Requirements of Linkage with Triage-Tag Information and Electric Health Records Available in a Huge Disaster

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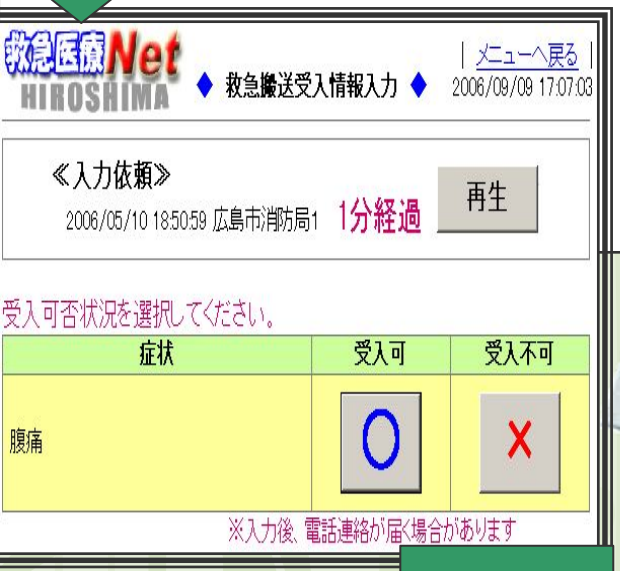
Introduction

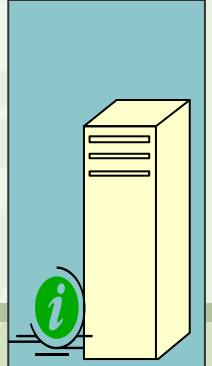
- In a huge disaster, hospitals outside of damaged zone have to accept not only victims but also diseased patients due to destructions of equipments in hospitals and hospital themselves in a damaged zone, as in the case Hanshin-Awaji earthquake on 17 January 1995, by which 64 hundreds people died and 40 thousands injured: In this case the number of transported diseased patients from the damaged zone to outside hospitals was greater than that of victims in the first two weeks [1].
- By lessens of Hanshin-Awaji earthquake, a triage-tag standardized by Japanese Fire Defense Agency has been used generally. In the case of leaving the metals in Amagasaki which is the first case of major incident in Japan after the earthquake, nevertheless, the identification and finding location of victims are pointed out as problems. [2]
- The authors has been developing the information system in Hiroshima region supporting rescue teams by sharing real-time acceptance information of hospitals of this region with bringing a wide area disaster in view, which nevertheless depends on inputs of hospital administrative [3]. To obtain more correct information of acceptance even in a huge disaster, and to support the identification and finding location of victim, we propose a new model of information system connected with personal information of victims and patients.

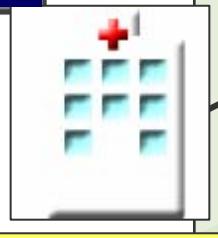
Acceptance Information of Emergency Hospital

Mobile terminal on Ambulance.

