



Health @ Home

A Telecare System for Patients
with Chronic Heart Failure

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Outline

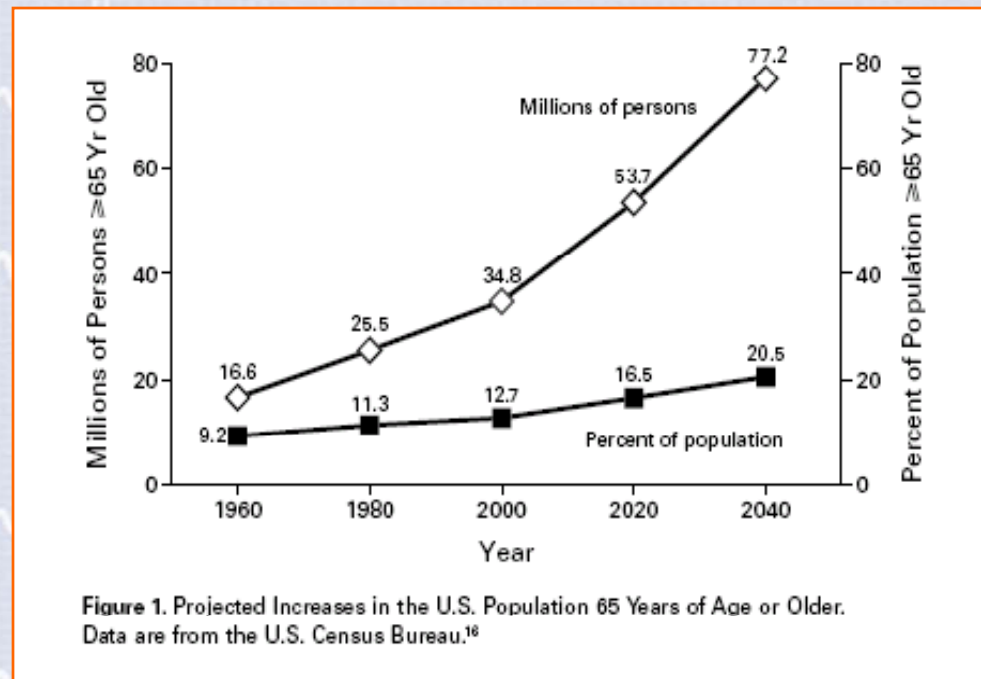


- Heart failure scenario
- H@H objectives
- Users' requirements
- H@H System Architecture
- Conclusions

Scenario



- Around **14 millions** of Europeans are affected by Chronic Heart Failure (CHF)
- Incidence of **3.600.000** new cases/year
- Most common cause of hospitalization in persons with more than 65 years of age



Objectives



- Develop an efficient system for home tele-monitoring of CHF patients
- ICT technologies can be efficiently used both for promptly acting in cases of destabilization of the CHF patients and for **reducing avoidable hospital re-admissions**, resulting in an **improved quality of life** for the patients and in a **cost reduction** for the National Sanitary System.

Concise Papers

Telemedicine: New Application of Communications Technology

WALTER H. HOLZER, MEMBER, IEEE

Abstract—Telemedicine may be defined as the practice of medicine at long distance by means of telecommunications, in particular, closed-circuit television and telemetry. Two-way television enables physicians to establish a nominal doctor-patient relationship with patients at a remote location, while providing the means for visual examination of patients. Biomedical telemetry transmits patients' vital signs, detected by standard medical bioelectric sensors and physiological function transducers.

In a telemedicine simulation experiment, a test group of physicians deemed black-and-white television adequate for most diagnostic purposes, but expressed a preference for color. The group evidenced little interest in picture resolution greater than that provided by the standard U.S. 525-line system. The Plumbicon camera was said to provide better pictures for medical purposes than the vidicon. In either color or black-and-white television, lighting is a critical factor in the proper rendition of flesh tones as well as in providing the necessary illusion of depth for the observation of detail. Com-

CONCLUSIONS

The telemedicine concept, which makes possible the provision of specialized medical care at locations not served by medical specialists, requires only the application of well-known and proved techniques and equipment from the fields of closed-circuit television, television broadcasting, medical electronics instrumentation, telemetry, and wide-band radio relaying. While absolutes with regard to television mode or operating parameters have not yet been defined, criteria are available for planning and designing telemedicine systems that will provide physicians with the necessary tools for diagnosis and treatment. Of particular importance in telemedicine is the engineering of lighting systems to provide consistent rendition of flesh tones with the necessary resolution, clarity, and depth. Telemetry requirements for the transmission of analog data can be keyed specifically to the known useful bandwidths and dynamic ranges of the various bioelectric and physiological signals and parameters to be measured in diagnosis.

