APPLICATION OF GIS AND GPS FOR FACILITATING THE MANAGEMENT IN CONSTRUCTION INDUSTRY

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Term Paper for CRP 514

(Introduction to GIS)

KFUPM

Presentation outline

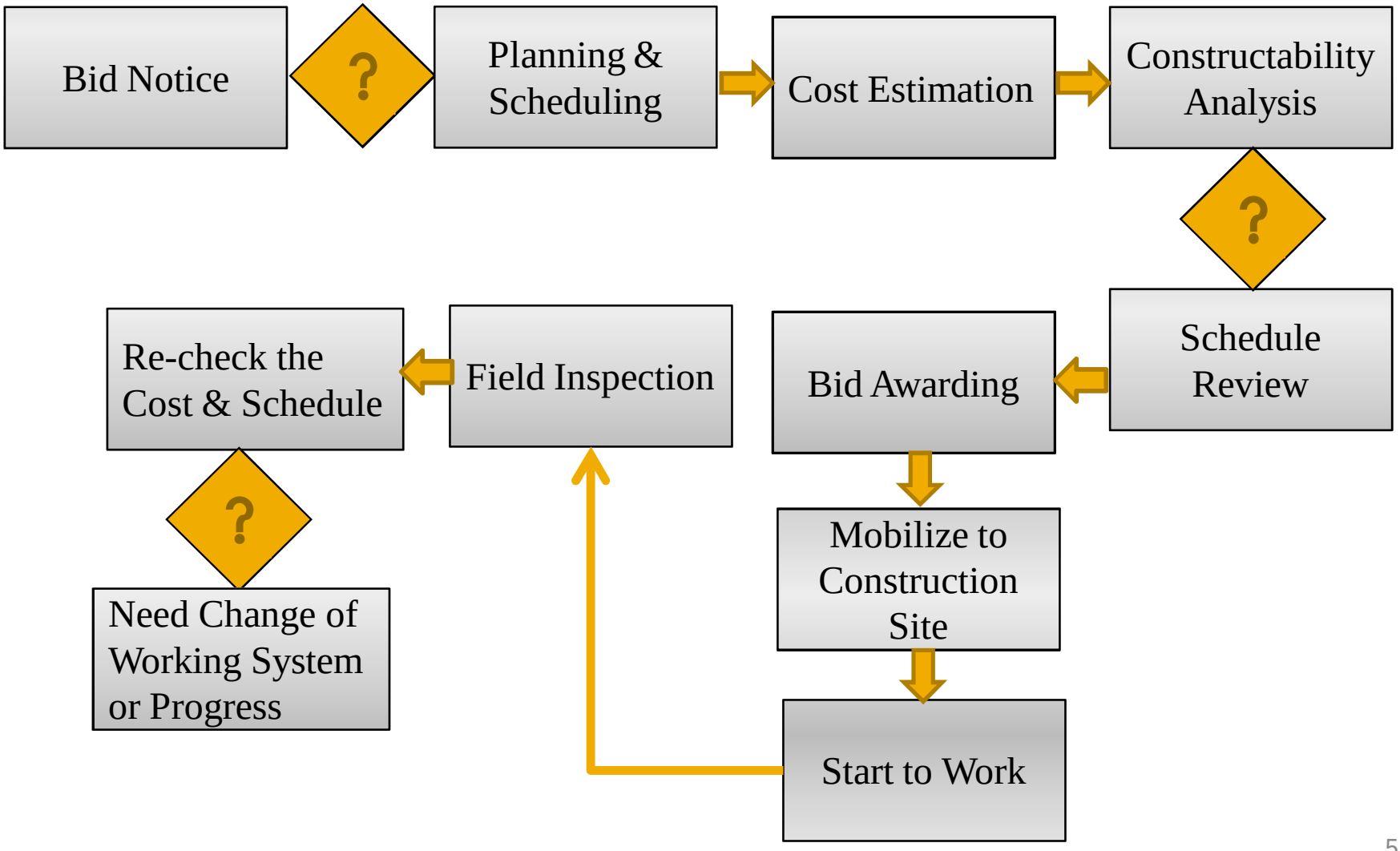
- Background of the Study
- What is Construction Management?
- Objectives
- Methodology
- Case Study Analysis
- Conclusion
- Recommendation

Some Pictures of Construction Sites

Background of the Study

- Construction projects (CP) deal with uncertainties.
- It is very potential source of GDP for example 33% for Palestine, 23% Tajikistan, 14% for UAE etc.
- 70% in Saudi Arabia and 50% in UAE projects are delayed by improper management.
- Can GIS & GPS solve the problems of Construction Industry?

Construction Management at a Glance (GIS?)



Objective

- To evaluate the applications of GIS & GPS in CP management
- To find out the potential applications of GIS & GPS in CP management

Methodology

Review of Literature from scholarly articles

Case study of selected articles

Finding potential applications of GIS & GPS in CP mgt.

Applications of GIS in CP Mgt.

From literature review following applications of GIS are found:

- Digital data-base for project information system
- 4D construction site layout management
- Construction schedule review and monitoring
- Time and space management
- Project cost estimation
- E-procurement for construction materials

Applications of GIS in CP Magt. Cont..

From literature review following applications of GIS are found:

- Underground utility rout design and planning
- Construction safety monitoring
- GIS and GPS for increasing construction productivity
- Positioning and tracking of construction vehicle

Case study 1: Resources Database in GIS

Bansal & Pal (2006)

- CPIS
- Data store for CP mgt.

