Informe Final

UIT-D
Comisión de Estudio 2

Cuestión 2/2

Información y telecomunicaciones/TIC para la cibersalud

6º Periodo de Estudios
2014-2017

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Cuestión 2/2: Información y telecomunicaciones/ TIC para la cibersanidad

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Prefacio

Las Comisiones de Estudio del Sector de Desarrollo de las Telecomunicaciones de la UIT (UIT-D) constituyen una plataforma basada en contribuciones en la que expertos de gobiernos, de la industria y de instituciones académicas producen herramientas prácticas, directrices de utilización y recursos para resolver problemas de desarrollo. Mediante los trabajos de las Comisiones de Estudio del UIT-D, los Miembros del UIT-D estudian y analizan cuestiones de telecomunicaciones/TIC orientadas a tareas específicas con el fin de acelerar el progreso de las prioridades nacionales en materia de desarrollo.

Las Comisiones de Estudio del UIT-D ofrecen a todos los Miembros del UIT-D la oportunidad de compartir experiencias, presentar ideas, intercambiar opiniones y llegar a un consenso sobre las estrategias adecuadas para atender las prioridades de telecomunicaciones/TIC. Las Comisiones de Estudio del UIT-D se encargan de preparar informes, directrices y recomendaciones basándose en los insumos o contribuciones recibidos de los miembros. La información se recopila mediante encuestas, contribuciones y estudios de casos, y se divulga para que los miembros la puedan consultar fácilmente con instrumentos de gestión de contenidos y de publicación en la web. Su trabajo está vinculado a los diversos programas e iniciativas del UIT-D con el fin de crear sinergias que redunden en beneficio de los miembros en cuanto a recursos y experiencia. A tal efecto, es fundamental la colaboración con otros grupos y organizaciones que estudian temas afines.

Los temas de estudio de las Comisiones de Estudio del UIT-D se deciden cada cuatro años en las Conferencias Mundiales de Desarrollo de las Telecomunicaciones (CMDT), donde se establecen los programas de trabajo y las directrices para definir las cuestiones y prioridades de desarrollo de las telecomunicaciones/TIC para los siguientes cuatro años.

El alcance de los trabajos de la **Comisión de Estudio 1 del UIT-D** es estudiar **"Entorno propicio para el desarrollo de las telecomunicaciones/TIC"**, y el de la **Comisión de Estudio 2 del UIT-D** es estudiar **"Aplicaciones TIC, ciberseguridad, telecomunicaciones de emergencia y adaptación al cambio climático"**.

Durante el periodo de estudios 2014-2017 la **Comisión de Estudio 2 del UIT-D** estuvo presidida por el Sr. Ahmad Reza Sharafat (República Islámica del Irán) y los Vicepresidentes representantes de las seis regiones: Aminata Kaba-Camara (República de Guinea), Christopher Kemei (República de Kenya), Celina Delgado (Nicaragua), Nasser Al Marzouqi (Emiratos Árabes Unidos), Nadir Ahmed Gaylani (República del Sudán), Ke Wang (República Popular de China), Ananda Raj Khanal (República de Nepal), Evgeny Bondarenko (Federación de Rusia), Henadz Asipovich (República de Belarús) y Petko Kantchev (República de Bulgaria).

Informe Final

El Informe Final de la **Cuestión 2/2: "Información y telecomunicaciones/TIC para la cibersalud"** ha sido preparado bajo la dirección de sus dos Correlatores: Isao Nakajima (Japón) y Done-Sik Yoo (República de Corea); y sus tres Vicerrelatores designados: Leonid Androuchko (Dominic Foundation, Suiza), Grégory Domond (Haití) y Malina Jordanova (Bulgaria). También contaron con la asistencia de los coordinadores del UIT-D y la Secretaría de las Comisiones de Estudio del UIT-D.

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El presente informe ha sido preparado por muchos expertos de administraciones y empresas diferentes. Cualquier mención de empresas o productos concretos no implica en ningún caso un apoyo o recomendación por parte de la UIT.

ntes de imprimir este informe, piense en el medio ambiente.

Índice

Resumen ejecutivo

En este Informe se definen la cibersanidad y sus aplicaciones para los países en desarrollo y se presenta importante información sobre los servicios y sistemas de cibersanidad de más de 40 países, así como sobre el ecosistema y las normas de cibersanidad relativ

as tanto a los aspectos técnicos como a la calidad de servicio. Se presta especial atención a las aplicaciones móviles, pues cerca de siete mil millones de personas, es decir el 95 por ciento de la población mundial, viven en zonas con cobertura de redes móviles celulares.

Este Informe se divide en cuatro (4) grandes secciones, aumentando paulatinamente el nivel de detalle y especificidad:

– **Capítulo 1**: Introducción;
– **Capítulo 2**: Directrices para la implementación de la cibersanidad en los países en desarrollo;
– **Capítulo 3**: Lecciones aprendidas; y
– **Capítulo 4**: Recomendaciones.

Al estar limitada la longitud del cuerpo principal del Informe, anexa se presenta una lista de valiosas contribuciones.

Este Informe no duplica otros documentos o informes de la UIT, pues ofrece información centrada en las posibles soluciones por y para los países en desarrollo. Es este un punto fundamental, pues el contexto (técnico, financiero, de recursos humanos, etc.) no es el mismo en los países desarrollados y en los países en desarrollo y el método de copia no es la mejor solución.

Los resultados y directrices presentados se aplican a todos: administraciones nacionales y locales, profesionales independientes, grupos de profesionales, sistemas sanitarios y proveedores de servicios relacionados con la sanidad en que se dan interacciones de cibersanidad, ya sea directamente con el paciente o entre proveedores, para la prestación de servicios sanitarios. Estos resultados y directrices son el fruto del trabajo realizado durante los últimos años por un grupo de expertos de la Cuestión 2/2 de la Comisión de Estudio 2 del UIT-D.

Futuro de la Cuestión

En el futuro, la Cuestión:

– tendrá por objetivo la materialización de los Objetivos de Desarrollo Sostenible (ODS), en particular del ODS 3: Garantizar una vida sana y promover el bienestar para todos en todas las edades;
– tomará medidas para contribuir a la concienciación de los entes decisorios, los reguladores, los operadores de telecomunicaciones, los donantes y los clientes acerca del papel de las TIC para mejorar la atención sanitaria en los países en desarrollo;
– participará en las actividades sobre cibersanidad de la Oficina de Desarrollo de las Telecomunicaciones de la UIT (BDT) en cooperación con otros organismos de las Naciones Unidas, como la Organización Mundial de la Salud (OMS);
– recopilará información sobre la condición y recepción social, incluidos los aspectos jurídicos y financieros, para la gestión del servicio público en los países en desarrollo; y

– facilitará las directrices necesarias para la normalización de la cibersanidad y la inclusión de nuevas tecnologías, como los macrodatos médicos y la inteligencia artificial, en colaboración con el Sector de Normalización de las Telecomunicaciones de la UIT (UIT-T).

1 CAPÍTULO 1 – Introducción

1. Objetivo del informe

En este Informe se detallan los mensajes políticos derivados de las conclusiones y lecciones extraídas de los trabajos de la Cuestión 2/2: Información y telecomunicaciones/TIC para la cibersanidad. Los principales mensajes de la Cuestión 2/2 se han preparado para presentarlos a los miembros de la UIT y los asistentes a la Conferencia Mundial de Desarrollo de las Telecomunicaciones (CMDT) de 2017. El objetivo es compartir con todos los miembros de la UIT, las instituciones nacionales, regionales e internacionales, así como con los legisladores y todos los grupos o particulares interesados en la cibersanidad, lo aprendido a raíz de los trabajos de la Cuestión 2/2.

2. Definiciones

Para evitar malentendidos, vamos a empezar este Informe aclarando la terminología, pues los miembros de la Comisión de Estudio, procedentes de diversos países y continentes, suelen utilizar una terminología diferente.

Qué se entiende por telemedicina y por cibersanidad cómo se emplean con frecuencia a continuación

[1]La telemedicina comprende los procesos de diagnóstico, tratamiento y prevención en el marco de los servicios de atención sanitaria modernos, que se llevan a cabo principalmente utilizando tecnologías informáticas y de telecomunicaciones. Su historia se remonta a 150 años atrás.[2,3]

Durante décadas no se contó con una definición de telemedicina aceptada a nivel internacional. Un estudio publicado en 2007 encontró 104 definiciones arbitradas del término telemedicina[4]. Consciente de esa laguna, la Organización Mundial de la Salud (OMS) adoptó la siguiente definición amplia de telemedicina[5], según la cual la telemedicina es:

"El suministro de servicios de atención sanitaria, en los que la distancia constituye un factor crítico, por profesionales que apelan a las tecnologías de la información y de la comunicación con objeto de intercambiar datos para hacer diagnósticos, preconizar tratamientos y prevenir enfermedades y accidentes, así como para la formación permanente de los profesionales de atención de salud y en actividades de investigación y evaluación, con el fin de mejorar la salud de las personas y de las comunidades en que viven".

En resumen, la OMS insiste en que en la telemedicina intervienen cuatro elementos interrelacionados:

– Su objetivo es suministrar atención clínica.
– Pretende superar los obstáculos geográficos, conectando a usuarios que no se encuentran físicamente en el mismo lugar.
– Implica la utilización de diversas tecnologías de la información.
– Su meta es mejorar la salud.

[1] Contribución de la Dra. Malina Jordanova, Instituto de Tecnología e Investigación Espacial (BAS), Bulgaria, Vicerrelatora para la C2/2.
[2] Bashshur R., Shannon G., History of Telemedicine: Evolution, Context, and Transformation, Mary Ann Liebert; 2009.
[3] Vladzymyrskyy A., Jordanova M., Lievens F., A Century of Telemedicine: Curatio Sine Distantia et Tempora, Sofía, Bulgaria, 2016.
[4] Sood S. P., Negash S., Mbarika V. W., Kifle M., Prakash N. Differences in public and private sector adoption of telemedicine: Indian case study for sectoral adoption. Studies in Health Technology and Informatics, 2007, 130, pp. 257–268.
[5] WHO Telemedicine: opportunities and developments in Member States: report on the second global survey on eHealth 2009 (Global Observatory for eHealth Series, 2), OMS, Ginebra, Suiza, 2010.

Al aumentar la participación de los sistemas de comunicación electrónicos, las principales Organizaciones Internacionales, la Unión Europea (UE), la Unión Internacional de Telecomunicaciones (UIT) y la Agencia Espacial Europea (AEE) han adoptado oficialmente el término "cibersanidad". Por cibersanidad se entiende "la utilización de tecnologías de la información y la comunicación modernas para colmar las necesidades de los ciudadanos, los pacientes, los profesionales de la salud, los proveedores de atención sanitaria y los legisladores".[6]

Para la OMS la cibersanidad[7] es "la transferencia de recursos y cuidados de salud por medios electrónicos. El término englobe tres áreas principales:

– la entrega de información sanitaria, por profesionales sanitarios y consumidores, a través de Internet y telecomunicaciones;
– la utilización del poder de las tecnologías de la información y el comercio electrónico para mejorar los servicios de salud pública, por ejemplo, a través de la formación de los profesionales sanitarios;
– el uso de prácticas relacionadas con el comercio electrónico en la gestión de servicios sanitarios.

La cibersanidad ofrece un nuevo método para utilizar los recursos de salud –como la información, el dinero y las medicinas– y con el tiempo contribuirá a utilizar más eficazmente esos recursos. Internet también ofrece una nueva manera de divulgar la información y de que las instituciones, los profesionales de la salud, los proveedores de atención sanitaria y el público en general interactúen y colaboren entre ellos".

Se utiliza un término más: telesalud. La telesalud comprende la supervisión, la promoción de la salud y las funciones de salud pública. Su definición es más amplia que la de telemedicina, pues incluye la utilización de telecomunicaciones informatizadas en pro de la gestión, la supervisión, la literatura y el acceso a los conocimientos médicos.

¿Cuál es el término correcto, entonces, telemedicina o cibersanidad? Hasta el momento ni a nivel europeo ni a nivel mundial se ha llegado a un acuerdo sobre este asunto. Paradójicamente, incluso entre los países de la UE, y dentro de ellos, se utilizan distintos términos para para describir un único y mismo servicio. Las posturas difieren y las preferencias suelen verse orientadas por la experiencia individual y las opiniones personales y profesionales. Por ese motivo, algunos autores consideran que telemedicina y cibersanidad son sinónimos. Otros aceptan que cibersanidad es un término más amplio y que incluye la telemedicina. Hay un tercer grupo que establece una clara distinción y para el que la telemedicina comprende la telecardiología, la telerradiología, la telepatología, la teleoftalmología, la teledermatología, la telecirugía, la telenfermería, etc., mientras que la cibersanidad incluye la salud electrónica, las tecnologías de la información y la comunicación en la salud (TIC-salud), todos los tipos de comunicaciones sanitarias, la PACS, los sistemas de información de pacientes, la cibereducación, la ciberprescripción, etc.

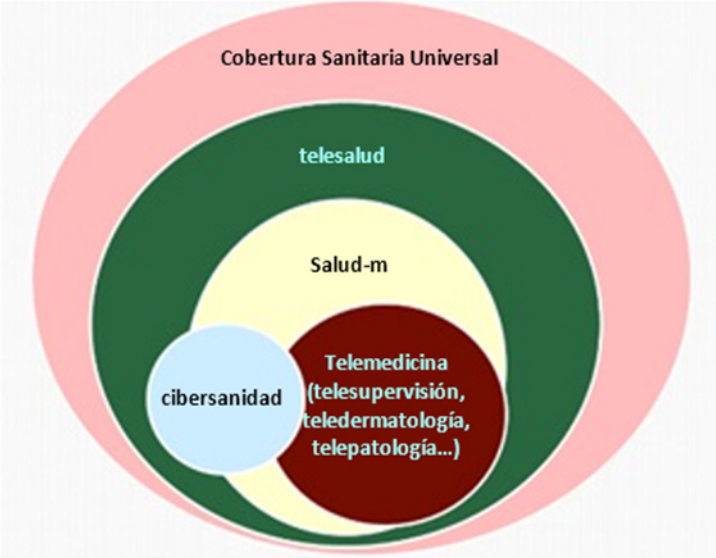
En 2005 la Asamblea Mundial de la Salud reconoció la cibersanidad como medio para lograr la utilización rentable y segura de las TIC en el ámbito de la salud y otros campos conexos, e instó a sus Estados Miembros a considerar la posibilidad de elaborar planes estratégicos a largo plazo para la creación e implantación de una infraestructura y unos servicios de cibersanidad en sus sectores sanitarios.

En la **Figura 1** se presenta la relación entre telemedicina y cibersanidad. En este Informe se utilizan telemedicina y cibersanidad como sinónimos.

6 Declaración Ministerial de la UE, eHealth 2003, Conferencia de Alto Nivel, Bruselas, 22 de mayo de 2003. Extraído el 21 de mayo de 2011 de: http://europa.eu.int/information_society/eeurope/ehealth/conference/2003/index_en.htm; http://ec.europa.eu/information_society/activities/ict_psp/documents/com_2004_0356.pdf.

7 WHO Trade, foreign policy, diplomacy and health: eHealth, 2016, disponible en http://www.who.int/trade/en/.

Figura 1: Relación entre telemedicina y cibersanidad



3. Exposición de la situación

La cibersanidad es un sistema integrado de servicios de atención de salud que emplea telecomunicaciones/TIC como un sustituto de los contactos personales entre el médico y el paciente o entre profesionales de la medicina. Incluye numerosas aplicaciones, como la telemedicina, las historias clínicas electrónicas, las consultas medicas a distancia, etc. la cibersanidad proporciona capacidades de transmisión, almacenamiento y recuperación de información médica en formato digital entre médicos, enfermeros, demás personal médico y pacientes con fines clínicos, educativos y administrativos, tanto a nivel local como a distancia.

La cibersanidad desempeña un papel muy importante en la asistencia sanitaria de los países en desarrollo, donde la aguda escasez de médicos, enfermeras y paramédicos es directamente proprocional a la enorme demanda insatisfecha de servicios sanitarios. Algunos países en desarrollo han puesto en marcha con éxito proyectos piloto de cibersanidad y desean continuar este tipo de iniciativas mediante la elaboración de un plan director de la cibersanidad, tal y como ha recomendado la OMS en su Resolución WHA58.28 de mayo de 2005. Esa Resolución pretende reducir las disparidades entre los servicios médicos de zonas rurales y urbanas y prestar una especial atención a los países menos adelantados (PMA). Sin embargo, la implantación de la cibersanidad en los países en desarrollo no ha alcanzado todavía un nivel suficiente para influir significativamente en los sistemas de atención sanitaria.

En algunos países en desarrollo el número de teléfonos móviles ha superado al número de teléfonos fijos, y la red de telecomunicaciones móvil puede considerarse como una plataforma más atractiva para la introducción de servicios de cibersanidad.

Mucho se ha escrito sobre el tema, pero, de acuerdo con las últimas investigaciones, podríamos enfrentarnos a una seria escasez de profesionales de la salud en los próximos diez o 15 años. ¿Qué significa eso para nosotros y para nuestro sistema de atención médica?

- no habrá suficientes médicos;
- la crisis es y será internacional;
- afectará a los países en desarrollo y a los países desarrollados.

La escasez que sufren y sufrirán muchos países en desarrollo será mucho más grave que la de los países desarrollados. La escasez crónica de profesionales de la salud formados se debe a la falta de formación, a la limitación de recursos financieros (malas condiciones laborales) y a la fuga de cerebros.

La pregunta es ¿qué podemos hacer? La respuesta es: fomentar la implantación mundial de la cibersanidad lo más rápido posible. En definitiva, la cibersanidad no será el milagro que solucione todos los problemas, pero sí la oportunidad de ofrecer a todas las personas del mundo una atención sanitaria asequible y de alta calidad.

4. Implantación mundial de la cibersanidad: necesidades, expectativas, enfoque global

No hay duda de que la cibersanidad es un tema global. Sin embargo, ¿en qué situación se encuentra su implantación a nivel mundial?

Los resultados de una de las encuestas más amplias realizadas en los últimos años se presentan en el *WHO Global eHealth Observatory.*[8,9] En cada una de las partes se da una idea del desarrollo de la cibersanidad en los Estados Miembros de la OMS. Los resultados obtenidos a partir de las respuestas de 114 países, que suponen el 81 por ciento de la población mundial, revelan que se están implantando con prioridad cuatro (4) esferas de la cibersanidad: la telerradiología, la telepatología, la teledermatología y la telepsiquiatría. La prestación de esos cuatro servicios está mucho menos adelantada en los países con ingresos medios-altos, medios-ajos y bajos que en los países con ingresos elevados. Por lo general, las regiones africana y del Mediterráneo oriental son las que cuentan menos países con servicios de telemedicina establecidos. En lo que se refiere a las tecnologías de salud móvil (salud-m), los cuatro servicios con mayor presencia son los centros telefónicos de información sanitaria (59%), los servicios telefónicos de urgencias gratuitos (55%), la gestión de emergencias y catástrofes (54%) y la telemedicina móvil (49%). Siguiendo la tendencia general de la telemedicina/cibersanidad, los países con ingresos más elevados son más activos a la hora de implantar la salud-m que los países con ingresos más bajos. Los países de la región europea son los más activos y los de la región africana los que menos.

En resumen, a pesar de los considerables fondos y esfuerzos dedicados al desarrollo de los servicios de cibersanidad, éstos no están tan ampliamente implantados como cabría esperar. No se trata de que no sean necesarios, pues el tiempo ha demostrado que la cibersanidad puede ayudar a resolver problemas de atención sanitaria o, al menos, ofrece la manera de hacerlo. Es cierto que la aceptación de las aplicaciones de cibersanidad es cada vez mayor en esferas como la cardiopatía crónica, el tratamiento de lesiones, la psiquiatría, la psicología, la cirugía, las enfermedades crónicas, el cuidado de ancianos y personas sin movilidad, las soluciones de cibersanidad móviles, etc. los expertos reconocen que la cibersanidad alberga un enorme potencial que aún no se ha materializado.

La cibersanidad se ha de integrar en el sistema de salud pública, aunque su objetivo último debe ser lograr el bienestar personal. Alberga muchas promesas:

- atención sanitaria rápida, oportuna, de alta calidad y asequible para todos en todo momento y en todo lugar;
- superar la escasez de personal y financiación de la atención sanitaria;
- optimización de los cuidados del paciente;
- optimización del trabajo del personal médico;
- aumento de los cuidados preventivos;
- protección de los derechos humanos;
- educación y, por ende, empoderamiento de la población, etc.

[8] WHO: mHealth: New horizons for health through mobile technologies, based on the findings of the second global survey on eHealth, Global Observatory for eHealth series, 2011, Vol. 3, [visto el 30 de agosto de 2011]; disponible en: http://www.who.int/goe/publications/goe_mhealth_web.pdf.

[9] WHO: Telemedicine: Opportunities and development in the Member States, Report on the Second Global Survey on eHealth, Global Observatory for eHealth series, 2011, Vol. 2, [visto el 30 de agosto de 2011]; disponible en: http://www.who.int/goe/publications/ehealth_series_vol2/en/index.html.

La materialización de estas promesas necesita la adopción de un enfoque a un nivel muy superior al local (regional o nacional) por un motivo muy simple: con más de 14 000 enfermedades conocidas,[10] la mayoría de ellas de alcance mundial, no hay un solo sistema de atención sanitaria nacional que pueda dedicar los recursos humanos o financieros necesarios para luchar contra todas ellas. Aprender de los demás es una de las mejores maneras de avanzar y crecer, pues siempre hay algo nuevo que aprender y alguien para enseñarnos.

La experiencia de anteriores ciclos de estudio de la CE 2 revela que la implantación de la cibersanidad tendrá éxito y será muy beneficiosa para la población si:

– se basa en el conocimiento, la confianza y la credibilidad;
– se adapta a las necesidades de la comunidad;
– respeta las tradiciones locales, la cultura, el desarrollo empresarial, evita copiar otros modelos, etc.;
– se basa en el sistema de atención sanitaria existente y lo utiliza.

O si se lleva a cabo una implantación de la cibersanidad local y/o nacional en un contexto global y viceversa, es decir, desde un punto de vista "glocal".

¿Qué significa "glocal"? Las TIC e Internet, asequibles y muy disponibles, contribuyen al salto de la atención sanitaria local a la global. Internet permite crear redes mundiales de instalaciones con características comunes. A través de esas redes, las instalaciones de atención locales pueden acceder a los conocimientos globales que mejoran su acceso, calidad y seguridad. Se trata de la atención sanitaria glocal.

El objetivo de la atención sanitaria glocal es lograr un sistema abierto, de alta calidad donde no se desperdicien los recursos globales o locales. No obstante, se hay deficiencias en la cooperación global. La falta de una cooperación global suficiente redunda en que los gobiernos siguen negociando y renegociando, revisitando y experimentando con políticas y filosofías de atención sanitaria. Sólo la colaboración y la cooperación obran en beneficio de la ciencia, la información y la tecnología a disposición de todos. Eso es lo que pretende facilitar la Cuestión 2/2.

5. Cuestión 2/2

La Cuestión 2/2 es una prolongación del anterior ciclo de estudios, es decir, de la Cuestión 14-3/2, y se basa en los logros consignados en su Informe Final (Cuestión 14-3/2: la información y las telecomunicaciones/TIC para la cibersanidad, 2014, http://www.itu.int/pub/D-STG-SG02.14.3-2014), así como en otras iniciativas resultntes del anterior periodo de estudios, en particular las telecomunicaciones móviles para la cibersanidad móvil.

La Cuestión 2/2 se basa en estudios anteriores y presta más atención a la infraestructura y a la plataforma de telecomunicaciones requerida para hacer posibles todas las aplicaciones y servicios de cibersanidad.

Sus objetivos son:

– aumentar la conciencia de los entes decisorios, los reguladores, los operadores de telecomunicaciones, los donantes y los clientes acerca del papel de la información y las telecomunicaciones en la mejora de la atención sanitaria en los países en desarrollo gracias a la cibersanidad;
– promover la elaboración de normas de telecomunicaciones para aplicaciones de cibersanidad junto con el UIT-T y el UIT-R, en particular;

[10] WHO, Classifications- ICD-10, http://www.who.int/classifications/help/icdfaq/en/, visitado el 30.3.2016.

- divulgar experiencias y prácticas idóneas sobre la utilización de la información y las telecomunicaciones en la cibersanidad en países en desarrollo;
- fomentar la colaboración entre los sectores de las telecomunicaciones y la atención sanitaria en los países en desarrollo;
- facilitar el trabajo sobre un plan general de cibersanidad para países en desarrollo;
- informar sobre cómo los hospitales y otras instituciones de atención sanitaria de países en desarrollo pueden beneficiarse de la infraestructura de acceso a telecomunicaciones de banda ancha para una solución de cibersanidad;
- elaborar un Informe y Recomendaciones sobre la utilización de las telecomunicaciones móviles para soluciones de cibersanidad en los países en desarrollo;
- fomentar la cooperación entre países en desarrollo en el ámbito de las telecomunicaciones para la cibersanidad.

Estos objetivos se consiguen:

- recopilando estudios de caso de los Miembros, los Miembros de Sector y los Asociados sobre prácticas idóneas en materia de tecnologías, servicios y aplicaciones de cibersanidad; y experiencias de los países en cuanto a la implantación satisfactoria de TIC para la salud, en particular en los países en desarrollo, en esferas sanitarias de alta prioridad, como la salud materno-infantil, las enfermedades transmisibles y no transmisibles, etc.;
- fomentando las telecomunicaciones para aplicaciones de cibersanidad en las conferencias y exposiciones pertinentes;
- participación de los miembros del Grupo de Relator en talleres internacionales, regionales y nacionales y presentación de ponencias para dar a conocer los resultados obtenidos;
- facilitar el establecimiento de contactos y la colaboración entre Miembros de la UIT y representantes de los países en desarrollo

Resultados

Las contribuciones recibidas hasta la fecha muestran un notable progreso en los documentos de resultados de la Cuestión 2/2, que se presentan en este Informe (**Cuadro 1**) y sus anexos.

En resumen, gracias al establecimiento de contactos se han presentado y tratado en las reuniones de la Cuestión 2/2 más de 100 contribuciones. Algunos de esos documentos tratan de temas organizativos que no se incluyen en este Informe. En los demás documentos se presentan eperiencias de países de todos los continentes con los servicios de cibersanidad. Se presentan éxitos, problemas y planes. De una u otra manera todas estas contribuciones han encontrado su sitio en este Informe. Por lo general, las contribuciones se centran en lo siguiente:

- Problemas y consideraciones básicos que se han de tener en cuenta a la hora de planificar o introducir servicios de cibersanidad, como los ecosistemas y normas en materia de cibersanidad. En esas contribuciones se basa el **Capítulo 2**.
- Ejemplos de prácticas idóneas de países en desarrollo, así como servicios de cibersanidad adelantados y probados, listos para su implantación. Esas contribuciones se incluyen en el **Capítulo 3** o en los anexos (a causa de las limitaciones de longitud del Informe);
- Ejemplos de proyectos y/o iniciativas de cibersanidad. Aunque extremadamente importantes e interesantes, se incluyen en los anexos y/o cuadros por encontrarse en sus primeras fases de desarrollo.

Cuadro 1: Resultados de la Cuestión 2/2 para el periodo de estudios 2014-2017

Productos	Resultados
Directrices sobre la manera de redactar la parte relacionada con las telecomunicaciones/TIC del Plan Rector de Cibersanidad	√
Directrices sobre la utilización de las telecomunicaciones móviles para soluciones de ciber-sanidad en los países en desarrollo	√
Compilar y resumir las necesidades y la eficacia de la infraestructura de telecomunicaciones para una utilización satisfactoria de las aplicaciones de cibersanidad, tenienddo en cuenta el entorno de los países en desarrollo	√
Divulgar las normas técnicas relacionadas con la introducción de servicios de cibersanidd en los países en desarrollo	√
Colaborar con la Comisión de Estudio 16 del UIT-T con miras a acelerar el establecimiento de normas técnicas para aplicaciones de cibersanidad	√
Colaborar con el Programa pertinente de la BDT, si así lo solicita, para promover la implan-tación del componente de telecomunicaciones/TIC en los proyectos de cibersanidad en los países en desarrollo, con inclusión del asesoramiento sobre prácticas idóneas y sobre la mejor manera de impartir capacitación a los países en desarrollo en cuanto al uso del com-ponente de telecomunicaciones/TIC en los proyectos de cibersanidad	√
Intercambiar y divulgar prácticas idóneas sobre aplicacioens de cibersanidad en los países en desarrollo, utilizando el sitio web de la UIT/BDT en estrecha colaboración con el Programa pertinente de la BDT	√

Colaboración

– La Cuestión 2/2 colabora con las siguientes Cuestiones de Comisiones de Estudio del UIT-D:

  - Cuestión 1/1 (Aspectos políticos, reglamentarios y técnicos de la migración de las redes existentes a las redes de banda ancha en los países en desarrollo);
  - Cuestión 7/1 (Acceso a los servicios de telecomunicaciones/TIC para las personas con discapacidad y con necesidades especiales) y
  - Cuestión 1/2 (Creación de la sociedad inteligente: desarrollo económico y social a través de aplicaciones de TIC).

– Colaboración en curso:

  - Con la Comisión de Estudio 20 del UIT-T (IoT y sus aplicaciones, incluidas las ciudades y comunidades inteligentes) para avanzar los trabajos sobre los requisitos y aplicaciones de cibersanidad de la CE20 del UIT-T, en particular la identificación de los requisitos del ecosistema de cibersanidad que se han de normalizar a partri de tecnologías de cibersanidd existentes y estables en los países en desarrollo;
  - Con la Comisión de Estudio 16 del UIT-T (Codificación, sistemas y aplicaciones multimedios);
  - Con la Comisión de Estudio 5 del UIT-T (Medio ambiente y cambio climático).

En el **Anexo 1** se reproducen las Declaraciones de Coordinación correspondientes a dicha colaboración.

– Con otras organizaciones: la Cuestión 2/2 colabora, cuando se revela necesario, con los organismos de las Naciones Unidas pertinentes y con otras organizaciones regionales e internacionales especializadas en la salud, por ejemplo, la OMS y otros organismos de normalización, en particular el IEEE.

La Cuestión 2/2 seguirá colaborando y compartiendo información con otras Cuestiones de Comisiones de Estudio del UIT-D, las Comisiones y Grupos de los otros Sectores y otras organizaciones, según proceda.

En todas sus actividades la Cuestión 2/2 ayuda a los países en desarrollo para que no dupliquen trabajos ya realizados ni opten por copiar a otros en la implantación de la cibersanidad. La Cuestión 2/2 se centra en los países en desarrollo pues son diferentes de los demás países y necesitan toda la ayuda posible para equipararse a los países desarrollados. Las características de los países en desarrollo que se indican a continuación siempre se han tenido presentes, en particular cuando se ha abordado la expansión de los sistemas de atención sanitaria.

6. Países en desarrollo: problemas y retos

¿Por qué la Cuestión 2/2 ha adoptado un enfoque específico para abordar la implantación de la cibersanidad en los países en desarrollo? La respuesta se encuentra en la definición de país en desarrollo así como en las diferencias entre países desarrollados y en desarrollo.

Definición: un país en desarrollo, también denominado país menos adelantado, es un país con un nivel de vida bajo, una base industrial insuficientemente desarrollada y un bajo valor del Índice de Desarrollo Humano en relación con otros países. Sin embargo, en el sistema de las Naciones Unidas no se ha establecido un convenio sobre la designación de países o zonas "desarrolladas" y "en desarrollo". La práctica común en las Naciones Unidas es considerar que Japón en Asia, Canadá y los Estados Unidos de América en América del Norte, Australia y Nueva Zelandia, en Oceanía, y Europa son países o regiones "desarrolladas". En las estadísticas del comercio internacional también se considera que la Unión Aduanera del Sur de África es una región desarrollada e Israel un país desarrollado. Los países surgidos de la antigua Yugoslavia se consideran países desarrollados, y los países del este de Europa y de la Comunidad de Estados Independientes no se incluyen como regiones desarrolladas ni en desarrollo.

El Fondo Monetario Internacional (FMI) utiliza un sistema de clasificación flexible que considera (1) los ingresos per cápita, (2) la diversificación de las exportaciones, y por tanto los exportadores de petróleo con un PIB per cápita elevado no entrarían en la clasificación de avanzados porque aproximadamente el 70 por ciento de sus exportaciones son de petróleo, y (3) el grado de integración en el sistema financiero mundial.

El Banco Mundial clasifica los países en cuatro grupos en función de sus ingresos. La clasificación se revisa el 1 de julio de cada año. El 1 de julio de 2015 las economías se dividían en función de su ingreso nacional bruto (INB) de la forma siguiente (http://data.worldbank.org/news/new-country-classifications-2015):

- países con bajos ingresos, con un INB per cápita de 1 045 USD o menos en 2014;
- países con ingresos medios-bajos y medios-altos, con un INB per cápita de hasta 4 125 USD;
- países con ingresos medios son aquéllos cuyo INB es superior a 1 045 USD e inferior a 12 736 USD;
- países con ingresos altos, con un INB per cápita igual o superior a 12 736 USD.

El Banco Mundial clasifica a todos los países con ingresos bajos y medios como países en desarrollo, pero señala que "el término se usa por razones de conveniencia; no se pretende implicar que todas las economías en dicho grupo estén experimentando un desarrollo similar o que otras economías hayan llegado a una etapa preferencial o final de desarrollo. La clasificación según los ingresos no refleja necesariamente el estado de desarrollo".

La información anterior es importante y debe recordarse ya que en el concepto de apoyo a los países en desarrollo se fundamenta la Cuestión 2/2.

Algunos aspectos importantes

Estos aspectos deben tenerse en consideración siempre que se debata sobre la implementación de la cibersanidad, ya que pueden tanto dificultar como conformar el desarrollo de la cibersanidad y su aplicación general.

Esbozo de los principales problemas financieros y de asistencia sanitaria en los países en desarrollo:

- la carga que suponen las enfermedades es diferente de la que suponen en las regiones desarrolladas;
- la población es más joven y con un crecimiento más rápido en comparación con las regiones desarrolladas;
- los servicios médicos son deficientes debido a la falta de facultades de medicina y de especialistas;[11]
- el gasto en asistencia sanitaria es varias veces menor en comparación con los países desarrollados.

Madagascar informó de los siguientes riesgos sobre la implementación de una estrategia[12] de cibersalud:

- falta de financiación;
- falta de recursos humanos técnicos para llevar a cabo el proceso;
- profesionales poco implicados en la implementación;
- retraso en las cuestiones jurídicas y de reglamentación;
- falta de infraestructuras TIC, en particular en ciertas zonas rurales;
- durabilidad de los servicios prestados de cibersalud: deberán calcularse los costes de operación y utilización para que los cubran instituciones claramente definidas;
- población poco interesada en utilizar los servicios de cibersalud.

La brecha digital

La brecha digital es uno de los principales problemas para quienes planifican o intentan poner en marcha servicios de cibersanidad y la Cuestión 2/2 tiene este problema en mente siempre.

¿Qué es la brecha digital? El término se introdujo en la década de 1990[13] y hace referencia a la diferencia existente entre los que tienen acceso y capacidad de utilizar las tecnologías de la información y la comunicación y los que no la tienen.

Los motivos de la brecha son numerosos, la pobreza en primer lugar, pero también la educación el analfabetismo, la edad, el género, la cultura, el contacto con las TIC, la ubicación geográfica, la infraestructura, la conectividad, el ancho de banda y los costos de las telecomunicaciones. La brecha digital no sólo existe entre países desarrollados y en desarrollo, sino también dentro de los países, sobre todo entre zonas urbanas y rurales.

La brecha digital se ha considerado un obstáculo para la puesta en marcha de la cibersanidad en el mundo en desarrollo y en las zonas Rurales del mundo desarrollado. Las expectativas eran que la brecha digital se reduciría con la mejora de las infraestructuras y la conectividad, la disponibilidad de ancho de banda adicional, la reducción de los costos de la tecnología y las comunicaciones y el uso creciente de los teléfonos móviles. Todo ello ha ocurrido en mayor o menor grado en gran parte del mundo en desarrollo y, sin embargo, la brecha digital sigue presente.

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[11] Eastwood J. B. et al. Loss of health professionals from sub-Saharan Africa: the pivotal role of the UK. The Lancet, Volume 365, Issue 9474, 28 de mayo–3 de junio de 2005, pp. 1893–1900.

[12] Documento 2/407, "Start-up of cyberhealth in Madagascar. Refocusing of programmes", República de Madagascar.

[13] Eubanks V. E. Trapped in the digital divide: the distributive paradigm in community informatics, The Journal of Community Informatics, 2007, vol. 3, pp. 1-12.

En un artículo M. Mars[14] ha señalado que la brecha digital entre países desarrollados y en desarrollo no se ha reducido en los últimos 10 años y plantea la cuestión de si se reducirá en algún momento. Teóricamente debería ocurrir, pero en la práctica es poco probable que ocurra conforme evoluciona la tecnología. Las conclusiones de los expertos sobre cuándo se cerrará la brecha digital entre los países desarrollados y en desarrollo no son alentadoras. Por todo ello, las actividades sobre cibersanidad en los países en desarrollo deben basarse en una comprensión realista de la brecha digital, sus implicaciones y los factores que la gobiernan.

El enfoque basado en la imitación, la cultura local y las tradiciones, la infraestructura

Aunque hay modelos de implantación de cibersalud que han tenido éxito, como un caso de estudio en España,[15] en las dos últimas décadas la asistencia sanitaria ha asistido al fracaso de miles de proyectos de cibersanidad. Incluso soluciones bien elaboradas y que están en funcionamiento en países desarrollados no han funcionado y han fracasado cuando se han puesto en marcha en regiones en desarrollo. Es más que evidente que un enfoque basado en la imitación no es la mejor forma de lograr un desarrollo generalizado de la cibersanidad. Soluciones muy utilizadas en países desarrollados no son siempre las que buscan o necesitan desesperadamente los países en desarrollo.

La falta de respeto o, aún peor, la ignorancia negligente sobre las tradiciones y las referencias culturales locales pueden arruinar hasta el proyecto de negocio de cibersanidad más cuidadosamente preparado. La aceptación cultural de cada una de las iniciativas de cibersanidad en zonas en desarrollo es una condición *sine qua non*.

La infraestructura y la falta de formación en TIC también son obstáculos que pueden frustrar la viabilidad de la cibersanidad en muchas regiones. Los países de África, las Américas y el sudeste asiático citan la infraestructura como uno de los grandes obstáculos a la implantación de la telemedicina.[16]

Además de todo lo anterior, a modo de conclusión conviene citar una encuesta realizada en 2015 sobre los retos y obstáculos a que se enfrenta la cibersanidad en los países en desarrollo.[17] Fue una encuesta realizada a expertos y sus resultados indican claramente que, en opinión de esos expertos, los problemas más importantes que se han de solucionar para poder implantar satisfactoriamente la cibersanidad en los países en desarrollo son los siguientes:

1) problemas culturales y educativos (95% de las respuestas);
2) políticas de apoyo económico a la cibersanidad (58%), y
3) elaboración de políticas de cibersanidad a largo plazo (50%).

[14] Mars M. The Digital Divide: Still a Reality? In M. Jordanova and F. Lievens (Eds.) Global telemedicine and eHealth Updates: Knowledge Resources, Vol. 6, Publ. ISfTeH, Luxemburgo, 2013, pp. 277-280.

[15] Documento 2/404, "La incorporación y empleo de las TIC en el sistema nacional de salud español", España.

[16] Telemedicine Opportunities and Developments in Member States, WHO, Global Observatory for eHealth series-Volume 2, 2010, Suiza.