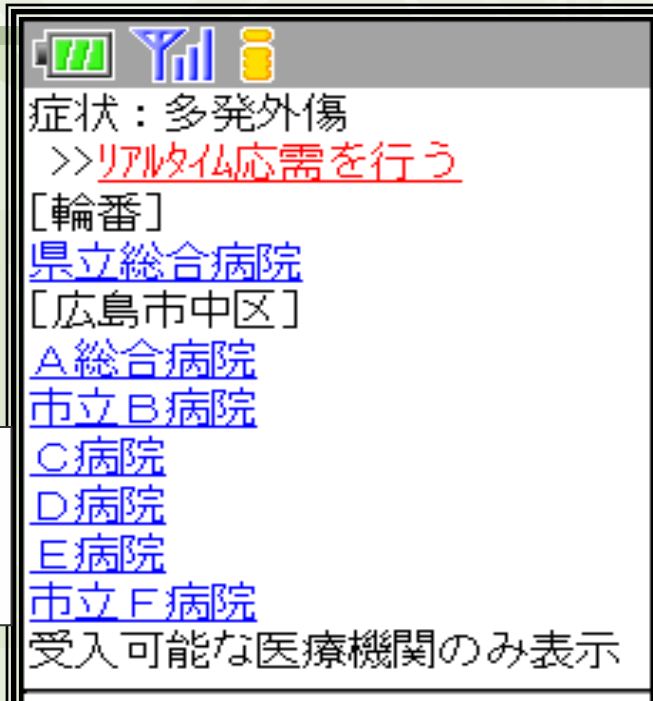
Input acceptance





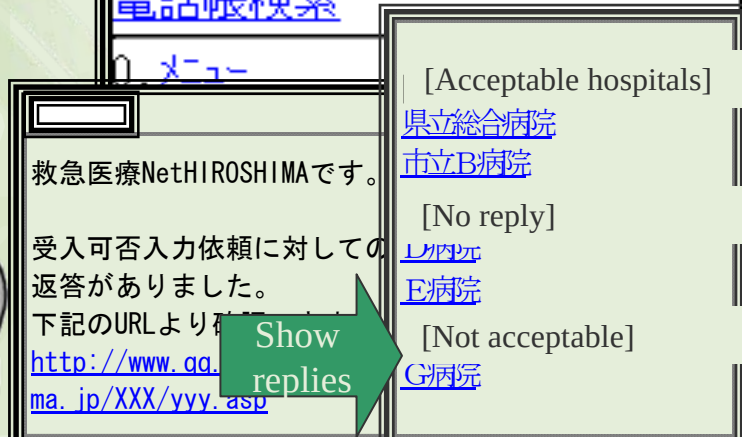


Call Hospitals



Present DIC system in Hiroshima

Call back



Method (1)

- We suppose the model system as following: In one administrative district named region A, a regional EHR system can be used with everyone living there; in which a disaster information center with an information system stands: These systems work under these conditions;

a) Both the EHR system and disaster information center system (DIC) have independently data centers far from this region connected with computer networks each other, which can work in a situation of huge disaster in this region.

b) All (heli)ambulances in the region can communicate with DIC by wireless transmitters, by which they can share acceptance information (maximum and occupation numbers of beds) of each emergency hospital in the region by a network connection between the EHR system and DIC.

c) All hospitals and clinics in the region have each permanent ID numbers of them on the EHR system.

d) Computer terminals in all the hospitals and clinics can communicate with the EHR data centers above mentioned without faults of power supplies or computer network.