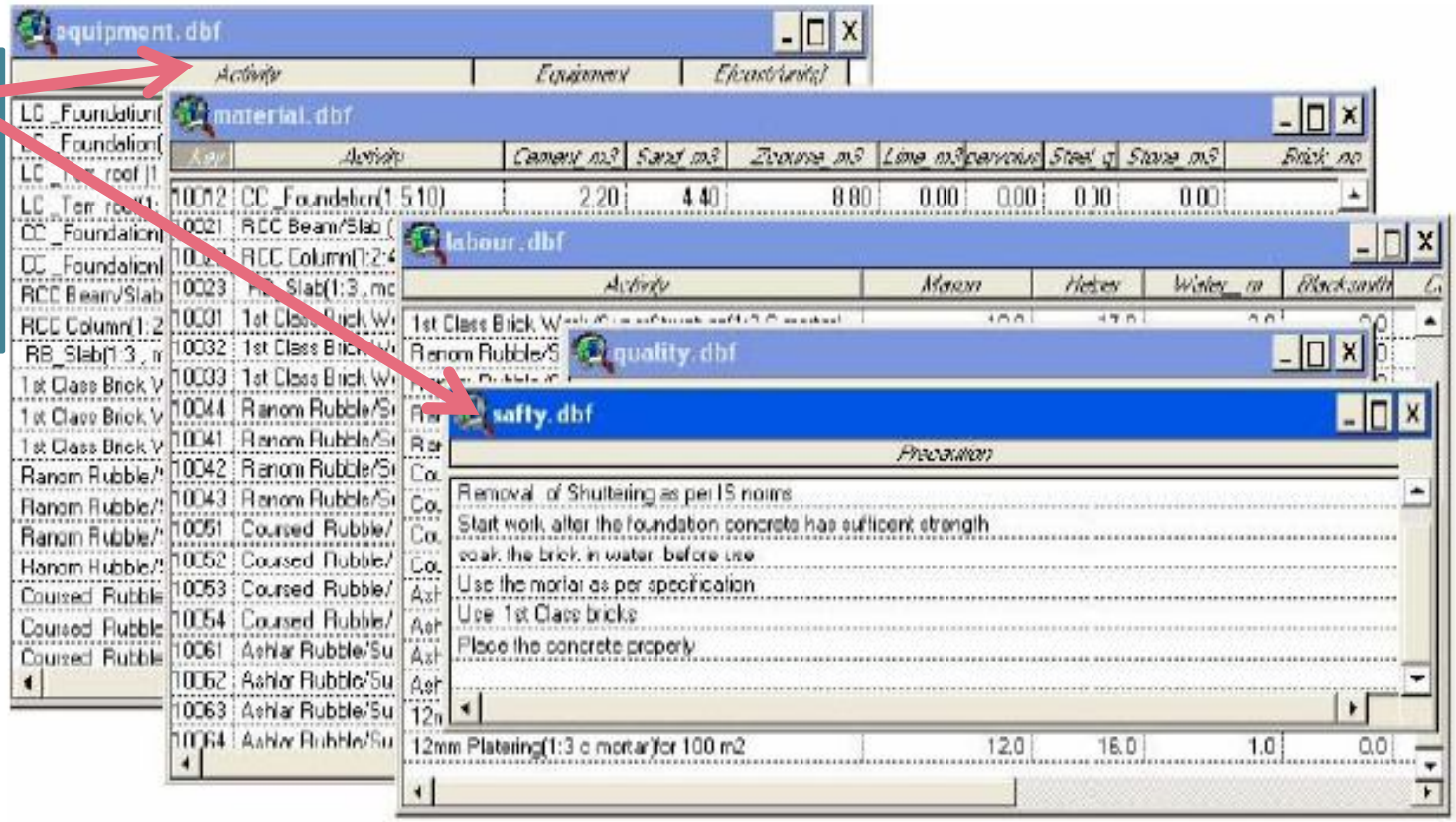


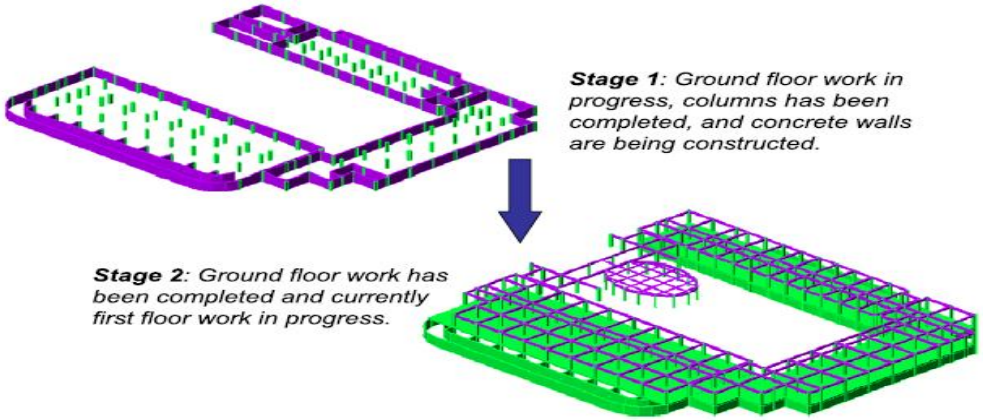
Fig: Attribute Table for Resource Database in ArcGIS

