosure of information prevents corruption that can take place during the construction design changes.*
*- It is important that contact information of the relevant departments and people in charge of the projects are clearly provided on Allimi, so that citizens can make the inquiries based on the basic information provided on the Allimi.*

# Supplementary Information & Recommendations for the Application of the Clean Construction System in Partner Countries

## V. Final Words

1. When introducing the PMIS, the most important task would be to prevent duplication of work. Therefore, partner countries are advised to investigate the current paper-based reporting system in detail, and then seek to computerize a reformed/upgraded reporting system through the PMIS.

2. When defining the new online reporting system, hold consultations with the relevant stakeholders, particularly with the actual users of the system, so that the user perspective can be accounted for, as much as possible.

3. It is worth investing time to carefully develop the new template for the online progress reporting through PMIS. The new online reporting should be designed in ways that integrate the key elements of the existing paper-based reporting system, so that the users can quickly learn to computerize their reporting processes through PMIS. In addition, after the initial pilot phase, it would be good for the responsible agencies to hold consultations with the users and upgrade the online reporting template based on the user feedback on an ongoing basis.

4. In terms of the technical specifications of PMIS and Allimi, it is best to be defined by the local technicians in partner countries, according to the available financial and IT resources in the country.

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