REFERENCES

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- [3] —, *Television Broadcasting Camera Chains*, Indianapolis, Ind.: Howard W. Sams & Co., 1971, p. 17.
- [4] G. H. Sullivan, C. Hoefner, and V. C. Bollo, "Electronic systems for biological telemetry," in *Bio-Telemetry*, L. E. Slater, Ed., in *Proceedings of the Interdisciplinary Conference on the Use of Telemetry in Animal Behavior and Physiology in Relation to Ecological Problems*, New York: Pergamon Press, 1963, pp. 84-85.
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State-of-the-art

IEEE literature shows scientific interest in telemedicine since **1974** with references dated back to **1963**.

Today, the authors **have no evidence** of extensive use of telemedicine in **sanitary public organizations**.

There are mainly **few experimental trials** typically in the framework of public funded projects with **no concrete follow-up** after project conclusion .

H@H Cosortium



Research

- Consorzio Pisa Ricerche-IT
- Fundación CITIC-ES
- Fondazione Gabriele Monasterio-IT

- Caribel
Programmazione-IT,
- Caen-IT
- Mediasoft-SLO

Industrial

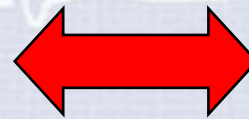
End-User

- Fondazione Gabriele Monasterio-IT
- Zdravstveni Dom Koper-SLO
- Hospitales Universitarios "Virgen del Rocío"-ES



H@H strength

- H@H is “user-driven”: The end-user partners are important HealthCare providers in their respective countries, they are involved throughout the **whole project** duration with a **fundamental role** in the **user’s requirements definition** and technology demonstration phases.