Case study 2: 4D Construction Site Layout Management

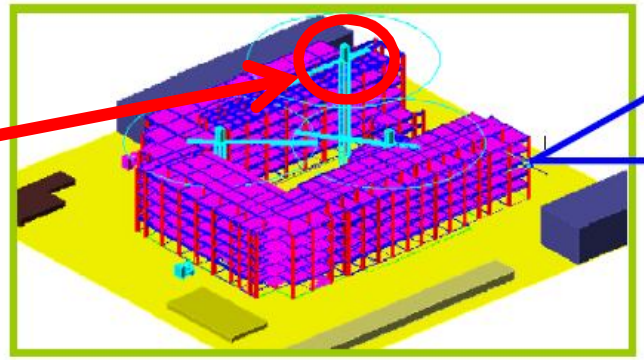
Poku & Arditi (2006)

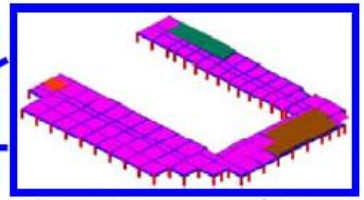
PMS-GIS (AutoCAD + P3 + GIS)

Zhaoyang et al. (2005)



Crane Position





Layout in one storey of the target building.

A sample site layout with storages, mixers and cranes which also contain schedule information.