[17] Mandirola Brieux H. F. et al. Challenges and Hurdles of eHealth Implementation in Developing Countries, Stud Health Technol Inform. 2015; 216, pp. 434-437.

1 CAPÍTULO 2 – implantación de la cibersanidad en los países en desarrollo: orientaciones

En este capítulo se exponen los tres problemas básicos que se han de tener en cuenta a la hora de planificar o introducir servicios de cibersanidad:

- el ecosistema de cibersanidad;
- las normas técnicas y de servicio; y
- los posibles beneficios que reportará la Iniciativa m-Powering Development.

Estos problemas se han identificado a partir de amplias investigaciones realizadas por la Cuestión 2/2 a lo largo del periodo de estudios. Por limitaciones de longitud, en el **Anexo 3** puede encontrarse información adicional.

1. El ecosistema de cibersanidad

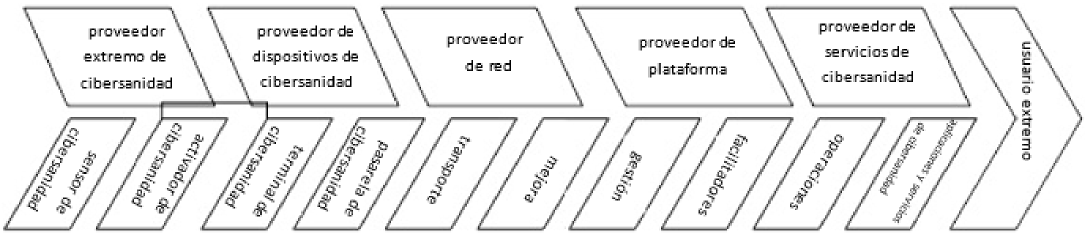
Con demasiada frecuencia los proyectos y aplicaciones de cibersanidad se ponen en marcha sin que se hayan tenido debidamente en cuenta todos los elementos fundamentales de un programa viable. Es importante considerar las iniciativas de cibersanidad como el resultado de un ecosistema de cibersanidad multidimensional en el que participan 5 elementos fundamentales, a saber, (1) las políticas y reglamentos de gobernanza; (2) el modelo de financiación; (3) la infraestructura tecnológica; (4) los servicios; (5) las partes interesadas. La creación de programas de cibersanidad en el contexto de un ecosistema de cibersanidad más amplio garatizará la viabilidad duradera de esas iniciativas.

1.. El ecosistema de cibersanidad, casos de uso y retos típicos de la República Popular de China

1... Descripción del ecosistema

En la **Figura 2** se muestra el ecosistema de cibersanidad. Se señalan algunas de las funciones fundamentales y cuáles son sus contribuciones típicas al sistema de cibersanidad.

Figura 2: Ecosistema de cibersanidad



El proveedor extremo de cibersanidad fabrica y facilita sensores y activadores de cibersanidad. Los sensores y activadores de cibersanidad deben ajustarse a limitaciones estrictas, por ejemplo, de forma y consumo energético por su repercusión en el cuerpo humano.[18]

El proveedor de dispositivos de cibersanidad fabrica y facilita dispositivos de cibersanidad que pueden dividirse en terminales y pasarelas. Sus funciones son muy semejantes. La principal diferencia entre terminales y pasarelas de cibersanidad es que las pasarelas suelen actuar como anclas entre las redes de corto alcance y las redes de área extensa, mientras que los terminales se conectan directamente

[18] Contribución de la Sra. Jia XueQin, China Unicom para el Ministerio de Industria y Tecnología de la Información (MIIT) (República Popular de China).

a la red de área extensa. Algunos dispositivos de cibersanidad son dispositivos médicos que deben ajustarse a las normas aplicables a estos últimos.

El proveedor de red facilita redes comerciales que ofrecen conectividad para el transporte de los datos de cibersanidad. Además, hay ciertas mejoras propias a la cibersanidad que pueden aportarse a las redes para colmar nuevos requisitos, como, por ejemplo, que los mensajes de alarma se han de entregar siempre de manera rápida y segura, se ha de soportar la geolocalización, etc.

El proveedor de plataforma ofrece la plataforma, que es un conjunto de capacidades, en forma de módulos de software, ofrecidas a las aplicaciones de cibersanidad (las aplicaciones de cibersanidad pueden desplegarse en dispositivos de cibersanidad y servidores de aplicación de cibersanidad) para acelerar su desarrollo, prueba e implantación. Ejemplos de estos módulos son la gestión de dispositivos de cibersanidad, la conversión y el almacenamiento de los datos de supervisión, etc.

Los proveedores de servicios de cibersanidad ofrecen servicios de cibersanidad a los usuarios extremos. A partir del servidor de aplicación de cibersanidad, los proveedores de servicios de cibersanidad son los principales responsables del funcionamiento habitual de los servicios de cibersanidad y de ocuparse del servicio técnico al cliente y la facturación, si procede.

Los usuarios extremos son los receptores de los servicios de cibersanidad y generalmente se organizan en categorías definidas por su seguro médico, es decir, con o sin seguro, con seguro público o privado, etc., a efectos de gestión financiera y gestión clínica de los casos.

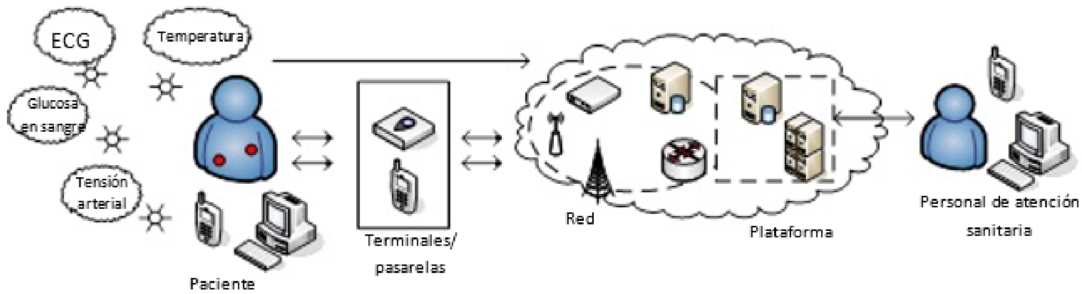
Cabe señalar que hay otras funciones especiales que también pueden tener cabida en el ecosistema de cibersanidad, a saber, los reguladores, las compañías de seguros, etc.

2... Casos de uso representativos para la cibersanidad

En función de los distintos requisitos reglamentarios, la cibersanidad puede ser de dos tipos: servicio de atención sanitaria y servicio de atención médica.

2.1.1.2.1 Caso de uso 1: servicio de atención sanitaria

Figura 3: servicio de supervisión cibersanitaria



En la **Figura 3** se ilustra un servicio de supervisión cibersanitaria como servicio de atención sanitaria típico de la cibersanidad.

1) Como se ven en la **Figura 3**, un paciente (es decir, el usuario extremo) puede obtener sus constantes vitales y otros datos biológicos (por ejemplo, electrocardiograma, temperatura, glucosa en sangre, tensión arterial) gracias a sensores implantados en su cuerpo, sensores ponibles o sensores adheridos a su cuerpo. Además, esos dispositivos pueden también obtener datos sobre el movimiento (por ejemplo, si camina, si corre o se cae) del usuario y otra información contextual (por ejemplo, duración de la supervisión, posición).
2) La información obtenida se telecargará en una plataforma de cibersanidad desde un dispositivo móvil directamente conectado a la red pública o desde una pasarela de cibersanidad inalámbrica

entre la red pública y el entorno del paciente. Los puntos extremos de cibersanidad (es decir, electrocardiograma, temperatura, glucosa en sangre, tensión arterial) se conectan con la pasarela de cibersanidad a través de una red inalámbrica de corto alcance (Bluetooth, Zigbee, etc.).

3) La plataforma de cibersanidad se ocupa del procesamiento de los datos, en función de los distintos sistemas de información sanitaria implicados, la gestión eficaz de los dispositivos y demás funciones auxiliares (por ejemplo, autentificación, control del tráfico y administración B2B). esta plataforma puede pertenecer a un operador de red o a un proveedor de plataforma tercero.

4) Los proveedores de servicios de cibersanidad, por ejemplo, personal de atención sanitaria (personal clínico, asistentes sanitarios, miembros de la familia y entrenadores personales) pueden acceder a los datos personales del paciente desde la web/computadora/dispositivo móvil e informar acerca de la situación sanitaria del paciente.

5) El paciente mismo puede acceder a sus datos personales y demás datos desde la web/computadora/dispositivo móvil.

2.1.1.2.2 Caso de uso 2: servicio de atención médica cibersanitaria

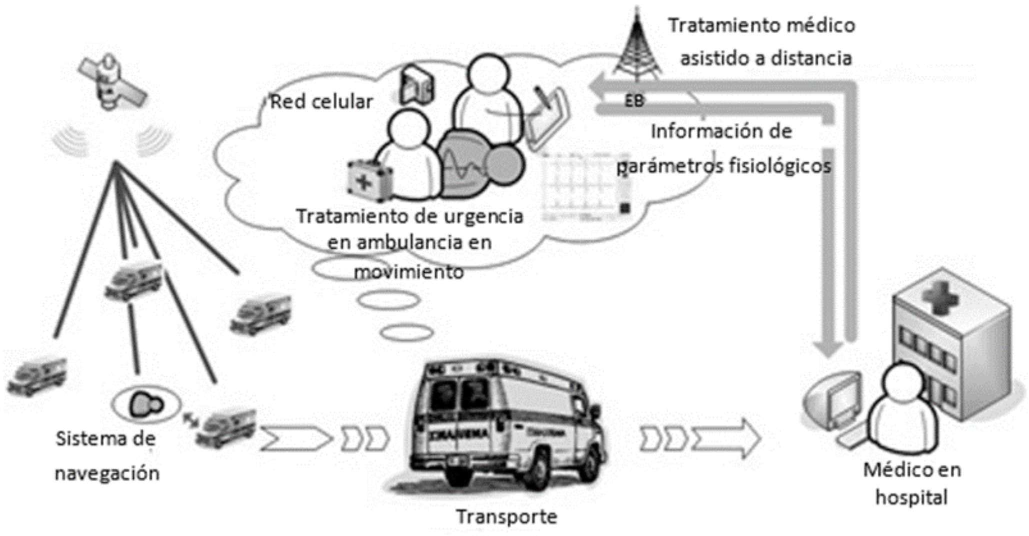
En la **Figura 4** se ilustra un servicio médico de urgencias prehospitalario como servicio de atención médica típico de la cibersanidad. El servicio médico de urgencias prehospitalario (SMUP) puede considerarse como un tratamiento médico de emergencia para pacientes heridos en accidentes o afectados por una enfermedad mortal suministrado entre el lugar en que se encuentra el paciente y el hospital. Puede reducir en gran medida el tiempo y los costos del transporte del paciente.

1) En la **Figura 4** se muestran ambulancias equipadas con un sistema de navegación y posicionamiento, por ejemplo, GPS, y una red de comunicación inalámbrica, por ejemplo, GPRS. Gracias al sistema de posicionamiento por satélite GPS, el centro de servicio médico de emergencia puede conocer la posición de las ambulancias disponibles y enviar rápidamente a la ambulancia más cercana. Al mismo tiempo, el sistema de navegación puede indicar al conductor de la ambulancia el camino más rápido hasta el hospital.

2) Una vez instalado el paciente en la ambulancia, el médico de urgencias de la ambulancia puede suministrar inmediatamente el tratamiento adecuado en función de las señales fisiológicas del paciente, como el ECG, el pulso, la saturación en oxígeno, la tensión arterial, la respiración etc. Aunque una ambulancia en movimiento es un entorno inestable, los datos fisiológicos pueden transmitirse al hospital de manera segura a fin de que los médicos en el hospital reciban esos datos con una alta calidad y puedan preparar todo lo necesario antes de la llegada de la ambulancia.

3) El tratamiento inmediato en la ambulancia permite a los pacientes que necesitan atención médica especial consultar directamente con los especialistas del hospital o de otras instituciones médicas distantes.

Figura 4: servicio médico de urgencias prehospitalario



3... Retos

Reto 1: Soporte de la protección de la confidencialidad. Siempre que se intercambie, almacene o procese la información del paciente, se ha de garantizar todos los participantes en el ecosistema de cibersanidad protegen y salvaguardan la confidencialidad de los datos. El intercambio de datos entre participantes en el ecosistema de cibersanidad se ha de realizar de tal manera que se prohíba toda divulgación no deseada de los datos, por ejemplo, a terceros.

Reto 2: Interoperabilidad de sistemas heterogéneos. A menos que las aplicaciones de cibersanidad estén totalmente normalizadas, la interoperabilidad será un gran problema para todos los participantes en el ecosistema de cibersanidad, que podrán utilizar distintos modelos de datos, API, mecanismos de protección de la confidencialidad, etc.

Reto 3: la reglamentación afecta al crecimiento del mercado de cibersanidad y, en particular, al mercado de atención médica. Gracias a la escasa reglamentación y a las urgentes necesidades del mercado (por ejemplo, estilo de vida inteligente para los ancianos, etc.), el mercado de la atención sanitaria está experimentando un crecimiento sin precedentes. Por otra parte, a causa de la fuerte reglamentación y de la autonomía de los hospitales, el mercado de la atención médica es difícil de normalizar para lograr la interoperabilidad.

2. Normalización de la cibersanidad

2.. Hacia la normalización de la cibersanidad

[19]La normalización de la cibersanidad es otra cuestión de enorme complejidad y uno de los principales obstáculos a la implantación de la cibersanidad, que afecta tanto a los países desarrollados como en desarrollo.

Pese a la enorme cantidad de dinero y recursos humanos dedicados, el resultado hasta la fecha ha sido bastante pobre, en particular para los intereses de los países en desarrollo. Éstos requieren una atención especial para satisfacer sus necesidades dada la situación de sus redes fijas y móviles. Las

[19] Contribución: L. Androuchko[1], M. Jordanova[2], I. Nakajima[3], [1]Universidad Internacional de Ginebra, Dominic Foundation, Suiza, Vicerrelator para la Cuestión 2/2; [2]Instituto de Investigación Espacial, Academia de Ciencias de Bulgaria, Bulgaria, Vicerrelatora para la Cuestión 2/2, [3]Universidad de Tokai, Facultad de Medicina, Japón, Relator para la Cuestión 2/2.

soluciones de las TIC para los servicios sanitarios y la cibersanidad, incluida la sanidad móvil, han tenido un gran desarrollo particularmente en el último decenio. Sin embargo, las soluciones son aún, con demasiada frecuencia, pequeñas aplicaciones aisladas incapaces de comunicarse con otros sistemas sanitarios y/o compartir información entre tecnologías y ámbitos geográficos diversos.

Las barreras para el crecimiento de sistemas de pequeño tamaño en países en desarrollo impiden que puedan ser utilizados para una gran base de pacientes y prestadores de asistencia sanitaria. Los responsables de la toma de decisiones no son necesariamente capaces de evaluar la verdadera situación sanitaria, lo cual impide que se realice una planificación, respuesta y formulación política integral.

El Sector de Normalización de la UIT coordina la normalización técnica de los sistemas multimedios y las capacidades para las aplicaciones de la cibersanidad. El Sector ha publicado recientemente un nuevo informe de seguimiento tecnológico (www.itu.int/en/ITU-T/techwatch/Pages/ehealth-standards.aspx) que analiza el futuro de la cibersanidad. En el informe se señala que el desarrollo de la cibersanidad requerirá estándares sobre la interoperabilidad y estrategias más globales para superar las barreras técnicas de la infraestructura y abordar aspectos de la privacidad, la seguridad y otros de tipo jurídico. Existen numerosas normas genéricas utilizadas en aplicaciones de cibersanidad para, por ejemplo, la codificación de vídeo, seguridad, transmisión de multimedios y lenguajes de programación, muchas de las cuales han sido desarrolladas por el UIT-T. Estos y otros asuntos son abordados por expertos de las Comisiones de Estudio 15, 16 y 17 (Seguridad) del UIT-T, el Grupo Temático sobre la capa de servicio M2M (http://www.itu.int/en/ITU-T/focusgroups/m2m/Pages/default.aspx) y otros organismos de normalización. Las normas internacionales sobre cibersanidad deben basarse en "tecnologías maduras y estables" y no sólo en tecnologías futuras avanzadas.

La Conferencia de Plenipotenciarios de 2010 celebrada en Guadalajara, México, aprobó una nueva Resolución, la Resolución 183 sobre "Aplicaciones de las telecomunicaciones/TIC para la cibersalud", que encarga a la UIT "la expansión de las iniciativas de telecomunicaciones/TIC para la cibersalud y que coordine las actividades relativas a la cibersalud entre el Sector de Radiocomunicaciones (UIT-R), el Sector de Normalización de las Telecomunicaciones (UIT-T), el UIT-D y, en particular, fomente la sensibilización, generalización y creación de capacidades en lo que respecta la creación de normas de telecomunicaciones/TIC, y que informe de las conclusiones al Consejo de la UIT, según proceda". Además de la Resolución 183, la Conferencia de Plenipotenciarios de la UIT de Guadalajara aprobó el "Plan Estratégico de la Unión para 2012-2015" uno de cuyos objetivos estratégicos para el UIT-T es la "reducción de la brecha en materia de normalización: proporcionar apoyo y asistencia a los países en desarrollo en la reducción de la brecha en materia de normalización por lo que se refiere a asuntos relacionados con la normalización, infraestructuras y aplicaciones de las redes de información y comunicación, y los correspondientes materiales de capacitación para la creación de capacidades, teniendo en cuenta las características del entorno de las telecomunicaciones de los países en desarrollo". Este objetivo se refiere a la cibersanidad en el sentido de que la normativa técnica sobre cibersanidad tiene que adaptarse a las redes existentes en los países en desarrollo.

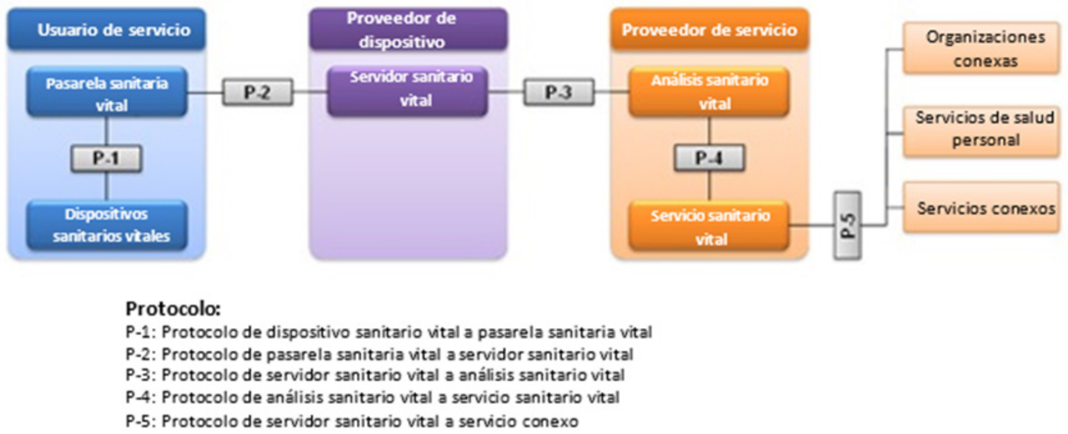
La Conferencia Mundial de Desarrollo de las Telecomunicaciones celebrada en 2010 en Hyderabad, también aprobó la Resolución 65 sobre "Mejora del acceso a los servicios de atención sanitaria utilizando las tecnologías de la información y la comunicación", en la que se encarga (a la Oficina de Desarrollo de las Telecomunicaciones) "que promueva la elaboración de normas de telecomunicaciones para la interconexión de redes de cibersalud con dispositivos médicos en el entorno de los países en desarrollo, junto con el Sector de Radiocomunicaciones y el Sector de Normalización de las Telecomunicaciones en particular".

Las Resoluciones, como las citadas, no son más que esbozos. El trabajo normalizador de la cibersanidad no tiene fin. El siguiente caso de estudio muestra la experiencia de Corea en la normalización de la cibersanidad. A continuación se resumen cuatro normas: (1) el Modelo de referencia para servicios sanitarios vitales destinado a la gestión de la salud personal; (2) el Modelo de referencia de seguridad de la información para servicios sanitarios vitales; (3) el Modelo de intercambio de historias clínicas basado en CCR- Parte 1: Definición y estructura; y (4) el Modelo de intercambio de historias clínicas de Corea – Parte 1: Definición y estructura.

3.. Modelo de referencia para servicios sanitarios vitales destinado a la gestión de la salud personal

[20]El objetivo de esta norma[21] es definir el "Modelo de referencia para servicios sanitarios vitales destinado a la gestión de la salud personal". Gracias a esta modelo de referencia se pueden crear aplicaciones coherentes y se logra la interoperabilidad en el desarrollo de servicios sanitarios vitales. En esta norma se describe el modelo de referencia para servicios sanitarios vitales, que está compuesto por un usuario de servicios sanitarios vitales, un proveedor de dispositivos y un proveedor de servicios. Cada uno de los componentes dispone de una unidad de procesamiento de datos y un protocolo de comunicación. En este documento se describen también los requisitos funcionales y las limitaciones del servicio sanitario vital. La creación de un modelo de referencia para servicios sanitarios vitales contribuye a minimizar la confusión que puede aparecer a lo largo de la creación del servicio. Esta norma puede contribuir a la creación de un sistema interoperable con una infraestructura de servicio común y una arquitectura normalizada para cada componente.

Figura 5: Modelo de referencia para servicios sanitarios vitales destinado a la gestión de la salud personal



4.. Modelo de referencia de seguridad de la información para servicios sanitarios vitales

En esta norma[22] se propone un "Modelo de referencia de seguridad de la información para servicios sanitarios vitales" para los servicios sanitarios que utilicen un registro vital. Para la prestación de servicios médicos y sanitarios personalizados, en esta norma se definen requisitos de seguridad y un modelo de referencia que reflejan la situación en que se basan actualmente los requisitos de seguridad. Para la introducción del modelo de referencia de seguridad de la información para servicios sanitarios que utilicen un registro vital, esta norma define la terminología, los requisitos de seguridad de un servicio sanitario vital y un modelo de referencia con todas las consideraciones en que se basan los requisitos de seguridad. Con la aparición en los últimos años de teléfonos inteligentes con cámaras y servicios en la nube de gran popularidad, el concepto de registro vital se ha ampliado a los dispositivos móviles y ponibles. Los estudios sobre el registro vital están avanzando rápidamente hacia la utilización de datos masivos, que contribuyen a registrar y almacenar hasta el más mínimo detalle de la vida cotidiana a partir de la correspondiente aplicación de registro vital. Se espera que los servicios sanitarios que utilizan registros vitales contribuyan a la aparición de un nuevo mercado de servicios médicos y a liderar el mercado de TIC sanitarias. Los registros vitales pueden ser beneficiosos para la salud o la práctica médica. Por ejemplo, la capacidad de medir los comportamientos del paciente puede facilitar el diagnóstico, mejorar la terapia y conducir a un cambio de estilo de vida

[20] Documento 2/233, "Development of e-health standards in Korea: Year 2014", República de Corea.
[21] TTAK.KO-10.0749, "Health Lifelog Service Reference Model for Personal Health Management", Telecommunications Technology Association (TTA), Corea, diciembre de 2014.
[22] TTAK.KO-10.0750, "Information Security Reference Model for Health Lifelog Service", TTA, Corea, diciembre de 2014.

saludable. La ingente cantidad de información obtenida de los sujetos podría utilizarse para mejorar los estudios médicos. Los científicos y empresas de todo el mundo se centran en las posibilidades y potencialidades sin límites que ofrece la tecnología de registro vital, por lo que están empeñándose en desarrollar servicios de atención sanitaria adaptados al usuario gracias a los datos de su registro vital. Esta norma puede contribuir al crecimiento de las industrias correspondientes y a la creación de nuevos mercados al sugerir la publicación de directrices claras sobre la aplicación de un modelo de referencia de protección de la privacidad a los servicios sanitarios adaptados al usuario, que utilizan los datos de su registro vital.

Figura 6: Modelo de referencia de seguridad de la información para servicios sanitarios vitales

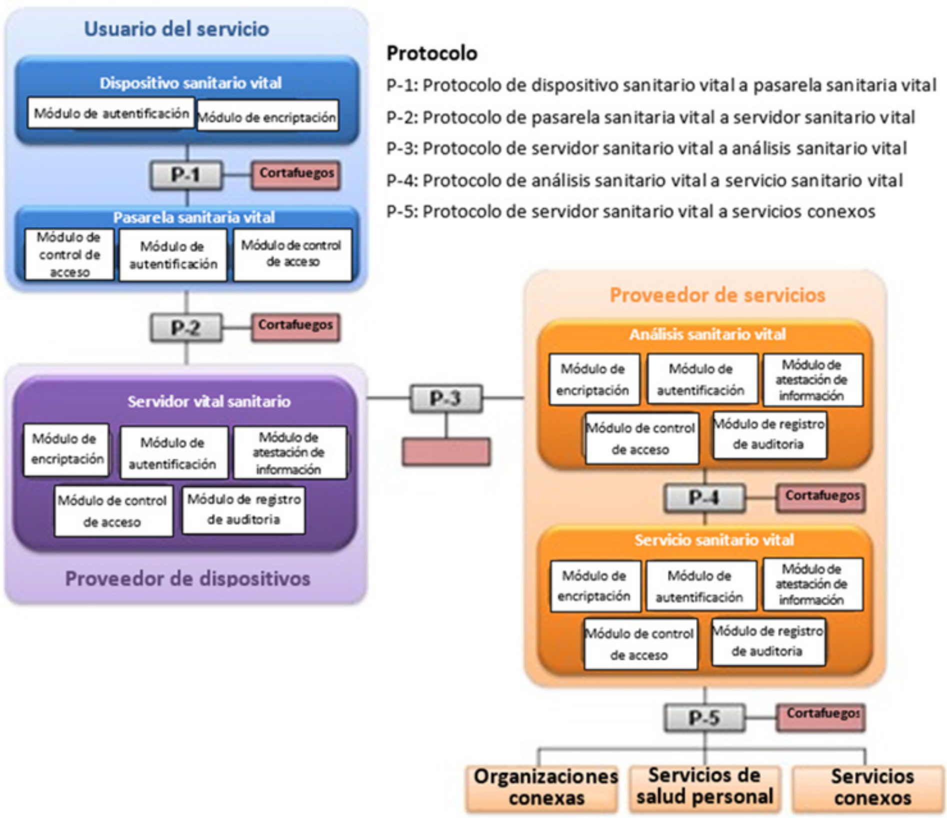
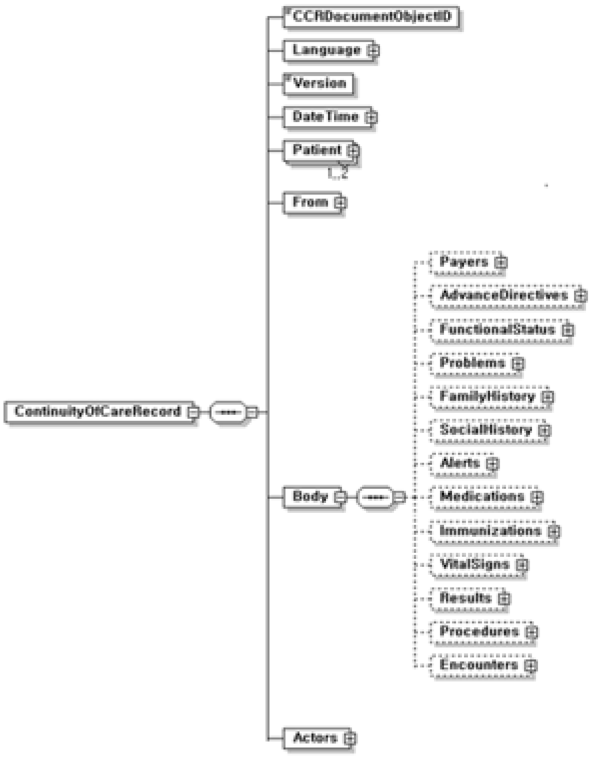


Figura 7: Estructura para el CCR



5.. Modelo de intercambio de historias clínicas basado en CCR

El objetivo de esta norma[23] es definir el Modelo de intercambio de historias clínicas basado en CCR[24] a fin de armonizar la aplicación de la norma y facilitar la interoperabilidad en el intercambio de historias clínicas. En esta norma se definen los principios básicos y la estructura del Modelo de intercambio de historias clínicas basado en CCR, además de los componentes normas y datos conexos, y se describen los requisitos para completar el modelo normativo. Además se dan ejemplos detallados de cada uno de los componentes. Esta norma contribuye a minimizar la confusión que puede causar el intercambio de historias clínicas generadas por instituciones de atención sanitaria con distintas estructuras; y a acelerar el desarrollo de las tecnologías necesarias, como los metadatos y la elevada utilidad de las historias clínicas. Además, gracias a la compatibilidad con el modelo de intercambio de historias clínicas establecido, se espera contribuir notablemente a la expansión de las industrias conexas.

6.. Modelo de intercambio de historias clínicas de Corea

El objetivo de esta norma,[25] "Modelo de intercambio de historias clínicas de Corea", es presentar un modelo de intercambio de diversos tipos de historias clínicas de la medicina coreana, suministrar tratamientos en colaboración, integrar la medicina en los servicios de cibersanidad y crear servicios de cibersanidad seguros y significativos, incluido el servicio de atención médica coreano, que podría implantarse masivamente en Corea. Para la introducción del modelo de intercambio de historias clínicas de Corea en la cibersanidad, esta norma define la terminología y la interoperabilidad de los servicios de cibersanidad, además de indicar los elementos que se han de tener en cuenta. La escala

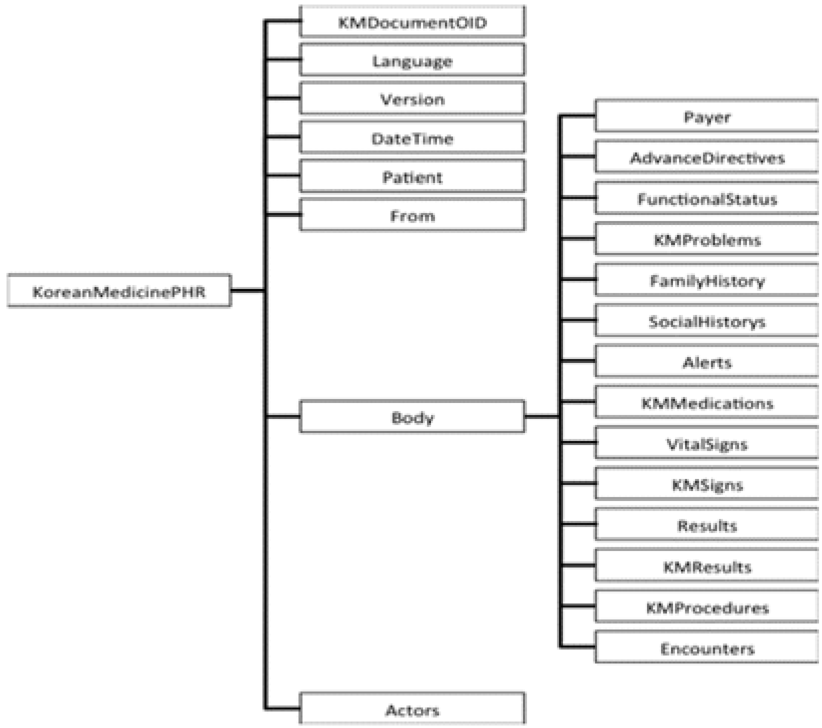
[23] TTAK.OT-10.0366, "CCR Based Personal Health Record Exchanging Model – Part 1: Definition and Structure", TTA, Corea, diciembre de 2014.

[24] ASTM E2369-05, "Standard Specification for Continuity of Care Record (CCR)", 2006.

[25] TTAK.OT-10.0365, "Korean Medicine Personal Health Record Exchanging Model- Part 1: Definition and Structure", TTA, Corea, diciembre de 2014.

de servicios cibersanitarios es amplia y compleja e incluye un amplio abanico de participantes, entre los que se cuentan el gobierno, los hospitales, las empresas de telecomunicaciones, los proveedores de servicios y los fabricantes. Para crear sinergias y facilitar la comunicación entre todos esos participantes, es fundamental que haya una normalización, además, cuando se integran los hospitales, clínicas y dispositivos sanitarios de medicina coreana, pueden ofrecerse más servicios. Sin embargo, estos servicios e información se han de procesar de manera diferente en función de la fuente de la información y de los datos que se han de compartir y comunicar. En este sentido, las normas pueden ayudar a comunicar y aumentar la eficacia de los servicios de atención sanitaria. Más concretamente, se ofrecerían ventajas tales como: (1) servicios más baratos, mejores y más coherentes para los pacientes, y (2) posibilidad de servicios más eficientes, más baratos y adaptados para los proveedores.

Figura 8: Estructura del Modelo de intercambio de historias clínicas de Corea



3. Normas de calidad de los servicios de cibersanidad

Cuando se habla de normas, resulta fundamental distinguir entre normas técnicas y normas para el suministro de atención sanitaria, es decir, normas de calidad.[26]

Desarrollar con éxito servicios de cibersalud requiere un alto grado de confianza entre personal sanitario, proveedores de servicios, usuarios y profesionales. En repetidas ocasiones se ha recordado esta necesidad a niveles nacionales e internacionales.

Una solución es elaborar un Código de práctica para servicios cibersanitarios global. Es una tarea ardua, pues tal Código debe servir de referencia para los servicios auxiliares a proveedores de servicios y usuarios y, así, fomentar las iniciativas nacionales y transfronterizas para superar las barreras que se oponen al desarrollo efectivo de los servicios cibersanitarios.

La Telecare Services Association (TSA) fue una de las primeras en intentar crear e introducir un código de este tipo. TSA es una organización sin ánimo de lucro que representa la mayor red industrial de

[26] Contribución de la Dra. Malina Jordanova, Instituto de Investigación Espacial, Academia de Ciencias de Bulgaria, Bulgaria, Vicerrelatora para la Cuestión 2/2.

este sector en Europa. Forman parte de ella más de 340 organizaciones, sobre todo procedentes de Reino Unido y de Europa. Los miembros de TSA son autoridades locales, arrendadores sociales registrados, proveedores de servicios de atención sanitaria públicos y privados, proveedores de tecnología privados, proveedores de telecomunicaciones e infraestructura que dan servicio a cerca de 1,7 millones de usuarios de servicios de telesalud y telecuidados, sobre todo en Reino Unido. TSA ha elaborado del Códigos:

El primero es el Código de Práctica de Telecuidados, inspirado por la gran expansión de la industria de telecuidados en Reino Unido. Esta industria interactúa e influye directamente en individuos vulnerables, ancianos o afectados por una enfermedad de larga duración. Dada la imperativa necesidad de normas estrictas para dar garantías a las personas que reciben los servicios, así como a sus familias y cuidadores, aunque también a los que prescriben el servicio, TSA dedicó tiempo y esfuerzo en elaborar el Código de Práctica. Este Código es el resultado de una amplia consulta con todos los interesados, incluidos departamentos gubernamentales ingleses y las administraciones de Escocia, Gales e Irlanda del Norte. El Código de práctica es un marco modular que cuenta con un módulo de proceso para cada uno de los componentes del servicio de telecuidados.

El Código de Práctica de Telesalud es el segundo código preparado por TSA, que se dedicó a ello en prioridad en 2011. TSA reunió a los miembros de su Foro de Telesalud, compuesto por líderes políticos y de opinión, proveedores de tecnologías y servicios, además de otros interesados, para determinar el alcance de una especificación de licitación. Ese grupo reconoció que, si bien hay normas de servicio que sólo pueden aplicarse a los telecuidados o a la telesalud, también hay una considerable cantidad de puntos comunes entre ambos servicios. Se llegó a la conclusión de que es necesario elaborar un Código de Práctica de Telecuidados y Telesalud plenamente integrado, donde al mismo tiempo se reconozcan los requisitos específicos de los telecuidados o la telesalud.

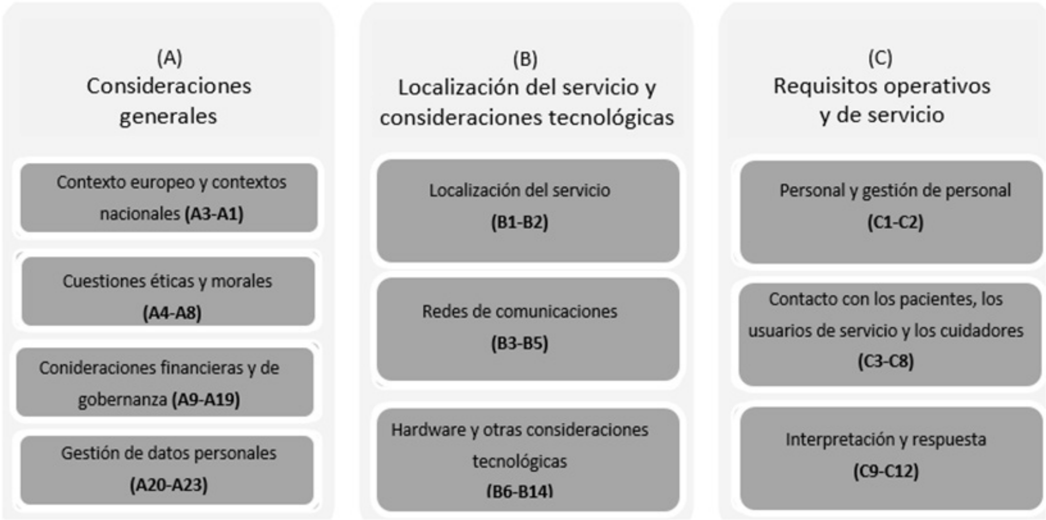
Puede encontrarse más información sobre los Códigos TSA en

http://www.telecare.org.uk/standards/telecare-code-of-practice.

La Unión Europea también tiene su Código de Práctica de Servicios de Telesalud. Fue creado por un consorcio de 13 socios de siete (7) Estados Miembros de la Unión Europea y el trabajo se enmarcó en el Programa de Acción Comunitaria en el ámbito de la salud (Contrato EAHC No: 2009 11 11) de la Comisión Europea (CE). El *Código de Práctica de Servicios de Telesalud para Europa* es la norma de referencia de servicios para proveedores de servicios y usuarios que promueve las iniciativas de la UE destinadas a crear confianza y eliminar obstáculos al desarrollo efectivo de servicios de telesalud en todos los Estados Miembros de la UE.

El proyecto de Código de Práctica Europeo de Servicios de Telesalud puede consultarse gratuitamente en http://telehealthcode.eu/project/documents.html. Este Código opta claramente por considerar que los servicios de telesalud pueden y deben ajustarse a las necesidades de todas las personas, independientemente de su edad, tanto en lo que respecta a su salud clínica como a su bienestar en general. En la **Figura 9** se muestran los aspectos más importantes del proyecto de Código, que se convierte en un marco orientador para los proveedores de servicios de telesalud de los 27 Estados Miembros de la Unión Europea y posiblemente en la referencia con respecto a la cual se podrán certificar y/o regular los servicios de telesalud.