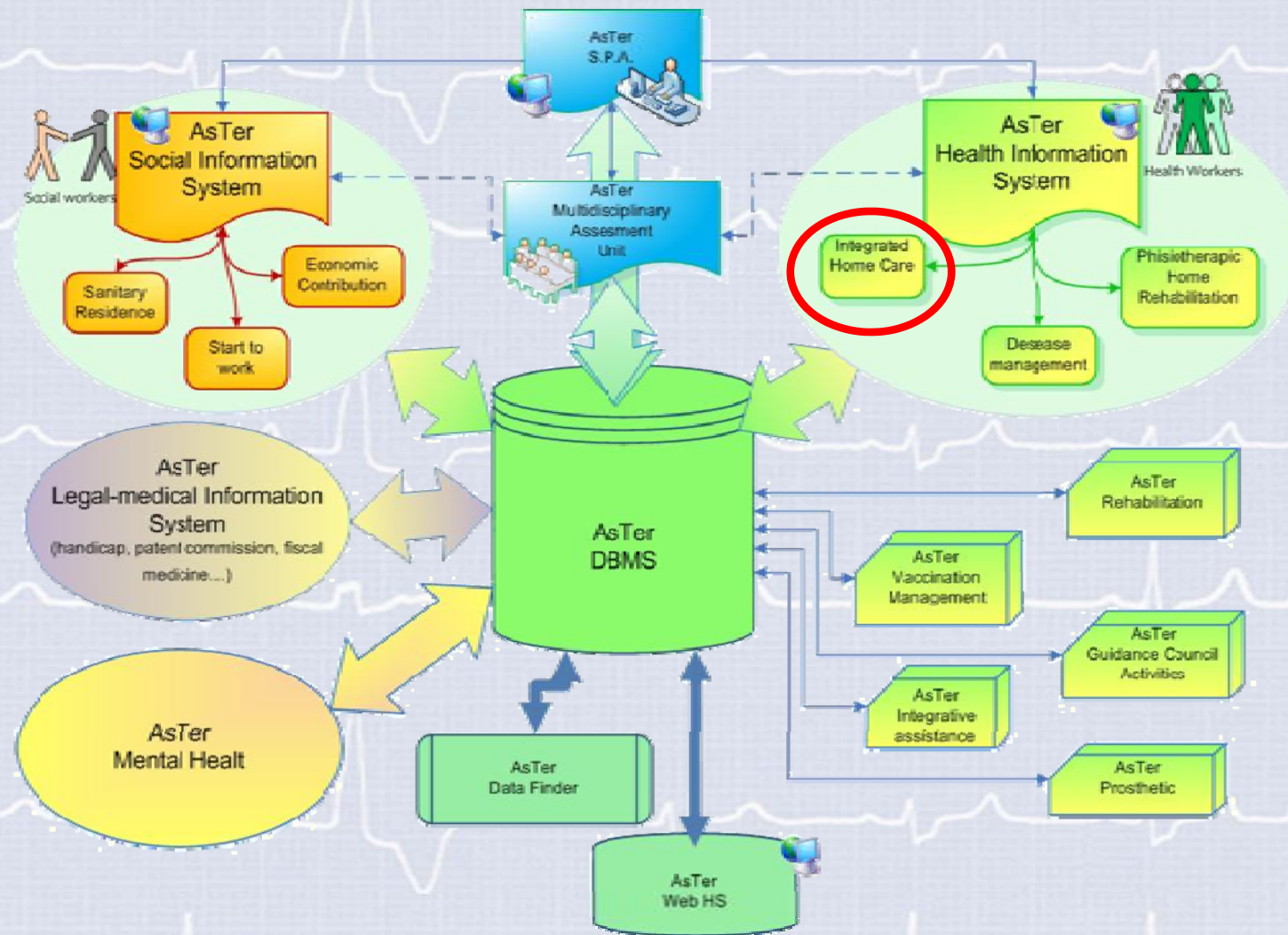


H@H strength

- H@H project benefits of the **As.Ter. Software Platform** created by Caribel Programmazione which allows planning, controlling and monitoring of activities carried out from social and sanitary professionals (doctors, nurses, physiotherapists etc) operating on the territory. This product, is widely accepted and used in Italy and has been adopted by nearly **20% of Italian public sanitary institutes**.
- **Compliance with HL7-RIM and HL7-CDA standards**



The As.Ter Platform



H@H Gantt



KO: 1 February 2009

	WPs	MONTHS																							
		01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
WP1	Requirement Analysis	█	█	█																					
WP2	System Architecture				█	█	█	█																	
WP3	Detailed design and implementation								█	█	█	█	█	█											
WP4	System Integration																								
WP5	Demonstration																								
WP6	Dissemination & Exploitation	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█