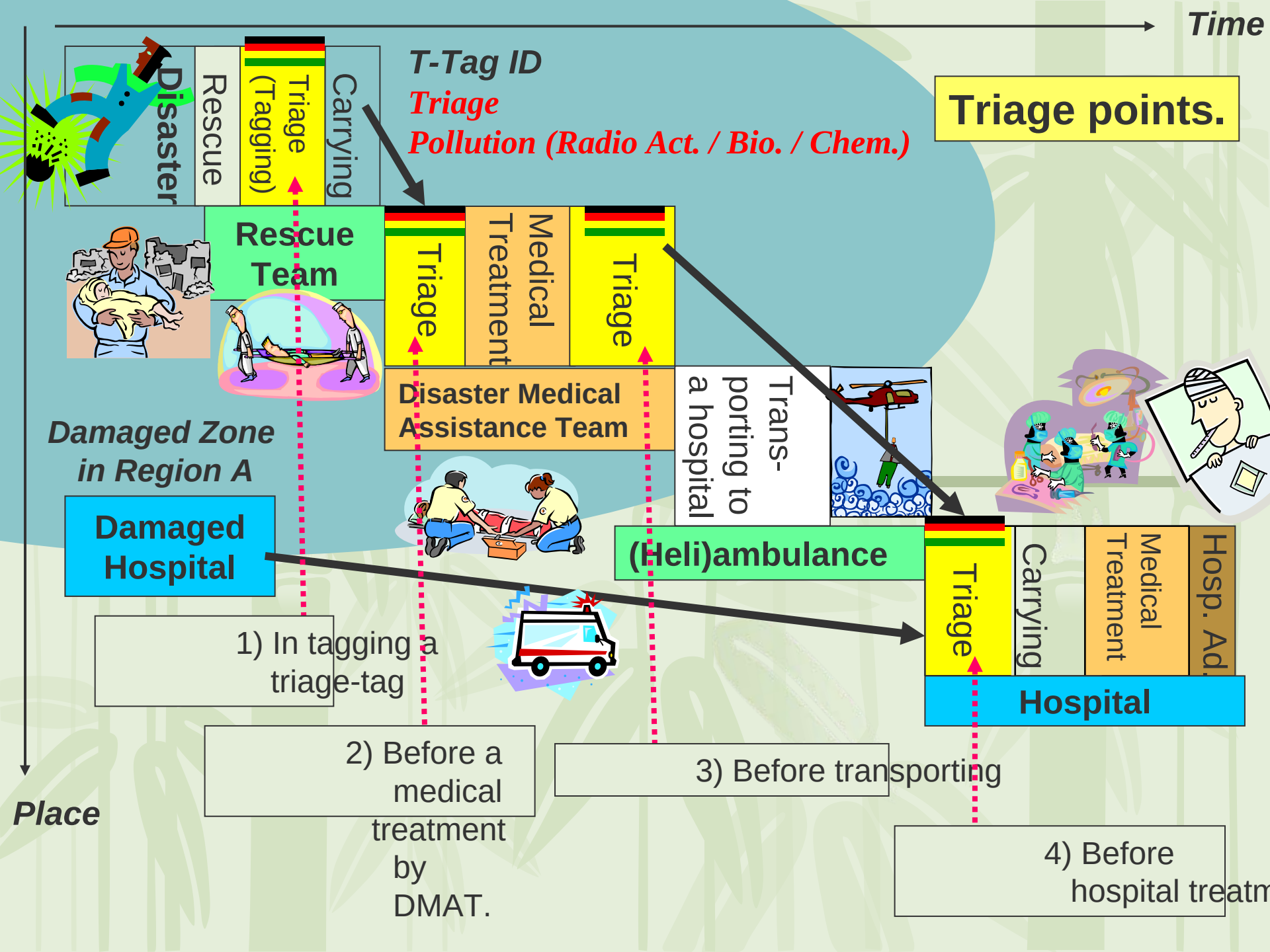
e) Every patient in the region has an ID of the EHR system, all of whose hospital records with IDs of hospitals can be retrieved by their ID on EHR.

Method (2)

- We next suppose a zone in region A, in which a huge disaster happens: We assume following conditions in this situation:

1. Computer terminals in all the hospitals outside the zone can communicate to the EHR system.
2. All the emergency hospitals outside the zone can provide their acceptance information to DIC.
3. All the victims should be triaged and tagged with permanent IDs: Other information standardized by Japanese Fire Defense Agency than a triage-tag ID should be recorded at each triage steps.
4. Disaster Medical Association Teams (DMAT) have already been to the zone, and the (heli)ambulances have been ready to transport victims or patients from the zone. In this situation, victims of disaster could be triaged four times;1) In tagging a triage-tag at a place he/she rescued; 2) Before a medical treatment by DMAT; 3) Before transporting to the outside region; 4) Before a medical treatment in the emergency hospital.
5. All diseased patients transported from the hospitals or clinics in the zone should be triaged before a medical treatment in the emergency hospital.

- Under these assumptions, we organize along a timeline from a rescue to a hospital admission of victim or patient, and consider on requirements of cooperation between the EHR system and DIC to update acceptance information in real-time and to find locations of victims and patients.