Figura 9: Aspectos tratados en el Código de Práctica Europeo de Servicios de Telesalud



7.. Códigos de práctica de telesalud para los países en desarrollo

La preparación de un código de telesalud aplicable a los países en desarrollo no será tarea fácil, pues no sólo debe garantizar la confianza y la fiabilidad en la amplia implantación y utilización de los servicios de telesalud, sino también reflejar las tradiciones locales y los aspectos culturales y religiosos. Una posible solución sería esbozar en torno a los elementos citados los grandes principios en que se ha de basar tal código. Por ejemplo, podría adoptarse para la preparación del código el modelo de referencia-respuesta adoptado por TSA (**Figura 10**)[27]. Evidentemente, se han de incluir también los aspectos abarcados por el Código de Práctica Europeo de Telesalud[28]. Uno de esos principios es que cada país pueda adaptar fácilmente el Código a sus infraestructuras, servicios y necesidades nacionales en materia de telesalud.

[27] TSA Telecare Code of Practice, http://www.telecare.org.uk/sites/default/files/file-directory/Secure_COP_Documents/Telecare%20Code%20of%20Practice%20Executive%20Summary.pdf.

[28] Rudel D., Jenko T., Fisk M., Rose R. Telescope – Telehealth Services Code of Practice for Europe, Infor Med Slov: 2012; 17(1): 38-44).

Figura 10: Modelo referencia-respuesta de TSA

8.. Iniciativa m-Powering Development

La omnipresencia a nivel mundial de los teléfonos y redes móviles constituye la espina dorsal del mundo digital. Según los datos correspondientes a 2016, hay en el mundo más de siete mil millones de abonos a servicios móviles activos en todo el mundo, que ayudan a la gente a comunicarse diariamente. El crecimiento y la riqueza de la tecnología móvil son fantásticas herramientas de empoderamiento, pues mejoran el acceso a servicios sanitarios asequibles y de alta calidad en cualquier lugar y momento.

El Oficina de Desarrollo de las Telecomunicaciones de la UIT (BDT) creó en 2012 la Iniciativa m-Powering Development, que se diseñó para fomentar y facilitar la expansión a gran escala de las comunicaciones móviles para reducir la desigualdad y estimular el desarrollo socioeconómico, sobre todo en aquellas comunidades que carecen de todo tipo de servicios. La UIT pide a todos sus socios e interesados a adherirse a la Iniciativa y colaborar para crear nuevos servicios en beneficio de todos y, sobre todo, de los más desfavorecidos.

El soporte de la atención sanitaria es sólo uno de los aspectos de esta Iniciativa del que todos los países pueden beneficiarse. La Oficina de Desarrollo de las Telecomunicaciones coordina la Iniciativa con una Junta Asesora de expertos procedentes de los sectores público y privado.

La Iniciativa m-Powering Development está diseñada para crear un recurso y un plan de acción para la implantación de servicios de TIC, desde la salud-m, la enseñanza-m y la gobernanza-m hasta el comercio-m y el deporte-m, recortando al mismo tiempo los gastos y rediseñando, para mejor, la prestación de servicios públicos a muchos millones de personas y, en particular, a los habitantes de zonas rurales y distantes. La Iniciativa m-Powering Development ya ha identificado numerosos métodos concretos y ejemplos reales de todo el mundo que, posiblemente, podrían aplicarse en otros lugares.

La Iniciativa está en marcha y ya ha producido sus primeros recursos, como los Informes de la Iniciativa m-Powering Development de 2015 y 2016 y el Diálogo Político de Alto Nivel sobre Salud Digital, que se celebró en Ginebra, Suiza, en mayo de 2016 (http://www.itu.int/en/ITU-D/Initiatives/m-Powering/Pages/DigitalHealth.aspx), que contó con la presencia de ministros de Telecomunicaciones/TIC y Ministros de Sanidad, que pudieron intercambiar opiniones sobre cómo las políticas y la colaboración transectorial pueden fomentar la innovación en pro de la calidad, la igualdad y la accesibilidad de los servicios sanitarios con miras a la consecución del Objetivo de Desarrollo Sostenible "Garantizar una vida sana y promover el bienestar para todos en todas las edades" (ODS3). También participaron interesados del sector privado y organizaciones no gubernamentales tanto del sector de las telecomunicaciones/TIC como del sector sanitario. La Iniciativa m-Powering Development ya ha identificado una serie de iniciativas de salud-m/cibersanidad para la prevención, el diagnóstico y el tratamiento de enfermedades.

La Cuestión 2/2 también ha recibido numerosas contribuciones sobre la salud-m. En el **Anexo 7** presentan ejemplos de servicios listos para su implantación, así como las conclusiones de ciertos estudios que demuestran que hasta los servicios 2G con mensajería de texto bidireccional básica (SMS) pueden facilitar a los pacientes valiosos servicios de información y asesoría sobre cuidados infantiles, planificación familiar, etc. Incluidas en el Cuadro están también otras iniciativas muy avanzadas:

- Sistemas de teleconsulta abordables y apoyo al diagnóstico;
- Programas de ciberaprendizaje;
- Iniciativas específicas, como programas para dejar de fumar (véase el **Anexo 4**);
- Sistemas de notificación de brotes de enfermedades mediante redes móviles, etc. por sólo citar algunas.

En adelante: la Iniciativa m-Powering Development sugiere que podrían resultar útiles ciertas estrategias como dar a conocer masivamente las prácticas con resultados demostrados, emplear enfoques globalmente sistemáticos, y una mayor participación de gobiernos, ministerios, órganos de reglamentación, etc. La Iniciativa presta una especial atención al potencial que albergan los dispositivos móviles para aportar una importante contribución a la educación médica y el ciberaprendizaje en general, así como para facilitar el bienestar y la adopción de un estilo de vida saludable.

9.. Conclusiones

En este capítulo se esbozan algunos problemas básicos que se han de tener en cuenta al planificar o introducir servicios de cibersanidad, como los ecosistemas de cibersanidad y las normas técnicas y de servicio. Por limitaciones de longitud no se pueden tratar en este Informe todos los problemas, pero hay que mencionar, al menos, uno más: el enfoque hacia la implementación de la cibersanidad. La Cuestión 2/2 no ha dejado de estudiar este asunto, que se trata en el **Capítulo 3**.

2 CAPÍTULO 3 – Lecciones aprendidas de los países en desarrollo

En este capítulo se resumen las lecciones extraídas de las actividades realizadas por la Cuestión 2/2 y se dan algunos ejemplos de iniciativas que han obtenido un gran éxito y reportado grandes beneficios en los países en desarrollo. Por limitaciones de longitud se aconseja al lector consultar los anexos, donde puede encontrar más información y una lista de las experiencias de algunos países.

Las siguientes lecciones atañen a la política de atención sanitaria y los legisladores de los países en desarrollo:[29]

Lecciones generales

Lección 1: Terminología – Hay una evidente necesidad de adoptar una terminología normalizada

Hasta en las contribuciones a la Cuestión 2/2 se utilizan distintos términos para un mismo servicio. La utilización de una terminología normalizada contribuirá a la coherencia y solidez de la comunicación y la documentación de todas las partes involucradas en los servicios de cibersanidad.

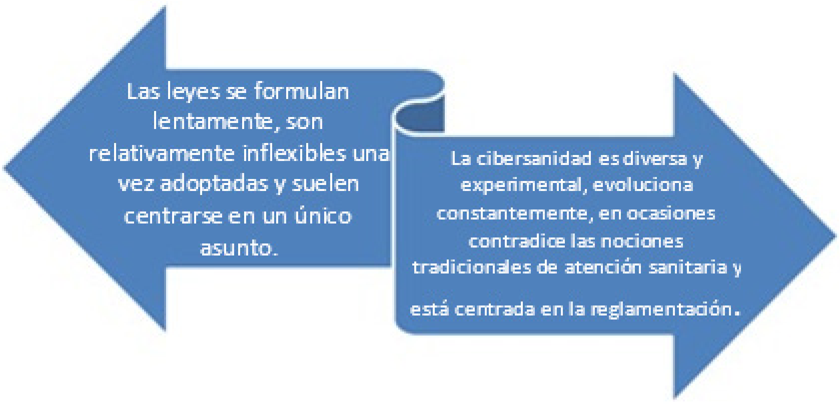
Lección 2: el establecimiento de contactos y el intercambio de información a todos los niveles posibles – local, nacional, mundial – son básicos para el éxito de la adopción de la cibersanidad

No hay que reinventar la rueda. Hay una gran cantidad de experiencias e información, de casos de éxito y de fracasos, además de personas de los que aprender. El intercambio de conocimientos es importante para la implantación efectiva de la cibersanidad.

Lección 3: Desarrollo de una política de cibersanidad sostenible

La adaptación de las leyes nacionales a los métodos de trabajo modernos es una tarea que lleva tiempo. En la **Figura 11** se muestra por qué es necesaria tal adaptación.

Figura 11: Necesaria adaptación de las leyes nacionales a los métodos de trabajo modernos



Los legisladores y entes decisorios locales y nacionales deben prestar más atención a las soluciones políticas a largo plazo y evitar adoptar decisiones cuya efectividad sea de corta duración. Se ha de prestar una especial atención a lo siguiente:

– Financiación inadecuada y carencia de conocimientos de TIC a todos los niveles del sistema de atención sanitaria. Para empezar es fundamental adaptar los programas docentes de medicina a

[29] Contribución: L. Androuchko[1], M. Jordanova[2], I. Nakajima[3], [1]Universidad Internacional de Ginebra, Dominic Foundation, Suiza, Vicerrelator para la Cuestión 2/2; [2]Instituto de Investigación Espacial, Academia de Ciencias de Bulgaria, Bulgaria, Vicerrelatora para la Cuestión 2/2, [3]Universidad de Tokai, Facultad de Medicina, Japón, Relator para la Cuestión 2/2.

la nueva realidad e incluir más cursos de TIC, cibersanidad y telesalud. Las soluciones de código abiertos pueden resultar especialmente interesantes como aplicaciones de software rentables.

- Encontrar soluciones de facturación y reembolso locales, pues sin ese estímulo no pueden implantarse ampliamente servicios de cibersanidad sostenibles.
- También se han de estudiar cuidadosamente y tener en cuenta las licencias y el ámbito de práctica (norma de cuidados).
- Una de las principales funciones de las autoridades es definir con antelación el marco político de la implantación y el desarrollo de la cibersanidad.

Lección 4: La fuerte implicación del gobierno a través de un plan rector de cibersanidad y/o la aplicación de la Herramienta para una estrategia nacional de cibersanidad de la UIT-OMS son requisitos fundamentales del éxito

Además, nunca hay que olvidar que la atención sanitaria es un asunto local, es decir, que la prestación siempre tiene lugar en un entorno local o regional y que recae en las autoridades locales la responsabilidad última de promocionar la cibersanidad. Por otra parte, las unidades administrativas más pequeñas (locales) pueden responder más rápidamente y con mayor flexibilidad a las demandas de cibersanidad de sus administrados. De este modo se garantizará que los servicios de cibersanidad implantados responden directamente a las necesidades de la población. También las autoridades regionales pueden con facilitad (en comparación con la administración nacional) propiciar la pronta implicación de los profesionales sanitarios y de todos los demás interesados en las fases de planificación y desarrollo de la implantación de la cibersanidad.

Lecciones sobre organización

Lección 5: la elección del método adecuado, en el que participen los legisladores locales, y la coordinación son vitales para que la adopción de la cibersanidad sea un éxito

Lección 5.1: es fundamental elegir el método de implantación de la cibersanidad correcto.

Pueden adoptarse dos métodos distintos. El primero es el método "de general a concreto", que se centra en la elaboración de políticas, procedimientos, reglamentos y directrices para ayudar a los entes decisorios. El segundo es el método "de concreto a general", que parte de los más afectados por los problemas y pretende lograr inductivamente un consenso y elaborar recomendaciones y políticas. Elegir un método dejando totalmente de lado el otro no es la mejor estrategia.

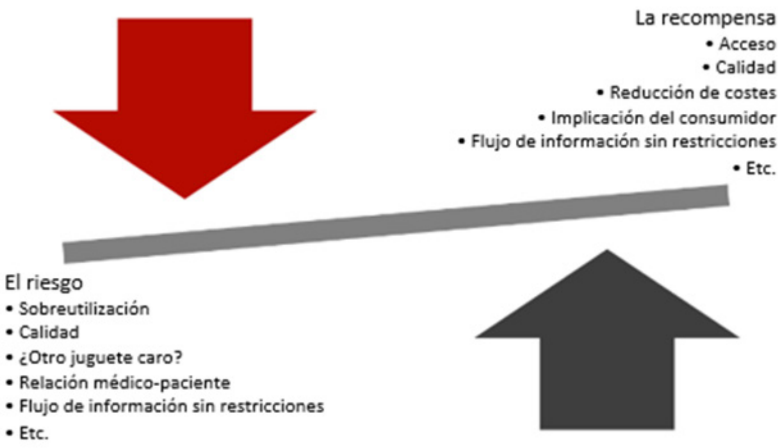
No hay que olvidar que no todo el trabajo corresponde al gobierno. El método de general a concreto tiene sus beneficios, pero también los tiene el de concreto a general. La estrategia más favorable es encontrar el equilibrio entre ambos, y esa responsabilidad es de4 las autoridades locales. La experiencia revela que los legisladores de los países en desarrollo, sean del nivel que sean, incluso regional y local, pueden propiciar, fomentar y ayudar en la implantación de la cibersanidad, pero siempre de manera equilibrada.

En la **Figura 12**[30] se ilustra la necesidad del equilibrio político. Un apoyo político de general a concreto equilibrado contribuirá a que la atención sanitaria sea más sostenible gracias a la generalización de la cibersanidad, lo que a su vez:

- ofrecerá un medio alternativo de prestar atención sanitaria;
- garantizará un acceso mejor y más equitativo;
- utilizará más eficaz y efectivamente los recursos existentes.

[30] Struck K. et al. Telehealth: Implementation Challenges in an Evolving Dynamic, http://www.mwe.com/files/Uploads/Documents/Events/Digital-Health-Webinar-Series-Telehealth-041415.pdf.

Figura 12: el equilibrio político según



Lección 5.2: la selección de la tecnología (hardware y software, ancho de banda de red disponible, técnicas móviles y/o inalámbricas) es un reto importante y tomar las decisiones correctas puede predefinir el éxito o el fracaso de la implantación de la cibersanidad.

Lección 5.3: es fundamental prestar una atención especial a las repercusiones inmediatas del servicio en los usuarios.

Lección 5.4: la gestión y el soporte son fundamentales para pasar de la fase piloto a la amplia implantación de los servicios de cibersanidad. Ambos pueden recaer en las autoridades nacionales o locales.

Lección 5.5: también pueden revelarse extremadamente útiles las asociaciones público-privadas. (Véase, por ejemplo, el cuadro "Compendium of ready to implement eHealth services" correspondiente al Himalaya indio en este Informe).

Privacidad, seguridad, normas

Lección 6: Es obligatorio elaborar una política de cibersanidad y aplicar las normas correspondientes

El acceso a una infraestructura de comunicaciones y la privacidad y seguridad de los datos y servicios son importantes, pero las normas y documentos jurídicos llevan mucho tiempo de preparar. Sin embargo, es obligatorio utilizAnnexesar las normas, pues ellas garantizarán la interoperabilidad en fases posteriores de la implantación de la cibersanidad. El gobierno debe participar obligatoriamente en la elaboración de las políticas y la aplicación de las normas.

En cuanto a las normas, ya sean técnicas o relativas a la calidad del servicio, no es necesario reinventar la rueda. Aprender de los demás ahorrará tiempo, dinero y esfuerzo.

En el resto de este capítulo se resumen algunos modelos operativos de servicios de cibersanidad ya elaborados y aplicados (o en fase de aplicación) en algunos países en desarrollo.

1. Desarrollo e instalación de una estación móvil de telemedicina en las zonas afectadas por catástrofes en Argentina

El acceso a la atención sanitaria es uno de los derechos humanos más importantes y es una de las responsabilidades insoslayables de los Estados y sociedades garantizar ese acceso a la comunidad a fin de lograr y preservar su bienestar.[31,32,33] Sin embargo, la desigualdad a la hora de acceder a servicios sanitarios de calidad sigue siendo una de las características definitorias de los países de América Latina y el Caribe, así como de otros muchos países en desarrollo de todo el mundo[34]. Resulta urgentemente necesario elaborar herramientas que permita la aplicación de políticas sanitarias que propicien que las poblaciones geográfica y socioeconómicamente aisladas puedan disfrutar de una atención sanitaria de alta calidad.[35]

La iniciativa que aquí se presenta fue motivada por las catástrofes naturales que devastaron América durante el primer semestre de 2010,[36,37] a saber, los terremotos de Haití y Chile, los corrimientos de terreno de Bolivia y Río de Janeiro, Brasil, el desbordamiento de ríos en Machu Picchu, Perú, y el norte de Argentina, las inundaciones y corrimientos de terreno en Guatemala, El Salvador y Honduras, y los huracanes que afectaron repetidamente a la zona del Caribe. Todas estas catástrofes revelaron la fragilidad de los planes de asistencia médica, no sólo cuando se interrumpe o fragiliza la comunicación, sino también cuando esa asistencia se ha de prestar en regiones aisladas.

Otra fuente de inspiración fueron los trabajos y opiniones que el Prof. Marcelo Petrich (primer Presidente de la Fundación Era Digital)[38] expuso en el libro La Telesalud en las Américas: "La aspiración de todos los que han participado en este proyecto es que esta publicación contribuya positivamente al desarrollo de la telesalud en las Américas, consolidando el compromiso para con una reforma del sector sanitario basada en la solidaridad".[35] Esto nos permite analizar el nivel de evolución de estas tecnologías en nuestras regiones y entender la fuerza que la UIT insufló a esas soluciones.

Pero, más allá de esas circunstancias previstas a la vez que impredecibles, el objetivo último del desarrollo de nuevas tecnologías debe ser el de reducir la desigualdad en el acceso a la atención sanitaria certificada, que deja patente la realidad que viven diariamente esos países. La telesalud contribuye a reducir la brecha digital.

10.. Objetivos

Una base de telemedicina transportable que pueda emplearse en caso de catástrofe natural y facilitar atención médica especializada en zonas geográficas distantes debe cumplir los siguientes requisitos:

- conectividad en cualquier lugar y sean cuales sean las circunstancias;
- portabilidad terrestre, aérea y fluvial;
- alimentación eléctrica autónoma;
- versatilidad de los periféricos médicos para ajustarse a cada situación;
- sostenibilidad del personal científico-académico especializado en medicina;
- adaptabilidad a las políticas sanitarias locales y a la realidad económica regional;
- implementación a costo reducido.

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31 Sra. Natacha Dinsmann, Universidad Nacional de Rosario, Facultad de Ciencias Médicas, República Argentina.

32 Asamblea General de las Naciones Unidas: Declaración Universal de los Derechos Humanos, Resolución 217 A (III). París, 10 de diciembre de 1948.

33 Organización de Estados Americanos, Comisión Interamericana de Telecomunicaciones (CITEL): La Telesalud en las Américas: Unión Internacional de Telecomunicaciones (2003).

34 Organización Panamericana de la Salud; Declaración de Buenos Aires: Hacia una estrategia de salud para la equidad, basada en la atención primaria, Buenos Aires, 17 de agosto de 2007.

35 Comisión Económica para América Latina y el Caribe: propuesta de agenda regional sobre población y desarrollo en América Latina y el Caribe después de 2014. Conferencia Internacional sobre Población y Desarrollo en América Latina y el Caribe después de 2014. Montevideo, 13 de agosto de 2013.

36 Fernandez A, Oviedo E.: publicación de las Naciones Unidas LC/L.3252: Salud electrónica en América Latina y el Caribe: avances y desafíos. Naciones Unidas, Santiago, Chile, Julio de 2011.

37 Guha-Sapir D, Vos F, Below R, Ponserre S: Annual Disaster Statistical Review 2010: The Numbers and Trends. Bruselas: CRED; 2011. Disponible en línea en http://www.cred.be/sites/default/files/ADSR_2010.pdf.

38 Acuerdo de colaboración entre la Facultad de Ciencias Médicas y la Fundación Era Digital.

11.. Diseño del proyecto

El plan preveía la creación de un consorcio para la colaboración entre universidades nacionales, ONG y empresas privadas, bajo los auspicios de organizaciones internacionales, para abordar los distintos aspectos de la construcción, explotación y conectividad de la estación móvil de telemedicina y aportar también soluciones académicas. Se llevaron a cabo sucesivamente las siguientes fases: (a) construcción de un contenedor ágil, práctico y transportable; (b) selección y adaptación de los periféricos médicos; (c) creación de una unidad de información, del software y de los sistemas auxiliares; (d) selección de los protocolos de conectividad de medios y por satélite; (e) designación de los profesionales académicos que prestarían asistencia especializada a distancia; (f) pruebas de operabilidad del equipo en condiciones extremas; (g) presentación y demostración en eventos científico-tecnológicos nacionales e internacionales y al público en general por los medios de comunicación; (h) instalación del primer prototipo en una zona víctima de catástrofes necesitada de ayuda sociosanitaria.

12.. Resultados

1... Consorcio de colaboración

El consorcio se formó a partir de la conclusión de acuerdos entre la Facultad de Ciencias Médicas de la Universidad Nacional de Rosario (FCM-UNR), la Fundación Era Digital y EXO S. A. El proyecto contó con el apoyo y el patrocinio de la Red de Telesalud de las Américas[39,40] de la Comisión Interamericana de Telecomunicaciones de la Organización de Estados Americanos (CITEL-OEA) y de la Secretaría de Comunicaciones y el Ministerio de Defensa del Gobierno de Argentina.

2... Creación de la Estación de Telemedicina Móvil (ETMo)

La última versión (Versión 2.0 – WiP/diciembre de 2013) de la estación de telemedicina móvil está compuesta de varios módulos que el usuario puede seleccionar para su incorporación efectiva en el contenedor:

- Módulo de telemedicina básico: se compone de una estación de trabajo con un monitor de 14”, teclado y ratón Bluetooth, encaminador de comunicaciones, software de telemedicina específico, cableado e integración;
- Modulo cardiorrespiratorio: se compone de un monitor de constantes vitales, tensiómetro, electrocardiógrafo de 12 electrodos, espirómetro digital y estetoscopio digital;
- Módulo de imagen: se compone de una cámara para la exploración superficial, un transductor de ultrasonido, una mesa de luz y un microscopio de luz directa (optativo);
- Periféricos médicos digitales: luz blanca, dermatoscopio, oftalmoscopio, otoscopio y laringoscopio;
- Alimentación eléctrica: paneles solares desplegables, baterías, generador eléctrico;
- Conexión por satélite optativa;
- Contenedor de transporte: baúl para el almacenamiento del equipo de telemedicina con ruedas y convertible en mesa de trabajo.

A la hora de construir el contenedor se tuvieron en cuenta todos los instrumentos, ordenadores y monitores que debían integrarse, así como las necesidades de conexión. Para la selección del equipo médico se tuvo en cuenta su versatilidad, conectividad, compatibilidad, origen y costo. Se dio prioridad a la eficacia, la accesibilidad y la asequibilidad, habida cuenta de que el objetivo es que

[39] Comisión Interamericana de Telecomunicaciones. OEA: Resolución CCP1, Creación de la Red de Telesalud de las Américas. Resolución PCC.I/RES.152 (XIV- 09).

[40] Comisión Interamericana de Telecomunicaciones. OEA: Resolución CCP1, Denominación de la Red de Telesalud de las Américas. Resolución PCC.I/DEC.133 (XIX-11).

esta estación de telemedicina pueda utilizarse en emplazamientos distantes y en regiones con bajos ingresos (**Figura 12**).

3... Personal médico

A partir de una lista de profesores de la FCM-UNR y de Jefes de servicios especializados de hospitales relacionados con la Universidad[41] se escogió un grupo de expertos en la mayor parte de disciplinas y especialidades médicas con experiencia reconocida en diagnóstico, gestión y tratamiento de las distintas situaciones que pueden dares en las muy diferentes circunstancias en las que pueden ser necesarias las ETMo.

4... Operabilidad del sistema

Para probar el funcionamiento de la ETMo en condiciones extremas, un grupo de médicos y técnicos se trasladó a la región más meridional del mundo transportando el contenedor con el equipo de telemedicina en un vuelo regular a la ciudad de Ushuaia en la provincia de Tierra del Fuego, Argentina, con ayuda de la Secretaría de Comunicaciones de Argentina. A su llegada, el grupo y el equipo continuaron viaje por tierra con diversos vehículos a tracción hasta la bahía Lapataia, donde en invierno las temperaturas son de varios grados bajo cero, no hay carreteras ni ciudades cercanas y donde no se dispone de alimentación eléctrica o conectividad a Internet (**Figura 13** y **Figura 14**).

Se estableció una conexión multipunto por satélite con una base en la ciudad de Ushuaia, donde se reunieron representantes de la CITEL y delegados del Comité Consultivo Permanente: Telecomunicaciones/TIC (PCC.I) de distintos países de la OEA[42], así como con la célula de crisis de la Red de Telesalud de las Américas, situada en la FCM-UNR en Rosario. Durante la prueba pudieron transmitirse diversas señales de audio e imagen de un paciente ficticio con los distintos periféricos médicos y se recibieron las respuestas en tiempo real del grupo de expertos y los comentarios de los demás espectadores.

Figura 13: El primer prototipo de ETMo instalado en Rosario, Argentina, en 2010

[41] Designación de los especialistas y expertos para el programa de segunda opinión médica. Rosario, FCM, 2010.

[42] Comisión Interamericana de Telecomunicaciones. OEA: Décimosexta reunión del CCP.I, Ushuaia, Argentina, 11-14 de mayo de 2010.

Figura 14: Prueba de la ETMo en la bahía Lapataia, Ushuaia, Tierra del Fuego, Argentina

5... Presentación del equipo y divulgación de la iniciativa

La estación de telemedicina móvil se dio a conocer a nivel nacional e internacional con gran cantidad de material gráfico y audiovisual publicado por la CITEL y su Red de Telesalud de las Américas.[43,44,45] Gracias a la reciente adhesión de la Universidad Nacional de Rosario a la UIT en calidad de Institución Académica Asociada, se prepare la presentación de este proyecto ante la Comisión de Estudio 2 del UIT-D a fin de darlo a conocer como mejor opción disponible para su utilización en los países en desarrollo.

6... Instalación y encargo del primer prototipo

A principios de 2014, el Ministro de Defensa argentino[46] fue testigo de la instalación de una estación de telemedicina transportable en Puerto Príncipe, Haití (**Figura 15**). Este equipo se diseñó especialmente para ajustarse a las necesidades de asistencia médica en caso de catástrofe natural y en situaciones extremas, permitiendo así solicitar una segunda opinión médica a cualquier centro del mundo. La ETMo fue una donación de la Facultad de Ciencias Médicas de la Universidad Nacional de Rosario y la Fundación Era Digital al Hospital Móvil Reubicable (HMR) de Argentina. El HMR es la única instalación médica de segundo nivel en Haití y está operado por miembros de las Fuerzas Armadas de Argentina que integran la misión de paz que llevan a cabo las Naciones Unidas en el país caribeño desde 2004. Las teleconferencias entre el Director del HMR en Haití y el personal médico auxiliar de la FCM-UNR en Rosario se iniciaron formalmente en marzo de 2014.

En la **Figura 15** puede verse al Ministro de Defensa de Argentina, Sr. Agustí Rossi, durante la instalación de la ETMo en Puerto Príncipe, Haití, en 2014

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43 Telam: Estación de telemedicina transportable. Telam Audiovisual 2010. Disponible en línea en: http://www.youtube.com/watch?v=lxsHzjdRGYg.

44 TN Ciencia: ETMo y telemedicina. Disponible en línea en: http://www.youtube.com/watch?v=vrwn0W2qr0Q.

45 Aen: Telemedicina móvil. Disponible en línea en: https://www.youtube.com/watch?v=06gB4zpt0w4.

46 Rossi A.: Debemos trabajar para que América Latina disminuya la desigualdad social. InfoNews, 26 de febrero de 2014.

Figura 15: Instalación de la ETMo en Puerto Príncipe, Haití, en 2014

Figura 16: Portada de la publicación “Telesalud en las Américas” de la CITEL, con el apoyo de la UIT y la Organización Panamericana de la Salud

Figura 17: Equipo interdisciplinario de la Universidad Nacional de Rosario (Argentina)

7... Consecuencias

El diseño, la construcción, el transporte y la instalación de una estación de telemedicina móvil creada en América Latina realza cuán importante es que los sectores público y privado aúnen esfuerzos para lograr objetivos transcendentales para la comunidad.

En la **Figura 18** puede verse al equipo interdisciplinario de la Universidad Nacional de Rosario que llevó a cabo el proyecto: el Profesor Marcelo Petrich muestra el dispositivo al ex-Decano de la FCM, Dr. Carlos Crisci, el Decano de la FCM, Dr. Miguel Farroni y la Profa. Natacha Dinsmann, Directora del Área de Informática y Telesalud, con estudiantes haitianos que viven en Rosario, cuando se implantó la ETMo en Puerto Príncipe.

Figura 18: El equipo interdisciplinario de la Universidad Nacional de Rosario cuando se implantó la ETMo en Puerto Príncipe

La iniciativa para la creación del dispositivo que aquí se presenta surgió en respuesta a la fragilidad demostrada por el sistema de atención sanitaria en situaciones como las causadas por las catástrofes naturales. Así, la primera ETMo, aun siendo portable y disponer de conectividad y alimentación eléctrica, sólo contenía dispositivos médicos adaptados a las situaciones de emergencia.

Sin embargo, la realidad geográfica y socioeconómica de América Latina y el Caribe, común a muchos otros países en desarrollo de todo el mundo, ofrece múltiples oportunidades de utilización generalizada de estaciones de telemedicina móviles. Es indudable que llevará a un acceso más equitativo a la atención sanitaria de alta calidad en cualquier circunstancia. Por este motivo el segundo prototipo de ETMo contiene también un sistema modular que permite adaptar la composición del equipo a las necesidades específicas, tanto de orden socioeconómico, como geográfico. De este modo, la activa incorporación de las estaciones de medicina en las estrategias de atención sanitaria primaria aumentará las posibilidades de consultar segundas opiniones, reduciendo además los costos reales al eliminarse los traslados al hospital, tanto de médicos como de pacientes, y contribuirá a evitar la superpoblación en los centros hospitalarios.

Por otra parte, la participación de profesionales y trabajadores de la industria nacional permitió producir tan útil dispositivo a un costo razonable para los países en desarrollo, lo que es fundamental para la aplicación de las políticas de sanidad universal.

8... Perspectivas

La velocidad a la que progresan la tecnología médica, la informática y las telecomunicaciones hace necesario seguir Adelante con este proyecto colaborativo e ir incorporando esos avances a fin de mejorar el rendimiento y la adaptabilidad de la ETMo a futuras situaciones.

Por último, hay que decir que este equipo no es un producto comercial aislado, sino un sistema plenamente integrado que trabaja en relación con personal médico académico. Es urgente crear en América Latina y en otros muchos países en desarrollo Escuelas de Medicina y Hospitales Universitarios que ofrezcan la red docente y de investigación global necesaria para prestar asistencia a los médicos que no residen cerca de centros urbanos. La ETMo puede ser una herramienta adecuada para conseguir ese objetivo.

2. Telemedicina ambulatoria, el Artículo 44 de la Ley de técnicos de salvamento de emergencia y el Artículo 20 de la Ley de ejercicio de la medicina de Japón

13.. Objetivo

El estudio de caso de Japón adopta diversos enfoques jurídicos para analizar el riesgo actual que implica ofrecer consejo médico a los vehículos de emergencias y al mismo tiempo abordar un problema implícito: cómo ofrecer ese consejo médico en virtud el Artículo 21 de la Ley básica de establecimiento de una sociedad conectada basada en la información y las telecomunicaciones avanzadas.[47]

14.. Antecedentes

Si un AED con inteligencia artificial determina que un electrocardiograma pasa de plano a fibrilación ventricular en el caso de un paciente resucitado con éxito, se administra una descarga eléctrica en el pecho del paciente. Sin embargo, en determinados casos, los pacientes desfibrilados en una ambulancia se quejarán de dolor más adelante, posiblemente porque la descarga se aplica automáticamente, aun cuando el paciente mantiene ciertos niveles de actividad cardiaca y riego cerebral. Guiado por la inteligencia artificial, el desfibrilador de la ambulancia aplica al potencial eléctrico un aFFT para analizar el espectro de frecuencias y administra el tratamiento cuando la frecuencia supera un nivel especificado (que el desfibrilador interpreta como fibrilación ventricular). También puede interpretarse que el rsultado indica taquicardia ventricular. Cabe señalar que no hay criterios de diagnóstico universalmente aceptados para este caso. Si el paciente se queja de dolor, o la la inteligencia artificial ha confundido la taquicardia ventricular con la fibrilación ventricular, a pesar de haber actividad cardiaca, o la fibrilación ventricular se ha convertido en taquicardia por sí sola. Dado que los pacientes con fibrilación ventricular rara vez vuelven a la normal con tanta rapidez, la segunda explicación es poco probable. Este tipo de problemas ponen de manifiesto las limitaciones de la inteligencia artificial en ausencia de un médico que examine al paciente en persona.

15.. Argumentación

El ámbito de actividad de los técnicos de emergencias está determinado por el Artículo 21 del Reglamento de aplicación de la Ley de técnicos de salvamento de emergencias y por los decretos correspondientes del Ministerio de Sanidad, Trabajo y Bienestar. El personal médico no siempre está presnte (en realidad, rara vez lo está); en la mayoría de los casos, los técnicos de emegencias deben recibir las instrucciones por teléfono. Tales condiciones exigen del personal médico que den instrucciones concretas para pacientes a los que nunca han examinado, basándose únicamente en lo que se les cuenta. En opinión del autor, tal proceder no es conforme con el Artículo 20 de la Ley de ejercicio de la medicina, que prohíbe a los médicos tratar a pacientes sin haberlos evaluado en persona. Se puede razonablemente dudar de que un técnico de emergencias, cuya educación médica consiste en apenas 250 horas de clases teóricas y una visita a un centro médico de urgencias, pueda realmente asumir el lugar del médico. El autor considera que las telecomunicaciones de banda ancha pueden ayudar a resolver este problema. El Artículo 21 de la Ley básica de establecimiento de una sociedad conectada basada en la información y las telecomunicaciones avanzadas parece señalar a la creación de un entorno de telecomunicaciones móviles de banda ancha que permita la supervisiónd e los pacientes en las ambulancias. El actual sistema de telecomunciaciones móviles, que no permite transmitir grandes volúmenes de datos desde la ambulancia al médico, no satisface el Artículo 21 de la Ley. El Gobierno japonés deja el desarrollo de la infraestructura móvil en manos del sector privado, que se rige por el principio de libre competencia o de mayor rentabilidad (es decir, desarrollar infraestructuras sólo en las zonas urbanas rentables y no en las zonas rurales). Las redes móvile spúblicas del sector privado tienen limitaciones de cobertura. La tasa de llamadas cortadas ha aumentado desde el terremoto, debido a la congestión. Se ha limitado la accesibilidad. Depender de empresas del sector privado que se rigen por la ley de mercado para ofrecer telecomunicaciones móviles destinadas al tratamiento médico de emergencia y en caso de catástrofe sugiere que el gobierno nacional no es plenamente consciente de la importancia de la gestión de riesgos.

[47] Nakajima, I. & Tomioka Y. (2009). *Aspects of Information Communications Technology for Better Medical Control*. International J. of eHealth & Medical Communications. 1(1), 18-27 e Isao Nakajima, Universidad de Tokai, Escuela de Medicina, Japón, Relator para la C2/2, Jh1rnz@aol.com; js2hb@ets8.jp.

16.. Conclusión

En virtud del Artículo 21 de la Ley básica de establecimiento de una sociedad conectada basada en la información y las telecomunicaciones avanzadas y del Artículo 44 de la Ley de técnicos de salvamento de emergencias, el Gobierno japonés está obligado a movilizar a los sectores público y privado para que colaboren en la creación de un entorno de telecomunicaciones móviles de banda ancha que permita realizar consultas médicas a distancia.

3. Ciberred Panafricana para la Teleformación y la Telemedicina de India

Proporcionar a los ciudadanos medios educativos adecuados y una atención de la salud asequible son dos preocupaciones importantes en muchos países en desarrollo.[48] Las mejoras tecnológicas en términos de infraestructura de comunicación para ofrecer una educación de calidad y atención sanitaria de manera uniforme, a lo largo y ancho del país, son un factor clave para el progreso de cualquier país. Los esfuerzos destinados a proporcionar educación y atención sanitaria desde las zonas urbanas/países desarrollados con recursos a las zonas distantes/rurales inaccesibles han obtenido resultados fructíferos en términos del éxito de unos servicios de calidad prestados de manera oportuna y rentable.

Inspirado por los avances en la formación médica y en materia sanitaria gracias a las tecnologías de la información y la comunicación, el antiguo Presidente de India, Dr. A. P. J. Abdul Kalam, en la sesión inaugural del Parlamento Panafricano, celebrada el 16 de septiembre de 2004, propuso en su discurso conectar a todas las naciones de la Unión Africana mediante una red de satélite y fibra óptica que facilitase efectivamente la comunicación para la prestación de servicios de teleformación, telemedicina, Internet, videoconferencias y VoIP, así como de cibergobierno, comercio electrónico, información y entretenimiento, localización de recursos, meteorología, etc.

[48] Anil Prakash, ITU-APT Foundation of India, India; Rakesh Kuman Bhatnagar, TEPC &- Presidente, CE del UIT-T, ITU-APT Foundation of India, Vicerrelator para la Cuestión 2/2.

Figura 19: Ciberred panafricana

Siguiendo la iniciativa del Ministerio de Asuntos Exteriores del Gobierno de India procedió a crear una ciberred que ahora se denomina Ciberred panafricana. El proyecto Ciberred panafricana está financiado por el Gobierno de India con un costo presupuestado aprobado de 5 429 millones INR, es decir, unos 117 millones USD. Se nombró a Telecommunications Consultants India Limited (TCIL) organismo ejecutor principal con la función de diseñar la red, adquirir e instalar los equipos y ocuparse de la operación y el mantenimiento y soporte durante 5 años tras la implantación de la red en cada país. Gracias a una extensión de 2 años, a mediados de 2016 todavía se prestaba ese servicio.

Ya se prestan a través de esta red servicios regulares de telemedicina y teleformación. En la actualidad, desde los hospitales súper especializados de India se pasa consulta de telemedicina en países africanos cuando surge la necesidad. Además, desde el 22 de abril de 2009 12 hospitales súper especializados de India imparten sesiones de Formación continua en medicina.

17.. Elementos conectados mediante la red

1) **India**

   a) Un centro de datos en TCIL Bhawan, Nueva Delhi (donde se centralizan todos los sitios y hospitales súper especializados de India);

   b) Teleformación en 5 Universidades/Instituciones docentes;

   c) Telemedicina en 12 hospitales súper especializados.

4) **África**

   a) Estación terrena central de satélite en Dakar, Senegal;

   b) Universidades regionales punteras;

   c) Hospitales súper especializados regionales;

d) Centros docentes para la teleformación, uno en cada uno de los países con que se ha concluido un Memorando de Entendimiento (MoU);

e) Hospitales de atención telemédica, uno en cada uno de los países con que se ha concluido un MoU.