Fig: Site Layout Management of CP

Case study 2: 4D Construction Site Layout Management

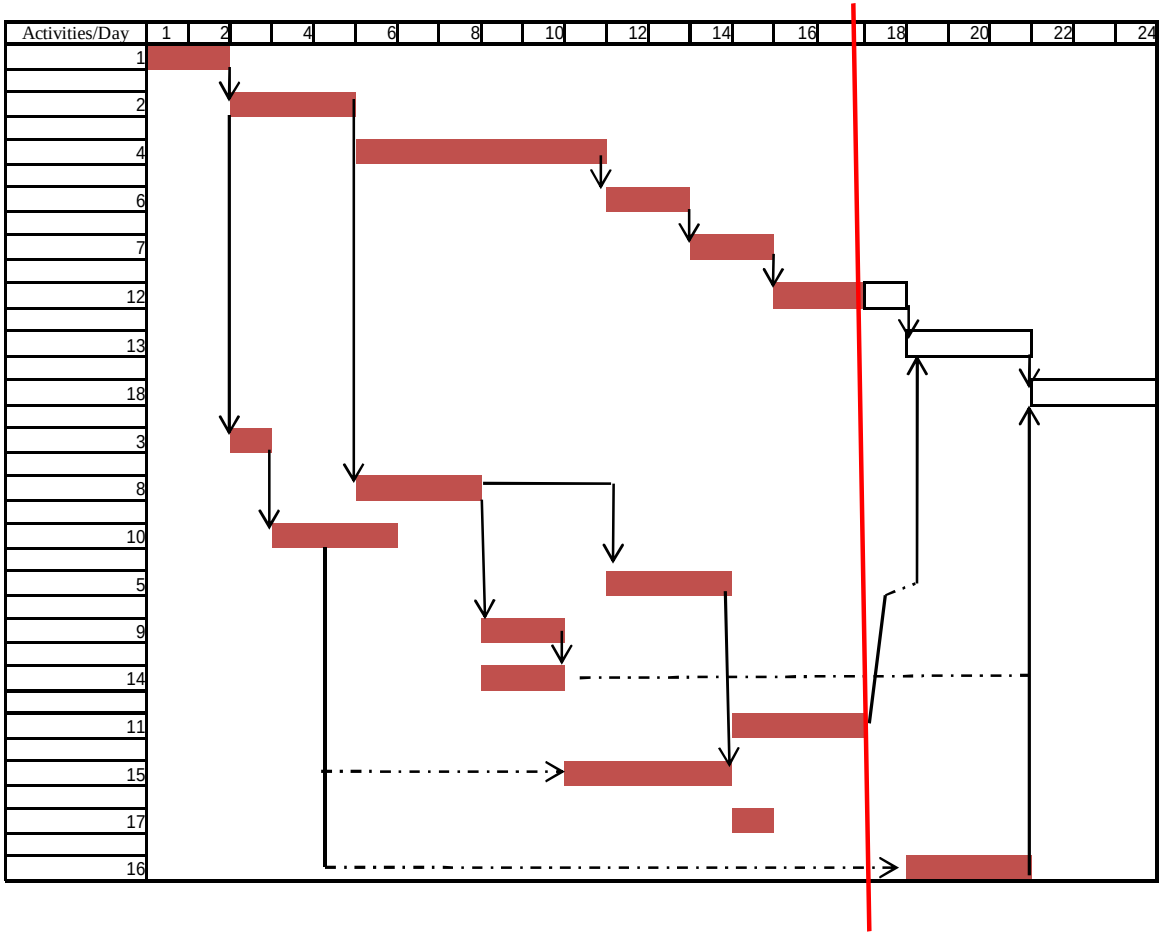


Fig: CPM Based Bar Diagram

Case study 3: Time and Space Management

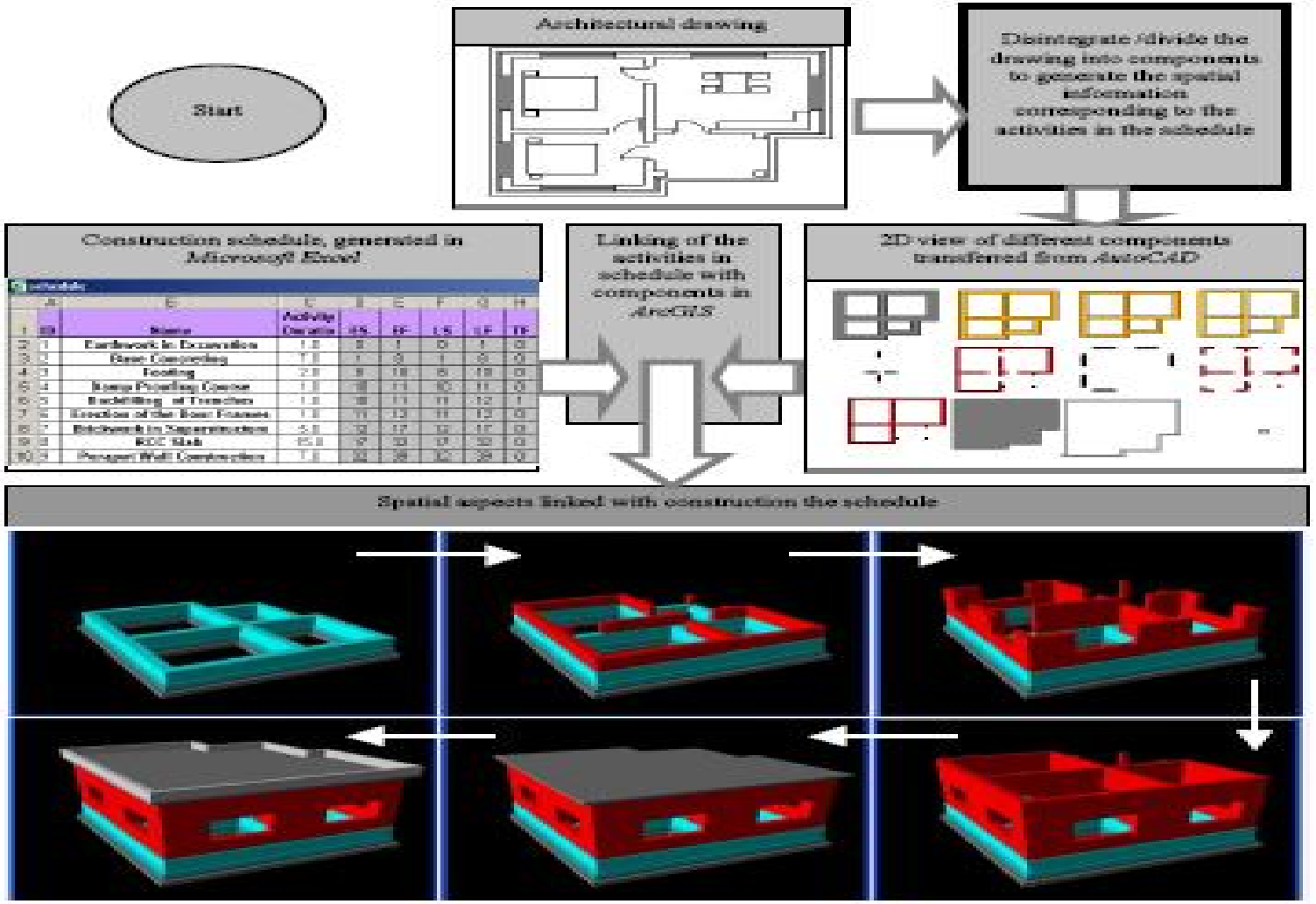
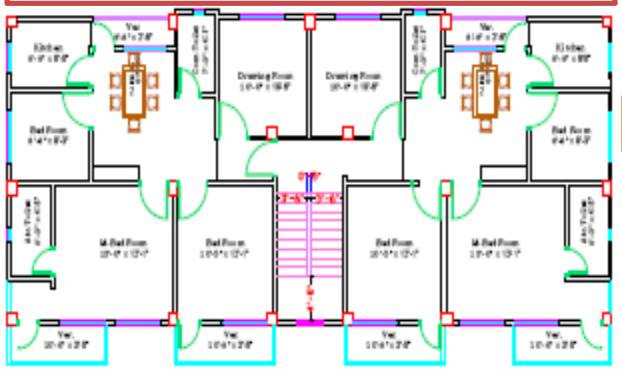


Fig: Linking the Time with Spatial Activities in Construction Site

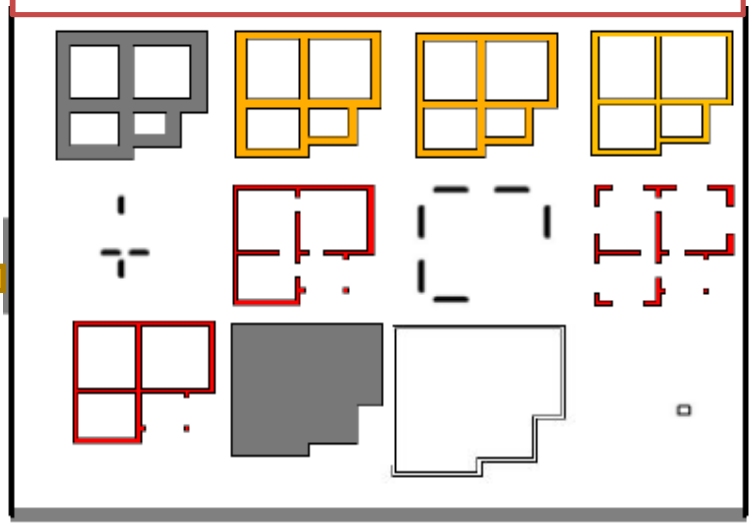
Start

Architectural Drawing



Disintegrate the drawing into components to generate the spatial information corresponding to the activities in the schedule