Time
Place
Triage points.
T-Tag ID
Triage
Pollution (Radio Act. / Bio. / Chem.)
Disaster
Rescue
Triage (Tagging)
Carrying
Rescue Team
Triage
Medical Treatment
Triage
Disaster Medical Assistance Team
Trans-porting to a hospital
(Heli)ambulance
Damaged Zone in Region A
Damaged Hospital
Triage
Carrying
Medical Treatment
Hosp. Ad.
Hospital
1) In tagging a triage-tag
2) Before a medical treatment by DMAT.
3) Before transporting
4) Before hospital treatm

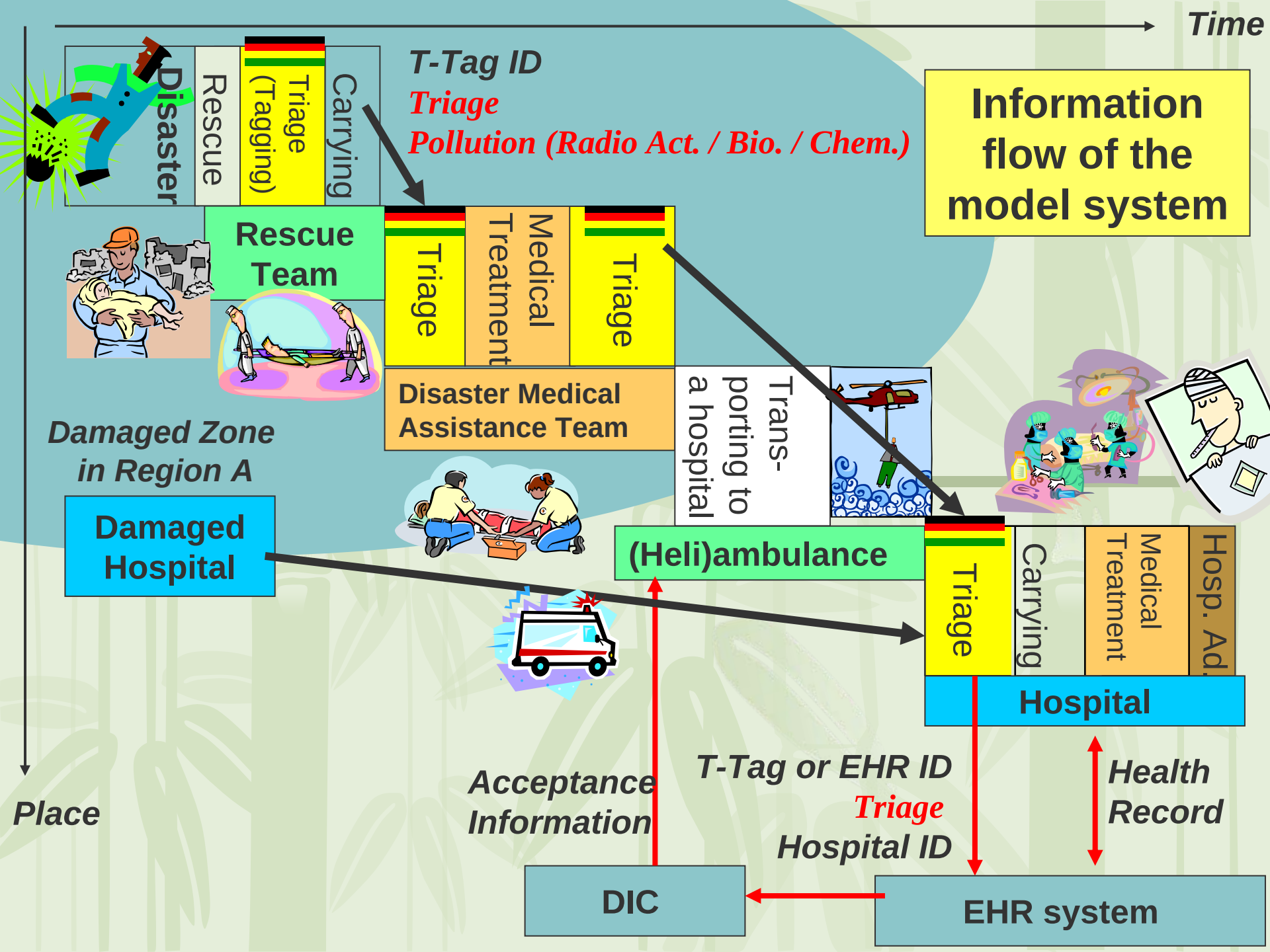
Results

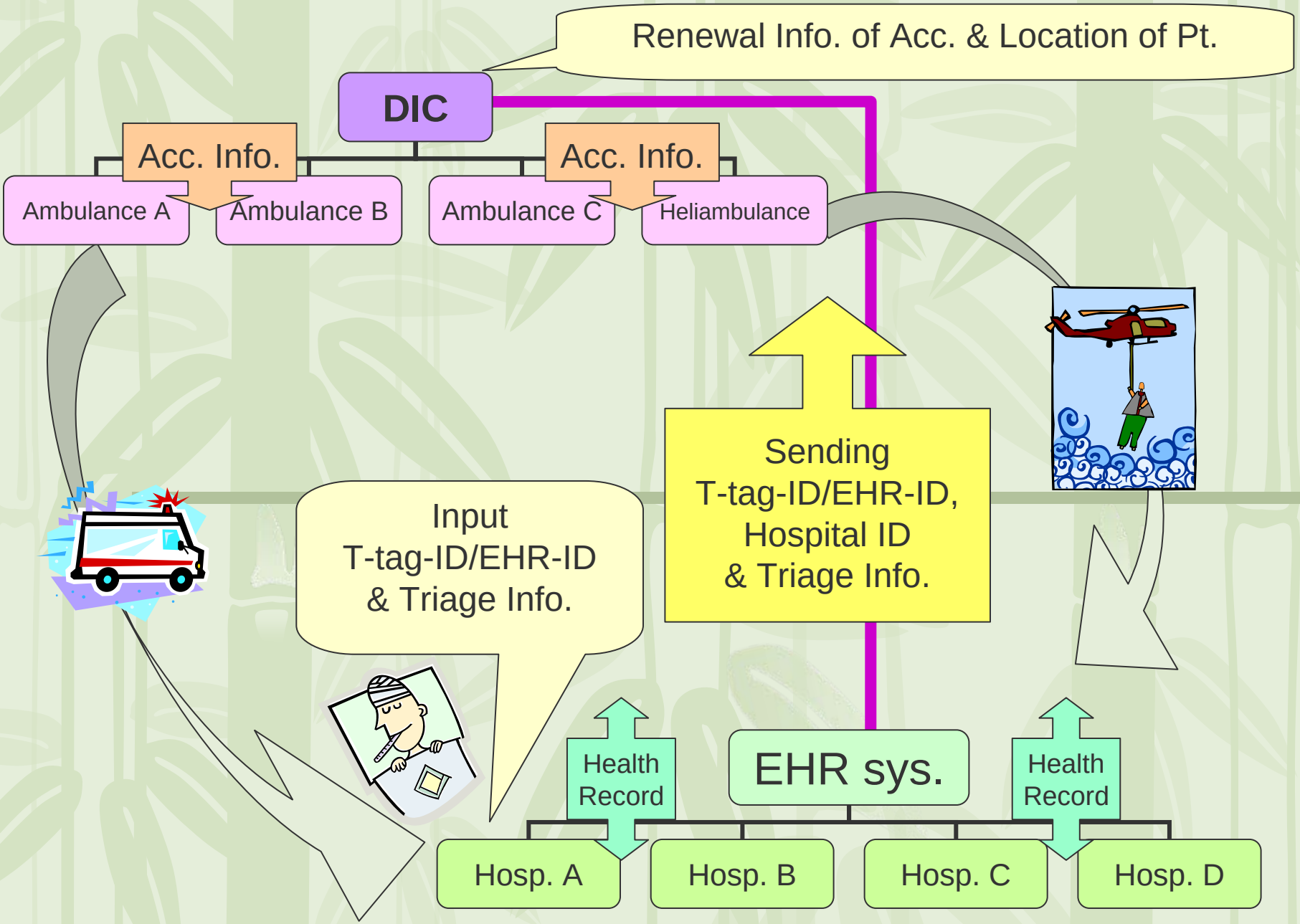
- Primary information in each triage step is shown in the table 1. Since a value of priority on a triage-tag can be varied, acceptance information of the hospital can be determined. In addition, we have to consider patients or victims not transported by (heli)ambulances who can come to a hospital without tagging of triage-tag. Thus, we can obtain most correct information at the fourth triage step before a hospital care. As almost all patients might have EHR-IDs which warrant continuous hospital cares and identifications, it is convenient to input EHR-IDs instead of triage-tag IDs. Since all hospitals have terminals for the EHR system, and since an admission recorded by a triage/EHR-tag ID means an occupation of acceptable bed, the above information can be input from the terminals and used for hospital cares. The locations of them are automatically obtained by input of above information.
- Due to these reasons, the requirements are following; 1) the EHR system have to obtain a triage-tag or EHR ID with triage information (priority) of victim or patient and hospital IDs in triage before hospital cares; 2) the EHR system sends the above information; 3) the DIC system can renew acceptance information and locations of victims and patients according to data from the EHR system and distribute to (heli)ambulances.