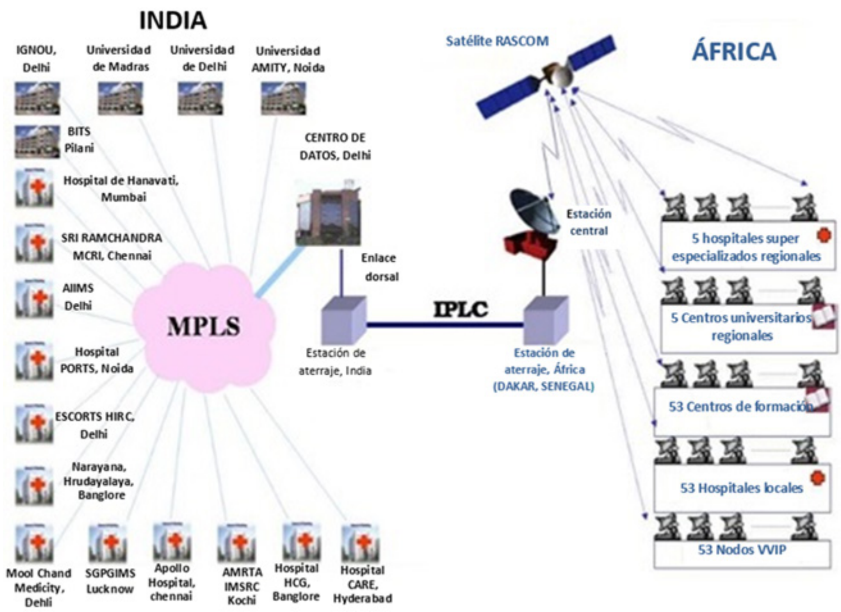
Las cinco (5) Universidades y los 12 hospitales súper especializados indios seleccionados están conectados (por una red IP basada en Conmutación por etiquetas multiprotocolo (MPLS)) al Centro de datos de TCIL Bhawan, que a su vez se conecta a las estaciones de aterraje de cables submarinos del proveedor de servicios IPLC.

1.. Objetivo y beneficios del proyecto

El objetivo básico del proyecto Ciberred panafricana es fomentar la capacitación en África impartiendo educación de calidad a los estudiantes desde las mejores Universidades/Instituciones docentes de India y ofrecer servicios de telemedicina mediante consultas médicas en línea entre los médicos en los hospitales locales y los especialistas indios en diversas disciplinas/especialidades/subespecialidades, como medicina general/interna, cardiología, neurología, patología, dermatología, urología, endocrinología, gastroenterología, oncología, ginecología, enfermedades infecciosas, oftalmología, etc. Los hospitales súper especializados de India ofrecen servicios de telemedicina a los países participantes. El proyecto también abarca la Formación continua en medicina del personal médico y paramédico a fin de actualizar y aumentar sus conocimientos y capacidades.

A lo largo de la implementación del proyecto, se organizaron programas de formación en los centros regionales de África para el personal de telecomunicaciones, TI y paramédico destinado a utilizar los equipos/red diariamente. En esa formación se vieron los conceptos, sistemas/arquitectura y procedimientos operativos relacionados con los elementos de red instalados en los países africanos.

Figura 20: Arquitectura de la Ciberred panafricana



La telemedicina es el uso de tecnologías electrónicas de la comunicación y la información (TIC) para ofrecer y prestar apoyo a la atención de la salud, sea cual sea la distancia entre el médico y el paciente. Los avances de la medicina y la ingeniería biomédica y los de las tecnologías de la información y la comunicación (TIC) han permitido el desarrollo de soluciones de telemedicina. Ello ha contribuido a la puesta a disposición de la población rural de medios de atención de la salud asequibles. La adopción de la telemedicina es una de las mejores opciones para prestar servicios de atención de la salud a la población rural. El uso de tecnologías de la información y la comunicación (TIC) entre los médicos especialistas y los pacientes asegura una mejora de los medios para la atención de la salud. El sistema de Formación continua en medicina ofrece una plataforma adaptada para que los médicos en active busquen orientación y se mantengan al tanto de las últimas novedades de los expertos en sus campos respectivos.

La conectividad de telemedicina ha permitido a 12 hospitales súper especializados ofrecer servicios especializados en 53 hospitales distantes equipados con equipos médicos para electrocardiogramas (ECG), ecografías, patología y rayos X. Todos los centros distantes están equipados con cámara, hardware y software de telemedicina. El software es un paquete integrado capaz de gestionar los pacientes, el almacenamiento y el reenvío de historias médicas, además de analizar las recetas con firma digital para los pacientes distantes. Todos los médicos de esos centros pueden referir las historias clínicas de los pacientes a cualquiera de los hospitales súper especializados y celebrar una sesión de telemedicina por vídeo a fin de que los médicos realicen el diagnóstico o den orientaciones al respecto. Las sesiones se programan entre el proveedor, el hospital súper especializado, el receptor y el centro de telemedicina distante.

Los 12 hospitales súper especializados ofrecen atención sanitaria continua a los Estados Miembros de la Unión Africana (UA) con 8 horas de consulta (en línea y fuera de línea) previstas para diversas especialidades con horarios mutuamente acordados con cada país.

La red de telemedicina también ofrece formación continua en medicina continua en diversas especialidades a través de cursos impartidos por los hospitales súper especializados regionales de la UA y la India, cuya compleción da derecho a un certificado/diploma, como exige la UA. Los hospitales súper especializados empezaron a impartir regularmente cursos de formación continua el 22 de abril de 2009. Hasta el 30 de junio de 2015 se habían impartido 4637 sesiones en inglés y 584 en francés. Cada mes se celebran 72 sesiones, de las cuales 24 en francés.

El proyecto se amplió hasta julio de 2016.

En el **Anexo 3** se presenta, como ejemplo de la utilización de la red panafricana en un país, el caso de Guinea.

4. Proyecto de Telemedicina SAARC de India

2.. Estudio de caso de cibersanidad de India

1) Proyecto de telemedicina SAARC

[49]El objetivo básico del proyecto Ciberred SAARC es ayudar a los países de la SAARC a prestar servicios de telemedicina mediante consultas médicas en línea entre los médicos de los centros de atención al paciente y especialistas indios en diversas disciplinas/especialidades/subespecialidades, como medicina general/interna, cardiología, neurología, patología, dermatología, urología, endocrinología, gastroenterología, oncología, ginecología, enfermedades infecciosas, oftalmología, etc. Los hospitales indios prestan servicios de telemedicina a los países de la SAARC participantes. El proyecto también comprende la formación continua en medicina del personal médico y paramédico a fin de actualizar aumentar sus conocimientos y capacidades.

El Gobierno de India quería compartir la experiencia del país en atención sanitaria/medicina con los países de la SAARC. La red ofrece servicios de telemedicina y formación continua en medicina a los países miembros de la SAARC gracias a una red de comunicación que conecta la India con los países de la SAARC. Dos hospitales súper especializados indios ofrecen estos servicios: el SGPGI de Lucknow y el PGIMER de Chandigarh.

[49] Anil Prakash, ITU-APT Foundation of India, India; Rakesh Kuman Bhatnagar, CE del UIT-T, ITU-APT Foundation of India (India), Vicerrelator para la Cuestión 2/2.

Telecommunications Consultants India Limited (TCIL) ha ejecutado este proyecto llave en mano que comprende el diseño, la provisión, la instalación, las pruebas, el encargo y la oferta de servicios de explotación y gestión. La red está diseñada para utilizar una red VSAT entre un hospital súper especializado y un centro de atención al paciente en cada uno de los países miembros de la SAARC. La configuración de la formación continua en medicina y la telemedicina se realiza en los hospitales súper especializados identificados de India. El servidor de telemedicina está instalado en el SGPGI de Lucknow. La telemedicina y la formación continua también se configuran en cada terminal distante en los países miembros de la SAARC.

Figura 21: Conectividad de red inicial

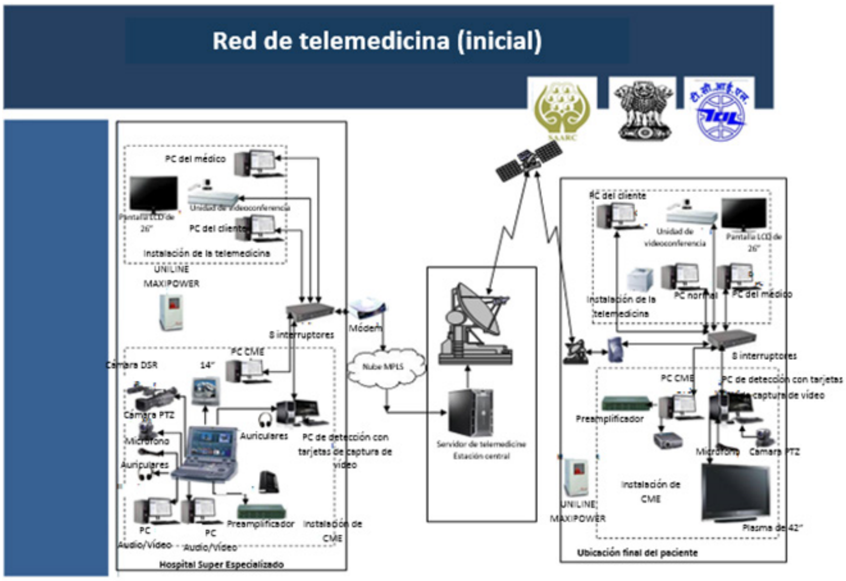
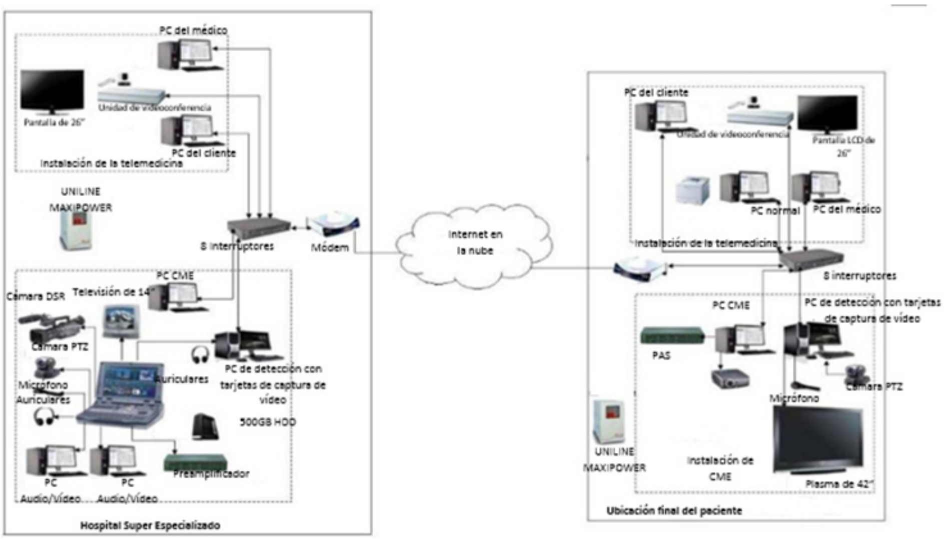


Figura 22: Conectividad de red actual



La infraestructura implantada consiste en un servidor de telemedicina, un software de servidor de telemedicina y un encaminador con conmutador LAN. La conectividad se logra mediante una red VSAT de banda ancha.

2) **Equipo para telemedicina**

En los hospitales súper especializados de India se ha instalado una aplicación de software de telemedicina para hospitales súper especializados, un equipo de videoconferencia, un PC (médico, registro), un UPS, un conmutador LAN y un monitor LCD de 26".

En los hospitales de los países de la SAARC se ha instalado una aplicación de software de telemedicina cliente en dos PC, un equipo de videoconferencia, PC para médicos y equipo, un UPS, un encaminador con conmutador LAN, un monitor LCD y los equipos médicos necesarios.

3) **CME setup**

El hospital súper especializado de India está equipado con un mezclador de audio y vídeo, una cámara y los accesorios esenciales, una estación de trabajo para difusión en directo con tarjeta de captura de vídeo y accesorios, un sistema de dirección pública, un monitor de TV de 14" TV con entrada y salida A/V, un PC con un monitor TFT de 17", un conmutador LAN gestionado y un divisor VGA. Los hospitales en los países de la SAARC están equipados con una cámara web, un micrófono (dinámico) con un pie y un adaptador, PC, sistema de dirección pública, un proyector LCD y un divisor VGA. Las aplicaciones de software se basan totalmente en una plataforma de código abierto y pueden interoperar con todos los sistemas existentes. También se está utilizando la el software de aplicación TeleVital.

Implementación en Bhután:

- Centro de atención al paciente de telemedicina – Jigme Dorji Wangchuck National Referral Hospital, Thimphu, Bhután.
- MoU contraído entre MEA y TCIL el 8 de febrero de 2008 – Bhután fue el primer país identificado.
- La red se inauguró en diciembre de 2008 y los dos años de funcionamiento se terminaron en diciembre de 2010. En virtud del MoU firmado entre el Gobierno de Bhután y TCIL, se amplió el proyecto por 1 año hasta diciembre de 2011.
- Equipo médico instalado: sistema de radiografía digital.
- Durante el periodo se realizaron con éxito más de 140 consultas/sesiones de formación continua.

Implementación en Afganistán:

- Centro de atención al paciente de telemedicina – Instituto Indira Gandhi de Salud Infantil, Kabul, Afganistán.
- MoU firmado entre MEA y TCIL el 17 de diciembre de2008 para la implementación del proyecto en Afganistán.
- La red se inauguró en septiembre de 2009 y funcionó durante cuatro años, hasta agosto de 2013, en virtud de nuevos MoU de ampliación del proyecto a la luz de los beneficios aportados por la red.
- Durante el periodo se realizaron con éxito más de 180 teleconsultas/sesiones de formación continua.
- Equipo médico instalado: microscopio digital, escáner/digitalizador de rayos X, electrocardiógrafo de 12 electrodos, microscopio de telepatología con cámara, tensiómetro, glucosímetro, analizador de orina, desfibrilador).

Implementación en Nepal:

- Centro de atención al paciente de telemedicina – Patan Hospital, Katmandú.
- MoU firmado entre MEA y TCIL el 28 de julio de 2009 para la implementación del proyecto en Nepal.
- La red se inauguró en enero de 2011 y funcionó durante tres años, hasta enero de 2014 en virtud de un MoU de ampliación del proyecto.

– Se celebraron sesiones periódicas de telemedicina/formación continua entre los hospitales súper especializados y el Patan Hospital de Katmandú, Nepal. Los dos hospitales súper especializados anunciaban las sesiones de formación continua con antelación para que los países receptores pudiesen participar en ellas.

– Equipo médico instalado: escáner/digitalizador de rayos X, microscopio de telepatología con cámara, ecocardiógrafo.

– Durante el periodo se celebraron unas 120 consultas/sesiones de formación continua. Esas sesiones son interactivas.

4) **Adhesión de otros países de la SAARC**

- Se han finalizado los estudios de localización y se han identificado lugares propicios en otros países miembros de la SAARC:
  - Bangladesh – Hospital Médico Universitario Bangabandhu Sheikh Mujib de Dhaka
  - Maldivas – Hospital Regional Kulhudhuffushi, H Dh. Kulhudhuffushi
  - Pakistán – Centro Médico de Postgraduado Jinnah, Karachi

5) **Beneficiarios**

- Médicos, enfermeras, técnicos, estudiantes de los hospitales beneficiarios de Bhután, Nepal y Afganistán.
- Especialidades médicas objeto de las sesiones de formación continua: pediatría, radiología, dermatología, estomatología, endocrinología, cardiología, neurología, genética, medicina de las transfusiones, cirugía, cirugía gastro-pediátrica, otorrinolaringología, reumatología y oftalmología.

6) **Situación actual del proyecto Ciberred de Telemedicina SAARC:**

Afganistán – los servicios de operación y mantenimiento prestados en el marco del proyecto cesaron en agosto de 2013, pero el servicio sigue activo.

Nepal – los servicios de operación y mantenimiento prestados en el marco del proyecto cesaron en enero de 2014. Se está estudiando una propuesta para ampliar la prestación de los servicios de operación y mantenimiento más tiempo; mientras tanto, el servicio está paralizado.

5. Telemedicina perinatal en zonas distantes: solución lista para su implementación de Japón

1.. Antecedentes y problemas

En Japón se tiende a reutilizar los datos recopilados en hospitales y clínicas para diagnosticar a los pacientes con la ayuda de esa acumulación de datos de casos anteriores.[50] Las TIC médicas empezaron a utilizarse con en los hospitales con las historias clínicas electrónicas y, desde 2000, su utilización se ha expandido a diversos tipos de establecimientos médicos regionales. En los hospitales se pueden gestionar y obtener los resultados de las pruebas, diagnósticos, imágenes y recetas de los pacientes gracias a un sistema de archivo médico electrónico.

Las alianzas médicas regionales y los hospitales conectados permiten compartir los datos de los pacientes y reducir la duplicación en tratamientos y consultas de pacientes que ya han visitado otros hospitales. Gracias a los datos puestos en común, se puede transferir a los pacientes de alto riesgo

50 Isao Nakajima, Universidad de Tokai, Escuela de Medicina, Japón, Relator para la C2/2.

a hospitales de nivel superior inmediatamente; y ese hospital estará preparado para aceptar a ese paciente, pues podrá haber examinado los datos obtenidos en el hospital que lo transfiere.

La función más importante de la telemedicina es la compartición de información entre médicos y pacientes y la utilización efectiva de los datos de los pacientes. Si los pacientes quieren mejorar, sabrán lo que más les conviene y elegirán el sistema de telemedicina. MITLA (Laboratorio Médico de Tecnología de la Información), especializado en las TI médicas, presta servicios de este tipo. En esta contribución se describe la experiencia de Japón en la introducción de la telemedicina en el campo de la medicina perinatal en zonas rurales y distantes.

2.. Sistema de telemedicina perinatal

El expediente electrónico perinatal es la principal tecnología de este sistema de telemedicina. Difiere en gran medida de la historia clínica electrónica (EMR) general o las EMR de otras especialidades, pues en las EMR perinatales se acumulan los datos de dos personas, la madre y el feto. Las leyes y reglamentos del departamento de obstetricia y ginecología también son distintos de los de los demás. Habida cuenta de esas diferencias, vale la pena contar con EMR perinatales y las tecnologías de atención perinatal tendrán valiosas repercusiones para las TIC médicas en su totalidad.

Hay tres tipos de EMR perinatal especializada: para hospitales, para clínicas y para telemedicina perinatal. Para los hospitales tiene una excelente función de gestión de riesgos elevados para el centro médico maternoinfantil perinatal, el hospital terciario. En segundo lugar, en las clónicas puede gestionar todos los sistemas del hospital como EMR. También es fácil detectar los riesgos del embarazo. Todas las EMR perinatales especializadas tienen una pantalla con una lista de exámenes prenatales. Pueden observarse la información básica sobre la madre y todos los datos de los exámenes prenatales. Contiene pantallas exclusivas par ala obstetricia y la ginecología que pueden registrar los datos de los exámenes prenatales y orientaciones sanitarias. Se puede registrar fácilmente información clínica que no se encuentra en las EMR generales. También tiene formatos informáticos específicos de la obstetricia y la ginecología, como pueden ser el pregnograma y el partograma. La EMR perinatal especializada ofrece ventajas en términos de autenticidad, legibilidad y almacenabilidad.

Figura 23: Número total de obstetras

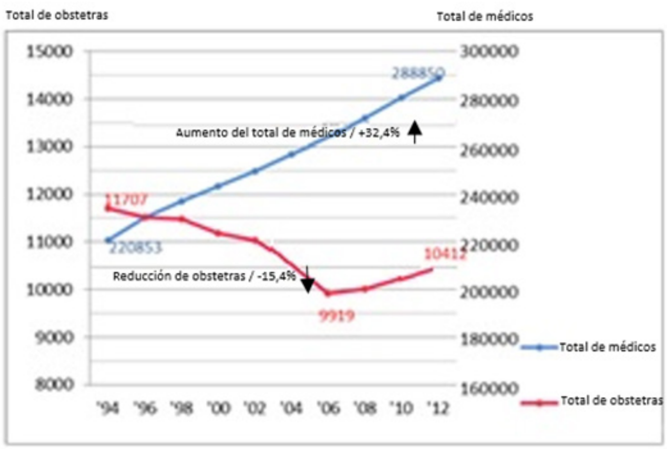
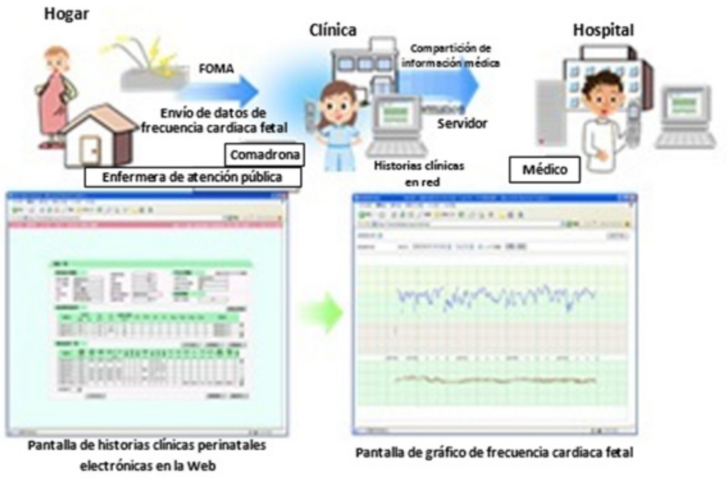


Figura 24: Sistema de telemedicina perinatal



El número de obstetras y de ginecólogos se redujo drásticamente entre 1984 y 2006, en comparación con otras especialidades (**Figura 23**), a causa del gran número de denuncias interpuestas por las pacientes a sus obstetras y por el creciente número de médicas que dejan de trabajar tras contraer matrimonio.

En zonas distantes, como islas y zonas montañosas, está habiendo problemas al no haber obstetras en los hospitales. Ese fenómeno social, que empezó a notarse entre 2004 y 2006, aún puede constatarse hoy en día. El sistema de telemedicina perinatal (**Figura 24**) se creó en 2006 y conectó a los hospitales centrales con las maternidades que carecían de especialistas. El medico puede examinar a distancia la información introducida por la comadrona en la maternidad. El sistema de telemedicina perinatal se compone de un servidor de datos central, un sistema de historias clínicas perinatales electrónicas ASP y un cardiotocograma (CTG) móvil, que mide las contracciones de la madre y la frecuencia cardiaca del bebé. También puede conectarse, de ser necesario, al sistema de imaginología de diagnóstico. El sistema de historias clínicas perinatales electrónicas ASP y el CTG móvil se instalan al mismo tiempo en el hospital central, la clínica y la maternidad, de modo que pueden compartirse todos los datos. Los especialistas, los generalistas y las comadronas comparten en tiempo real la información médica, en función del riesgo de los pacientes, y pueden examinar el caso juntos. Gracias a la telemedicina las pacientes pueden recibir las instrucciones adecuadas del especialista.

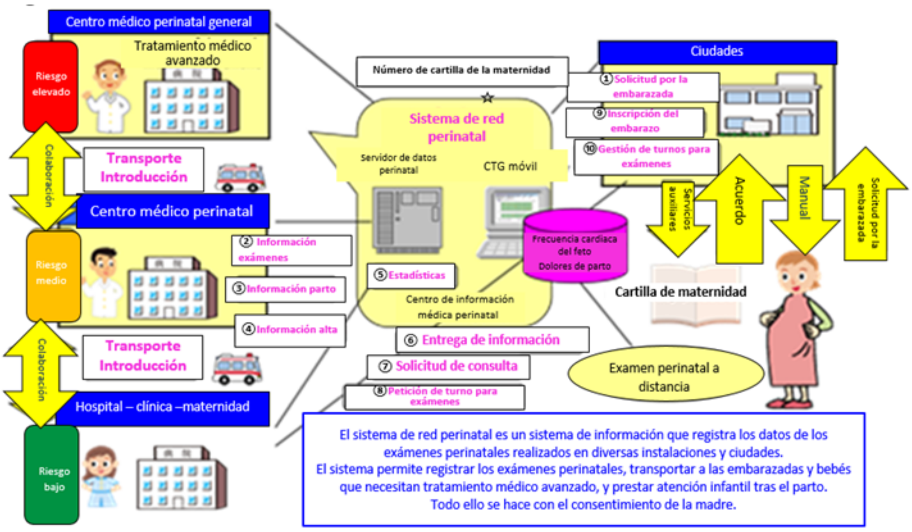
En un primer momento este sistema de telemedicina perinatal se instaló en la ciudad de Tono, prefectura de Iwate, donde no había obstetras. Las embarazadas necesitan pasar consulta con una frecuencia mínima de un mes, pero para las mujeres de Tono eso implicaba un viaje de 50 km hasta el hospital principal por carreteras de montaña. Para afrontar ese problema se creó en Tono, en 2007, un centro médico llamado Net Yurikago (cuna). En esa maternidad, comadronas se encargaban de hacer a las embarazadas de Tono las pruebas periódicas. En caso de inquietud o problema, las pacientes podían consultar con el médico por Internet.

Una vez introducido el sistema de telemedicina perinatal en Tono, se implantó también en Hokkaido, Okinawa y la isla de Amami-Oshima. Tras una conferencia internacional celebrada en 2011, se introdujo también en la región de Phitsanulok, Tailandia. En ese momento, se utilizaba un servidor ubicado en Japón, pero los especialistas de Phitsanulok quisieron ubicar los servidores en su país a fin de poder almacenar la información médica obtenida. Tras la experiencia de Phitsanulok, se instaló un servidor en Chiang Mai, Tailandia, para la ejecución del proyecto JICA de la prefectura de Kagawa. Ese mismo año se introdujo el sistema en la República Democrática Popular Lao, incluido el servidor. Al mismo tiempo se creó un comité asesor en la prefectura de Iwate, Japón, destinado a tratar del sistema de alianzas regionales, no sólo en cuanto a telemedicina, sino también urgencias perinatales y atención médica general. Ese comité está compuesto de eminentes representantes de la industria, el gobierno y las instituciones académicas.

3.. Creación de alianzas regionales perinatales "Ihatov (Utopía)"

"Ihatov"[51] es una red de información médica perinatal para embarazadas que permite a hospitales y pacientes establecer una buena relación durante el embarazo. Las mujeres pueden conservar la relación tras el parto y, si deciden volver a sus lugares de origen para dar a luz, la clínica más cercana podrá acceder a su historia clínica con antelación (**Figura 25**).

Figura 25: Red "Ihatov"



El gran terremoto sufrido en el noreste de Japón, que asoló la zona costera de la región de Honshu, causó la pérdida de mucha información médica, barrida por el tsunami posterior. La información de atención perinatal de la prefectura de Iwate estaba registrada en el servidor de datos central de "Ihatov", lo que dio pie a que se reconociera esta red como un sistema muy eficaz.

El Gobierno de Japón ha decidido que en el futuro se utilizará un número de seguridad social identificador. Sin embargo, en la prefectura de Iwate ya se utilizan número identificadores para los bebés que van a nacer. Este número es una de las claves para la compartición de información entre instituciones médicas y pacientes que utilizan "Ihatov". Las embarazadas deciden si quieren compartir o no la información cuando reciben la cartilla de la maternidad con el número. Si así lo desean la información puede compartirse con todos los hospitales y ayuntamientos, y los datos se almacenan para su utilización futura. Las instituciones médicas pueden fácilmente encontrar los datos de todos los pacientes desde cualquier lugar gracias a "Ihatov".

En Japón los hospitales se clasifican en tres categorías, en función del riesgo que presenta el paciente: hospitales primarios, secundarios y especializados. Si el estado del paciente cambia repentinamente, es posible transferirlo a un hospital especializado de nivel superior. Si el hospital al que se traslada ya dispone de los datos del paciente, gracias a "Ihatov" puede preparar y gestionar la transferencia del paciente de manera más rápida y eficaz, como puede gestionar la transferencia de las embarazadas de alto riesgo a hospitales especializados seleccionados de su región. Los principales hospitales ya están en la red y las clínicas también pueden hacerlo. Esa colaboración perinatal regional está dando resultados satisfactorios. Otras prefecturas adoptarán este modelo en el futuro próximo.

Las alianzas regionales "Ihatov" tienen importantes consecuencias, entre las que se pueden citar las tres siguientes. "Ihatov" es un sistema que aprovecha una base de datos de historias clínicas. Su inscripción en "Ihatov" permite el traslado de las embarazadas y los bebés al hospital sin sobresaltos

[51] Toshihiro Ogasawara. Kazuhiro Hara. A challenge for producing Data cooperation system of medicine information network construction "Ihatov" and electronic medical recording system for perinatal medicine. Japanese Journal of Telemedicine and Telecare. 9(2):2013.10. 203-206 ISSN 1880-800X.

y los cuidados prenatales se facilitan en circunstancias totalmente controladas. Además, la inscripción se basa en el consentimiento y se gestiona muy cuidadosamente la privacidad de los pacientes.

4.. Acelerar el funcionamiento nacional y en el extranjero

Acelerar el funcionamiento en el extranjero

En Japón, dado el descenso en el número de obstetras y ginecólogos, algunas zonas dependen del sistema de telemedicina. En el extranjero, sobre todo en algunos países en desarrollo, la situación es parecida a la de Japón. No hay suficientes médicos especialistas para el número cada vez mayor de embarazadas. Los riesgos se dividen en tres categorías: altos, medios y bajos. La mayoría de hospitales en el extranjero, en particular los de zonas Rurales, tratan a los pacientes de riesgo medio o bajo, pues no disponen de especialistas ni de equipos para cirugía.

La introducción de un sistema de telemedicina perinatal reviste un gran valor para los países en desarrollo y las zonas rurales. El sistema de telemedicina perinatal es relativamente sencillo de explotar. Los hospitales sólo deben preparar un PC y un CTG móvil. La ventaja de utilizar un CTG móvil y un PC para el sistema de telemedicina es que mejorarán los cuidados perinatales aunque cada vez haya menos especialistas, pues, por ejemplo, con sólo unos cuantos especialistas, se podrá diagnosticar a las embarazadas en su lugar de residencia desde el hospital.

Acelerar el funcionamiento nacional

El declive de la tasa de natalidad y el envejecimiento de la población son fenómenos más acusados en Japón que en países de Europa. La población de más de 65 años representa ya el 25 por ciento de la población total. Se ha estimado que en 10 años será del 30 por ciento y cerca del 40 por ciento dentro de 30 años. Esto significa que cada vez hay menos jóvenes para cuidar de los ancianos. Para garantizar la salud de los ancianos es necesario que ellos mismos gestionen su estado de salud utilizando sus teléfonos inteligentes y tomando ellos mismos los datos necesarios.

La cartilla de maternidad es el punto de partida de la atención sanitaria personal (PHR). Al principio, las mujeres jóvenes utilizaban una cartilla de maternidad en papel, pero ya se han acostumbrado a utilizar tecnologías móviles, como las tabletas y los teléfonos inteligentes, como parte de su vida cotidiana. Ahora se utiliza la cartilla de maternidad electrónica, que está conectada y permite la compartición de información entre hospitales y centros de atención al paciente. La cartilla de maternidad conectada permite a la usuaria confirmar la información, directamente introducida por los servicios sociales y hospitales de atención primaria, por ejemplo, para obtener las medidas necesarias inmediatamente del sistema. La cartilla de maternidad electrónica ofrece ventajas no sólo para el cuidado de niños y embarazadas, sino también los hospitales, el lugar de residencia de la paciente y las tiendas o empresas de su interés.

Sería conveniente generar datos PHR desde sistemas como “Ihatov”, que es una interfaz de datos entre servicios sociales y hospitales. El mecanismo PHR debe desarrollarse para muchas empresas o tiendas que podrán facilitar a la población la información detallada que necesiten. En el futuro necesitaremos tecnologías de búsqueda e integración de datos más realistas. La tecnología de búsqueda de datos se divide en procesamiento estadístico medioambiental y gestión de historias clínicas. Esas tecnologías también están relacionadas entre ellas y resultan convenientes para que las personas puedan encontrar instantáneamente la información basada en sus propios datos de salud. En la actualidad hay varias instituciones de I+D dedicadas a la creación de un mecanismo para la entrega de información más útil a los usuarios.

En la siguiente contribución se ilustra la aplicación del sistema de medicina perinatal presentado más arriba.

6. Introducción de la telemedicina perinatal en Lao

5.. Introducción

La República Democrática Popular Lao (en adelante, Laos) es un país sin litoral cuya población asciende a 6 510 000 habitantes.[52] Laos limita con China, Vietnam, Camboya, Tailandia y Myanmar. Su superficie es idéntica a la de Honshu, Japón. Laos está situado en una zona geopolíticamente importante en la zona del Mekong e Indochina; es un país en desarrollo de la zona ASEAN, por lo que hay una gran diferencia económica entre Laos y otros países de la ASEAN. Sin embargo, Laos está experimentando un desarrollo económico sostenido gracias al crecimiento de los sectores de los recursos minerales y la generación eléctrica hidráulica. Para el desarrollo económico es necesario que aumente la población y el objetivo del Gobierno de Laos es alcanzar los Objetivos de Desarrollo del Milenio (ODM) y dejar de ser un país en desarrollo en 2020.

En lo que respecta a la atención perinatal, el Objetivo 4 de los ODM es la reducción de la mortalidad de niños menores de 5 años y el Objetivo 5 es mejorar la salud materna. La tasa de mortalidad de los niños menores de 5 años pasó de 131 por 1 000 habitantes en 2003 a 79 por 1 000 habitantes en 2011. Aunque se ha cumplido el objetivo del 80 por 1000 fijado para 2015, sigue siendo una tasa elevada. Por consiguiente, el Gobierno de Laos modificó su objetivo a 70 por 1 000 en 2015. Además, Laos tiene la segunda tasa de mortalidad de niños menores de 5 años más alta, junto con Myanmar, de la zona del Mekong. La mortalidad infantil mejoró, pasando de 104 por 1 000 en 2003 a 68 por 1 000 en 2011, pero sigue lejos del nuevo objetivo, a saber, 45 por 1 000.

6.. Antecedentes y problemas

Por término medio, una mujer en Laos tiene 3,108108 hijos y en el país nacen cada año unos 100 000 niños. No obstante, esta cifra no es muy precisa, pues no hay ningún sistema de registro civil en Laos. El Gobierno de Laos aprobó una lista de examines médicos para las embarazadas. A partir de las directrices de la OMS, se determinan ciertos exámenes y revisiones en función de la semana de gestación. Aunque la OMS recomienda cuatro exámenes durante el embarazo, algunas madres nunca ven a un médico. La tasa media de consulta médica en el país es inferior al 80 por ciento.

Las instalaciones médicas se organizan en hospitales centrales, hospitales de prefectura, hospitales de condado y centros de salud. En los centros de salud, que son centros de atención primaria, no hay médicos y tan sólo suele haber entre una y tres enfermeras. En el segundo nivel están los hospitales de condado, donde sólo en 27 de 130 se pueden realizar operaciones. El traslado de los pacientes de los centros de salud a los hospitales de condado se efectúa en función del diagnóstico.

Laos cuenta con unos 6 700 000 abonos a la telefonía móvil y la tasa de penetración en la población ronda el 104 por ciento. No todas las personas tienen un teléfono móvil, pero algunas poseen varias tarjetas SIM de prepago, por lo que la tasa de penetración es muy elevada.

La mayoría de los abonados tiene acceso a la telefonía celular 2G y utiliza principalmente la telefonía (llamadas vocales) y el SMS (texto). Se pueden encontrar teléfonos inteligentes, pero aún hay poca gente que utiliza las redes 3G. LTC empezó a ofrecer la 4G (LTE) en Vientiane en enero de 2013 y ofrecerá 4G (LTE) en las grandes ciudades. Esto demuestra que la infraestructura de telecomunicaciones se está desarrollando rápidamente.

La tasa de abono a telefonía móvil se revela aún más alta si la consideramos que el número de líneas de telefonía fija es de 150 000 (tasa de penetración en los hogares del 14 por ciento) y el de líneas de banda ancha es de 110 000 (tasa de penetración en los hogares del 10 por ciento).

[52] Yhuko Ogata, Japón, yhuko@melody.international.

7.. Integración del sistema

Se presentan dos propuestas: 1) Sistema de historias clínicas perinatales tipo web y 2) monitor de frecuencia cardiaca fetal móvil "CTG móvil".

Los médicos y hospitales pueden utilizar por Internet o mediante un servidor. Los hospitales centrales pueden ver los datos introducidos por los hospitales rurales y viceversa. Con los equipos CTG móviles instalados en los hospitales Rurales se efectúan las mediciones que se envían a los médicos o especialistas de los hospitales centrales para que puedan realizar el diagnóstico a distancia. Se puede compartir la información médica de la embarazada con instalaciones distantes en tiempo real. En el centro de atención primaria, donde no hay especialistas, se pueden realizar los cuidados y tratamientos convenientes por instrucción de los especialistas de otros hospitales gracias a este sistema de telemedicina, que da buenos resultados al aumentar la capacidad e los centros de atención primaria para cuidar adecuadamente a sus pacientes.

A través de la línea de comunicación (2G, 3G, 4G), el CTG móvil puede medir la frecuencia cardiaca del feto, el movimiento fetal y las contracciones. Esos datos se pueden compartir con los especialistas en zonas rurales. El especialista puede confirmar los datos de las embarazadas de alto riesgo y prescribir inmediatamente su traslado o la realización de los exámenes pertinentes gracias al sistema de telemedicina perinatal. Este sistema se introdujo en Laos en 2013. Se seleccionaron dos o tres clínicas que cumplían los siguientes criterios: (1) zona rural; (2) sólo comadronas o enfermeras; (3) carencia de médico especialista.

La oportunidad del monitor CTG móvil

A lo largo del embarazo, lo más probable es que el estado de la paciente no sufra cambios repentinos. Los médicos pueden examinar los resultados de un examen realizado durante 20-40 minutos para ver la frecuencia cardiaca del feto y verificar que está bien. Este es el caso más frecuente en telemedicina.

Durante el parto es posible que el estado de los pacientes sufra cambios repentinos. El monitor tiene una función de diagnóstico automática que ordena el envío inmediato de los resultados de la medición. Se puede modificar el periodo de medición en función de la situación.

En cada una de las dos clínicas se instalaron dos monitores CTG móviles para realizar los exámenes. El sistema de historias clínicas perinatales estaba listo para la fase de prueba y el objetivo era mejorar el sistema para adaptarlo a las necesidades de Laos. Para las teleconsultas se utilizó un sistema de reunión por TV de una empresa japonesa. Esa misma empresa facilitó también los PC. Se utilizó la red local gubernamental. Durante la prueba realizada en el Hospital Mittaphab de Vientiane, se examinaron las pruebas realizadas por la mañana a una embarazada cuyo gráfico mostraba fuertes contracciones a intervalos cortos. Se decidió mantenerla en el hospital y dio a luz en condiciones seguras por la tarde.

8.. Debate y conclusión

Uno de los aspectos más importantes de la atención perinatal es la gestión de los datos, que ha superado la etapa de los expedientes en papel y se ha introducido en el mundo digital. Por tanto, hemos de definir los exámenes para la madre y el bebé mejorando las tecnologías médicas. A fin de llevar expedientes clínicos perinatales electrónicos se ha de respetar el siguiente formato de registro:

– Los datos perinatales se registran por series temporales.
– Facilidad para detectar leves cambios en las embarazadas.
– Se permite a los médicos conocer bien la situación de la paciente y si hay complicaciones.
– Ver los datos da a los médicos información crítica que les permiten tomar decisiones con confianza.

– La compartición de la información perinatal permite al hospital estar listo antes de que llegue la ambulancia. Del mismo modo, los médicos y especialistas pueden comprobar el estado de las pacientes de alto riesgo a distancia.

En Japón, las clínicas, centros de atención primaria y hospitales centrales aceptan a los pacientes en función de su estado y del riesgo que presentan. Este sistema se ha perfeccionado sobre todo en el campo de la obstetricia a causa del número decreciente de obstetras y de ginecólogos. Las alianzas regionales, que son sistemas abiertos y semiabiertos, están en relación con los hospitales primarios, secundarios y centrales. En otros países, en particular en los países en desarrollo, como ocurre en Japón, hay pocos médicos. Sin embargo, la diferencia entre los países en desarrollo y Japón reside en que en Japón hay facultades de medicina y existe un sistema de atención médica de madres y niños. La solución a esos problemas es que los especialistas en los países desarrollados den a distancia la segunda opinión. Además, se alienta a los países en desarrollo a utilizar el registro de maternidad.