2D view of different components transferred from AutoCad



Construction schedule generated in Microsoft Excel

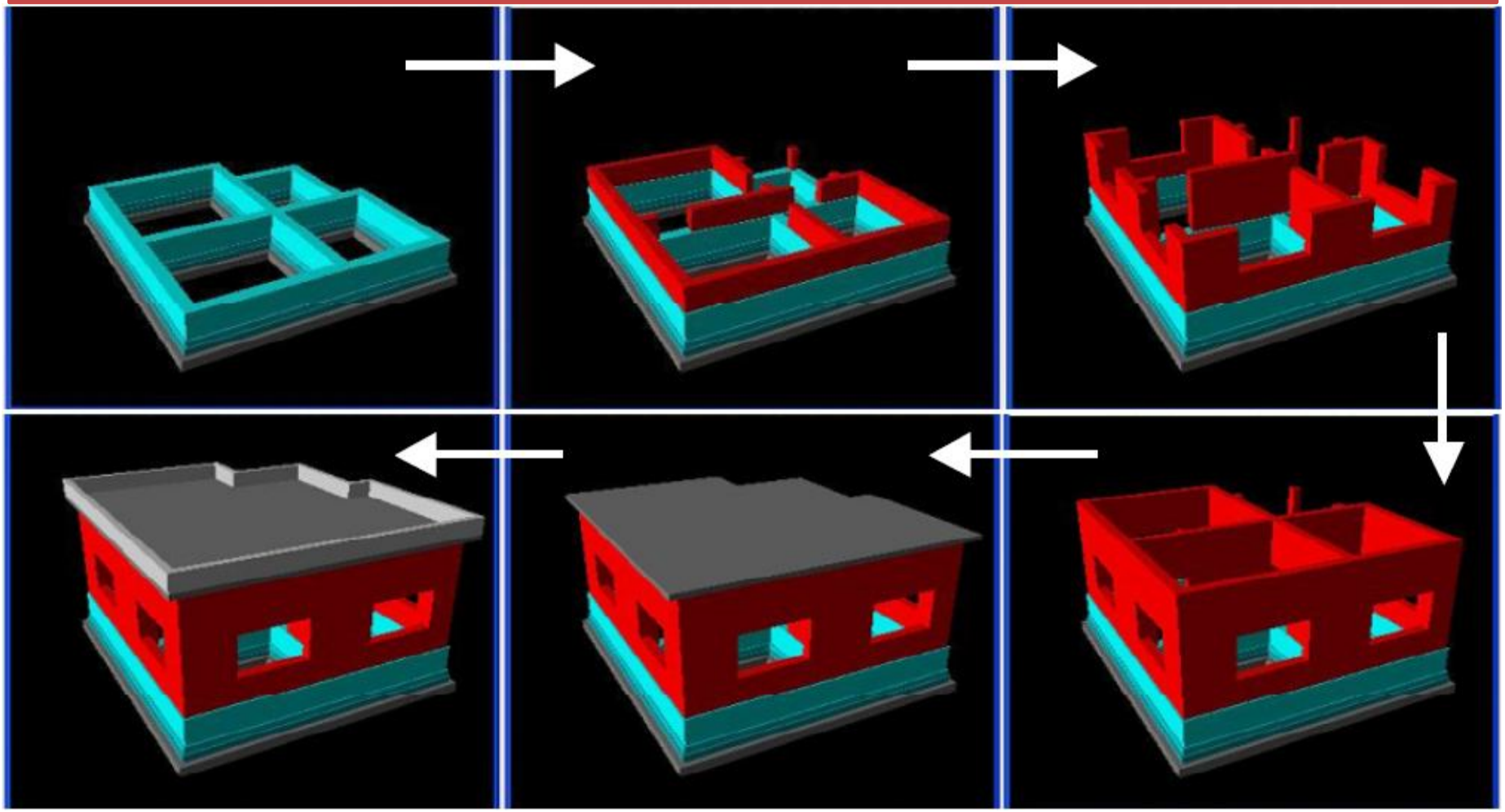
schedule

	A	B	C	D	E	F	G	H
1	ID	Name	Activity Duratio	ES	EF	LS	LF	TF
2	1	Earthwork in Excavation	1.0	0	1	0	1	0
3	2	Base Concreting	7.0	1	8	1	8	0
4	3	Footing	2.0	8	10	8	10	0
5	4	Damp Proofing Course	1.0	10	11	10	11	0
6	5	Backfilling of Trenches	1.0	10	11	11	12	1
7	6	Erection of the Door Frames	1.0	11	12	11	12	0
8	7	Brickwork in Superstructure	5.0	12	17	12	17	0
9	8	RCC Slab	15.0	17	32	17	32	0
10	9	Perapet Wall Construction	7.0	32	39	32	39	0

Linking of the activities in schedule with components in ArcGIS

Cont.