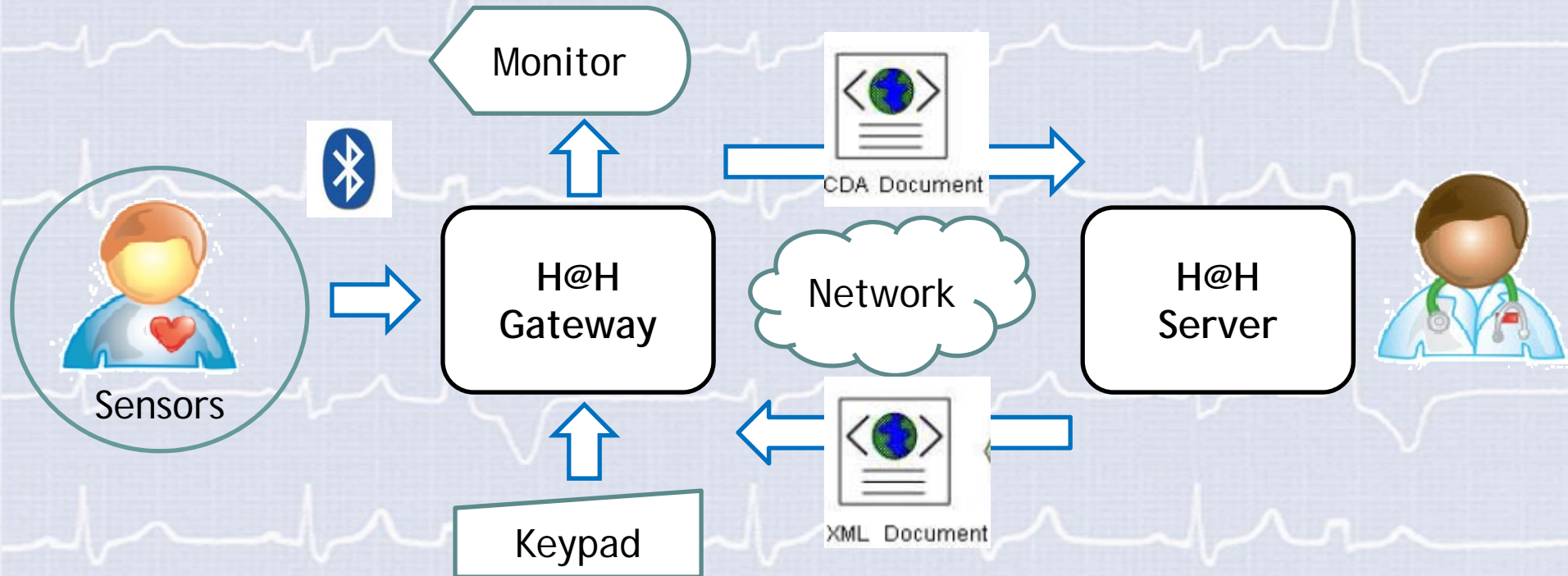
Today



Main Users' requirements

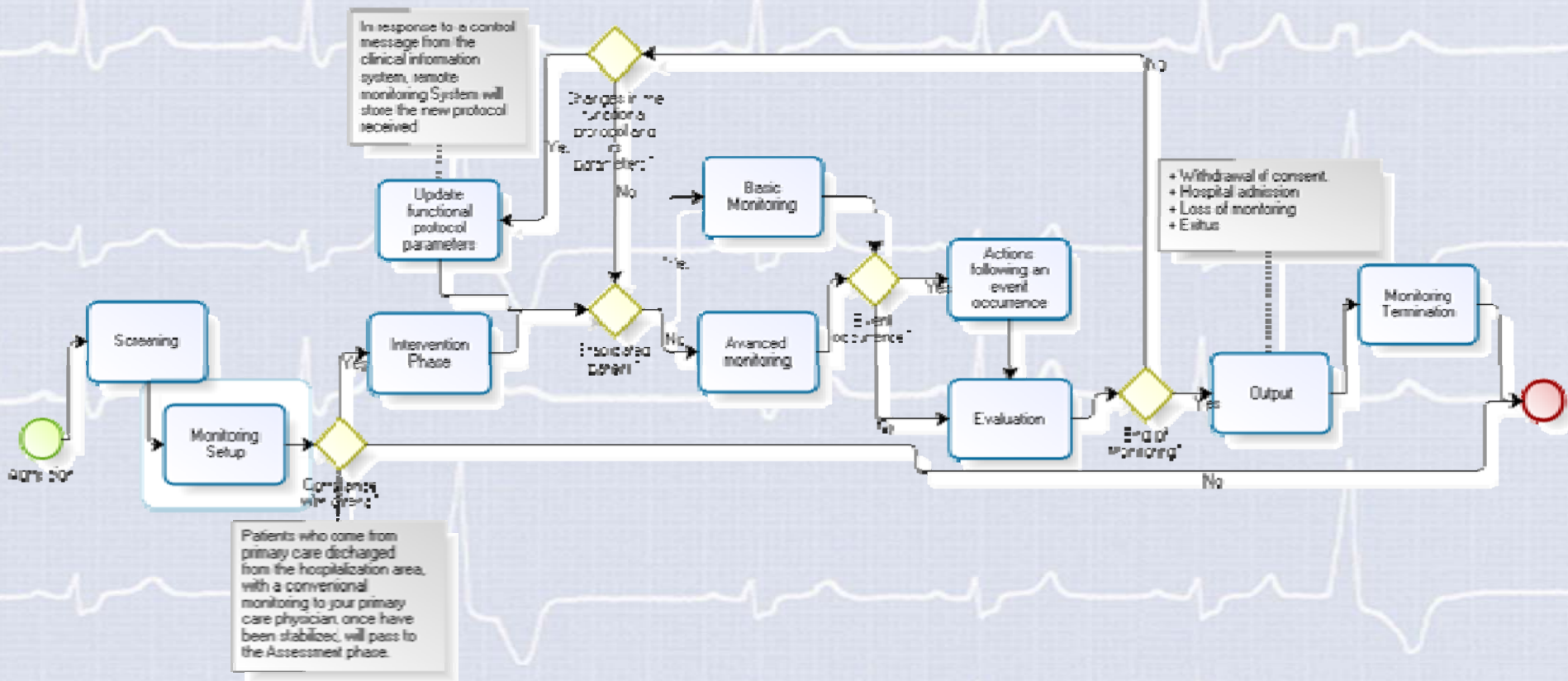
- The impact with the **patient** should be minimal.
- The signal quality should not excessively depend **on transducers positioning**.
- **Interaction** with the remote monitoring system is to be limited to **simple actions** (like turn on-off).
- Remotely measured data are to be flowed into the **usual Hospital information system** so that clinicians should not be required any additional work.
- The system shall provide **standard** methods of interaction with external devices and systems.
- **Alarms** have to be generated both **from** monitoring devices and Hospital Information Systems; such alarms have to be provided to both a referring center and directly to family care givers or health professionals so that **appropriate care actions could be taken**.