La introducción del modelo de atención perinatal de Japón en los países en desarrollo, sobre todo en el sudeste de Asia, y concretamente en Laos, lleva tiempo y necesita un cierto esfuerzo. Una vez introducidos y utilizados los sistemas, se revelarán su utilidad y valor. En la actualidad los médicos de los hospitales centrales tienen la capacidad técnica de leer las gráficas de los monitores CTG a distancia. El CTG móvil es un instrumento médico que transmite los datos de frecuencia cardiaca del feto, el movimiento fetal y las contracciones a través de una conexión internet. Se puede ayudar a las pacientes de alto riesgo de hospitales primarios o secundarios gracias al diagnóstico temprano emitido por los especialistas. Cuando se introdujo el modelo de atención perinatal de Japón en Laos, también se envió a médicos y comadronas a formar al personal local y dotar de eficacia al sistema.

El "Proyecto de investigación para la introducción de un sistema de TIC para la atención médica y sanitaria básica (consulta a distancia para la atención perinatal en zonas Rurales) en Laos" fue financiado por el Ministerio de Asuntos Internos y Comunicaciones de Japón. En el **Anexo 7** se resumen en cuadros los modelos de trabajo de los servicios de cibersanidad ya desarrollados e implantados (o en fase de implantación) en los países en desarrollo. También se puede encontrar en los anexos información sobre los beneficios de IMT2020 para la implantación de la cibersanidad en los países en desarrollo, así como ejemplos de dispositivos ponibles para la salud de la mujer en los países en desarrollo (**Anexo 8** y **Anexo 9**).

3 CAPÍTULO 4 – Recomendaciones

A partir de las experiencias recopiladas durante el ciclo de estudio de la Cuestión 2/2, se considera que las siguientes recomendaciones son fundamentales para los legisladores y políticos en materia de sanidad de los países en desarrollo:

– Se han de invertir más esfuerzos en concienciar y formar a las autoridades locales, legisladores, interesados, operadores de telecomunicaciones, personal médico y, sobre todo, la población acerca del papel de las TIC en la implementación general de la cibersanidad, así como sobre los beneficios que la adopción de la cibersanidad aportará a los sistemas de atención sanitaria nacionales. Se ha de prestar una especial atención al personal médico para facilitar su aceptación de los servicios de cibersanidad donde y cuando sean necesarios;
– Se han de dedicar más esfuerzos a fomentar la implementación de:
    - Soluciones de sanidad-m: Pueden encontrarse ejemplos de los beneficios que reporta la adopción de la sanidad-m en el Anexo 2.1 (Iniciativa de Salud Móvil UIT-OMS para las enfermedades no transmisibles (Iniciativa Be He@lthy Be Mobile), una aplicación que se centra en la función del móvil en la vida cotidiana del paciente para fomentar cambios de comportamiento mediante la promoción de la salud y la autogestión continua.
    - Tecnologías de asistencia: Estas soluciones están infravaloradas aunque pueden cambiar significativamente los servicios de atención sanitaria;
    - La economía de la cibersanidad: pues es necesario evaluar la rentabilidad de la cibersanidad antes de proceder a su implantación;
    - Medios sociales: Los medios sociales, por su amplia presencia, son una herramienta educativa para la población y los médicos, además de servir para la prevención contra las enfermedades.
– Se ha de prestar más atención a lo siguiente:
    - financiación insuficiente y falta de conocimientos de TIC en todos los niveles del sistema de atención sanitaria. Un principio básico es adaptar el programa de los estudiantes de medicina a las nuevas realidades, integrando más cursos sobre TIC, cibersanidad y telesalud. De especial interés pueden ser las soluciones de código abierto como aplicaciones de software rentables;
    - encontrar las soluciones de facturación y reembolso adecuadas, pues, sin estímulo, no podrá haber servicios de cibersanidad amplios y sostenibles;
    - también se han de considerar y definir detalladamente las licencias y el ámbito de práctica (norma de atención).
– Facilitar el intercambio de experiencias y establecer relaciones a nivel local y mundial.
– Fomentar la colaboración entre los sectores sanitario y de telecomunicaciones para maximizar la utilización de los recursos limitados de ambos en la implantación de servicios de cibersanidad y soluciones médicas;
– Se recomienda vivamente la utilización de la Herramienta de estrategia de cibersanidad nacional de la UIT-OMS (**Anexo 4**).

Abbreviations and acronyms

Various abbreviations and acronyms are used through the document, they are provided here for simplicity.

Abbreviation/acronym	Description
AAL	Ambient Assisted Living
ACCP	Advanced Care Coordination Platform
AED	Automated External Defibrillator
AICD	Automated Implantable Cardioverter-Defibrillator
API	Application Program Interface
APT	Asia-Pacific Telecommunity
ASEAN	Association of Southeast Asian Nations
ASHA	American Speech-Language-Hearing Association
ASP	Application Service Provider
ATM	Automatic Teller Machine
B2B	Business to Business
BAN	Body Domain Network
BDT	Telecommunication Development Bureau
CCR	Continuity of Care Record
CCSA	China Communications Standards Association
CDMA	Code-Division Multiple Access
CDR	Call Detail Record
CEN	European Committee for Standardization
CHUK	University Teaching Hospital of Kigali
CHW	Community Health Workers
CIDEP	Interdisciplinary Centre for Ongoing Education
CITEL-OAS	Inter-American Telecommunication Commission of the Organization of American States
ClaML	Classification Markup Language
CME	Continued Medical Education
CMS	Clinical Management System
CO	Carbon monoxide
COEL	Carbon Monoxide Exposure Limiter
CONATEL	Comisión Nacional de Telecomunicaciones

(continuación)

Abbreviation/acronym	Description
COP	Telecare Code of Practice / Telehealth Code of Practice
CTG	Cardiotocography
CVD	Cardiovascular Disease
DOH	Department of Health
DICOM	Digital imaging and communication in medicine
DRC	Democratic Republic of the Congo
e-LMIS	electronic Logistic Management Information System
EC	European Commission
ECG	Electrocardiogram
EDI	Electronic Data Interchange
EDPRS	Economic Development and Poverty Reductiion Strategy (Rwanda)
EDS	Demographic and Health Survey (Enquête Démographique et de Santé de la République Démocratique du Congo)
EHR	Electronic Health Record
EMR	Electronic Medical Record
ENT	Ears, nose and throat (otolaryngology)
epSOS	Smart Open Services for European Patients
ESA	European Space Agency
ETMo	Telemedicine Mobile Station (Estación de Telemedicina Móvil)
ETRI	Electronics and Telecommunications Research Institute (Korea (Rep. of))
ETSI	European Telecommunications Standards Institute
EU	European Union
EV-DO	Evolution-Data Optimized
FCM-UNR	National University of Rosario, Faculty of Medical Sciences
FDD-LTE	Frequency Division Duplex – Long-Term Evolution (4G)
FG	Focus Group
FFT	fast-Fourier transform
FHIR	Fast Healthcare Interoperability Resources
FOSS	Free and Open Source Software
GCC	Global Communication Center
GDP	Gross Domestic Product

(continuación)

Abbreviation/acronym	Description
GDSN	Global Data Synchronization Network
GLN	Global Location Number
GMPC	Gateway Mobile Positioning Center
GNI	Gross National Income
GP	General Practioner
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile Communications
GSVML	Genomic Sequence Variation Markup Language
GTIN	Global Trade Item Number
HDI	Human Development Index
HDO	Healthcare Delivery Organization
HIV/AIDS	Human Immunodeficiency Virus infection and Acquired Immune Deficiency Syndrome
IHE	Integrating the Healthcare Enterprise
HIF	Healthcare Information Framework
HIS	Hospital Information Systems
HL7	Health Level Seven International
HMR	Argentinian Re-locatable Hospital (Hospital Militar Reubicable)
HRA	Health Reimbursement Agreements
HRTT	Health Resource Tracking Tool
HSSP	Health Sector Strategic Plan (Rwanda)
ICD	International Classification of Disease
ICSRs	Individual Case Safety Reports
ICT	Information and Communication Technology
ID	Identity Document
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IHE	Integrating the Healthcare Enterprise
IHTSDO	International Health Terminology Standards Development Organisation
ILTC	Intermediate and Long-term Care

(continuación)

Abbreviation/acronym	Description
IMF	International Monetary Fund
INR	International Normalized Ratio
IoT	Internet of Things
IP	Internet Protocol
IPLC	International Private Leased Circuit
ISDN	Integrated Services Digital Network
ISMS	Information Security Management System
ISO	International Organization for Standardization
IT	Information Technology
ITU	International Telecommunication Union
ITU-D	ITU Telecommunication Development Sector
ITU-R	ITU Telecommunication Radiocommunication Sector
ITU-T	ITU Telecommunication Standardization Sector
K-medicine	Korean medicine
LAN	Local Area Networks
LC	Learning Center
LCD	Liquid-Crystal Display
LDCs	Least Developed Countries
LED	Light-Emitting Diode
LHR	Lifetime Health Record
LTC	Lao Telecommunications Company
LTE	Long-Term Evolution (4G)
M2M	Machine to Machine
MDGs	Millennium Development Goals
MEA	Ministry of External Affairs (India)
mHealth	Mobile Health Technologies
MHz	Megahertz
MITLA	Medical Information Technology Laboratory
MoH	Ministry of Health (Rwanda)
MOHH	Ministry of Health Holdings (Singapore)

(continuación)

Abbreviation/acronym	Description
MoU	Memorandum of Understanding
MPLS	Multiprotocol Label Switching
NCDs	Non-Communicable Diseases
NEHR	National Electronic Health Record
NGN	Next-Generation Network
NGO	Non-governmental Organization
NICT	New Information and Communication Technology
OEM	Original Equipment Manufacturer
OID	Office of Intellectual Disability
PACS	Picture Archiving and Communication System
PC	Personal Computer
PEH	Patient-End Hospital
PEMS	Pre-hospital Emergency Medical Service
PGIMER	Postgraduate Institute of Medical Education and Research (Chandigarh, India)
PHC	Portable Health Clinic
PHD	Personal Health Devices
PHR	Personal Health Record
PKI	Public Key Infrastructure
PMNCH	Partnership for Maternal and Newborn Health
PSTN	Public Switched Telephone Network
R&D	Research and Development
R-HMIS	Rwanda Health Management Information System
RBC	Rwanda Biomedical Center
RCT	Randomized Controlled Trials
RECOTED	Congolese Telemedicine and Distance Learning Network
RHU	Regional Health Unit
ROI	Return of Investment
RURA	Rwanda Utilities Regulatory Authority, Rwanda (Rep. of))
SAARC	South Asian Association for Regional Cooperation
SAMU	Number of emergency calls for ambulance

(continuación)

Abbreviation/acronym	Description
SDGs	Sustainable Development Goals
SDO	Standards Development Organisation
SGPGI	Sanjay Gandhi Post Graduate Institute of Medical Sciences (Lucknow, India)
SMS	Short Message Service
SNOMED	Systematized Nomenclature Of Medicine Clinical Terms
SSH	Super Specialty Hospitals
TCIL	Telecommunications Consultants India Limited
TD	Teledentistry
TDD-LTE	Time Division Duplex – Long Term Evolution (4G)
TEPC	Telecom Equipment & Services Export Promotion Council
TFT	Thin-Film Transistor
TMDU	Telemedicine Data Transmission Unit
TRAC	Treatment and Research AIDS Centre
TSA	Telecare Services Association
TTA	Telecommunications Technology Association (Korea (Rep.of))
UFMG	Universidade Federal de Minas Gerais (Brazil)
UN	United Nations
UNDP	United Nations Development Programme
UNIKIN	University of Kinshasa (Democratic Republic of the Congo)
UPS	Uninterruptible Power Supply
USF	University of Florida (United States of America)
UWB	Ultra-wide Band
V2V	Vehicle to Vehicle
VoIP	Voice over Internet Protocol
vf	Ventricular fibrillation,
VGA	Video Graphics Array
VSAT	Very Small Aperture Terminal
vt	Ventricular tachycardia
WADO	Web Access to DICOM Persistent Objects
WGs	Working Groups

(continuación)

Abbreviation/acronym	Description
WHO	World Health Organization
WiMAX	Worldwide Interoperability for Microwave Access
WTDC	World Telecommunication Development Conference

Annexes

Annex 1: Liaison statements

Liaison statement to ITU-T Study Group 20 on collaboration

LIAISON STATEMENT FROM ITU-D STUDY GROUP 2 QUESTION 2/2 TO ITU-T STUDY GROUP 20 ON COLLABORATION

ITU-D Study Group 2 Question 2/2: Information and telecommunications/ICTs for eHealth

29 April 2016

To:	ITU-T Study Group 20 (IoT and its applications including smart cities and communities (SC&C))
From:	ITU-D Study Group 2 (SG2), Question 2/2
For:	Action
Approval:	Q2/2 Rapporteur Group meeting on 29 April 2016
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BDT Focal Point:	Mr Hani Eskandar, BDT/IEE/CYB, BDT Focal Point for Question 1/2 Tel.: +41 22 730 6026 E-mail: hani.eskandar@itu.int

The **Rapporteur Group on Question 2/2 (Information and telecommunications/ICTs for eHealth)** thanks ITU-T SG20 for its liaison statement to Q2/2 (document SG2RGQ/96) concerning the work on eHealth requirements and applications in ITU-T SG20, especially identification of the requirements for the eHealth ecosystem to be standardized based on mature and stable existing eHealth technologies in developing countries. We will reflect the content of the liaison statement in the Question 2/2 Final Report.

The Rapporteur Group is pleased to accept the invitation to collaborate with ITU-T Study Group 20 and exchange information on topics of mutual interest.

Question 2/2 would like to invite ITU-T Study Group 20 to share the information and provide input for consideration during the preparation of the Final Report on Question 2/2 for the 2014-2017 study period. A preliminary report will be submitted to the ITU-D Study Group 2 meeting in September 2016. The studies will be concluded in April 2017 when the Final Report will be submitted to Study Group 2 for approval.

Additional information about the ITU-D SG2 Question 2/2 structure, management team and ongoing work, can be found in the Attachment and following website: http://www.itu.int/net4/ITU-D/CDS/sg/rgqlist.asp?lg=1&sp=2014&rgq=D14-SG02-RGQ02.2&stg=2.

ITU-D Study Group 2 (SG2), Question 2/2 looks forward to cooperating with you.

Attachments:

Mandate of Question 2/2

Report of the Rapporteur Group April 2016 meeting on Question 2/2

Liaison statement to ITU-T Study Group 16 on collaboration

LIAISON STATEMENT FROM ITU-D STUDY GROUP 2 QUESTION 2/2 TO ITU-T STUDY GROUP 16 ON COLLABORATION

ITU-D Study Group 2 Question 2/2: Information and telecommunications/ICTs for eHealth

29 April 2016

To:	ITU-T Study Group 16 (Multimedia coding, systems and applications)
From:	ITU-D Study Group 2 (SG2), Question 2/2
For:	Action
Approval:	Q2/2 Rapporteur Group meeting on 29 April 2016
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BDT Focal Point:	Mr Hani Eskandar, BDT/IEE/CYB, BDT Focal Point for Question 1/2 Tel.: +41 22 730 6026 E-mail: hani.eskandar@itu.int

The **Rapporteur Group on Question 2/2 (Information and telecommunications/ICTs for eHealth)** thanks ITU-T SG16 for its liaison statement to Question 2/2 (document SG2RGQ/95) concerning the work on a large number of Recommendations related to eHealth, namely in the ITU-T H.810-H.850 series of Recommendations. We will reflect the content of the liaison statement in the Question 2/2 Final Report.

The Rapporteur Group is pleased to accept the invitation to collaborate with ITU-T Study Group 16 and exchange information on topics of mutual interest.

Question 2/2 would like to invite ITU-T Study Group 16 to share the information and provide input for consideration during the preparation of the Final Report on Question 2/2 for the 2014-2017 study period. A preliminary report will be submitted to the ITU-D Study Group 2 meeting in September 2016. The studies will be concluded in April 2017 when the Final Report will be submitted to Study Group 2 for approval.

Additional information about the ITU-D SG2 Question 2/2 structure, management team and ongoing work, can be found in the Attachment and following website: http://www.itu.int/net4/ITU-D/CDS/sg/rgqlist.asp?lg=1&sp=2014&rgq=D14-SG02-RGQ02.2&stg=2.

ITU-D Study Group 2 (SG2), Question 2/2 looks forward to cooperating with you.

Attachments:

Mandate of Question 2/2

Report of the Rapporteur Group April 2016 meeting on Question 2/2

Liaison statement to ITU-T Study Group 5 on collaboration

LIAISON STATEMENT FROM ITU-D STUDY GROUP 2 QUESTION 2/2 TO ITU-T STUDY GROUP 5 ON COLLABORATION

ITU-D Study Group 2 Question 2/2: Information and telecommunications/ICTs for eHealth

29 April 2016

To:	ITU-T Study Group 5 (Environment and climate change)
From:	ITU-D Study Group 2 (SG2), Question 2/2
For:	Action
Approval:	Q2/2 Rapporteur Group meeting on 29 April 2016
Contacts:	Mr Isao Nakajima, Japan, Rapporteur for Question 2/2 Phone number: +81 90 8850 8380 E-mail: js2hb@ets8.jp Mr Done-Sik Yoo, Korea (Rep. of), Co-Rapporteur for Question 2/2 Phone number: +82 42 860 1163 E-mail: dsyoo@etri.re.kr
BDT Focal Point:	Mr Hani Eskandar, BDT/IEE/CYB, BDT Focal Point for Question 1/2 Tel.: +41 22 730 6026 E-mail: hani.eskandar@itu.int

Rapporteur Group on Question 2/2 (Information and telecommunications/ICTs for eHealth) thanks ITU-T SG5 for its liaison statement to Question 2/2 (document SG2RGQ/90) concerning the WHO Monograph on Radio Frequency fields: Environmental Health Criteria, Chapter 2 on Sources, measurements and exposures and Chapter 3 on Radiofrequency Electromagnetic Fields Inside The Body. We will reflect the content of the liaison statement in the Question 2/2 Final Report.

The Rapporteur Group is pleased to accept the invitation to collaborate with ITU-T Study Group 5 and exchange information on topics of mutual interest.

Question 2/2 would like to invite ITU-T Study Group 5 to share the information and provide input for consideration during the preparation of the Final Report on Question 2/2 for the 2014-2017 study period. A preliminary report will be submitted to the ITU-D Study Group 2 meeting in September 2016. The studies will be concluded in April 2017 when the Final Report will be submitted to Study Group 2 for approval.

Additional information about the ITU-D SG2 Question 2/2 structure, management team and ongoing work, can be found in the Attachment and following website: http://www.itu.int/net4/ITU-D/CDS/sg/rgqlist.asp?lg=1&sp=2014&rgq=D14-SG02-RGQ02.2&stg=2.

ITU-D Study Group 2 (SG2), Question 2/2 looks forward to cooperating with you.

Attachments:

Mandate of Question 2/2

Report of the Rapporteur Group April 2016 meeting on Question 2/2

LIAISON STATEMENT FROM ITU-D STUDY GROUP 2 QUESTION 2/2 TO ASIA-PACIFIC TELECOMMUNITY (APT) ON COLLABORATION

ITU-D Study Group 2 Question 2/2: Information and telecommunications/ICTs for eHealth

7 April 2017

To:	Asia-Pacific Telecommunity (APT)
From:	ITU-D Study Group 2 (SG2), Question 2/2
For:	Action
Approval:	ITU-D Study Group 2 meeting on 7 April 2017
Contacts:	Mr Isao Nakajima, Japan, Rapporteur for Question 2/2
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BDT Focal Points:	Mr Hani Eskandar, BDT/IEE/CYB, BDT Focal Point for Question 1/2 Tel.: +41 22 730 6026 E-mail: hani.eskandar@itu.int
	Mr Takashi Masumitsu, BDT/IEE/CYB, BDT Focal Point for Question 1/2 Tel.: +41 22 730 5369 E-mail: takashi.masumitsu@itu.int

ITU-D Study Group 2 Question 2/2 (Information and telecommunications/ICTs for eHealth) would like to express its sincere appreciation and gratitude for your liaison statement to ITU-D SG2 Q2/2 (document 2/455) concerning the APT Report on eHealth in APT region.

The Rapporteur Group is pleased to accept the invitation to collaborate with Asia-Pacific Telecommunity and exchange information on topics of mutual interest.

We are pleased to inform you that ITU-D Study Group 2 Question 2/2 (Information and telecommunications/ICTs for e health) approved the **Final Report on Information and telecommunications/ICTs for eHealth** at the fourth and final meeting of ITU-D Study Group 2 for the 2014-17 study period which was held in Geneva in April 2017. The Report defines eHealth and its applications for developing countries and brings forward significant information on eHealth services and systems from more than 40 countries, and eHealth ecosystem and standards – both technical and for service quality.

Additional information about the ITU-D SG2 Question 2/2 structure, management team and work, can be found in the Attachment and following website: http://www.itu.int/net4/ITU-D/CDS/sg/rgqlist.asp?lg=1&sp=2014&rgq=D14-SG02-RGQ02.2&stg=2.

We look forward to continuing cooperating with you.

Attachments:

Final Report on Question 2/2 for the 2014-17 study period

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LIAISON STATEMENT FROM ITU-D STUDY GROUP 2 QUESTION 2/2 TO ITU-T STUDY GROUP 16 AND STUDY GROUP 20 ON FINAL REPORT FOR ITU-D SG2 Q2/2 (EHEALTH)

ITU-D Study Group 2 Question 2/2: Information and telecommunications/ICTs for eHealth

7 April 2017

To: ITU-T Study Group 16 (SG16), Study Group 20 (SG20)

From: ITU-D Study Group 2 (SG2), Question 2/2

For: Action

Approval: ITU-D Study Group 2 meeting on 7 April 2017

Contacts: Mr Isao Nakajima, Japan, Rapporteur for Question 2/2

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ITU-D Study Group 2 Question 2/2 (Information and telecommunications/ICTs for eHealth) is pleased to inform you that it has approved the **Final Report on Information and telecommunications/ICTs for eHealth** at the fourth and final meeting of ITU-D Study Group 2 for the 2014-17 study period which was held in Geneva in April 2017. The Report defines eHealth and its applications for developing countries and brings forward significant information on eHealth services and systems from more than 40 countries, and eHealth ecosystem and standards – both technical and for service quality.

Additional information about the ITU-D SG2 Question 2/2 structure, management team and work, can be found in the Attachment and following website: http://www.itu.int/net4/ITU-D/CDS/sg/rgqlist.asp?lg=1&sp=2014&rgq=D14-SG02-RGQ02.2&stg=2.

We look forward to continuing cooperating with you.

Attachments:

Final Report on Question 2/2 for the 2014-2017 study period

LIAISON STATEMENT FROM ITU-D STUDY GROUP 2 QUESTION 2/2 TO WORLD HEALTH ORGANIZATION ON FINAL REPORT FOR ITU-D SG2 Q2/2 (EHEALTH)

ITU-D Study Group 2 Question 2/2: Information and telecommunications/ICTs for eHealth

7 April 2017

To: World Health Organization (WHO)

From: ITU-D Study Group 2 (SG2), Question 2/2

For: Action

Approval: ITU-D Study Group 2 meeting on 7 April 2017

Contacts: Mr Isao Nakajima, Japan, Rapporteur for Question 2/2

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ITU-D Study Group 2 Question 2/2 (Information and telecommunications/ICTs for eHealth) is pleased to inform you that it has approved the **Final Report on Information and telecommunications/ICTs for eHealth** at the fourth and final meeting of ITU-D Study Group 2 for the 2014-17 study period which was held in Geneva in April 2017. The Report defines eHealth and its applications for developing countries and brings forward significant information on eHealth services and systems from more than 40 countries, and eHealth ecosystem and standards – both technical and for service quality.

Additional information about the ITU-D SG2 Question 2/2 structure, management team and work, can be found in the Attachment and following website: http://www.itu.int/net4/ITU-D/CDS/sg/rgqlist.asp?lg=1&sp=2014&rgq=D14-SG02-RGQ02.2&stg=2.

We look forward to continuing cooperating with you.

Attachments:

Final Report on Question 2/2 for the 2014-2017 study period

Annex 2.1: IEEE standards activities in eHealth

Overview

The eHealth environment emerging around the globe is predicated on standards-based interoperability of multi-vendor technology, and helps to enable multi-vendor systems and applications to speak the same language.[53]

Figure 1A: Improving personal health device communication through consensus building

Healthcare providers are then able to cost-effectively source the disparate array of standards-based technologies that their patients need without limitations on how information is shared across the end-to-end infrastructure.

IEEE has many standards in the eHealth technology area designed to help healthcare products, vendors and integrators create devices and systems for disease management; fitness tracking; health monitoring; independent living. Many of these IEEE standards cover eHealth technology area, from body area networks to 3D modeling of medical data and personal health device communications. The IEEE 11073™ family of standards is a group of standards under Health Informatics/Personal Health Device Communication for data interoperability and architecture.

IEEE is part of a larger ecosystem and has active collaborative relationships with other global organizations such as:

– Health Level Seven International (HL7), with a focus on data exchange/delivery);
– Integrating the Healthcare Enterprise (IHE), with a focus on development domain integration and content profiles; and
– International Health Terminology Standards Development Organisation (IHTSDO) with a focus on Systematized Nomenclature Of Medicine Clinical Terms (SNOMED) Clinical Terminology;
– ISO and CEN, both of which adopt many of the IEEE 11073 standards.

[53] Bill Ash, Institute of Electrical and Electronics Engineers, Inc., (IEEE), United States of America, w.ash@ieee.org.

This allows IEEE standards to be developed and used within a framework for interoperable medical device communications worldwide.

The growing IEEE 11073 family of standards is intended to support interoperable communications for personal health devices and convey far-ranging potential benefits, such as reducing clinical decision-making from days to minutes, reducing gaps and errors across the spectrum of healthcare delivery and helping to expand the potential market for the medical devices themselves.

IEEE standards

1) Approved Standards

- IEEE Std 802.3-2012, IEEE Standard for Ethernet
- IEEE Std 802.11-2011, IEEE Standard for Information Technology – Telecommunications and Information Exchange Between Systems – Local and Metropolitan Area Networks – Specific Requirements – Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications
- IEEE Std 802.15.1-2005, IEEE Standard for Information Technology – Telecommunications and Information Exchange Between Systems – Local and Metropolitan Area Networks – Specific Requirements – Part 15.1a: Wireless Medium Access Control (MAC) and Physical Layer (PHY) specifications for Wireless Personal Area Networks (WPAN)
- IEEE Std 802.15.4-2011, IEEE Standard for Local and Metropolitan Area Networks – Part 15.4: Low Rate Wireless Personal Area Networks (LR-WPANs)
- IEEE Std 802.15.6-2012, IEEE Standard for Wireless Body Area Networks
- IEEE Std 2010-2012, IEEE Recommended Practice for Neurofeedback Systems
- IEEE Std 11073-10101:2004, Health informatics – Point-of-care medical device communication -- Part 10101: Nomenclature
- IEEE Std 11073-00103:2012, Health informatics – Personal health device communication Part 00103: Overview
- IEEE Std 11073-10101:2004, Health informatics – Point-of-care medical device communication – Part 10101: Nomenclature
- IEEE Std 11073-10102:2012, Health informatics – Point-of-care medical device communication Part 10102: Nomenclature – Annotated ECG
- IEEE Std 11073-10103:2012, Health informatics – Point-of-care medical device communication Part 10103: Nomenclature--Implantable device, cardiac
- IEEE Std 11073-10201:2004, Health informatics – Point-of-care medical device communication - Domain information model
- IEEE Std 11073-10404:2008, Health Informatics – Personal Health Device Communication - Device Specialization- Pulse Oximeter
- IEEE Std 11073-10406:2011, Health informatics – Personal health device communication Part 10406: Device specialization – Basic electrocardiograph (ECG) (1-to 3-lead ECG)
- IEEE Std 11073-10407:2008, Health Informatics – Personal Health Device Communication - Device Specialization- Blood Pressure Monitor
- IEEE Std 11073-10408:2008, Health informatics – Personal health device communication Part 10408: Device specialization – Thermometer
- IEEE Std 11073-10415:2008, Health Informatics – Personal Health Device Communication - Device Specialization- Weighing Scale
- IEEE Std 11073-10417:2011, Health informatics – Personal health device communication Part 10417: Device specialization – Glucosemeter

- IEEE Std 11073-10418:2011, Health informatics – Personal health device communication Part 10418: Device specialization – International Normalized Ratio (INR) monitor
- IEEE Std 11073-10420:2010, Health informatics – Personal health device communication Part 10420: Device specialization – Body composition analyzer
- IEEE Std 11073-10421:2010, Health informatics – Personal health device communication Part 10421: Device specialization – Peak expiratory flow monitor (peak flow)
- IEEE Std 11073-10424:2014, Health informatics – Personal health device communication-Device specialization- Sleep apnea breathing therapy equipment
- IEEE Std 11073-10425:2014, Health informatics – Personal health device communication-Device specialization – Continuous Glucose Monitor (CGM)
- IEEE Std 11073-10441:2013, Health Informatic – Personal health device communication Part 10441: Device specialization – Cardiovascular fitness and activity monitor
- IEEE Std 11073-10442:2008, Health informatics – Personal health device communication Part 10442: Device specialization – Strength fitness equipment
- IEEE Std 11073-10471:2008, Health informatics – Personal health device communication Part 10471: Device specialization – Independent living activity hub
- IEEE Std 11073-10472:2010, Health informatics – Personal health device communication--Part 10472: Device specialization – Medication monitor
- IEEE Std 11073-20101:2004, Health informatics – Point-of-care medical device communication - Application profile – Base standard
- IEEE Std 11073-20601:2008, Health informatics – Personal health device communication-Part 20601: Application profile – Optimized exchange protocol
- IEEE Std 11073-20601:2014, Standard for Health Informatics – Personal Health Device Communication- Application Profile – Optimized Exchange Protocol
- IEEE Std 11073-30200:2000, Health informatics – Point-of-care medical device communication - Transport profile – Cable connected
- IEEE Std 11073-30200a:2011, Health informatics – Point-of-care medical device communication Part 30200: Transport profile – Cable connected Amendment 1
- IEEE Std 11073-30300:2004, Health informatics – Point-of-care medical device communication - Transport profile – Infrared
- IEEE Std 11073-30400:2010, IEEE Health informatics – Point-of-care medical device communication Part 30400: Interface profile – Cabled Ethernet

2) Current new or revision projects

- IEEE P3333.1.2, Draft Standard for the perceptual Quality Assessment of Three Dimensional (3D) Contents based on Physiological mechanisms
- IEEE P3333.2.2, Draft Standard for Three-Dimensional (3D) Medical Visualization
- IEEE P3333.2.3, Draft Standard for Three-Dimensional (3D) Medical Data Management
- IEEE P1333.2.4, Draft Standard for Three-Dimensional (Medical Simulation)
- IEEE P1708, Draft Standard for Wearable Cuffless Blood Pressure Measuring Devices
- IEEE P1822, Draft Standard for Digital Microscope Analyzer, Whole Slide Image Scanner and Digital Microscope
- IEEE P3333.1, Draft Standard for the Quality Assessment of Three Dimensional (3D) Contents based on Psychophysical Studies
- IEEE P3333.2, Draft Standard for Three-Dimensional Model Creation Using Unprocessed 3D Medical Data

- IEEE P11073-10101, Draft Standard for Health informatics – Point-of-care medical device communication – Nomenclature
- IEEE P11073-10101a, Draft Standard for Health informatics – Point-of-care medical device communication- Nomenclature Amendment for additional definitions
- IEEE P11073-10201, Draft Standard for Health informatics – Point-of-care medical device communication- Domain information model
- IEEE P11073-10301-1, Draft Standard for Health informatics – Point-of-care medical device communication- Part 10301-1: Device Specialization – Infusion pump, General
- IEEE P11073-10302-1, Draft Standard for Health informatics – Point-of-care medical device communication- Part 10302-1: Device Specialization – Physiologic monitor, General
- IEEE P11073-10303-1, Draft Standard for Health informatics – Point-of-care medical device communication- Part 10303-1: Device Specialization – Ventilator, General
- IEEE P11073-10404, Draft Standard for Health Informatics – Personal Health Device Communication- Device Specialization – Pulse Oximeter
- IEEE P11073-10406a, Draft Standard for Health informatics – Personal health device communication Part 10406: Device specialization--Basic electrocardiograph (ECG) (1- to 3-lead ECG) Amendment
- IEEE P11073-10407-2008/Cor 1, Health Informatics – Personal Health Device Communication - Device Specialization- Blood Pressure Monitor – Corrigendum 1
- IEEE P11073-10408-2008/Cor 1, Health informatics – Personal health device communication Part 10408: Device specialization – Thermometer – Corrigendum 1
- IEEE P11073-10413, Draft Standard for Health informatics – Personal health device communication- Device specialization – Respiration rate monitor
- IEEE P11073-10415-2008/Cor 1, Health Informatics – Personal Health Device Communication - Device Specialization – Weighing Scale – Corrigendum 1
- IEEE P11073-10417a, Draft Standard for Health informatics – Personal health device communication Part 10417: Device specialization--Glucose meter Amendment 1
- IEEE P11073-10418-2011/Cor 1, Health informatics – Personal health device communication Part 10418: Device specialization – International Normalized Ratio (INR) monitor - Corrigendum 1
- IEEE P11073-10419, Draft Standard for Health informatics – Personal health device communication- Device specialization- Insulin pump
- IEEE P11073-10420-2010/Cor 1, Health informatics – Personal health device communication Part 10420: Device specialization – Body composition analyzer- Corrigendum 1
- IEEE P11073-10422, Draft Standard for Health informatics – Personal health device communication – Device specialization – Urine analyzer
- IEEE P11073-10423, Draft Standard for Health informatics – Personal health device communication – Device specialization – Sleep Monitor IEEE P11073-10424
- IEEE P11073-10471a, Draft Standard for Health informatics-Personal health device communication Part 10471: Device specialization-Independent living activity hub Amendment
- IEEE P11073-20101, Draft Standard for Health informatics – Point-of-care medical device communication – Application profile – Base standard
- IEEE P11073-20201, Draft Standard for Health informatics – Point-of-care medical device communication – Part 20201: Application profile – Polling mode
- IEEE P11073-20202, Draft Standard for Health informatics – Point-of-care medical device communication – Part 20202: Application profile – Baseline asynchronous mode

- IEEE P11073-20301, Draft Standard for Health informatics – Point-of-care medical device communication – Part 20301: Application profile – Optional package, remote control
- IEEE P11073-20401, Draft Standard for Health informatics – Point-of-care medical device communication – Part 20401: Application profile – Common networking services

Annex 2.2: Standards for eHealth

Standards for eHealth especially telemedicine has been developed since 1990's in ISO (ISO/TC215).[54] In early 2000's, standardization for Personal Health Devices (PHD) has been started in IEEE (IEEE-11073 PHD Work Group). The standards for eHealth has been established in the field of medical information and medical data exchange systems. The published standards are in **Table 1A**.

Table 1A: Standards for medical information and medical data exchange systems

No	Title of Standard
ISO 10159:2011	Health informatics- Messages and communication- Web access reference manifest
ISO/IEEE 11073-00103:2015	Health informatics- Personal health device communication- Part 00103: Overview
ISO/IEEE 11073-10101:2004	Health informatics- Point-of-care medical device communication- Part 10101: Nomenclature
ISO/IEEE 11073-10102:2014	Health informatics- Point-of-care medical device communication- Part 10102: Nomenclature- Annotated ECG
ISO/IEEE 11073-10103:2014	Health informatics- Point-of-care medical device communication- Part 10103: Nomenclature- Implantable device, cardiac
ISO/IEEE 11073-10201:2004	Health informatics- Point-of-care medical device communication- Part 10201: Domain information model
ISO/IEEE 11073-10404:2010	Health informatics- Personal health device communication- Part 10404: Device specialization- Pulse oximeter
ISO/IEEE 11073-10406:2012	Health informatics- Personal health device communication- Part 10406: Device specialization- Basic electrocardiograph (ECG) (1- to 3-lead ECG)
ISO/IEEE 11073-10407:2010	Health informatics- Personal health device communication- Part 10407: Device specialization- Blood pressure monitor
ISO/IEEE 11073-10408:2010	Health informatics- Personal health device communication- Part 10408: Device specialization- Thermometer
ISO/IEEE 11073-10415:2010	Health informatics- Personal health device communication- Part 10415: Device specialization- Weighing scale
ISO/IEEE 11073-10417:2014	Health informatics- Personal health device communication- Part 10417: Device specialization- Glucose meter
ISO/IEEE 11073-10418:2014	Health informatics- Personal health device communication- Part 10418: Device specialization- International Normalized Ratio (INR) monitor
ISO/IEEE 11073-10420:2012	Health informatics- Personal health device communication- Part 10420: Device specialization- Body composition analyzer
ISO/IEEE 11073-10421:2012	Health informatics- Personal health device communication- Part 10421: Device specialization- Peak expiratory flow monitor (peak flow)
ISO/IEEE 11073-10441:2015	Health informatics- Personal health device communication- Part 10441: Device specialization- Cardiovascular fitness and activity monitor

54 Dr Done-Sik Yoo, Electronics and Telecommunications Research Institute (ETRI), Republic of Korea, +82 42 860 1163, dsyoo@etri.re.kr.