Spatial aspect linked with the construction schedule



Case study 4: GIS and GPS for Increasing Construction Productivity

Fig: Construction Site with Labor, Materials and Equipment

Case study 4: GIS and GPS for Increasing Construction Productivity

Li et al. (2005)

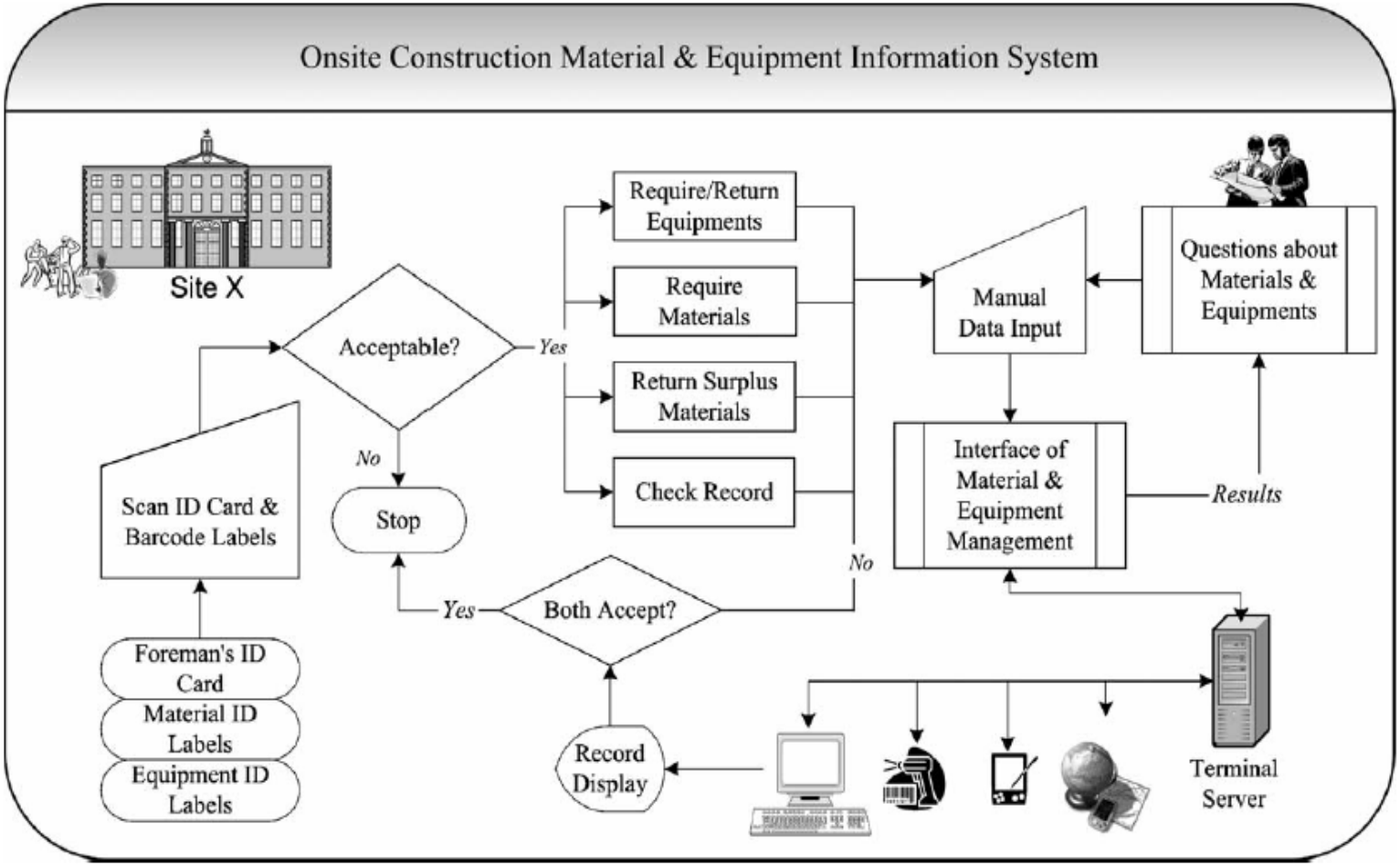
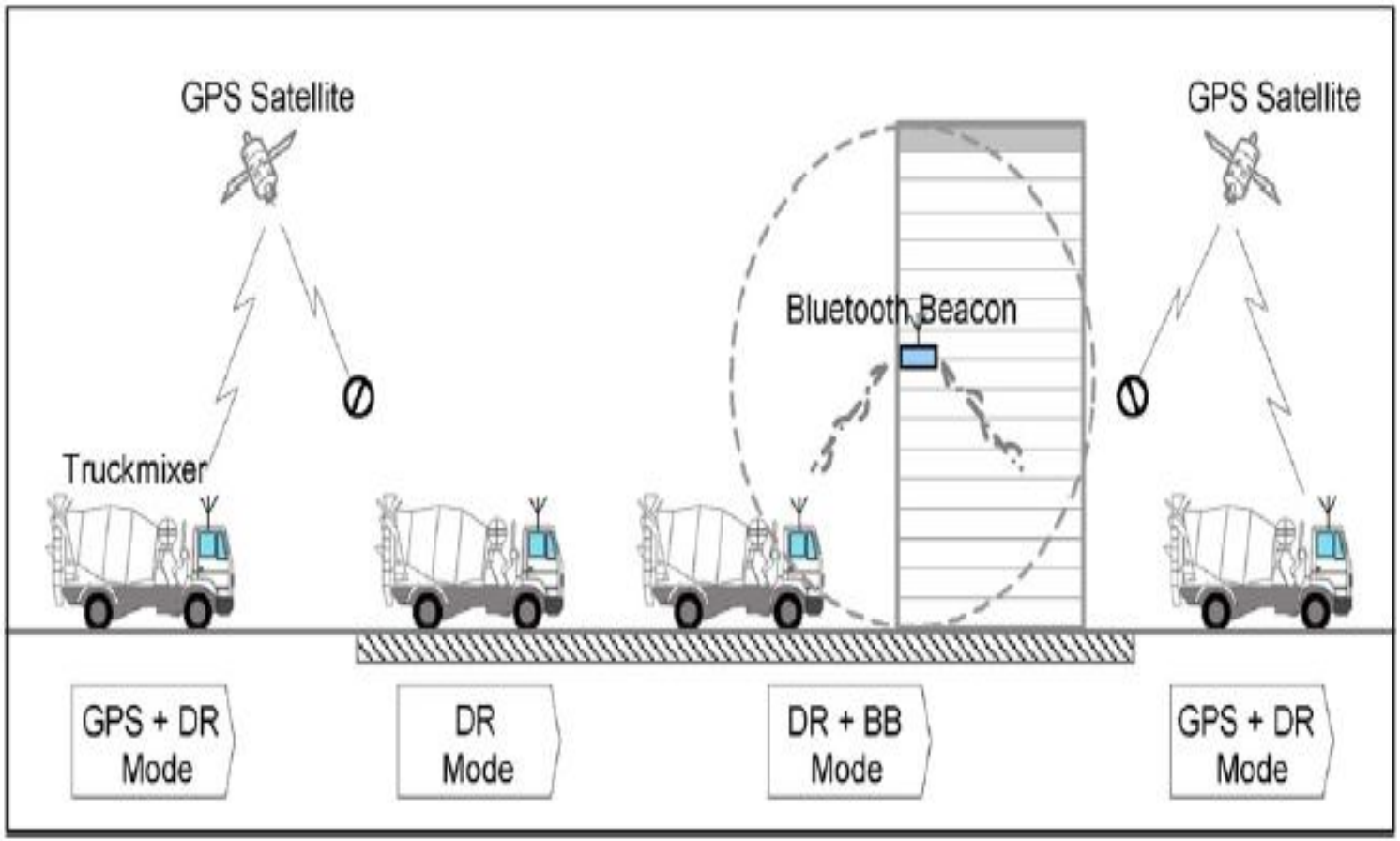