System Architecture

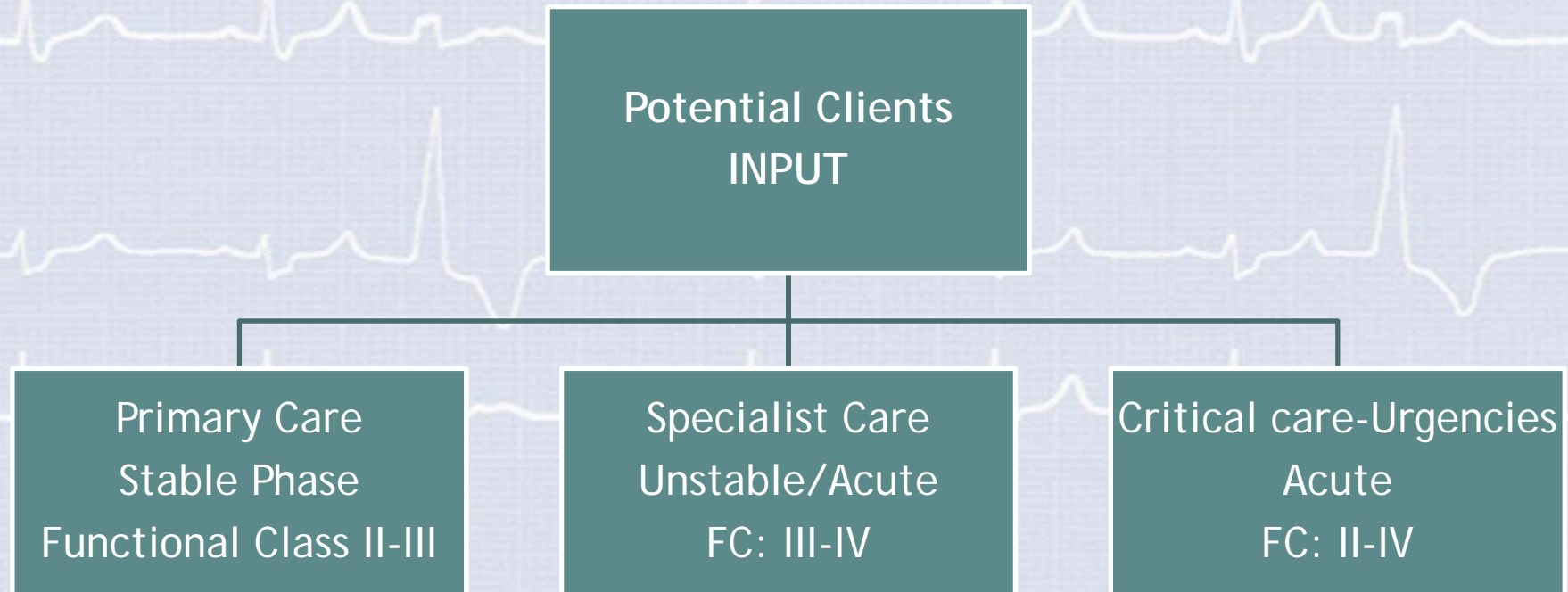


- **HL7 CDA fully compliant output towards server**
- **XML compliant response from server**
- **Standard Bluetooth for communication with sensors**
- **Communication with server over public networks using HTTPS**