Table 1A: Standards for medical information and medical data exchange systems (continuación)

No	Title of Standard
ISO/IEEE 11073-10442:2015	Health informatics- Personal health device communication- Part 10442: Device specialization- Strength fitness equipment
ISO/IEEE 11073-10471:2010	Health informatics- Personal health device communication- Part 10471: Device specialization- Independant living activity hub
ISO/IEEE 11073-10472:2012	Health Informatics- Personal health device communication- Part 10472: Device specialization- Medication monitor
ISO/IEEE 11073-20101:2004	Health informatics- Point-of-care medical device communication- Part 20101: Application profiles- Base standard
ISO/IEEE 11073-20601:2010	Health informatics- Personal health device communication- Part 20601: Application profile- Optimized exchange protocol
ISO/IEEE 11073-30200:2004	Health informatics- Point-of-care medical device communication- Part 30200: Transport profile- Cable connected
ISO/IEEE 11073-30300:2004	Health informatics- Point-of-care medical device communication- Part 30300: Transport profile- Infrared wireless
ISO/IEEE 11073-30400:2012	Health informatics- Point-of-care medical device communication- Part 30400: Interface profile- Cabled Ethernet
ISO 11073-90101:2008	Health informatics- Point-of-care medical device communication- Part 90101: Analytical instruments- Point-of-care test
ISO 11073-91064:2009	Health informatics- Standard communication protocol- Part 91064: Computer-assisted electrocardiography
ISO/TS 11073-92001:2007	Health informatics- Medical waveform format- Part 92001: Encoding rules
ISO/TR 11487:2008	Health informatics- Clinical stakeholder participation in the work of ISO TC 215
ISO 11615:2012	Health informatics- Identification of medicinal products- Data elements and structures for the unique identification and exchange of regulated medicinal product information
ISO 11616:2012	Health informatics- Identification of medicinal products- Data elements and structures for the unique identification and exchange of regulated pharmaceutical product information
ISO/TR 11633-1:2009	Health informatics- Information security management for remote maintenance of medical devices and medical information systems- Part 1: Requirements and risk analysis
ISO/TR 11633-2:2009	Health informatics- Information security management for remote maintenance of medical devices and medical information systems- Part 2: Implementation of an information security management system (ISMS)
ISO/TR 11636:2009	Health Informatics- Dynamic on-demand virtual private network for health information infrastructure
ISO 12052:2006	Health informatics- Digital imaging and communication in medicine (DICOM) including workflow and data management
ISO/TR 12300:2014	Health informatics- Principles of mapping between terminological systems
ISO/TR 12309:2009	Health informatics- Guidelines for terminology development organizations

Table 1A: Standards for medical information and medical data exchange systems (continuación)

No	Title of Standard
ISO/TR 12773-1:2009	Business requirements for health summary records- Part 1: Requirements
ISO/TR 12773-2:2009	Business requirements for health summary records- Part 2: Environmental scan
ISO 12967-1:2009	Health informatics- Service architecture- Part 1: Enterprise viewpoint
ISO 12967-2:2009	Health informatics- Service architecture- Part 2: Information viewpoint
ISO 12967-3:2009	Health informatics- Service architecture- Part 3: Computational viewpoint
ISO/TR 13054:2012	Knowledge management of health information standards
ISO 13119:2012	Health informatics- Clinical knowledge resources- Metadata
ISO 13120:2013	Health informatics- Syntax to represent the content of healthcare classification systems- Classification Markup Language (ClaML)
ISO/TR 13128:2012	Health Informatics- Clinical document registry federation
ISO/TS 13131:2014	Health informatics- Telehealth services- Quality planning guidelines
ISO/TS 13582:2013	Health informatics- Sharing of OID registry information
ISO/TS 14265:2011	Health Informatics- Classification of purposes for processing personal health information
ISO/TR 14292:2012	Health informatics- Personal health records- Definition, scope and context
ISO/TR 14639-1:2012	Health informatics- Capacity-based eHealth architecture roadmap- Part 1: Overview of national eHealth initiatives
ISO/TR 14639-2:2014	Health informatics- Capacity-based eHealth architecture roadmap- Part 2: Architectural components and maturity model
ISO/TR 16056-1:2004	Health informatics- Interoperability of telehealth systems and networks- Part 1: Introduction and definitions
ISO/TR 16056-2:2004	Health informatics- Interoperability of telehealth systems and networks- Part 2: Real-time systems
ISO/TS 16058:2004	Health informatics- Interoperability of telelearning systems
ISO/TS 16791:2014	Health informatics- Requirements for international machine-readable coding of medicinal product package identifiers
ISO 17090-1:2013	Health informatics- Public key infrastructure- Part 1: Overview of digital certificate services
ISO 17090-2:2008	Health informatics- Public key infrastructure- Part 2: Certificate profile
ISO 17090-3:2008	Health informatics- Public key infrastructure- Part 3: Policy management of certification authority
ISO 17090-4:2014	Health informatics- Public key infrastructure- Part 4: Digital Signatures for healthcare documents
ISO 17115:2007	Health informatics- Vocabulary for terminological systems

Table 1A: Standards for medical information and medical data exchange systems (continuación)

No	Title of Standard
ISO/TS 17117:2002	Health informatics- Controlled health terminology- Structure and high-level indicators
ISO/TR 17119:2005	Health informatics- Health informatics profiling framework
ISO 17432:2004	Health informatics- Messages and communication- Web access to DICOM persistent objects
ISO/TS 17439:2014	Health informatics- Development of terms and definitions for health informatics glossaries
ISO/TR 17791:2013	Health informatics- Guidance on standards for enabling safety in health software
ISO 18104:2014	Health informatics- Categorial structures for representation of nursing diagnoses and nursing actions in terminological systems
ISO 18232:2006	Health Informatics- Messages and communication- Format of length limited globally unique string identifiers
ISO/TR 18307:2001	Health informatics- Interoperability and compatibility in messaging and communication standards- Key characteristics
ISO/TS 18530:2014	Health Informatics- Automatic identification and data capture marking and labelling- Subject of care and individual provider identification
ISO 18812:2003	Health informatics- Clinical analyser interfaces to laboratory information systems - Use profiles
ISO/TR 19231:2014	Health informatics- Survey of mHealth projects in low and middle income countries (LMIC)
ISO 20301:2014	Health informatics- Health cards- General characteristics
ISO 20302:2014	Health informatics- Health cards- Numbering system and registration procedure for issuer identifiers
ISO/TR 21089:2004	Health informatics- Trusted end-to-end information flows
ISO 21090:2011	Health informatics- Harmonized data types for information interchange
ISO 21091:2013	Health informatics- Directory services for healthcare providers, subjects of care and other entities
ISO/TS 21298:2008	Health informatics- Functional and structural roles
ISO 21549-1:2013	Health informatics- Patient healthcard data- Part 1: General structure
ISO 21549-2:2014	Health informatics- Patient healthcard data- Part 2: Common objects
ISO 21549-3:2014	Health informatics- Patient healthcard data- Part 3: Limited clinical data
ISO 21549-4:2014	Health informatics- Patient healthcard data- Part 4: Extended clinical data
ISO 21549-5:2008	Health informatics- Patient healthcard data- Part 5: Identification data
ISO 21549-6:2008	Health informatics- Patient healthcard data- Part 6: Administrative data
ISO 21549-7:2007	Health informatics- Patient healthcard data- Part 7: Medication data
ISO 21549-8:2010	Health informatics- Patient healthcard data- Part 8: Links

Table 1A: Standards for medical information and medical data exchange systems (continuación)

No	Title of Standard
ISO 21667:2010	Health informatics- Health indicators conceptual framework
ISO/TR 21730:2007	Health informatics- Use of mobile wireless communication and computing techno-logy in healthcare facilities- Recommendations for electromagnetic compatibility (management of unintentional electromagnetic interference) with medical devices
ISO/HL7 21731:2014	Health informatics- HL7 version 3- Reference information model- Release 4
ISO/TS 22220:2011	Health informatics- Identification of subjects of healthcare
ISO/TR 22221:2006	Health informatics- Good principles and practices for a clinical data warehouse
ISO/TS 22224:2009	Health informatics- Electronic reporting of adverse drug reactions
ISO 22600-1:2014	Health informatics- Privilege management and access control- Part 1: Overview and policy management
ISO 22600-2:2014	Health informatics- Privilege management and access control- Part 2: Formal models
ISO 22600-3:2014	Health informatics- Privilege management and access control- Part 3: Implementations
ISO/TS 22789:2010	Health informatics- Conceptual framework for patient findings and problems in terminologies
ISO/TR 22790:2007	Health informatics- Functional characteristics of prescriber support systems
ISO 22857:2013	Health informatics- Guidelines on data protection to facilitate trans-border flows of personal health data
ISO/TS 25237:2008	Health informatics- Pseudonymization
ISO/TS 25238:2007	Health informatics- Classification of safety risks from health software
ISO/TR 25257:2009	Health informatics- Business requirements for an international coding system for medicinal products
ISO 25720:2009	Health informatics- Genomic Sequence Variation Markup Language (GSVML)
ISO/TS 27527:2010	Health informatics- Provider identification
ISO 27789:2013	Health informatics- Audit trails for electronic health records
ISO/TS 27790:2009	Health informatics- Document registry framework
ISO 27799:2008	Health informatics- Information security management in health using ISO/IEC 27002
ISO/TR 27809:2007	Health informatics- Measures for ensuring patient safety of health software
ISO/HL7 27931:2009	Data Exchange Standards- Health Level Seven Version 2.5- An application protocol for electronic data exchange in healthcare environments
ISO/HL7 27932:2009	Data Exchange Standards- HL7 Clinical Document Architecture, Release 2
ISO/HL7 27951:2009	Health informatics- Common terminology services, release 1

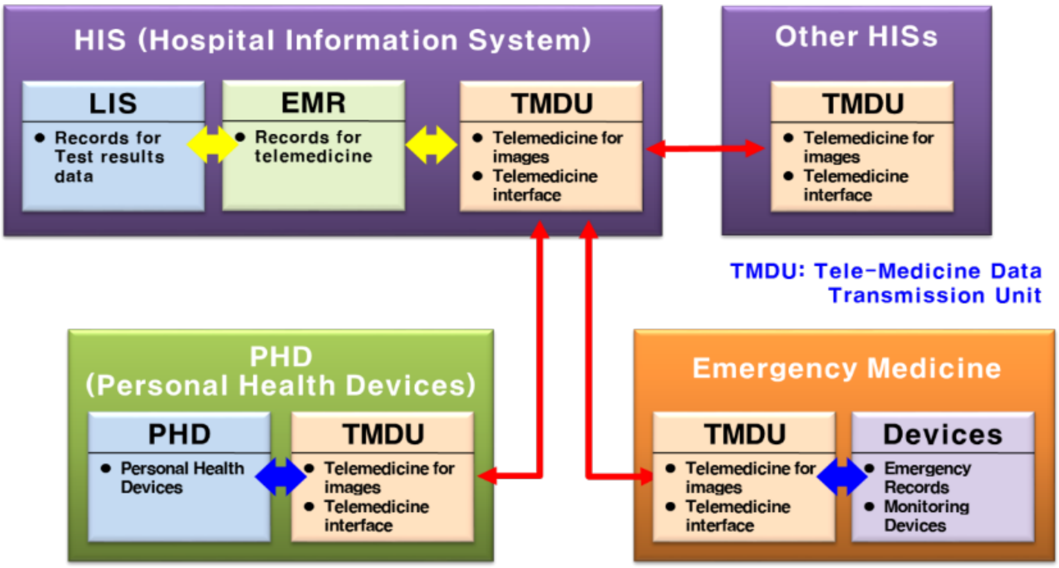
Table 1A: Standards for medical information and medical data exchange systems (continuación)

No	Title of Standard
ISO/HL7 27953-1:2011	Health informatics- Individual case safety reports (ICSRs) in pharmacovigilance- Part 1: Framework for adverse event reporting
ISO/HL7 27953-2:2011	Health informatics- Individual case safety reports (ICSRs) in pharmacovigilance- Part 2: Human pharmaceutical reporting requirements for ICSR
ISO/TR 28380-1:2014	Health informatics- IHE global standards adoption- Part 1: Process
ISO/TR 28380-2:2014	Health informatics- IHE global standards adoption- Part 2: Integration and content profiles
ISO/TR 28380-3:2014	Health informatics- IHE global standards adoption- Part 3: Deployment
ISO/TS 29585:2010	Health informatics- Deployment of a clinical data warehouse
IEC 80001-1:2010	Application of risk management for IT-networks incorporating medical devices- Part 1: Roles, responsibilities and activities
IEC/TR 80001-2-1:2012	Application of risk management for IT-networks incorporating medical devices- Part 2-1: Step by Step Risk Management of Medical IT-Networks; Practical Applications and Examples
IEC/TR 80001-2-2:2012	Application of risk management for IT-networks incorporating medical devices- Part 2-2: Guidance for the communication of medical device security needs, risks and controls
IEC/TR 80001-2-3:2012	Application of risk management for IT-networks incorporating medical devices Part 2-3: Guidance for wireless networks
IEC/TR 80001-2-4:2012	Application of risk management for IT-networks incorporating medical devices - Part 2-4: General implementation guidance for Healthcare Delivery Organizations
IEC/TR 80001-2-5:2014	Application of risk management for IT-networks incorporating medical devices - Part 2-5: Application guidance- Guidance for distributed alarm systems
ISO/TR 80001-2-6:2014	Application of risk management for IT-networks incorporating medical devices - Part 2-6: Application guidance- Guidance for responsibility agreements
ISO/TR 80001-2-7:2015	Application of risk management for IT-networks incorporating medical devices - Application guidance- Part 2-7: Guidance for Healthcare Delivery Organizations (HDOs) on how to self-assess their conformance with IEC 80001-1

A schematic diagram for telemedicine is shown in **Figure 2A**[55]. The Telemedicine Data Transmission Unit (TMDU) should be positioned in every telemedicine system including Hospital Information Systems (HIS), Personal Health Devices (PHD) and ambulances for emergency medicine. If the standard based TMDU is installed, it would be very easy to establish and expand the telemedicine system in the country.

[55] Yoo, Done-Sik, Standard Development of Data Exchange Technology for Telemedicine Services, Presentation at u-Health Project Group Meeting, Telecommunications Technology Association (TTA), Seoul, Republic of Korea, March 2015.

Figure 2A: Schematic diagram for telemedicine



It is necessary to review and investigate published standards for eHealth and to prioritize them in order to introduce developing countries. To do this, it is needed to meet and collaborate with standard experts. In the Question 2/2 for the 2014-2018 Study Period, it would be very helpful to appoint the Liaison officer to the T sector as well as other related SDOs such as ISO/TC215.

Development of eHealth Standards in Korea during 2015

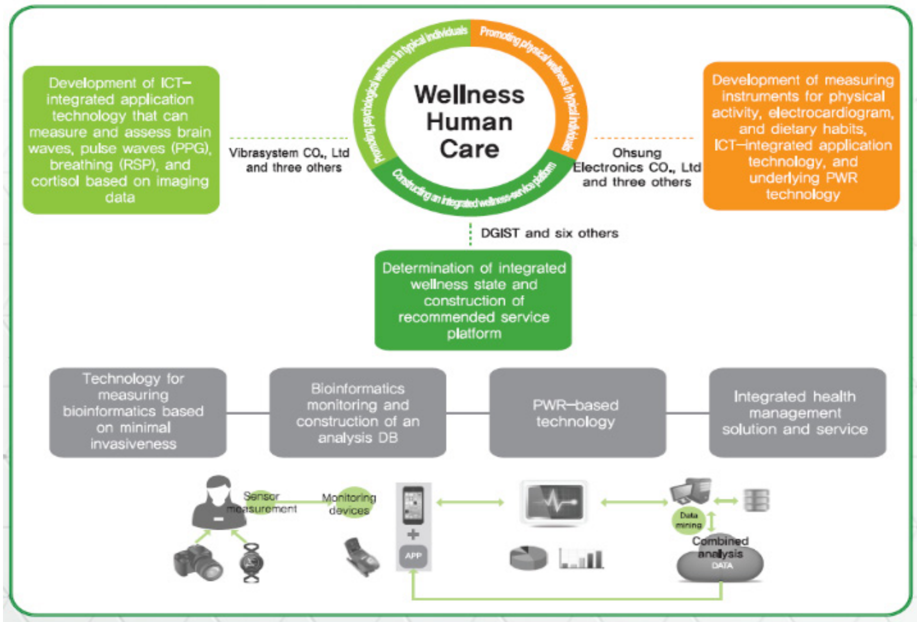
1) Wellness Human Care Service Platform – A Reference Model for Wellness Condition Reasoning and Content Recommendation

[56]The purpose of this standard is to define a Reference Model for Wellness Condition Reasoning and Content Recommendation (**Figure 3A**[57],[58]) on the Wellness Human Care Service Platform that provides services for the pursuit of optimal health and high quality of life through an individual's active health promotion and prevention activities. This standard describes the requirements and standard items on the wellness human care platform to provide services that enable the reasoning of personalized wellness conditions and recommendations of appropriate content and programs. In addition, detailed requirements and recommendations for each component are also described.

Considering individuals' increasingly active pursuit of healthy lifestyles beyond the limited markets of Korean eHealth industries mainly based on medical institutions, this standard is applicable to various fields as follows: self-care, living care, wellness entertainment, etc. This standard provides the interoperability between products and services in these fields and the wellness human care service platform and is expected to have a great impact on related industries in the future.

[56] Dr Done-Sik Yoo, Electronics and Telecommunications Research Institute (ETRI), Korea (Rep. of), dsyoo@etri.re.kr.
[57] 2/233, "Development of e-health standards in Korea: Year 2014", The Second Meeting of ITU-D Study Group 2, ITU-D, Geneva, Switzerland, September 2015.
[58] TTAK.KO-10.0831, "Wellness Human Care Service Platform - Reference Model for Wellness Condition Reasoning and Contents Recommendation", Telecommunications Technology Association (TTA), Republic of Korea, Dec 2015.

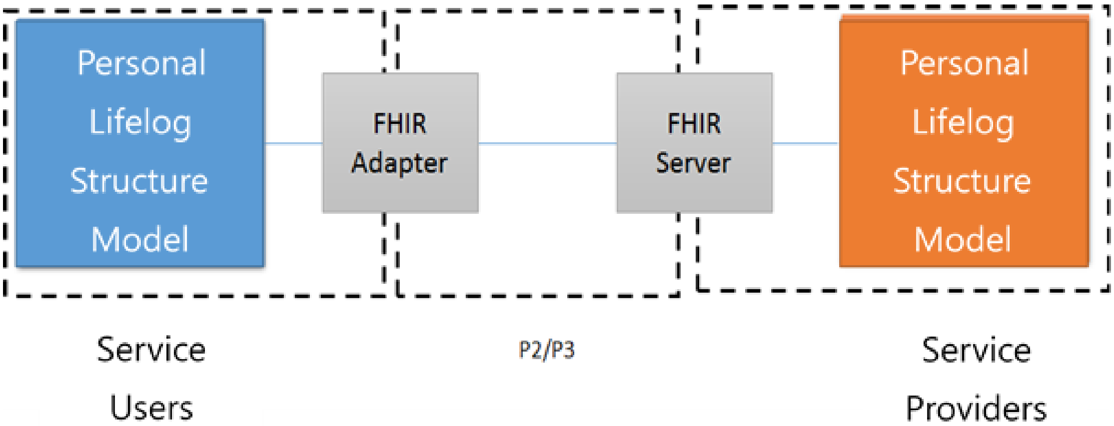
Figure 3A: Reference model for wellness condition reasoning and content recommendation



2) Protocols based on HL7 FHIR for Health Lifelog Services

The purpose of this standard is to help implement standardized services by defining the components and protocols for health lifelog services. With the development of smart devices, the healthcare service sector has been rapidly changing. However, the standardization of related products and services does not catch up with market demands. This standard defines the communication components and RESTful APIs based on HL7 FHIR for health lifelog services. The provision of health lifelog service protocols with a health lifelog data model will contribute to minimizing confusion, which may occur in the development of a health lifelog service. As a result, this standard is expected to help build a system that provides service infrastructure and the basic architecture of each component.

Figure 4A: Service based on the Data Model

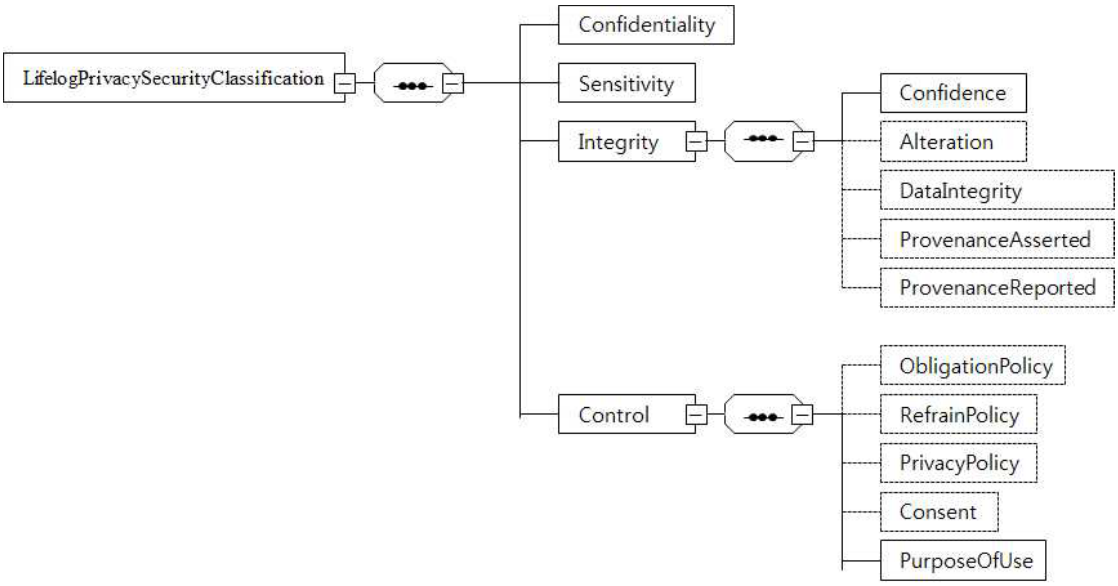


Source: TTAK.KO-10.0832, “Protocols based on HL7 FHIR for Health Lifelog Services”, TTA, Republic of Korea, December 2015.

3) Privacy and security classification guideline for Health Lifelog Services

This standard defines the privacy and security classification guideline for health lifelog services to prevent privacy invasion. In providing personalized medical and healthcare services, the privacy and security classification guideline can be used to control access, specify protective measures, and determine additional handling restrictions required by communications security policy. In presenting the privacy and security classification guideline for health lifelog services, this standard defines terminologies and describes the details of the privacy and security classification guideline, which applies based on the risk assessment of harm resulting from unauthorized disclosure. The advent of lifelog technologies has changed the user patterns as well as the paradigm of internet services, and emphasized the importance of personalized services. However, the issue of privacy infringement and leakage of users' sensitive medical information is aggravating with the application of lifelog technologies to healthcare. This standard helps address the problem of privacy infringement in healthcare services using lifelog technologies and ensures the interoperability among healthcare services. Moreover, this standard is expected to help reduce medical expenses by improving the health of individuals. Finally, this standard is expected to contribute to the emergence of a new medical service market that will include remote treatment services as well as to the revitalization of various business areas, including healthcare, marketing, and public health policy-making.

Figure 5A: Structure for the privacy and security classification guideline



Source: TTAK.OT-10. 0834 "Privacy and Security Classification Guideline for Health Lifelog Services", TTA, Korea, Dec 2015.

4) Requirements for description of Korean medicine treatment in personal health record exchange – Part 1: Medication

The purpose of this standard is to present the requirements for description of Korean Medicine treatment in personal health record exchange for the various types of personal health records of Korean medicine, and to help Korean medical services collaborate with and be integrated into eHealth services. It also describes requirements to consider in exchanging Korean Medicine treatment records. To enable the exchange of personal health records for Korean Medicine personal healthcare services, this standard defines terminologies and describes the interoperability with eHealth services and necessary considerations. The scale of eHealth services is very huge and complicated due to the involvement of various stakeholders including the government, hospitals, telcos, medical service providers and medical device manufactures. To create synergy and facilitate communication among stakeholders, standardization is a must. Furthermore, if Korean medicine hospitals, Korean medicine clinics, and Korean medicine healthcare devices are included in eHealth services, a more variety of services can be provided. To that end, it is necessary to differentiate services and information processing procedures in accordance with the source of key data for data sharing and communication. In this context, this standard can facilitate communication and increase the efficiency of healthcare. The benefits this standard is expected to deliver include: 1) more affordable and sustainable better-quality services for patients, and 2) more efficient, cheaper and customized provision of patient services for suppliers.

Annex 3: eHealth Initiatives of Member States

Telemedicine initiative in Cameroon

1) Introduction

Cameroon has an estimated population of 22 million, and a ratio of one doctor per 10,000 inhabitants in 2009.[59] That ratio will certainly not have evolved much since that date, given the speed with which the population is increasing and the low training rates in the field of healthcare in Cameroon.

This situation is made worse by the fact that barely 15 per cent of the population has social security health coverage, making healthcare a luxury for many Cameroonians. Thus, numerous patients have died because they have not received care in time. This led young doctors, in 2015, to create an initiative to resolve, if only partially, the difficulties relating to access to healthcare in Cameroon. This not-for-profit organization – SOS MEDECINS – uses information and communication technologies to provide proximity services.

This contribution presents this approach, which is in fact midway between traditional medicine and telemedicine.

2) The "SOS MEDECINS" services

SOS MEDECINS offers two types of service: a service at home, and advice online. The medical service at home is provided to those who have subscribed to it in advance. When required, the subscriber or person acting on his/her behalf calls the SOS MEDECINS switchboard and indicates where the patient is, providing any further information necessary to foresee the resources required (general practitioners, specialists, nurses, equipment, etc.). The resources are mobilized and taken to wherever the patient is.

Where advice is concerned, use is made of current means of communication – WhatsApp, Facebook, Viber, and even the traditional telephone. In general, people can ask basic questions even if they are not subscribers, but if they want to take it any further they have to subscribe.

After barely a year's existence, SOS MEDECINS in Cameroon has had 497 patients receiving home visits, with appointments generally made by telephone, and 11 834 people receiving advice online (WhatsApp, Viber, Facebook, etc.).

3) Difficulties and future outlook

The difficulties encountered by SOS MEDECINS relate to the address system, which is very imprecise in Cameroon. It often takes patients a long time to explain where they are.

With the development of mobile broadband in Cameroon, SOS MEDECINS intends to get their subscribers to use geolocation applications to make it easier to find them. SOS MEDECINS now provides its services in three towns, and intends to expand to most localities in Cameroon, allowing subscribers anywhere in those localities to receive care when required. Partnerships are also being envisaged with SOS MEDECINS France and SOS MEDECINS Sénégal.

4) Gifted Mom – services

According to the 2013 Human Development Report published by the United Nations Development Programme (UNDP), 690 out of every 100,000 women die from pregnancy-related causes. The report also observes that 61 out of every 1,000 children die before the age of five years, particularly as a result of non-vaccination.

[59] Mr Albert Kamga, Ministry of Posts and Telecommunications, Cameroon, kamga@minpostel.gov.cm.

The statistics relating to such mother and child mortality issues are far more alarming, although they are not available on WHO's, or even Cameroon's, web pages showing current statistics. In 2016, cases of tragic and dramatic deaths of pregnant women have been recorded in Cameroon's main cities. A case in point was the death on 13 March 2016 of a mother with her four babies.[60] Only a few days later, another case involving the death of twin-pregnancy babies was recorded in Yaoundé, the political capital. With such dramatic events occurring in the main cities, in which the key hospital facilities are located, one can imagine how bad the situation is in remote areas.

It was in the interests of helping to resolve this prenatal and neonatal problem that a group of young Information and Communication Technology (ICT) engineers set up, in 2013, a platform known as "Gifted Mom", to provide better support for pregnant women and monitoring for children aged below five years.

The Gifted Mom platform offers the following services and solutions:

- Green telephone line for ad hoc assistance to pregnant women: A woman requiring telephone assistance can send a text message to the short code 8006. She will then be put in contact with a call-centre operator for assistance and advice, in English or French – the official languages – or in one of the local languages.
- Monitoring of pregnant women: Pre-registered pregnant women receive telephone calls, for those who are unable to read, or SMS texts for those who can, reminding them of important dates and deadlines for prenatal consultations.
- Monitoring of child vaccinations: Mothers of children under five years of age are informed by telephone or SMS of the vaccination dates foreseen in the national immunization programme (measles, poliomyelitis, tetanus, etc.).
- Education: Gifted Mom advises young girls and communities, particularly on sex-related matters (sex education) and family planning. Information on scheduled training sessions is for the most part disseminated by mobile, but the training sessions themselves are face to face.

Awareness-building among women and the general public regarding the services provided by Gifted Mom is achieved through the distribution of flyers, radio and television spots, representation at forums, partnerships with hospital training exercises, a presence on social networks, websites, and so on.

In June 2016, the platform had over 10,000 users. The services provided by Gifted Mom are free of charge. Financing comes from awards received and from partners, including the following:

- The Partnership for Maternal and Newborn Health (PMNCH)
- Mobile Alliance for Maternal Action
- The MasterCard Foundation
- Women Deliver
- ALN Ventures
- etc.

Gifted Mom has already received numerous awards, including:

- African Young Enterprise Award
- The Queen's Young Leaders
- D-Prize
- Ashoka Changemakers
- Anzisha Prize

[60] https://www.youtube.com/watch?v=UlF4j-8ipNY.

5) References

- http://www.giftedmom.org
- http://www.lemonde.fr/afrique/article/2015/02/06/gifted-mom-un-projet-innovant-pour-combattre-la-mortalite-infantile_4571727_3212.html
- http://www.lemonde.fr/afrique/article/2016/05/10/au-cameroun-une-application-pour-que-les-femmes-enceintes-ne-meurent-plus-en-silence_4916830_3212.htm
- https://www.facebook.com/thegiftedmom/

Wireless heart health: case study from People's Republic of China

To support the prevention and management of CVDs in China's rural communities, Qualcomm® Wireless ReachTM launched the Wireless Heart Health program in collaboration with Life Care Networks in 2011.[61] Wireless Heart Health targets rural doctors and patients. This program was deployed in resource-scarce, community health clinics located in 21 provinces and direct-controlled municipalities across China.

The Wireless Heart Health program features a mobile broadband-enabled system developed by Life Care Networks. This system includes a smartphone with three built-in ECG sensors and an Electronic Health Record (EHR) platform that offers instant access to patient records, including ECG data.

Table 2A: Wireless heart health

1. Entity submitting the case study	
1.1 Country of entity:	USA
1.2 Name of entity:	Qualcomm Incorporated
1.3 Type (one reply only):	
□	Member State
X	**Sector Member**
□	Associate
□	Academia
□	Regional Organisation
□	International Organisation
□	UN Organisation
□	Other
1.4 Website:	www.wirelessreach.com
1.5 Contact name:	Michelle Martin
1.6 Contact title:	Government Affairs Analyst, Staff
1.7 Contact phone:	858-845-8621
1.8 Contact e-mail:	
1.9 Contact e-mail:	
X	Case study only
□	Case study and discussion at the next relevant meeting

[61] Contribution Ms Laboni Patnaik, Qualcomm Inc., United States of America.

Table 2A: Wireless heart health (continuación)

	Information on who will present the case study at the meeting(s) can be entered using the contribution submission form here (http://www.itu.int/ITU-D/CDS/contributions/sg/index.asp)	
2.	**Case study details**	
2.1 Title:		Wireless Heart Health
2.2 Country:		China
2.3 Study period:		2011 (continuing)
2.4 Relevant ITU-D Study Group Question:		
X	**Q10-3/2: Telecommunications/ICT for rural and remote areas (2010-2014)**	
X	**Q14-3/2: Information and telecommunications/ICTs for eHealth (2010-2014)**	
X	**Q25/2: Access technology for broadband telecommunications including IMT, for developing countries (2010-2014)**	
2.5 Status (one reply only):		
□	Planned	
X	**Ongoing**	
□	Completed	
□	Other. Please specify	
2.6 Type of initiative (one reply only):		
□	Not applicable to this initiative	
X	Pilot/trial	
□	Initiative funded by USF	
□	Other. Please specify	
2.7 Start year:		2011
2.8 Length (years) (one reply only):		
□	< 1	
□	1	
□	2	
□	3	
□	4	
□	5	
X	**6-10**	
□	> 10	
2.9 Seat location of the initiative/project:		Twenty-one provinces and direct-controlled municipalities: Beijing, Shanghai, Tianjin, Anhui, Shandong, Hunan, Jiangsu, Fujian, Zhejiang, Jilin, Shanxi, Shaanxi, Xizang, Guangdong, Liaoning, Heilongjiang, Yunnan, Guizhou, Guangxi, Xinjiang and Hebei.
2.10 Please indicate closest main city and GPS coordinates, if possible:		

Table 2A: Wireless heart health (continuación)

2.11 Size of the population concerned by the initiative/ project:	Population of China: 1.4 billion (as of 2015). Rural population of China: 603 million (as of 2015). Rural population concerned by the initiative: 390 million (as of 2015).
2.12 Website of the initiative:	https://www.qualcomm.com/company/wireless-reach, http://www.qualcomm.cn/company/wireless-reach, http://www.lifecarenetworks.com/
2.13 Beneficiary region:	
◻	Global
◻	Africa
◻	Arab States
X	**Asia & Pacific**
◻	CIS
◻	Europe
◻	The Americas
◻	Not in any region
2.14 Beneficiary countries (please list):	China
3. Detailed description	
3.1 Detailed description:	

Table 2A: Wireless heart health (continuación)

Description of the country's geography, terrain, climate, demographics, and socio-economic situation:	China is developing fast. However, the income gap between urban and rural residents is widening. According to government statistics, the average disposable income of rural residents is less than RMB 12,000 (about USD $1,800) per year – approximately one-third that of urban residents. Recently, Peking University's Institute of Social Science Survey found that China's Gini coefficient for income was 0.49 in 2012, compared to 0.47 in 2010. The imbalanced allocation of health resources between rural and urban areas has been a subject of public concern. In most remote and underdeveloped areas in China, the private clinic is an important supplement to public hospitals, which have a severe shortage of health professionals and medical resources. Experts agree that the global health burden of cardiovascular disease (CVD) is on the rise and disproportionately affects rural residents. CVDs are currently the leading cause of death in China, responsible for about 2.6 million deaths annually. By 2020, this figure is projected to increase to 4 million deaths per year. China will lose USD $27.8 trillion in national income between 2012 and 2030 due to the five main non-communicable diseases (NCDs), including CVD, cancer, chronic respiratory disease, diabetes and mental health. CVD is one of the two most costly NCDs. Cardiovascular diseases are some of the hardest diseases to diagnose, especially when patients are not showing common symptoms. The main challenges facing CVD care in rural areas are the difficulties in reaching patients, inadequate medical facilities and sometimes the limited capacity and capabilities of doctors. Experts worldwide agree that early detection and consistent monitoring through electrocardiogram (ECG) screening, paired with necessary treatment, have the potential to decrease health risks associated with CVD.
3.2 Objectives and implementation details:	

Table 2A: Wireless heart health (continuación)

Objectives and implementation details of the initiative/project applications (basic telephony, e-business, e-administration, e-education, eHealth, ICT training, etc.):	Luo Zhengxiang, head of the Guangdong Cardiovascular Disease Research Institute, notes, "CVDs have spread to many rural areas in most parts of China, where medical care is less adequate than what can be found in the cities." To support the prevention and management of CVDs in China's rural communities, Qualcomm® Wireless Reach™ launched the Wireless Heart Health program in collaboration with Life Care Networks in 2011. Wireless Heart Health targets rural doctors and patients. This program was deployed in resource-scarce, community health clinics located in 21 provinces and direct-controlled municipalities across China. The Wireless Heart Health program features a mobile broadband-enabled system developed by Life Care Networks. This system includes a smartphone with three built-in ECG sensors and an electronic health record (EHR) platform that offers instant access to patient records, including ECG data. Doctors hold the device to patients' chests for approximately 30 seconds while the sensor collects their ECG data. The data is automatically stored in the patient's EHR and sent immediately over the 3G or 4G LTE wireless network for analysis by a cardiac specialist at the Life Care Networks Call Center, which is staffed around the clock in Beijing. The on-call cardiac specialists provide feedback within minutes to clinic staff and patients via SMS or a phone call. Currently, the call center has 72 physicians and 10 nurses. For simple cases, the physicians at the call center can provide diagnosis, consultation and treatment remotely. For more complex cases, patients are screened by the system and then referred to specialized hospitals for further testing or treatment.
3.3 Considerations:	
Consideration of indigenous communities, isolated and poorly served areas, small islands and their particular needs and situations:	As the largest information and communications platform in history, mobile broadband technology has become a force for change. It drives economic growth and provides unprecedented opportunities to empower individuals across all socio-economic levels and in every corner of the globe – places where landlines and paved roads may not reach. Mobile technology is the principal tool for digital inclusion, giving everyone the chance to access the Internet and broadband services. Low cost devices and free applications bring isolated communities access to information and people worldwide. CVDs are currently the leading cause of death in China and are on the rise, especially in rural areas. Mobile technology is now empowering rural communities with tools and resources to better manage their health.
3.4 Financing:	
Financing and partnership aspects of the initiative, including the estimated total cost of the initiative and the types of funders (e.g. sponsors' contribution, charitable donations and subsidies from USF):	It is the Company's policy to not disclose the amount of funding for each program. It is important to recognize that the success of this program is made possible by the shared responsibility of all the partners who have contributed their expertise, resources and technology. Because of the program's reach and the variety of contributions from the different partners, the investment is much more than a US dollar amount. The program partners have worked together, each providing technical advice, support, training, funding and in-kind contributions.

Table 2A: Wireless heart health (continuación)

3.5 Financial scale of the initiative (one reply only):		
□	Not applicable	
□	Less than USD 100 000	
X	Between USD 100 000 and USD 499 999	
□	Between USD 500 000 and USD 999 999	
□	USD 1 000 000 or more	
3.6 Type of initiative (in relation to financing) (one reply only):		
□	Not applicable for this initiative	
□	Governmentally subsidized (sponsored)	
□	Privately subsidized	
X	**Partnership between government and private sectors**	
□	Funded by USF	
□	Other	
***3.7 Type of application/services provided:**		
□	Not applicable for this initiative	
□	Public voice and data services	
□	Radio or TV broadcasting	
□	E-governance, e-administration	
□	Support for small business, e-business	
X	EHealth	
□	Tele-education, e-learning	
X	ICT training	
□	Disaster preparedness / emergency support / disaster mitigation	
□	Environmental monitoring / protection	
□	Other	
3.8 Type of technology used:		
□	Not applicable for this initiative	
□	Wired local loop: Copper, optical fibre, etc. (customer's loop)	
□	Wireless local loop (customer's loop)	
□	Fixed wireless access (long distance)	
X	**Mobile wireless access**	
□	Satellite two-way communications: VSAT, etc.	
□	Wireless LANS and IP-based related networks	
□	Terrestrial voice, data, sound or television broadcasting	
□	Satellite voice, data, sound or television broadcasting	

Table 2A: Wireless heart health (continuación)

◻ Hybrid or combined technologies	
◻ Other	
3.9 Decision-making process to determine the initiative/project:	Qualcomm Wireless Reach holds an open call for proposals annually. Applicants are encouraged to submit a proposal focused on education, healthcare, public safety, entrepreneurship or the environment. Proposals are vetted based on the strength of their ability to demonstrate the use of wireless technology to strengthen economic and social development.
4. Infrastructure and regulatory environment	
4.1 Infrastructure components (Pre-existing telecommunication facilities, transport access, electricity supply, distance to the nearest local exchange and/or IP network, human resources, security, etc.):	The project leverages existing advanced wireless telecommunications networks, in this case China Telecom's CDMA2000 1x, EV-DO, TDD-LTE and FDD-LTE networks, which are serviced with power and backhaul capabilities. The networks cover most populated areas, although additional spectrum may serve to increase coverage and quality of service issues. The project operatives and beneficiaries require only the most basic infrastructure/power services.
4.2 Regulatory components (Universal service obligations, licensing conditions, frequency availability (for radio-based projects), other regulatory issues, etc.):	China has licensed radio spectrum for 3G and 4G LTE mobile services and had allocated spectrum to the three Chinese mobile carriers for long-term use (without specific withdraw date) respectively. China Telecom, as the project partner, has been allocated 30 MHz (2x15) within the 1900 MHz band (reserved), 20 MHz(2x10) within the 800 MHz band for CDMA2000 (1x&EVDO) use, 40 MHz (2x20) within band40 and band41 for TDD-LTE use, and 60 MHz (4x15) within band1 and band3 for FDD-LTE use.
4.3 Other factors which influenced the operating environment (Manufacturers, standards, etc.):	The project utilizes standard 3G and 4G LTE equipment and operations – there are no special factors required for the successful execution of the project.
5. Technical description and services provided	
5.1 Architecture, type of systems, main technical characteristics, frequencies (for radio-based projects), **power** consumption, **performances** (capacity, reliability, quality of service), **network management**, etc.:	The purpose-built smartphone includes three sensors which drive the one-lead ECG module inside the mobile device to record and receive the data. The smartphone then displays the ECG waveform on the screen and sends the data to the backend server via CDMA air interface. The device is powered by the Qualcomm Snapdragon S1 processor and installed with Android 4.2 operating system. Patient data in the EHR and in the ECG-sensing smartphone is protected by SSL encryption Life Care Networks partners closely with government health systems, so data adheres to the government's protection and privacy standards in order to integrate with government hospital-grade EHRs.
5.2 Installation and deployment (Network planning, subscriber management, etc.):	Life Care Networks operates a platform, connected to all user devices for data collection and analysis. The platform can also allow system managers to push out application updates, provide remote debugging services and conduct remote user communications.
5.3 Interconnection to national networks/backbones:	All devices can be connected to the national/local 3G or 4G LTE wireless network. The Life Care Network data platform is also connected to the national public health network. The program assists local health bureaus to collect and monitor patient data.