Fig: A Conceptual Model for the Crew IRP-based Barcode System

Case study 5: Positioning and Tracking of Construction Vehicle

Lu et al. (2007)



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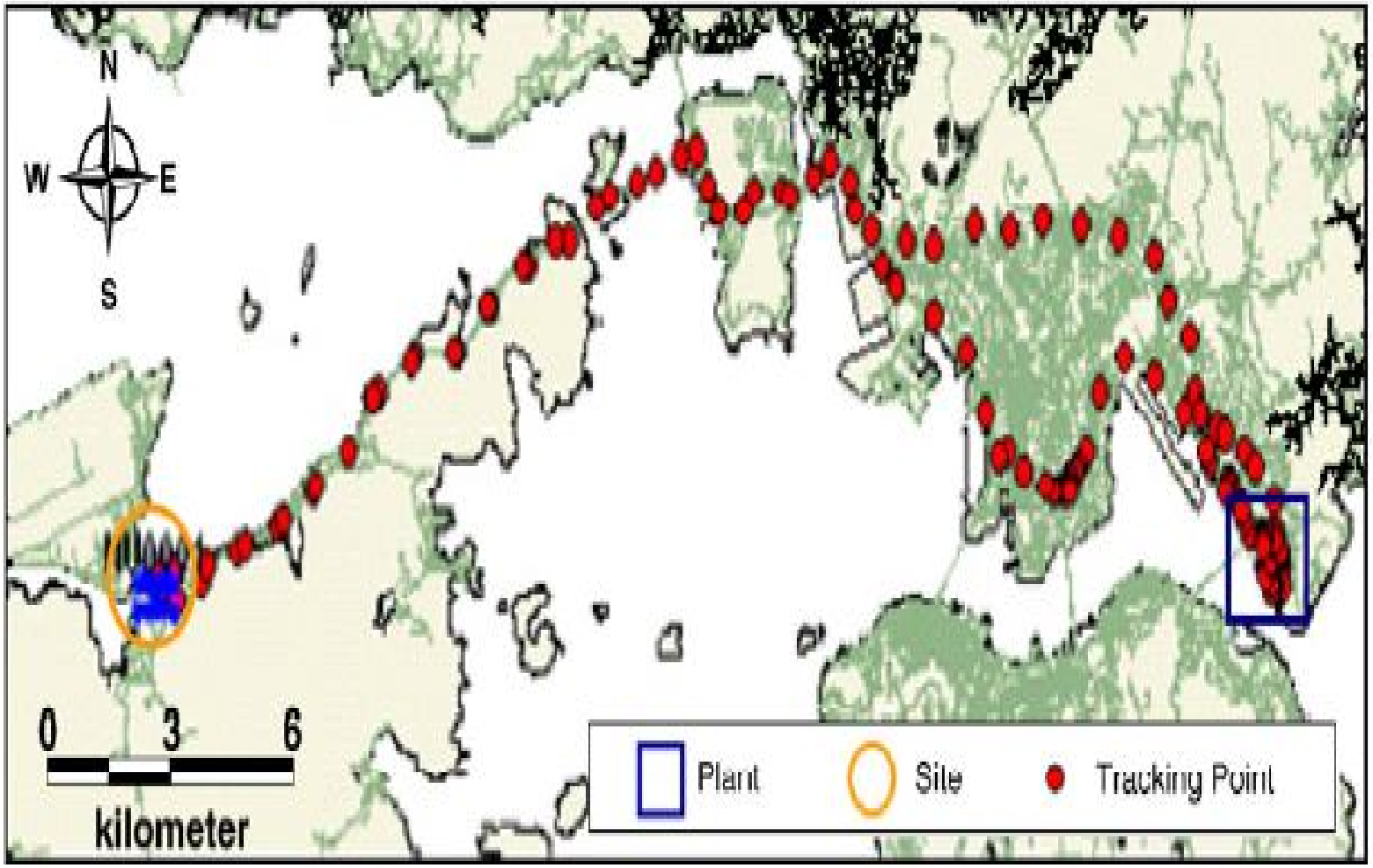