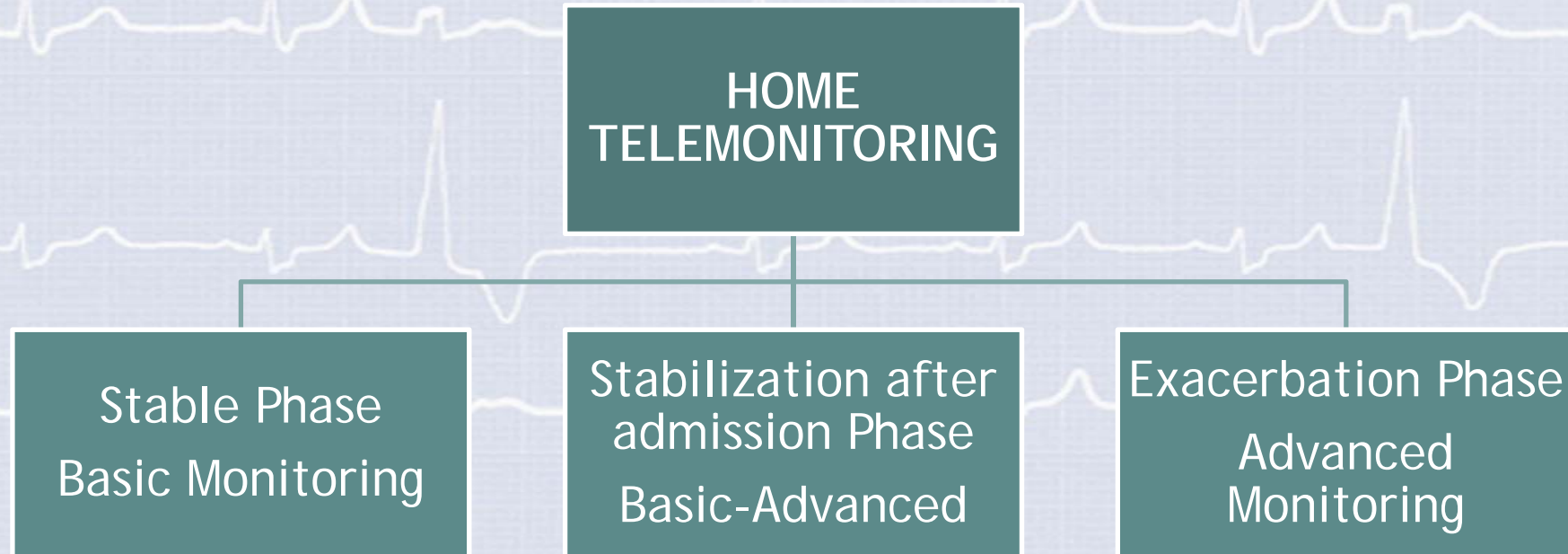
BPMN process modelling format



Potential Patients



Types of monitoring



H@H versioning



	Functional feature	Basic	Advanced
Physiological Parameters	ECG	√	√
	Respiration-Chest Impedance		√
	Scale (weight + water retain)		√
	Posture		√
	SpO ₂	√	√
	Scale (weight)	√	
	Blood Pressure	√	√
Data flow	Data transmission	√	√
	Data security	√	√
	Asynchronous server request		√
Various features	Manual user events	√	√
	Reminder for planned measurements	√	√
	Drug assumption reminder/recorder	√	√
	Remote Therapeutic Protocol Update	√	√
	Remote monitoring Protocol Update	√	√
Processing	Alarm detection in the gateway		√
	Automatic protocol updating		√

Conclusion



- ❑ the effort of putting together **clinical expert** advise on drawing personalized strategies of follow-up for the CHF patient;
- ❑ define strategies of graduated **use of paramedic and clinical staff**, on the basis of clinical severity;
- ❑ up-to-date ICT, applied to **clinical informatics**, wearable device implementation for pathophysiological parameter collection and transmission;
- ❑ comparison analysis (**quality/cost ratio**) with usual follow-up strategies.

Are **keys** to the **success** of the CHF Health@Home care model and so to its transfer to the **market** and to an extensive use by **Public Sanitary Systems**

Thanks for the attention !!

<http://www.health-at-home.eu/>