Table 2A: Wireless heart health (continuación)

5.4 For each service delivered (POTS, "IP telephony", etc.)**: mode** (data type and bit rate) **and quality** (voice quality and bit error rate):	SMS – Data (GMS, 9.6kbps) Telephony – Voice (GMS, 9.6kbps) ECG Data – Packet Data (3G, 2.8Mbps; 4G, 50Mbps)
6. Cost aspects	
6.1 Cost of the equipment, cost per line and cost of the operation of the system:	Device Cost – USD $95 Operation Cost – USD 2,500 per month
6.2 Cost of each terminal and cost of the service for the user:	The rural healthcare providers participating in the Wireless Heart Health program received ECG-sensing smartphones at no cost, contingent upon a three-year commitment to pay a monthly service fee of USD $24 to China Telecom.
6.3 New technologies deployed for providing reduced cost capital and operating cost solutions:	Smartphones with built-in ECG sensors, pre-loaded with an EHR platform developed specifically for this program and with connectivity to an advanced wireless 3G or 4G LTE telecommunications network provide healthcare workers with instant access to electronic patient records and can provide cost-effective user experiences.
7. Effectiveness and sustainability of the initiative/project	

Table 2A: Wireless heart health (continuación)

7.1 Effectiveness and benefits of the initiative/project for the targeted user groups:	By utilizing 3G and 4G LTE wireless technology to collect heart data from underserved patients and send it to specialists for immediate consultation, this project successfully overcomes some of the barriers to screening for and treating cardiovascular diseases in rural areas of China. Since the project's implementation in 2011, more than 600 doctors have used the Wireless Heart Health system and more than 160,000 patients have benefitted from it. For example, Dr. Ren Nianbao runs a community clinic in Langmaoshan, a rural region outside Jinan city, Shangdong province. Although it is a tiny clinic, Dr. Ren receives hundreds of patients each day. He said that about 20 percent of these patients are suffering from CVDs and that CVDs are on the rise in many of the areas he serves mainly "because of bad habits, such as eating a lot of high-calorie foods." However, a large portion of these patients do not realize they have CVDs. Prior to participating in the Wireless Heart Health program, Dr. Ren and his staff were using a conventional 12-lead ECG machine to screen for CVDs. Because this huge, complex machine is too difficult to transport and use in patients' homes, it was difficult to screen patients with a potential risk of acute CVD and who may need immediate help but aren't able to travel to a clinic. Now, Dr. Ren's clinic relies on the smartphone to quickly, easily and affordably collect accurate ECG data and receive expert consultation from cardiac specialists in the Life Care Networks Call Center in Beijing 310 miles away. Dr. Ren said he uses the mobile device 30 to 50 times per day, as more and more people are coming to him for health consultations. "Patients now have access to quick and accurate screenings," says Dr. Ren. "It's also convenient that we can check a patient's medical history on the mobile-centric digital tracking system and get examination results from the monitoring center in one to two minutes." Dr. Ren was also very excited to report that some of his patients were now correcting their own bad habits, based on greater understanding of their health, gained through the Wireless Heart Health program. Taking corrective measures will help patients prevent their diseases from worsening. Speaking about the ECG-sensing smartphones' impact on patients, Dr. Ren says, "With these efficient and trustworthy devices, many patients are now willing to get regular health examinations – increasing their knowledge and understanding of how to develop healthy lifestyles."

Table 2A: Wireless heart health (continuación)

7.2 Profitability of the initiative/ project and/or its contribution to local entrepreneurial activities:	Given that the need for CVD diagnosis and management will be ongoing, the Wireless Heart Health program was designed to be financially sustainable and is not reliant on future funding from Qualcomm Wireless Reach. The more than 600 rural healthcare providers participating in the Wireless Heart Health program received ECG-sensing smartphones at no cost. Moving forward, providers will continue to receive ECG-sensing smartphones for free, contingent upon a three-year commitment to pay a monthly service fee of RMB 150 (USD $24) to China Telecom. Market research by Life Care Networks shows that, by charging a nominal fee for their ECG screening services, each rural doctor would earn about RMB 300 (USD $48) per month from the delivery of ECG screenings, which means they will capture roughly RMB 150 (USD $24) in revenue. Patients pay an average price of RMB 10 (USD $1.60) for a screening that uses the ECG-sensing smartphone. The Chinese government provides a subsidy of RMB 50 (USD $8) toward heath care costs, which patients can use to pay for ECG screenings.
7.3 Specific strategies to respond to the needs of women, youth, handicapped, indigenous people and other marginalized or socially disadvantaged groups:	Quick, accurate, affordable heart screenings are provided via mobile broadband devices in order to efficiently and effectively reach resource-scarce populations and provide them with access to much-needed health services.
7.4 Aspects of the initiative/project, which could be strengthened to enhance its effectiveness or sustainability maximizing the benefits of telecommunication infrastructure in rural and remote areas:	Providers report that most patients are happy with the new method of conducting ECG screenings, though many lack full knowledge about the device and remain more ambivalent than providers toward the new technology. This is not unusual when new technology is introduced. Often, user education is the first step to a successful and sustainable technology deployment. Providers suggested some potential technology advances for the next iteration of the devices, including adding more sensors for more leads and improving wireless connectivity. While most users reported overall satisfaction with the device, the few who reported being dissatisfied noted connectivity issues as a reason. Wireless connectivity in rural areas has greatly improved in the past decade and is expected to continue to improve steadily in the coming years. With better connectivity, even more patients in rural areas with limited access to advanced medical care can have access to CVD screening, diagnosis and treatment.
8. Social and human development impact	
8.1 Overview of key social and human development needs of the population in the initiative/project area:	As discussed in "3.1 Detailed description", CVDs are currently the leading cause of death in China, responsible for about 2.6 million deaths annually. By 2020, this figure is projected to increase to 4 million deaths per year. The main challenges facing CVD care in rural areas are the difficulties in reaching patients, inadequate medical facilities and sometimes the limited capacity and capabilities of doctors. The Wireless Heart Health program provides unprecedented access to affordable, quality CVD screening and treatment for rural patients. By charging a nominal fee for their ECG screening services, the more than 600 rural doctors participating in this program are incentivized to conduct home visits and reach as many patients as possible.

Table 2A: Wireless heart health (continuación)

8.2 Role and commitment of the initiative/project to addressing these needs:	The Wireless Heart Health program was developed by Qualcomm Wireless Reach in collaboration with Life Care Networks and Community Health Association of China. Qualcomm Wireless Reach is the main funder of the Wireless Heart Health program and provides project management support. Life Care Networks provides ECG-sensing smartphones, developed the mobile application and EHR, provides technical training to participating clinicians and provides remote services for consultation, diagnosis and treatment through its call center in Beijing. From 2011 to 2013, Community Health Association of China aided in site selection, program implementation and impact analysis; from 2014 to present, China Telecom and Momentum have assumed this role.

Table 2A: Wireless heart health (continuación)

8.3 Socio-economic benefits for, and impacts on the community(ies) and/or at a wider level, including support for gender equity, promotion of community participation and the needs of marginalized and disadvantaged populations:	More than 600 doctors and staff in approximately 600 hospitals, community health centers and primary clinics are utilizing the ECG-sensing smartphones and EHR platform provided by the Wireless Heart Health program. Since the program's rollout, CVD specialists in Life Care Networks Call Center have given expert feedback to local doctors for more than 160,000 rural patient ECG screenings, of which 20 percent pointed to potential CVD conditions requiring further medical attention. In fall 2015, Qualcomm Wireless Reach, Life Care Networks and a team of experts from Vital Wave, Inc. designed and implemented a use and satisfaction survey for the Wireless Heart Health program. The goal of the survey was to understand experiences among healthcare providers using the ECG-sensing smartphones to care for their patients. The survey showed that healthcare providers in rural China are very satisfied with the mobile devices and believe they are providing improved care and services to patients with CVD. Key points from the research findings include: – Two-thirds (66%) of providers were able to examine more patients than before by using the ECG-sensing smartphone; 61% report more CVD diagnoses using the device. – Almost one-quarter (23%) of providers offered in-home ECG screenings to patients using the ECG-sensing smartphone. – A majority (75%) of respondents reported that the biggest benefit of the ECG-sensing smartphones is the long-run decrease in cost of CVD screening and diagnosis. – More than half (62%) of providers reported that the Life Care Networks Call Center increased the accuracy of their diagnoses and that call center feedback improved their confidence in providing diagnoses. – ECG-sensing smartphones with the Life Care Networks platform are six times less expensive for patients than conventional 12-lead ECG machines: RMB 4.47 (USD $0.67) versus RMB 26.48 (USD $3.96). In conclusion, research findings demonstrate that the Wireless Heart Health program has been very successful in supporting rural residents, providers and government agencies addressing the rising health burden of CVD. With the ECG-sensing smartphones, costs are decreasing significantly, quality and reach of care is increasing, and satisfaction is high among patients and practitioners. China views technological innovation as the key for sustainable progress now and in the future. The Wireless Heart Health program contributes to China's sustainable development. This program also addresses UN Sustainable Development Goal (SDG) 3: Ensure healthy lives and promote well-being for all at all ages.

Table 2A: Wireless heart health (continuación)

8.4 Means foreseen to enhance the initiative's/project's future contributions to human and social development:	Wireless Heart Health is an excellent example of how Wireless Reach takes programs to scale. We developed, tested and refined this program's technology and business model to ensure that Wireless Heart Health could succeed at-scale. Sustainability of the business model in order to deliver critical CVD screenings to at-risk and underserved populations was the top priority when we scaled the program across China in 2013. The business model proved successful as the uptick of users skyrocketed beyond the original targeted provinces. Simply put, with ECG-sensing smartphones, CVD screening in China is now a possibility for the many instead of the few.
9. Other observations	
9.1 Unexpected results and lessons learned:	The ECG-sensing smartphone from Life Care Networks is increasing the volume of ECGs being conducted in rural China. Since 2012, more than 525,000 ECG images have been sent over the wireless network using ECG-sensing smartphones. Approximately 160,000 of these images were covered by the Wireless Heart Health program. Additionally, just half of the providers surveyed had used traditional 12-lead machines to administer ECGs prior to obtaining the ECG-sensing smartphone. Therefore, we can conclude that the ECG-sensing smartphones are increasing patient access to CVD testing. However, the mechanism for feedback loops from end beneficiaries (patients) is underdeveloped, which results in lack of knowledge on end beneficiary satisfaction. Also, there is lack of knowledge on use and satisfaction to inform decision-making on UI, functionality and services. Based on the program findings, we recommended that Life Care Networks create a sustainability and scale-up strategy that includes: 1) providing enhanced training for providers and education for patients, 2) furthering research and development on the sensors, 3) conducting periodic surveys to create feedback loops with providers, and 4) deepening collaboration with operators on improving connectivity.
9.2 Anticipated near/long-term initiative/project challenges and reorientation:	Findings suggest that from the providers' perspective, increased patient education about the device could improve acceptance and satisfaction among patients, and further system enhancements would increase their own satisfaction with the devices. For example, more than one-quarter (26%) of survey respondents reported that they may use the traditional ECG machines if a patient does not trust the ECG-sensing smartphone. This is a common occurrence when new technology is introduced and presents an opportunity for Life Care Networks to support healthcare providers in educating patients about the accuracy of the ECG-sensing smartphone. Providers suggested some potential technology advances for the next iteration of the devices, including: adding more sensors for more leads (77%) and, as discussed above in 7.4, improving wireless connectivity (67%). Life Care Networks is currently developing the next generation device – a 12-lead ECG-enabled smartphone – as directed by the program findings and user feedback.
9.3 Additional information considered useful:	The mobile industry changes at a rapid pace and solutions need to continually be reinvented and/or enhanced to meet current needs.

Table 2A: Wireless heart health (continuación)

eHealth in Congo

The situation of the Democratic Republic of the Congo, a country with a land area of 2,345,405 km^2 and the second largest country in terms of population (69 million) in sub-Saharan Africa, continues to be characterized by levels of disease and mortality aggravated by the poverty and food insecurity experienced by most of the population.[62] Poor access to healthcare – generally of low quality – comes on top of the precarious economic situation and the limited ability of the population, in the absence of any collective funding system, to pay the cost of care. This, together with poor hygiene, access to drinking water and nutrition, allows infectious diseases to flourish, including diarrhea, malaria, respiratory infections, parasite infestations, tuberculosis and AIDS. This was confirmed by the statement made by the Minister of Public Health at the 65th World Health Assembly. It was acknowledged that DRC is facing enormous difficulties in organizing healthcare, difficulties that are due not only to the quasi-continental scale of the country but also to the privatization of the healthcare sector in 1987, which led to the breakdown of the health system and restricted the population's access to care.

The results of the first demographics and health survey (EDS) in 2007, covering the period 2002-2007, show that infant mortality (for children aged up to 1 year) has stagnated at around 90 per 1 000 live births over the past ten years. Child mortality for the 1 to 5 year age group appears to have fallen, from 84 per 1 000 live births (1992-1997) to 62 (2002-2007), giving an overall infant/child mortality rate (for the 0-5 years group) of around 148 per 1,000 live births, which is still one of the highest rates in Africa. Maternal mortality of 549 deaths per 100,000 live births, some 50 per cent of which are the result of hemorrhages or infections, remains above regional levels despite an apparent fall during recent years.

In addition, depending on the particular region and environment, sleeping sickness, onchocerciasis (river blindness), bilharzia, leprosy, plague, rabies and Ebola-type fevers are specific health problems of potentially high morbidity and mortality. In addition to problems of transmissible diseases, there are the "non-transmissible" ones, once associated more with the developed and industrialized countries which, looking beyond 2020, will become a major public health problem in Sub-Saharan Africa too.

In the Democratic Republic of the Congo, the emergence of non-transmissible diseases (diabetes, high blood pressure, strokes) is beyond doubt. Studies carried out in Kinshasa have shown that 7 per cent of the 15 to 49 years age group suffers from diabetes. An estimated 228,000 people in Kinshasa alone (a city of 12 million) are diabetic. The same source suggests that hospital prevalence of diabetes is 5.4 per cent, while high blood pressure is a major concern owing to its prevalence, severity and early onset. According to hospital data, cardiovascular disease represents 20.7 per cent of all illness and 21 per cent of deaths; high blood pressure accounts for more than 12.5 per cent of illness and 14.7 per cent of deaths.

Human resource problems are also especially severe. Health services which once suffered shortages of healthcare staff, especially in rural areas (accounting for two-thirds of the population), have experienced a total reversal over the past 15 years.

In the absence of any state monitoring and regulating mechanism, the country has seen an uncontrolled proliferation of private training institutions for medical staff (nurses and doctors) and administrative staff (healthcare managers). As a result, most health services today have a glut of staff, while the number of private health services grows constantly, artificially inflating the range of private care services on offer and competing with public and community services. This also has repercussions as regards quality of services, viability of the healthcare system, and precarious employment and living conditions of healthcare staff.

[62] Masika Sikuli Kivu, Ministry of Posts, Telecommunications and New Information and Telecommunication Technologies, Democratic Republic of the Congo.

The health system of DRC is in the middle of a reconstruction process. Achievements of the sector between 2001 and 2010 should not be minimized, notably the increase in routine vaccinations and the reduction in child and maternal mortality rates. The second demographics and health survey (EDS 2014-2015) showed that the health status of the Congolese population has improved. The most significant improvements have been seen in the child mortality rate, the use of impregnated mosquito nets, vaccinations of children against measles, and childbirths attended by qualified medical staff.

However, primary healthcare relies on around 20,000 doctors and on infrastructure comprising 8,266 health centres, 250 general hospitals of reference, and 516 health areas. Those figures are not sufficient for the country's total population given that, according to WHO standards, a doctor should be seeing 20 patients a day in a hospital, whereas a health centre doctor in DRC has to deal with 14,000 inhabitants per health region.

Many other challenges have to be faced. Low birth weight remains a matter of concern, the fertility rate is still high, the quality of some services still needs to be improved, and particular attention needs to be paid to the treatment of diseases among children below the age of five years. High-risk behavior likely to spread HIV infection among the general adult population persists, despite a slight fall in the incidence of the disease as recorded by the EDS 2013-2014 compared to 2007. Achieving improvements will require more robust intervention by all those concerned, improved basic training for medical staff, better working conditions, harmonization of financial resources of partners, infrastructures and hospital equipment, funding to launch the health development programme, an increased health budget, and so on. But it will also require above all raising of awareness and a greater sense of responsibility on the part of the general public.

Against this background, it is possible to use Information and Communication Technologies (ICTs) as part of a strategy in such a way as to improve processes in the health system and interconnect those involved – patients, doctors, laboratories, pharmacies, hospitals, care staff, and so on. Healthcare can be made accessible by something as simple as a mobile phone.

In Africa, use of ICTs is still small in scale and fragmented, and coverage is limited. Some countries use mobile telephony to support health service provision, awareness raising and education, remote data collection, remote monitoring and care in the home, communicating treatments and notifications to patients, and in response to epidemic outbreaks and emergencies. Others use the satellite system to promote health by communicating with patients and healthcare professionals in hospitals and healthcare establishments. Major problems in the region include the "digital divide", that is, not all of the population, especially in Africa, has access to telecommunication/ICT services as a result of inadequate telecommunication/ICT infrastructure and services and the lack of expertise in their use.

The Millennium Development Goal (MDG) advocated by ITU aims to "connect the world" by broadband by 2015. The DRC currently has more than five GSM operators and several ISPs installed across the country, offering users mobile telephony and Internet services. As for the Internet service, the available speeds are such that certain applications cannot be used as intended.

Although it is a developing country in which the telephone is no longer a luxury for the few, being now within reach of all, overall national coverage is still equivalent to a penetration rate of no more than around 17 per cent, according to the Posts and Telecommunications regulatory authority (ARPTC) in a recent study published in Kinshasa. The market research company Target is attempting to analyze ways of reversing this trend in DRC. Like other countries, DRC is obliged to adapt to trends in the new information and communication technologies which are now a key factor in social and economic development in all areas of human life throughout the world. This is why the Government, through the Deputy Prime Minister responsible for posts, telecommunications and new information and communication technologies, is making considerable efforts to develop the country's fiber-optic networks (cables for data packet transport). The President of the Republic on 8 July 2013 officially inaugurated the fiber-optic cable landing station at Moanda in the Province of Congo-Central.

The implementation of the Congo SAT I project, will, according to the Deputy Prime Minister, speaking at a press conference on 23 June 2015, lead to many benefits for the country and for Africa in the field of telecommunications. Areas where optical fiber is inaccessible owing to natural obstacles will be covered by the satellite, according to Minister Thomas Luhaka Losendjola, who has emphasized his commitment to strengthening the country's fibre-optic communication capacity. The project costs for this first satellite are of the order of USD 320 million. A feasibility agreement was concluded in 2012 between DRC and a Chinese company. The satellite will be launched following agreement on the funding arrangements, three years from the date of the original commitment. DRC will be the third country in Africa to benefit from a satellite communication system, after Egypt and Nigeria. As regards the legal and regulatory aspects of telecommunications and ICTs, the President of DRC on 16 October 2002 approved the framework Law No. 13/2002 on telecommunications, complemented by Law No. 014-2002, for which there are a number of implementing texts, namely:

- The Ministerial Order regarding measures to combat telecom fraud in DRC;
- Inter-ministerial Order setting conditions for telephone subscriptions in DRC;
- Decision regarding the establishment of the Interconnection Advisory Board;
- Decision on the Directive regarding certification of telecommunication terminal equipment and facilities;
- Decision defining the principles of interconnection;
- Ministerial Order concerning the appointment of a delegate responsible for management of the C/D point.

Thus, SAT I project will build an infrastructure and lay the foundation for further implementation of eHealth.

There are as yet, however, no specific provisions on the use of telecommunications/ICTs in the health sector. EHealth is a young discipline which brings health into the digital age. There is no other solution for storing and filing the billions of items of data currently filed on paper or, in some cases, in electronic form. Electronic processes assist all those involved in accomplishing their respective tasks. The aim is to enhance security and quality in the area of healthcare, and in the longer term to help stabilize costs. All citizens should be confident of having their health data available at the right time and place.

DRC, other than endeavoring to set up telemedicine in the university clinics of Kinshasa and the Kinshasa Medical Centre, and actually using it already at the Ngaliema clinic, lags behind certain other African countries in the area of eHealth. Thanks to the telemedicine project, part of the Pan-African Online Services Network to be implemented over five years from 2009 to 2014, a number of African doctors and 10,000 students have benefited from the transfer of Indian expertise via an e-network. The project is based in the English-speaking countries of Africa and in Senegal. DRC joined the programme one year after the launch.

The Ministries for Higher and University Education and Public Health of DRC have collaborated with the NGO PSDA and its international partners in developing an autonomous structure called the Congolese Telemedicine and Distance Learning Network (RECOTED) with a view to setting up an independent mechanism for following up the implementation of joint projects supported by foreign contributions and implemented through public-private partnerships.

To that end, with the encouragement of the Minister for Higher and University Education at that time, PSDA has established infrastructure intended to facilitate the operation of the RECOTED/UNIKIN and RECOTED/ISTA sites. RECOTED is made up of international and national experts in the fields of medicine and higher education. Its mandate is to:

- Establish a national network for the promotion and appropriation of NICTs especially in the field of health (telehealth, telemedicine) and education (e-learning);
- Combat the "brain drain";

- Act as a catalyst for foreign contributions and provide a meeting place for North-South and South-South partnerships;
- Promote the economic sustainability of projects;
- Promote exchanges of experience in the framework of an "International Voluntary Health Initiative";
- Advise the Government on health policy and respond to the Government's requests on anything that concerns public health;
- Advise members of the national network on issues of health at the global level;
- Organize international forums in order to contribute to progress in the various areas of the healing arts.

In order to facilitate the use of eHealth throughout our country, in accordance with the circular note BDT/IP/CSTG of 27 May 2015 regarding Question 2 of BDT Study Group 2, it will be essential to address the following initiatives.

1) *Take further steps to assist in raising the awareness of decision-makers, regulators, telecommunication operators, donors and customers about the role of ICTs in improving healthcare delivery in developing countries.*

   a) Decision makers must:

      - Adopt, through governments, a telecommunication development policy to encourage the application of telecommunications/ICTs to healthcare and implementation of eHealth;
      - Develop a framework of standards, legislation and regulations better adapted to the telecommunication/ICT environment in the service of eHealth;
      - Educate the wider public on the above framework;
      - Deploy and progressively exploit optical fibre over the entire country in order to make urban and rural health areas accessible;
      - Launch the satellite to improve accessibility to communications in areas where optical fibre is inaccessible owing to obstacles;
      - Draw up the national Informatization master scheme for the public services;
      - Ensure that the health information system is computerized;
      - Improve regulation of the postal, telecommunication and new information and communication technology (NICT) markets;
      - Take steps to implement the current legal framework for reforming the postal and telecommunications/NICT sector;
      - Strengthen leadership, governance and inter-sector collaboration by building capacity and improving equipment in the health and telecommunication/ICT sectors;
      - Establish material telecommunication/ICT infrastructure in urban and rural health areas in order to make primary care accessible;
      - Provide higher educational establishments with medical IT curricula;
      - Mobilize partners, within and outside the sector, to implement eHealth;
      - Reinforce cooperation between national and foreign training institutions;
      - Progressively integrate eHealth in local community facilities;
      - Equip urban and rural health areas with suitable electrical facilities;
      - Up a body to harmonize, integrate and coordinate telecommunication/ICT projects in the service of eHealth.

   b) The regulator must:

- Encourage widespread introduction of broadband access in order to reduce the digital divide;
- Facilitate licensing for telecommunication/ICT operators;
- Exempt telecommunication/ICT equipment from taxes and duties;
- Use universal service funds to reduce telecommunication/ICT investors' costs in rural health areas.

c) Donors must:

- Conclude public-private partnership agreements in order to improve basic telecommunication/ICT infrastructure in provinces where they are currently inadequate;
- Promote and contribute actively to funding eHealth development activities.

d) At the level of telecommunication/ICT operators, it is important to:

- Invest in telecommunications/ICTs in urban and rural health areas in order to facilitate implementation and use of eHealth;
- Ensure that access to telecommunication services is affordable and of good quality.

e) At the customer level, it is important to raise awareness of national communities to encourage use of eHealth.

2) Encourage collaboration and commitment between the telecommunication sector and the health sector in developing countries, in order to maximize the utilization of limited resources on both sides for implementing eHealth services.

This means significantly strengthening the use of health-related NICTs by the health ministry, which will allow:

- Improvements in primary healthcare systems and health information systems, ensuring reliability, creativity, high quality and affordability;
- Promotion of research in the medical field to reinforce public disease prevention programmes in the areas of sexual health, genetics and sexually transmitted and chronic diseases while respecting the citizen's right to privacy;
- Development of international standards for the exchange of health data, taking due account of privacy concerns;
- Reporting, monitoring and dealing effectively with persistent behaviour involving high risk of HIV infection and propagation in the adult population, despite the reduction in the incidence recorded by the EDS – 2013-2014 by comparison with 2007;
- Extend telecommunication/ICT coverage in the most remote or poorly served health areas and for vulnerable populations;
- Medical and humanitarian assistance in disasters and emergencies.

3) Continue to disseminate experiences and best practices with the use of ICTs in eHealth.

Training of doctors comes under the remit of the Ministry of Higher and University Education, which every year sends an average of 2,500 doctors onto the employment market, according to the 2010-2011 statistical directory. In order to disseminate experiences and best practices in using information and telecommunication technology for eHealth in developing countries, it is important to integrate medical information, an area which concerns clinical practice, IT management and management for better health:

a) As an option in universities, higher medical and IT training institutions, to ensure that the qualified professionals sent by the Ministry onto the employment market are skilled in information and communication technologies, in order to improve quality, security and efficacy of health and care systems. These medical IT professionals will have skills including:

- Basic notions of medical IT;
- Familiarity with the prospects and limitations regarding the informatization of healthcare processes and the implementation of IT systems to improve security, quality and efficacy;
- Analyzing and evaluating the particular challenges of managing medical information at the level of the user, institutions, and healthcare institutions;
- Using modelling and analysis applied to information systems in the medical field;
- Understanding IT tools including databases, files, decision-making aids and so on;
- Learning to implement and follow-up Informatization projects, including strategic dimensions and change management;
- Understanding the means of building intelligent systems and understanding data warehouses, data mining, and knowledge management;
- Dealing effectively with the current challenges of eHealth, care networks, e-medicine and the medical Internet.

b) As a training module at the Interdisciplinary Centre for Ongoing Education (CIDEP), in order to strengthen capacity of health professional at work:

- Putting in place communications infrastructure to promote distance learning;
- Informing the beneficiary population of new information and telecommunication technologies in the field of eHealth;
- Improving governance of the existing telemedicine and distance learning network (RECOTED), and at the level of the country's pilot universities, to enable it to carry out these missions.

In conclusion, we would note that the emergence of eHealth is a major challenge for improving primary healthcare in DRC, a country of continental dimensions. The recent deployment of optical fibre along the African coast and the bringing into service of the first satellite communication project (Congo Sat I) will enable DRC to have a national backbone and better prospects in priority areas such as health and education.

Experts:

1) Mr. Alanga Famba Vicky, Member of the Cabinet of the Deputy Prime Minister Responsible for Posts, Telecommunications and New Information and Communication Technologies (PT-NICT);
2) Mr. Mahamba Kyambale, ATB2, Single Division of the PT-NICT Directorate;
3) Mr. Mputu Onda, ATB2, Postal Regulation, Documentation, Policy and Strategy;
4) Mr. Ngbango Kale Apollinaire, ATB1, Responsible for Databases, Directorate of IT, Ministry of Higher and University Education;
5) Madame Kimosi Ditu Edwige, ATB1, Single Division, Ministry of Higher and University Education;
6) Mr. Kanyinda Kazadi Rémy, Head of Works, Higher Institute of Medical Technologies, (ISTM/KINSHASA);
7) Mr. Ngika Mbulu Richard, CB, Coordinator, Communications Cell, General Secretariat for Public Health;
8) Mr. Ebwa Abongomane Dieudonné, ATB2, Technical Assistant, General Secretariat for Public Health.

The importance of adequate infrastructure is well underlined in the case of Congo. Yet, it is necessary to note that even in developed economies, the infrastructure may not be sufficient for a wide implementation of some eHealth services as for examples in emergency care. The following contribution from Japan reveals such a case.

Assistance in implementing cyberhealth programmes: the case of Guinea

1) Overview of the pilot project

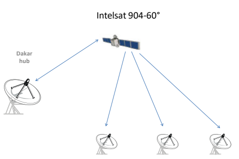
[63]The project is being implemented by Telecommunications Consultants India Limited (TCIL) with funding from the Indian Government. The network created by the project is called the “Pan African E-Network Project”. At the level of the African continent, the network comprises a central earth station (hub) in Dakar (Senegal), which is already linked by satellite to:

- 53 VSAT stations in 53 national hospitals (one in each Member State) for telemedicine, 53 VSAT stations set up in 53 universities (in each Member State) for e-learning, and 53 VSAT stations set up in 53 diplomatic or presidential missions (one for each Member State) to provide VIP services.
- 53 VSAT stations in five African “regional leader” universities and five African “super-regional specialist hospitals” providing telemedicine and e-learning services, respectively, via the network.

The central earth station in Africa is linked to the data centre in India via fibre-optic submarine cable. For each signatory country, there is an agreement for the management and operation of the network related to the resources donated by the Indian Government.

In Guinea, the Gamal Abdel Nasser University has been chosen to host the e-learning centre, the University Hospital of Donka has been chosen for eHealth, and the Ministry of Foreign Affairs for e-diplomacy.

Figure 6A: Pilot project: Completion and extension of the Pan African E-Network Project (eHealth)



2) Project description

In Guinea, a number of important project elements have been implemented in the fields of eHealth (site of the Donka University Hospital Centre), e-learning (University of Conakry) and e-diplomacy (Ministry of Foreign Affairs).

The eHealth site is equipped with high-tech facilities including digital radio. This enables professionals to exchange information with their colleagues in India on cases which, in the past, would have required medevac of patients abroad.

In the light of the above, the extension of the Pan African E-Network Project (eHealth) for the period 2015-2017 focuses on the following elements:

- The Ignace Deen University Hospital Centre (Conakry), for 2015;
- The Kindia and Kankan regional hospitals, for 2016;
- The Nzérékoré and Labé regional hospitals, for 2017.

3) Project objectives

[63] Mr Ibrahima Sylla, Ministry of Posts, Telecommunications and New Information Technologies (MPTNTI), Guinea.

The aims of the project are to:

- Reduce the digital divide in the field of health;
- Improve the capacities of medical professionals (doctors and nurses) using information and communication technology;
- Promote the widespread use of ICTs and facilitate access to these technologies for the entire population in both urban and rural areas;
- Ensure access to high-quality healthcare in rural areas.

4) Actions still required:

- Complete and improve the eHealth site (Donka University Hospital Centre) that is currently in use;
- Undertake a feasibility study for the various health centres identified;
- Ensure project implementation and follow-up;
- Develop management structures for planned new services.

Implementation of telemedicine in Haiti

1) Introduction

[64]The healthcare system in Haiti is in a very precarious condition owing to a combination of factors arising from a shortage of human resources and medical infrastructure. In the face of this alarming situation, considerable resources need to be deployed in order to meet the crucial need for access to medical services. eHealth can serve as a shortcut to the improvement of Haiti's healthcare service.

2) Healthcare situation in Haiti

Haiti, a country of 10.4 million inhabitants, is contending with numerous crises, including an alarming medical situation. Things became even more precarious in the wake of the 2010 earthquake, which left many people without limbs and with all manner of other after-effects. A cholera epidemic only made matters even worse for this already very weakened country in the western hemisphere.

A number of challenges stand in the way of access to healthcare in Haiti:

- Lack of medical specialists;
- The cost of medical services;
- The price of medicines;
- A highly deficient medical and health infrastructure.

These shortcomings have a negative impact on normal access to healthcare services in Haiti, most of whose population is therefore unable to obtain adequate care. The situation is all the more difficult for those on low incomes, who are unable to seek medical treatment abroad. As new diseases prepare to strike the country, the means available for combating them are dwindling further and further. The capacity of the existing hospitals to accommodate new cases is very limited by comparison with the high level of demand. In Haiti, there is only one hospital on three levels, and one doctor for every 10,000 inhabitants. A study has shown that 35.7 per cent of medical facilities are public, 31.8 per cent are parastatal, and 32.5 per cent are in the private sector.

[64] Mr Gregory Domond, National Telecommunications Council (CONATEL), Haiti.

Over 40 per cent of Haitians are without access to healthcare, while 80 per cent of the population uses traditional medicine to meet its needs. Implementation of a telemedicine project in Haiti is justified for the following reasons:

- Scarcity of doctors specializing in certain fields;
- Absence of medical and healthcare infrastructure, particularly in remote areas;
- Meagre economic resources of those concerned;
- Emergence of new diseases.

3) Potential applications of telemedicine in Haiti

Bearing in mind the various constraints and the urgent needs of Haiti's population, it is altogether reasonable to opt for telemedicine applications that are easy to apply and capable of offering some degree of solution to patients' expectations. In this highly precarious context, the following applications could be implemented within the country.

- Establishment of a telemedicine network: case-file transmission;
- All medical case files requiring specialist examination will be sent to Port-au-Prince via the transmission system;
- Tele-expertise: remote consultation of doctors or other experts;
- Doctors in regional hospitals will submit case files requiring expert examination to specialists based in Port-au-Prince, via the transmission system;
- Tele-information: consultation of medical information (databases, medical imagery, training courses);
- Doctors can consult patients' medical data, as necessary, for training purposes, thanks to the databases and file transmission system.

In the future, other telemedicine applications will become possible as further telecommunication/ICT facilities are deployed throughout the country.

4) Public hospitals selected

Haiti has a referral hospital in each of its ten major cities. Private hospitals are not accessible to most of the population on account of the financial constraints. In the majority of cases, patients are referred to the public hospitals for the treatment they require. It is therefore reasonable to select public hospitals so that the greatest possible number of patients can be treated. The hospitals covered by this project are the busiest ones and belong to the Haitian State.

The Hospital of the State University of Haiti, based in Port-au-Prince (West), is the country's largest hospital in terms of patient capacity. Under this project, it will exchange medical data with the nine other hospitals located in the country's nine other major cities: Hôpital Saint Michel (Jacmel, Sud-Est), Hôpital Immaculée Conception (Cayes, Sud), Hôpital Saint Antoine (Grande Anse), Hôpital Sainte Thérèse de Miragoâne (Nippes), Hôpital Justinien (Cap Haïtien, Nord), Hôpital de Fort-Liberté (Nord-Est), Hôpital Immaculée (Port-de-Paix, Nord-Ouest), Hôpital Sainte Thérèse (Hinche, Centre) and Hôpital La Providence (Gonaïves, Artibonite).

5) Networking of the public hospitals

Given that most of the specialists live in Port-au-Prince, Haiti's capital city, and that the state of the roads makes it impossible to save someone's life in a critical emergency, the solution has to lie in the networking of the main hospitals, making it the medical data which travel rather than patients.

Various solutions are possible for such a transmission system. An Internet connection provided by a telecommunication operator or Internet access provider would not appear appropriate since medical activities must not be subject to outages, i.e. loss of the signal during the course of an emergency.

Considering the requirements in terms of deployment time, costs and service reliability, it is logical to opt for radio-relay links, by means of which the Hospital of the State University of Haiti will be interconnected with the nine other referral hospitals located in the country's other major cities. This private network will be used solely for the transmission of patient data.

It will, moreover, be supplemented by a backup link to ensure service continuity at all times.

6) Infrastructure and equipment in the public hospitals

Each of the selected public hospitals must be equipped with a local area network (LAN) connected to the radio-relay transmission system. A database must be developed for each hospital in order to store patient data and have them readily available upon request.

Other items of equipment such as printers, scanners and sensors will be necessary for the work of each hospital.

7) Modus operandi of Haiti's telemedicine system

Given that most of the country's specialists are located in Port-au-Prince, it is logical for the operational centre of the telemedicine system to be accommodated there as well. All the other nine regional hospitals use the transmission system to transmit to it all the medical data of patients living in their respective geographic *départements* (results of medical examinations, medical imagery, photos of injured and fractured limbs, etc.), whereupon the on-duty specialists examine the data and send back their medical opinions and advice for the treatment to be given. In the case of patients requiring special attention, the specialists can ask that they be sent to Port-au-Prince.

8) Training of medical staff

The project's success will depend on the levels of awareness and training of Haiti's medical staff. To begin with, the entire medical community must be made familiar with the use of ICTs in the field of healthcare, so that they can feel comfortable and ready to work together in this way.

Doctors and nurses assigned to the hospitals concerned by the project must receive training in the workings of the system and in processing of the medical data transmitted and received by means of the transmission system.

9) Project objectives

The project objectives are as follows:

- Foster the use of ICTs in the healthcare sphere to meet the corresponding challenges
- Enhance the capacities of healthcare professionals (doctors and nurses) through the use of ICTs.

10) Actions required

- Undertake a feasibility study for the selected hospitals
- Guarantee the project's implementation and bringing into operation.

Use of ICT for eHealth promotion in Rwanda

1) Background

[65]Since 2009 after the inception of Rwanda National eHealth Strategic Plan, the Government of Rwanda has engaged in the deployment of various information technologies in a bid to improve its health sector development. On this basis, Information management and technology have helped the Rwanda's health sector achieve a sustainable improvement in healthcare system. The Ministry of Health (MoH) and the Rwanda Biomedical Center (RBC) have marged all Government institutions that contribute to healthcare service delivery to facilitate integration of eHealth systems under one leadership. This aimed to have an effective infrastructure, applications and information systems supporting effective and efficient delivery of healthcare services in Rwanda.

2) Rwanda ICTs Initiatives to Promote eHealth and the Welfare of its Citizens

eHealth is now an effective tool of sharing information needed to deliver healthcare services and controlling different diseases.

To strengthen community-level and facility based maternal and child health interventions, the Government of Rwanda through Ministry of Health has launched a mobile application (mHealth) called RapidSMS system, this system dedicated to advancing the use of mobile technologies to improve health services.

The objective of this mHealth is to save lives by tracking pregnant women and newborn (children under two years of age), promote early detection of life-threatening emergencies, and facilitate Community Health Workers (CHW) reporting by using this innovative technology tool RapidSMS.

Table 3A: RapidSMS Rwanda Continuum Care Model

RapidSMS RWANDA CONTINUUM CARE: 1000 DAYS OF TRACKING PREGNANT WOMEN & NEWBORNS				
Pregnancy (9 Months)	**Newborn Care (28 Days)**	**Postnatal Care (42 Days)**	**Child Health (12 Months)**	**Child Nutrition (2 Years)**
Pregnancy Confirmation	**Newborn Home Care Visits**	**Postnatal Home Care Visits**	**Child Health & Immunizations**	**Child Killer Diseases & Nutrition**
Early registration of women begins immediate reminder alerts for completion of prenatal visits, tracking of risky pregnancies and increased deliveries at health facilities.	Continued follow-up of newborns during the first 28 days after birth.	Continued follow-up of women during the first 42 days after delivery.	Monthly child health checkups including nutrition and immunization progress.	Tracking of leading killers of children and severe malnutrition leading to stunting.