Fig: Linking the Time with Spatial Activities in Construction Site

Conclusion

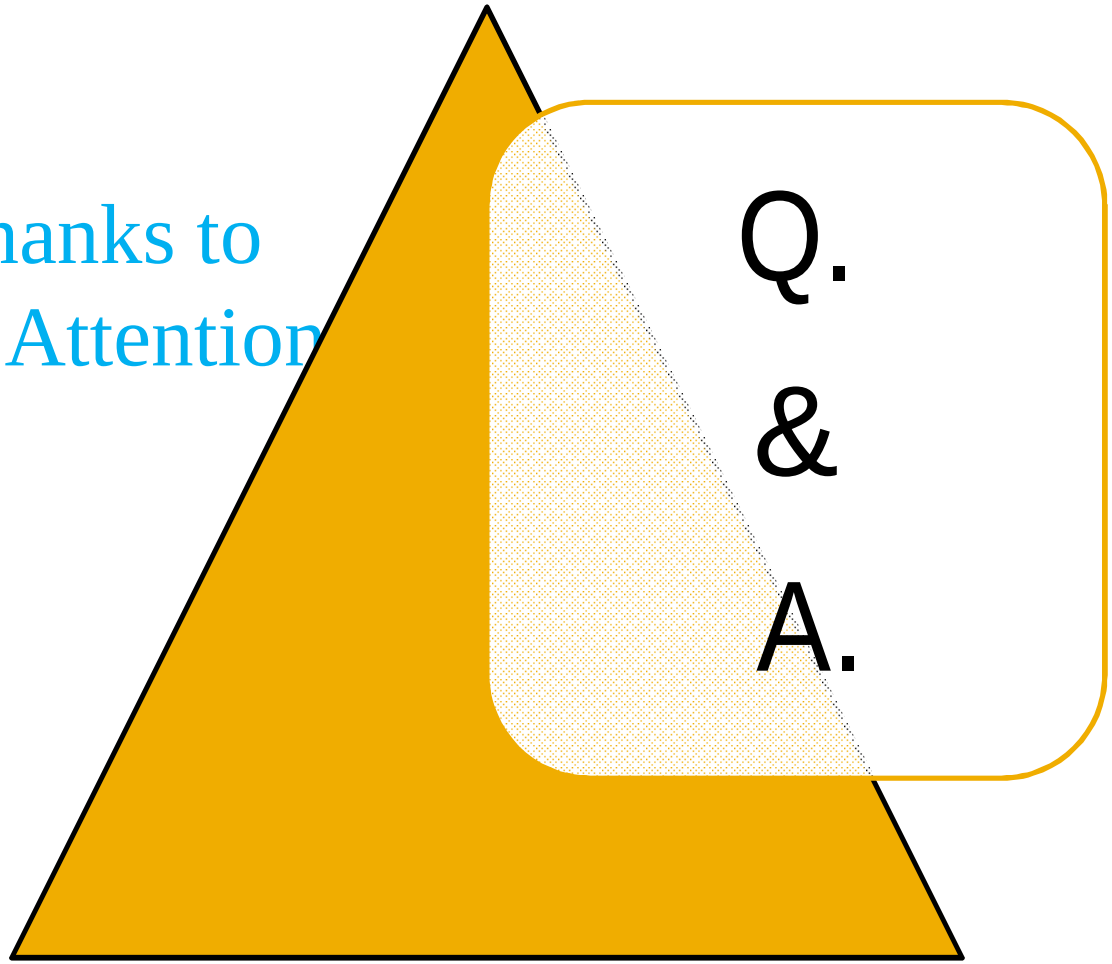
- GIS is using almost all areas of CP management and mostly noticeable areas are:
  - ✓Schedule review and monitoring, resource tracking,
  - ✓Procurement,
  - ✓optimize plant production and
  - ✓ safety monitoring
- Reduce time and save the money for making project successful.

Recommendation

Some potential application of GIS&GPS in CP might be:

- CP monitoring by cost control such as earn value approach
- Project risk management
- Management at resource constraint condition
- Positioning labor and equipment at elevated working stage for safety
- Resolving conflict and dispute among parties

Thanks to
Pay Attention



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