Primary information in each triage steps

Steps of triage	Information on Triage-tag				Use of Info.
In tagging	ID of tag				#
	Place of accident	Situation of Insury			
		Polition(Chem.、Bio.、Rad.)			*
	Common in each steps.	Triage officer			
		START infor.	Priority		*
			Symptom(degree of Insury, disfunction of organ, etc･･･)		
Before treatments					
Before Transportation			Vital signs	Respiration rate	
				Heart rate	
				Level of consciousness	
Before hospital care.		Medical treatments			
		Others		Age	
				Alergy	
				Medication	
				Past history	
				Last meal time.	
				Effect of medical treatments	
	Location of victim	Transporter			#
		Hospital name			*, #

*: Information to renew acceptance information.
#: Information for location of victims or patients.


Time
Place
Information flow of the model system
Disaster
Rescue
Triage (Tagging)
Carrying
T-Tag ID
Triage
Pollution (Radio Act. / Bio. / Chem.)
Rescue Team
Triage
Medical Treatment
Triage
Disaster Medical Assistance Team
Trans-porting to a hospital
(Heli)ambulance
Damaged Zone in Region A
Damaged Hospital
Triage
Carrying
Medical Treatment
Hosp. Ad.
Hospital
Acceptance Information
T-Tag or EHR ID
Triage
Hospital ID
Health Record
DIC
EHR system



Information flow between DIC and EHR systems.

Discussion and future remarks

- Using wireless devices like RFID for identifications [4], hospitals can easily input IDs to renew acceptance information.
- Mobile devices to input pre-hospital information (symptom, pollution, etc.) and information of transporter (ID of heli/ambulaces) could be helpful for preparations in hospitals and precise trace of victims.

- Acknowledgement

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- References

[1] T. Yoshioka et al. "Mass disaster medicine manual", Health Publishing (2001).

[2] http://square.umin.ac.jp/jadm/toku-iin/amagasaki2.pdf

[3] K. Ishikawa et al. "Next Generation Information System to Support and Evaluate Emergency Relief at Wide Area Disaster", *Supplement of J. Med. Info.* **26**, pp.569-572 (2006).

[4] Chia-Chen Chao, Wen-Yuan Jen, Yu-Chuan Li, Y.P.-Chi, Chang-I Chen, "Patient Safety Management: RFID Technology to Improve Emergency Room Medical Care Quality", in submitting.

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