Rwanda has ambitious plans to strengthen its healthcare system by improving patient data management. On this basis, in creating a stronger and more efficient eHealth sector, the Rwandan Ministry of Health is now expanding a digital medical records system called OpenMRS, a platform that carries patients' data reliably and can be customized for different uses.

Initially, OpenMRS was rolled out in Rwanda to support HIV services. But with this new OpenMRS, the hospital staff will be able to use the system for antenatal and maternity services, neonatology,

[65] Jean de Dieu Imanishimwe, Rwanda Utilities Regulatory Authority (RURA), Republic of Rwanda; Mathieu Ntegano, Rwanda Utilities Regulatory Authority (RURA), Republic of Rwanda.

pediatric consultation, family planning and gynecology, internal medicine, emergency clinical services, and billing services.

The OpenMRS allows healthcare providers to track, follow-up, manage, and better support patients. It also produces comprehensive reports, helping healthcare facility leadership make evidence-based decisions, and reducing mistakes made because of insufficient information, such as incorrect diagnoses.

In 2012, The Rwandan Ministry of Health has initiated a project called Rwanda Health Management Information System (R-HMIS) a tool for collection, validation, analysis, and presentation of aggregate statistical data, tailored to integrated health information management activities. With this tool all data from health facilities are timely and accurately reported.

In 2013, an initiative called electronic Logistic Management Information System (e-LMIS) was launched by Rwandan Ministry of Health to provide effective and sustainable supply chain system for medicines and other health commodities. This e-LMIS initiative has the ability to:

– Monitor drug expire dates and stock situation alerts for better inventory management at national, district and facility levels.
– Improve supply planning and ordering cycle time.
– Provide management information at real time to enable correct and impactful decision making.

The e-LMIS is currently deployed and fully functioning in all district pharmacies, district/referral hospitals and all health centers of Rwanda.

In 2010, the Rwandan Ministry of Health has initiated a tracking tool called Health Resource Tracking Tool (HRTT) to map all financial resources used and allocated to the health sector by both Ministry of Health and development partners, and harmonization of reporting of health spending. This improves accountability at national and districts levels.

In this year 2016, the digital healthcare scheme is expected to be deployed in Rwanda by a British company in partnership with the Rwandan government. With support from the Ministry of Health and that of Youth and ICT, the state-of-the-art system is expected to allow mobile phone subscribers to access consultations, reducing the impact of the shortage of doctors and other health professionals in the country. The company has already its team in Kigali, particularly software developers who are working on the product to localize it both in terms of having a feature phone version and also being able to use Kinyarwanda, the national language of Rwanda.

In June 2016, the Ministry of Health in Rwanda has signed a memorandum of understanding with the Republic of South Korea as part of efforts to improve technology within the health sector. The collaboration is expected to improve telemedicine, Hospital Information System (HIS) and provision of ICT-based medical services in Rwanda. This agreement will enable Korea Telecom, Yonsei University Health System and University Teaching Hospital of Kigali (CHUK) to cooperate on digital healthcare.

Another eHealth programme in Rwanda is the Treatment and Research AIDS Centre (TRAC), which was established in 2005. TRAC is a digital system that collects, stores, retrieves, displays and disseminates critical information about drug distribution and HIV/AIDS patient information. The system enables anti-retroviral treatment programme practitioners to submit reports electronically and have access to information.

By improving interventions, monitoring and reporting, these eHealth solutions have increased citizens' access to healthcare.

3) Major outcomes of eHealth Initiatives in Rwanda

Rwanda's health sector kept its leadership in the use of ICT for the delivery of health service across the country. In Rwanda, telemedicine and e-diagnosis have improved the way medical professionals share medical expertise. These include creation of a network of specialists; improving access by healthcare practitioners to specialists and improving the quality of diagnostics and treatment as well.

In Rwanda, the great strides are being made to improve healthcare services through the use of ICT in different eHealth initiatives. Among other benefits, the efforts made by the Government of Rwanda for eHealth promotion in Rwanda have caused a drop of maternal mortality rate from 750 to 210 for the period of 2005 – 2015 and the infant mortality decrease from 62 to 32 deaths per 1000 live births for the period of 2008 – 2015 (source: Rwanda DHS survey).

The percentage of health facilities connected to internet has reached 96.2 per cent countrywide, and this has marked an increase in number of clinical emergencies supported through RapidSMS, while the number of patients at community level tracked using RapidSMS reached 186,719 by December 2015.

The initiated eHealth programs in Rwanda have improved patient health outcomes and patient safety by equipping primary healthcare providers with better equipment, tools and information for clinical decision support and by allowing a gradual transition to technology assisted practice.

Table 4A: ICT in Health Sector of Rwanda

Key Indicators	2015
Infrastructure	
Hospitals	
Total number of Public and Private non-profit Hospitals	48
% of Public and Private non-profit Hospitals with Telemedicine Infrastructure	21%
% of Hospitals connected to Internet	100%
Health Centers	
Total number of Health Centers	494
Total number of Health Centers connected to Internet	475
% of Health Facilities connected to Internet	96.2%
Applications and systems	
Electronic Medical Records (EMR) Migrated to OpenMRS	
Number of Hospitals using less paper in medical records	10
% of Hospitals using less paper in medical records	21%
Health Management Information System (HMIS)	
Number of Health facilities reporting into HMIS	1,161
HMIS data managers assisted through HMIS e-support messaging	463
Rapid SMS	
Number of Patients at community level tracked using RapidSMS	186,719
Number of clinical emergencies supported through RapidSMS	4,185
Telemedicine	

Table 4A: ICT in Health Sector of Rwanda (continuación)

Key Indicators	2015
Number of hospitals using Telemedicine	13
% of Hospitals using Telemedicine	27%
Calls for Medical Assistance (Call Center)	
Number of emergency calls for ambulance (SAMU)	38,423
Number of call received for clarification on health issues	720
EDPRS 2/HSSP Indicators	
Number of registered private clinics and dispensaries reporting routinely using HMIS	301

4) Challenges

In Rwanda, the promotion of ICT in Health sector is still facing a number of challenges; some of them are: a) Low electricity access rate. As of July 2016, the electricity access rate was 24 per cent of population in Rwanda, b) Low level of computer literacy among healthcare providers

5) Conclusion

Rwanda is investing considerable resources to realize its eHealth vision. As the country is divided into four provinces which are structured in four tiers: 30 districts, 416 sectors, 2,148 cells and 14,837 villages, the government of Rwanda through its Ministry of Health continues to engage with a visionary approach in deploying various technologies required to achieve a sustainable health system from national to districts, sectors, cells and villages.

The ITU eHealth expert training course hosted at Tokai University

1) Purpose

This input document reports on the activities over the past 12 years (2001-2012) of the eHealth expert training course hosted at Tokai University, Japan.[66]

2) Background

In accordance to the Buenos Aires Action Plan in 1994, the Telecommunication Development Bureau (BDT) of ITU has undertaken 10 activities to improve telecommunication infrastructures in developing countries. Among these activities telemedicine projects were one of the most favourite activities that many developing countries were interested and eager to participate.

Though only few countries had any experience related to telemedicine in 1994, the ITU/BDT SG2 Question 14/2 implemented and studied a number of telemedicine pilot projects in developing countries. As a result, the awareness and interest in telemedicine has been growing tremendously among ITU members. There are now over 100 developing countries that have undertaken different kinds of telemedicine projects.

However, despite the recent improvement in hardware and the removal of regulatory barriers, telemedicine is facing major difficulties in developing countries. Lack of expertise and training opportunities on telemedicine has become one of the major obstacles for the deployment of telemedicine in developing countries. Professor Leonid Androuchko, the Vice-Rapporteur of ITU/

[66] Isao Nakajima, Rapporteur for Question 2/2, Japan.

BDT SG2 Q2/2, has requested developed countries to offer training courses on telemedicine, but to date no ITU member has responded due to issues related to cost. On the end, at the meeting of ITU/BDT SG2 in Caracas, Venezuela in September 2001, the Co-Rapporteur of Telemedicine, Dr Isao Nakajima (Professor of Tokai University) proposed an eHealth Expert Training Course hosted by Tokai University Institute of Medical Sciences. This proposal was adopted unanimously. It was the first attempt to offer the specialized training courses on telemedicine and eHealth for healthcare workers from developing countries. The course has already attracted attention not only in Japan but also from a number of other countries.

3) Program outline

The ITU Telemedicine Expert Training Course was hosted at Tokai University. Tokai University invited selected participants from developing countries like Indonesia, Bhutan, Haiti, Pakistan, and Nauru, and Cook Islands to study and provided all facilities including accommodation.

On the completion of this program, participants got the knowledge in current trends of telemedicine as well as research and application methodology in telemedicine

Activities in the course can be summarized as follows:

1) Dissemination of telemedicine research and implementation, especially involvement of Nakajima Laboratory in the telemedicine project.
2) To get insight about the advances in telemedicine equipment.
3) To enrich and explore research possibilities related to telemedicine.

Research items:

- Telemedicine via PSTN in rural areas;
- Wifi and IP-based satellite communications;
- Wavelet analysis for biomedical data;
- Independent component analysis;
- UWB radar to detect victims;
- Super high definition TV;
- Web radio for disaster application;
- Ambulance communications;
- Tele-Surgery;
- Teleradiology;
- Telecardiology;
- Tele-Presence and virtual reality.

4) To enhance the administrative and management capability in telemedicine services.

4) Conclusion

The Course has benefitted participants from developing countries. The participants have gained an understanding of telemedicine system from knowledge-wise up to its current and future trends.

During 2001-2012, 16 researchers from Indonesia, Pakistan, Bhutan, China, Haiti, Nauru, and Cook Islands graduated from the ITU eHealth expert training course hosted at Tokai University. After the training, they returned to their countries and have continued to contribute substantially to eHealth and telemedicine and on rural communications in developing nations.

Remote Interactive Training for Doctors Based On Video Conference Solutions

Medical education as no other area requires an access to best practices and knowledge of leading practitioners: diagnosticians and surgeons, as even best in class course books.[67] 3D films and modern simulators cannot replace clinical discussions with experienced doctors and communication with peers while mastering new methods of diagnostics and surgeries. One would like to gain knowledge from best professionals, leaders in their areas. However in real life it is not always possible as renowned medical professionals don't work in the same clinic, let alone a city or country. In this regard the advent of modern videoconference tools are very helpful. They provide remote interactive communication based on high quality audio and video signal, simultaneous broadcasting of two video streams and in the near future – transmittance of a 3D image.

Our experience of remote interactive trainings for doctors in video conference format started with using inexpensive Intel and V-Con videoconference systems, PictureTel office systems and ISDN digital telephony. Notably, to provide transmission at speed of 24-30 frames per second (for broadcasting surgeries for instance) we had to use 6 to 8 digital phone channels. That increased the costs of telemedical lectures. However, the costs were still 10 times lower as compared to overall costs of a lecturer's trip to any remote region. Even larger cost saving effect was demonstrated during first remote video conferences that helped us promptly solve issues of diagnostics and treatment.

If we compare costs of a teleconference organized to diagnose and choose treatment for newborns with heart defects, they are 100 times lower than an actual trip of a patient and his family to Moscow Cardio-Vascular Center. It is also important to note that the telemedical project "Moscow to the Russian Regions", launched in late 1990s, and aimed at organizing remote trainings for doctors and telemedical consulting revealed a high level of interest among the regions. The only constraints for our activities were the limited digital capacities and low budgets of clinics during the economic crisis.

With the development of digital telecommunications and a possibility to use HD video format we moved to a new level of teletraining for doctors. Our aims were:

– To hold remote lecture courses as part of continuous postgraduate training for doctors;
– To involve the best Russian and foreign clinics for holding interactive master classes with on-line broadcasting of surgeries and diagnostic procedures;
– To offer remote telementoring for young doctors (primarily surgeons) by experienced medical professionals.

The idea of remote telelectures is to use multiple point video conference format based on high quality audio and video signal for full-pledged interactive communication between the lecturer and a remote audience of doctors. During the lecture it is possible to organize clinical and medical case discussions or demonstrate any (presentations, videos, medical research data, ECG, X-Ray images, etc. It is also possible to examine a patient by using diagnostic equipment. Maintaining contact between an audience and a lecturer might be problematic, however this challenge is set off by a possibility to attend lectures of renowned professionals from various cities and countries.

The idea of interactive master classes in videoconference format is to provide full-pledged interactive communication between the audience located remotely and an operating surgeon. Observing a surgery is possible by means of video cameras installed in the operating theatre and a camera on the surgeon's helmet. This approach allows to learn from the experience of a great professional as students can watch the surgery "through the eyes of a surgeon" (It is well known that often a surgeon has to keep his head low over the operating field and even his assistants can't see all the surgical procedures. It is important to note that video cameras in the operating theatre are controlled remotely (zooming, pointing a camera to an object, switching from one camera to the other). This is done from a remote class room (except for a camera on the surgeon's helmet) and this allows observing work

[67] V. Stolyar, M. Amcheslavskaya, A. Selkov, Russian Association of Telemedicine, Moscow, Russian Federation.

of an entire surgical team or some of its members. During many surgeries (endoscopic, X-ray and others) and diagnostic procedures it is important to provide a remote audience with two or more simultaneous video streams.

As an example, that enables at the same time to watch hands of an endovascular surgeon and an X-ray image of placing a stent or positioning an ultrasound sensor. On top of that there is a possibility of interactive communication. During on-line broadcasting it is important to get a 3-D image of a surgery. That will provide for a good understanding of everything the surgeon does. But this effect is impossible to achieve by means of a standard camera, therefore, we have developed a stereoscopic set consisting of a surgical helmet equipped with two miniature digital HD cameras with the same optical characteristics, means of control, etc. This development is protected by several patents. Within two years it was tested in such areas as neurosurgery, oncology, maxilla-facial surgery, laser surgery and others. It has proved to be very helpful during interactive master classes for practicing surgeons.

The idea of telementoring is rather simple. It is aimed at organizing interactive communication between a young doctor working at an operating theatre or a diagnosticroom and his experienced mentor located remotely. In challenging circumstances this format helps a young doctor immediately apply his mentor’s advice and demonstrate acquired skills.

Table 5A: The interactive training school during last two decades

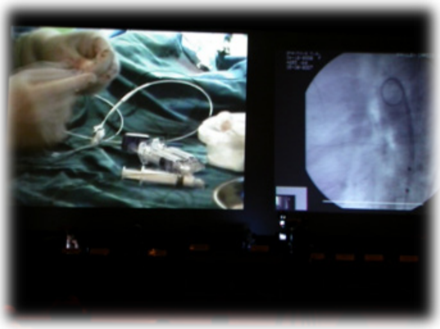
1999 Teleconsultation Moscow- Yakutia

1999 Moscow, Lecture on pediatric neurosurgery

2004 Lecture for Russian doctors given in the University of Regensburg (Germany)

2004 Lecture for doctors from 12 Russian regions given in Moscow

Table 5A: The interactive training school during last two decades (continuación)



2014 Demonstration of an endovascular procedure

2014 Demonstration of an open heart surgery

2015 Utilization of a stereoscopic set

2015 Stereoscopic set in neurosurgical operating theatre

2016 Broadcasting of an endoscopic procedure

2016 Broadcasting of an eye surgery

In conclusion: Modern videoconference technologies are effective for remote medical trainings. However, we see a need in modernizing existing technologies with the account of specific goals of medical trainings, first and foremost, trainings of top-level doctors. Firstly, it is organizing simultaneous broadcasting of two videostreams, one of which provides for stereoscopic images. Secondly, image quality has to improve up to 4K. Thirdly, these solutions have to be integrated with virtual reality technologies and that is very relevant for telementoring. At the moment we are exploring these areas together with Russian and foreign developers, R&D and educational facilities.

Annex 4: Fighting NCD

ITU-WHO Mobile Health initiative for non-communicable diseases

With non-communicable diseases (NCDs) killing more people each year than all other causes combined, it is no longer a question of when these diseases will be addressed in public health, but how.[68] A new initiative, run jointly by the World Health Organization and the International Telecommunications Union, may provide the answer. It seeks to use the mobile phone as a new public health tool for the prevention and management of NCDs, leveraging the fact that with a global penetration rate of 96 per cent the technology has a greater reach into the lives of most populations than the majority of public health infrastructure in the developing world.

Not only do mobiles represent a unique opportunity in terms of availability, they are also affordable, accessible, and acceptable to users. On the provider side, the role of telecommunication infrastructure as an intermediate good – meaning it can be used in a variety of other sectors beyond health – makes it a good public investment. Economies of scale also offer a way to reduce the increasing burden on health systems to meet the healthcare needs of expanding populations. Finally the mobile's existing role in individuals' daily routines puts it in a unique position to foster behavioural change via health promotion and continuous self-management. Preventing the onset of NCDs requires early and broad-based community health interventions, whilst treatment requires a complex set of long-terms disease management and behavioural components (Ezzati & Riboli, 2012[69]). Add this to the infrastructure and resource constraints affecting the majority of health systems in the developing world, and the need for health systems to equip patients with tools for self-care becomes obvious (Alwan et al. 2010[70]).

The potential to integrate mobile phones into health management (mHealth) has existed for some time, but previous mHealth interventions have suffered from being limited to small trials in high-income settings, with a lack of assessment on long-term health impact or cost-effectiveness (Free et al., 2013[71]; Labrique, Vasudevan, Chang, & Mehl, 2013[72]). It is this gap which the new UN initiative, Be He@lthy Be Mobile, is aiming to bridge. Through the UN organizations for health and ICTs it works with the health ministries of low-, middle- and high-income countries to scale up successful mobile-based methods of NCD prevention and management to create population-level programmes. Over a four-year period, the initiative will work with the ministries of health and telecommunications in eight countries – Costa Rica, India, Philippines, Norway, United Kingdom, Zambia, Senegal and Tunisia – to launch mHealth programs addressing national NCD burdens. In collaboration with international experts the initiative is creating a series of "Planning and Implementation Documents" (PIDs) to assist country efforts to scale up mHealth solutions for NCDs within national health systems. Once complete, this series of PIDs will form a 'toolkit' for mHealth programmes, currently including tobacco cessation, diabetes prevention and management, cervical cancer control, hypertension prevention and management, and wellness promotion. The solutions will initially be SMS- or app-based, and will provide interventions targeting the full disease spectrum from prevention to management and treatment. It will also strengthen national health systems by training health workers and facilitating data collection.

The PIDs will represent a blueprint for large-scale mHealth implementation, with countries choosing the programmes and interventions that are the most feasible, affordable and suited to their needs. Experiences are fed back into the initiative to create a set of best practices and standard operating procedures for large-scale mHealth programs, which will eventually be published and made freely

68 Hani Eskandar, ITU/BDT/IEE/CYB, BDT Focal Point for Question 2/2.
69 Ezzati, M., & Riboli, E. (2012). Can noncommunicable diseases be prevented? Lessons from studies of populations and individuals. Science (New York, N.Y.), 337(6101), 1482–1487. doi:10.1126/science.1227001//
70 Alwan, A. (2011). Global status report on noncommunicable diseases 2010.
71 Free, C., Phillips, G., Watson, L., Galli, L., Felix, L., Edwards, P., et al. (2013). The effectiveness of mobile-health technologies to improve health care service delivery processes: a systematic review and meta-analysis. PLoS Medicine, 10(1), e1001363. doi:10.1371/journal.pmed.1001363//
72 Labrique, A., Vasudevan, L., Chang, L. W., & Mehl, G. (2013). H_pe for mHealth: more "y" or "o" on the horizon? International Journal of Medical Informatics, 82(5), 467–469. doi:10.1016/j.ijmedinf.2012.11.016/

available for any country wishing to use mobiles to reduce NCD rates in their population. A longer-term aim of establishing regional research hubs to foster innovation and knowledge around mHealth is designed to set the technology's use as a permanent focus area in public health management. There are two elements to this approach which maximize its chances of successfully incorporating mHealth tools into national NCD strategies. The first is the range of interventions made available by the technology. The flexibility of the mobile as a platform allows countries to select the approach, content and delivery form which is best suited to the local context and sociocultural preferences of the community or area where the intervention will be offered. This kind of targeting increases the likelihood of the program having a positive impact on population health.

The second is the initiative's approach to partnerships. By requiring that there be government financial and technical buy-in from the very beginning of a program, the initiative guarantees its long-term sustainability as an element of national health services. Governments will gain the technical knowledge needed to run the programs without the support of the WHO-ITU secretariat, based in Geneva. This is then reinforced by the inclusion of partners from across all sectors: academia, private sector, philanthropy, non-governmental organizations and civil society. The diversity of stakeholders ensures that both the technology and the medical input are consistently of the highest quality available, whilst also encouraging a more holistic approach to health which encapsulates the spirit of the program and the behavioural shift it is trying to catalyze.

The disease burdens and health system challenges of the twenty-first century demand a shift in public health response mechanisms (WHO, 2013).[73] The evidence showing mHealth can be an effective tool in population health management exists and is growing rapidly; the remaining challenge facing the technology is how to firmly embed its role as a public health tool by demonstrating its medical and financial effectiveness at scale. The Be He@lthy Be Mobile initiative places existing evidence on a global platform which is enabling a range of partners to work together in providing a holistic solution to a common problem, using an even more common device.

Some key policy recommendations:

– mHealth is a good aid for smoking cessation, diabetes management and (systolic) blood pressure control. It should be made available nationally for these services in order to gather additional evidence on areas outside the remit of small-scale trials, such as longer-term health impact and cost-effectiveness at scale.
– Further research is required to improve our understanding of which other applications have a positive effect on NCD management and prevention for specific diseases, such as cancer. However this should not limit work directed at scaling up successful mHealth interventions in a post-trial phase to offer mHealth services at a wider level.
– There remains an urgent need for trials conducted in low- and middle-income settings. Of the trials reviewed in this study, 95 per cent were conducted in high-income countries. This creates barriers to understanding important elements such as cost and message content adaption which could influence mHealth impact in these settings.
– In areas where mHealth has shown minimal impact in trials, the intervention design should be improved before running additional trials. This could include adopting elements from successful mHealth trials and incorporating these into the design of weaker interventions to see if the success can be transferred.

[73] World Health Organization (2013) "Global Action Plan for the Prevention and Control of Noncommunicable Diseases: 2013-2020".

mTobaccoCessation

1) Background

[74]The World Health Organization (WHO) and the International Telecommunication Union (ITU) have formed a partnership called the 'Be He@lthy, Be Mobile' Initiative to use mobile technology – in particular text messaging and apps – to help combat noncommunicable diseases (NCDs) such as diabetes, cancer, cardiovascular diseases and chronic respiratory diseases. As part of this initiative they wish to assemble evidence-based and operational guidance to help countries and governments to implement these programmes. This document provides an extract of such a guide in relation to mTobaccoCessation – mobile phone-based support for people to quit smoking.

There is now sufficient evidence that mobile phone-based support for smoking cessation can be effective. A recent Cochrane Systematic Review *(1)* included five high-quality randomized controlled trials (RCT) with 6-month cessation measures and concluded that the intervention increased quitting rates by approximately 71 per cent. Three of the studies included purely text messaging interventions: STOMP was developed by the University of Auckland and trialled across New Zealand *(2)*; txt2stop was further developed from STOMP for a United Kingdom (UK) population and tested in the largest and highest quality trial to date *(3)*; researchers in Australia added text messages as an option to their online quitting coach and as a separate intervention *(4)*. The review identified several studies underway on further text message cessation programmes in the United States of America (USA), Norway and the UK.

Other reviews have indicated that text messaging may also be effective in other areas of healthy behaviour change and disease management. There are currently no randomized controlled trials of the effectiveness of any smartphone apps to support smoking cessation. One review of the available smartphone apps (via iTunes) found that few apps adhered to key cessation guidelines, or recommended or linked to proven effective techniques such as pharmacotherapy, counselling or quit lines *(5)*.

2) Steps for developing a new text messaging behaviour change programme: Overview

In broad terms, developing a text messaging programme should include the same phases of development that are typical for the development of all health communication materials.

1. **Designing the text messaging programme**
    - **Step 1:** Choose the behaviour change goal.
    - **Step 2:** Choose the communication objectives and behavioural techniques.
    - **Step 3.** Design the framework for the programme.
    - **Step 4:** Write the message library.
2. **Pretesting the text messaging programme concept and messages**

Once a text messaging programme has been developed it needs to be pretested, pilot tested and revised. Additional evaluation is recommended to determine its efficacy and, if disseminated, to evaluate the programme implementation.

3. **Designing the text messaging programme**

Step 1: Choose the behaviour change goal

The target of a behaviour change programme should be carefully selected based on a balance of health priorities and characteristics of the target audience, such as readiness to change.

[74] Hani Eskandar, ITU/BDT/IEE/CYB, BDT Focal Point for Question 2/2.

Step 2: Choose the communication objectives and behavioural techniques

Carefully consider the communication objectives and behavioural techniques that will be used to promote change in the targeted group. Communication objectives and behavioural techniques should be based on insights from the formative research and informed by theory and available evidence-based guidelines. Communication objectives are what people should know at the end of the programme and behavioural techniques are the actions people should take to make the targeted behaviour change.

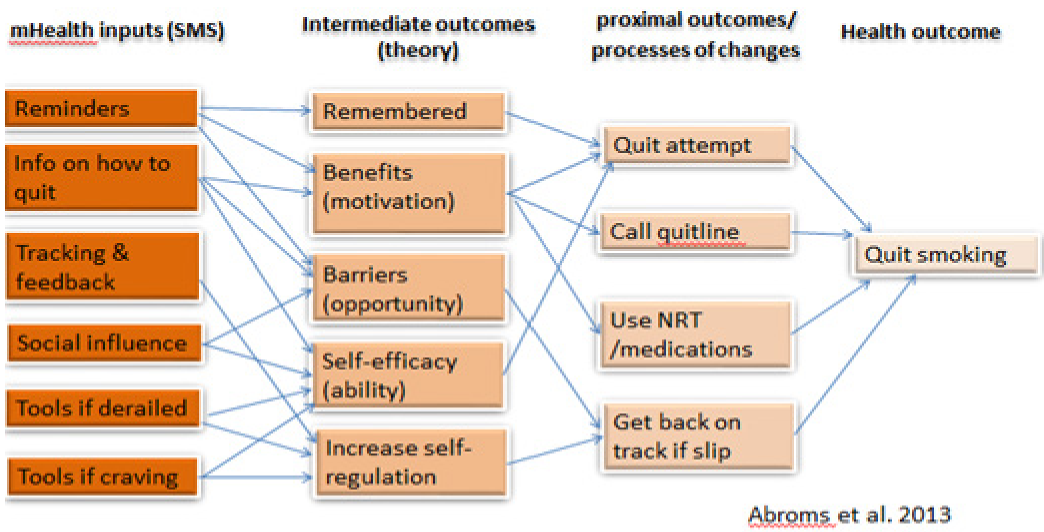
Example: For a smoking cessation programme, communication objectives might be aimed at increasing knowledge about the short-term health benefits associated with quitting. Behavioural techniques might include getting participants to call a quitline, set a Quit Date, track smoking patterns in the pre-quit period, manage cravings in the post-quit period, and reach out for help when experiencing an intense craving or when slipping up and smoking.

Once the communication objectives and behavioural techniques are identified, consider how the attributes of text messaging as a modality can support the communication objectives and behavioural techniques targeted.

Mobile communication allows for interactive help anywhere and anytime. This includes: real-time help in crisis situations; messaging that can interrupt and remind participant of goals; help that is personalized and tailored to the individual; goal setting; in-the-moment tracking of goals and feedback on goals. Additionally, mobile communication can be thought of as a modality that can supplement other programming modalities (e.g. face to face counselling) and provide additional opportunities to reinforce messaging from counselling sessions.

To help organize the logic of a health behaviour text messaging programme, it is beneficial to create a diagram outlining how particular programme components (inputs) fit with theoretical constructs, which can then be used to achieve proximal outcomes and longer term behavioural and health outcomes. **Figure 7A** presents a logic model describing how a hypothetical smoking cessation text messaging programme might work.

Figure 7A: Logic model for mHealth & smoking cessation



Step 3: Design the framework for the programme

The framework for the programme provides an overarching plan of how messages are sent to users. The framework should include a description about the timing and frequency of messages as well as indicate the kinds of messages that 'check-in' on users (surveys) and the keywords users will be able to use to ask for additional help in times of need. For an example of a framework and message library, see QuitNowTxt message library.[75]

In designing the framework, decisions may need to be made about the following key issues:

– **Frequency of messages:** The frequency of messages will be determined by the need for the programme's messages to stand out to the user. Most proven text messaging programmes proactively send out at least one message per day in the key behaviour change periods of the programme, and fewer text messages (e.g. three messages per week) in a less acute phase of the programme. Example: Text2Quit sends five messages on the quit date, daily messages in the first week after quit date and three messages per week in the weeks after that. For users who are frequent texters, message frequency may need to be higher so that messages stand out from the many texts they already send and receive daily. It should be noted that some programmes do not send regular texts, and only send texts when a user requests information (e.g. SexInfo, a sexual health information service, is a reactive service that replies when the user initiates a question to the system).

– **Timing of messages:** The timing of messages may be related to both their content (e.g. what they are asking the user to do), the daily routine of the user (e.g. when the user is free to consider the text message), and the nature of the behaviour change (e.g. meal tracking texts should be sent at lunchtime). Consideration also needs to be made as to what event will trigger the messages. These could be messages timed around the event of enrolment, around a date of behaviour change (e.g. quit date), or around a weekly cycle (e.g. day of the week such as a Monday pledge text).

– **Nature of interaction with the programme:** While some text messaging programmes (e.g. text4baby) are primarily one-way, with little opportunity for replies and other forms of interaction, most proven programmes have some element of interaction. It is recommended that interaction occurs around surveys (e.g. "Are you ready to quit? Reply 1 if you are ready or 2 if you are not ready"), tracking (e.g. "How many cigarettes did you smoke yesterday? Reply and see if you met your goal") and with keywords. Keywords are words that the user can send into the system at any time for additional help (e.g. a user sends in the keyword 'crave' if they are having a craving and need help). Keywords should be limited in number so that users can easily remember them and use them as needed.

– **Source of messages:** The source of the text messages is generally the programme name (e.g. text4baby). However, automated messages may be supplemented with messages from a real person, counsellor or clinician. In some programmes, automated messages are supplemented by messages written by a person when a user indicates to a computer-generated survey that they need additional help (e.g. they just smoked a cigarette). Even within automated programme messages, message source can vary, with some messages coming from the programme and others from a specific person who is part of the programme. For example, in Text2Quit, some messages come from a fictitious quit pal who offers social support. In other programmes, the programme may pair a user with an actual quit buddy to interact with via text.

– **The degree to which the programme will be tailored:** A decision has to be made as to whether the programme will run as a single generic programme, with all users receiving the same programme, whether there will be different versions (or protocols) for different types of user, or even whether personalized versions of the programme may be offered. In general, creating extra protocols or tailoring to individual characteristics can be expensive and therefore must be carefully thought through. A reason to consider including tailored protocols is because the evidence suggests that tailored programmes result in higher readership, higher message recall, perceptions of higher personal relevance and in some cases greater behaviour change.

75 http://smokefree.gov/health-care-professionals.

Example: In a texting programme designed to help pregnant women quit smoking, there could be different message protocols for women who are: ready to set a quit date in the next 2 weeks; women who want to cut down on their smoking; and women who are not willing to quit or cut down. Across programmes, message protocols could be tailored around factors such as: demographic variables (e.g. if the user is male or female), readiness to change (e.g. if the user is willing to set a quit date), planned method for behaviour change (e.g. whether they will quit with medications), source of social support, and benefits they will personally reap by changing behaviour. For programmes with multiple protocols, consideration needs to be made as to whether a user will be able to switch protocols once in one particular programme protocol (e.g. move from having a quit date protocol to the cutting down protocol).

– **Consider other ways the programme will be 'smart'**: Because text messages are sent by a computer system, they can be 'smart'. They can track progress over time and give feedback on progress towards goals. They can track user interaction with the system and offer points or other 'gamified' rewards systems to promote engagement. For users with low engagement, the system can offer reminders to take steps and make progress.

Step 4: Write the message library

The message library is a database of the actual messages that will be sent to the user. Messages need to be written for each case supported by the programme. Messages need to be 160 characters (including spaces) or fewer. For an example of a framework and message library, see QuitNowTxt message library.[76]

Here are some tips when writing the message library:

– **Messages can take many forms.** They can be aimed at providing information or advice, asking users to track behaviours, providing feedback on goals, offering reminders or providing social support (see **Table 6A** for examples). Remember: try to keep it to one actionable message per text. People are processing information in a distracted state and it is possible to say too much in 160 characters (even likely).

– **Message language.** Text messages generally should start with the programme name. Do not use abbreviations or text speak (e.g. 'how r u doin?'). Users find this type of language to be unprofessional coming from a credible health source.

– **Provide a way for users to get more information.** Give them the option to either reply to a text to request more information or provide a link to a web page with more information.

– **Consider smartphone or social media integration.** Remember, users may be reading text messages on smartphones. This means that text messages can seamlessly link to email, web and Facebook, and the content can include multimedia (audio, video), games and visualization of data. Consider how you might build in multimedia links from the text messages.

– **Repurpose already-existing content.** Where possible, use existing materials and adapt for use in the text messaging programme. Most government publications are in the public domain and can be used without permission for such purposes.

– **Focus on message quality.** As with all good health communications materials, messages should be evidence-based and derived from theory. Messages should stem from your communication objectives and the behavioural techniques you plan to promote.

– **Consider the literacy demands on your audience.** Once the message library is written, check the literacy demands associated with the messages. This can be done by importing the messages into Microsoft Word and using the tool to determine reading level. In general, shorter words and sentences have lower literacy demands. Also, messages should cover one main point rather than multiple points to avoid confusion.

[76] http://smokefree.gov/health-care-professionals.

Table 6A: Message examples based on approach

Approach	Example message
Provide health information, advice and tips, often tailored around user characteristics	Try using Nicotine Replacement Therapy (NRT). Smokers who use NRT double their quit rates.
Ask users to set goals	By how many cigarettes do you hope to cut down?
Provide opportunities for tracking progress	Track how many cigarettes you smoked yesterday.
Provide reinforcement for goals which are met	Congrats! You met your goal.
Offer reminders (e.g. to take vitamins; to follow-through with goals)	Your Quit Day is tomorrow.
Offer social support	Hi! I'm your quitpal. I've been through this and quitting is tough. Stick with it and you'll make it through.

Annex 5: eHealth in APT Region

[77]This annex collects several use cases of eHealth system with M2M/IoT system in Asia – Pacific regions, and describes concept and importance for eHealth, related international standardization. Hopefully this informative report will help readers to learn about how the eHealth services are introduced in the APT region and will be a facilitator of new ideas and collaborations.

1) Scope

The scope of the report is followings:

- Introduction of concept and importance of ICT countering eHealth
- Introduction of related international standards activities
- Introduction of case studies
- Analysis of further study items for APT member countries

2) Terms and Definitions

It includes all terms and definitions of this report. This clause will be the good collection of well-known terminologies for the study of ICT and eHealth.

Editor's note: Because this document has several terms related to eHealth, EHealth and eHealth, we have to define the term of eHealth.

mHealth: Mobile computing, medical sensor and communications technologies for healthcare

3) Concept and importance for eHealth

The period 1998-1999 was the era of a significant rise in e-commerce and "eHealth" was introduced at that time as a new term to describe the combined use of Information and Communication Technologies (ICT) in the health sector and a subset of e-commerce [8]. Along with the progress of ICT, eHealth has been characterized not only by health-related technical developments, but also by the development of solutions to improve healthcare locally, regionally, and worldwide by the usage of ICT [2].

eHealth provides substantial benefits to both personal health and public health. It empowers individuals in self-monitoring, chronic disease management and access to trusted health knowledge sources. It also improves the abilities to support surveillance and management of public health interventions and to analyse and report on population health outcomes [3].

An eHealth ecosystem involves different roles impacting the ecosystem stakeholders, such as citizens, research professionals, hospitals, health-related business actors and governments.

3.1 Concept of eHealth

eHealth is an emerging field in the intersection of medical informatics, health and business, referring to health services and information delivered through, or enhanced by, ICT.

eHealth is concerned with improving the flow of information to support the delivery of various health services and the management of systems for health.

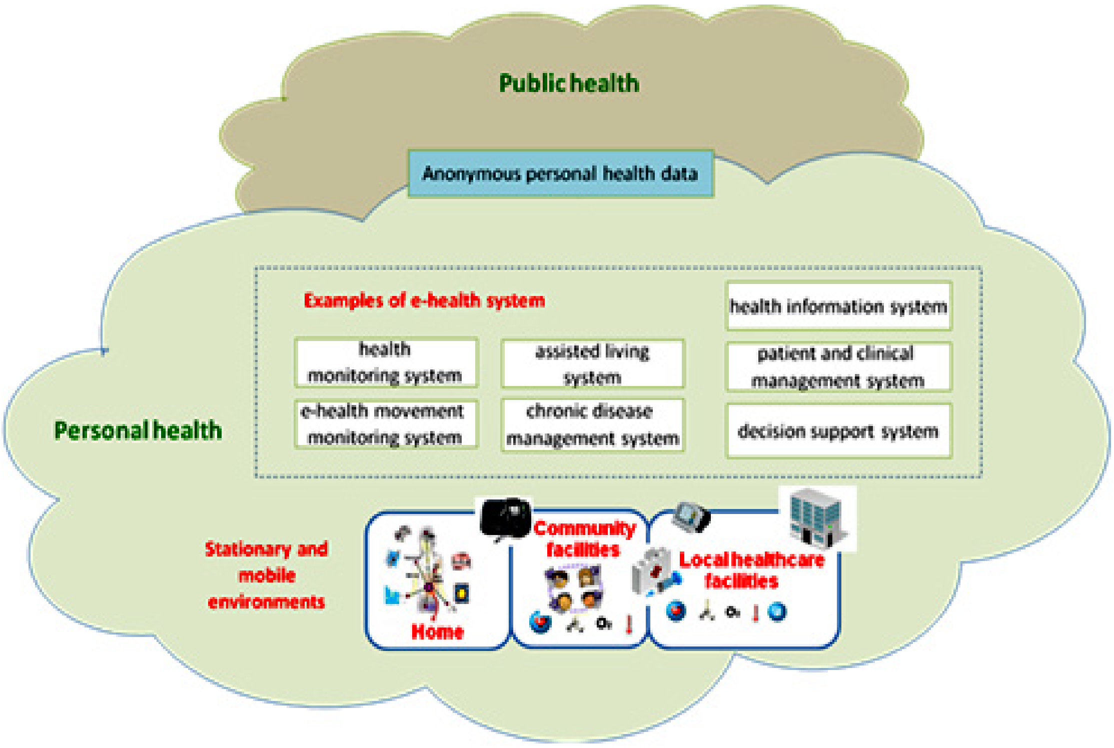
eHealth deals with both personal health and public health: personal health focuses on personalized healthcare, while public health manages diseases and risk factor trends in populations.

[77] Hideo Himeno, NEC Corporation, Japan.

3.2 Overview of eHealth system

An eHealth system contains the infrastructure for providing eHealth services to users. **Figure 8A** provides an overview of eHealth system, including examples of eHealth system and their deployment environments.

Figure 8A: eHealth system overview



Examples of eHealth system include health monitoring system, eHealth movement monitoring system, chronic disease management system, assisted living system, decision support system, health information system, patient and clinical management system, as well as other systems assisting disease prevention, diagnosis, treatment and lifestyle management. These systems may be deployed in stationary and mobile environments, such as home, local healthcare facilities and community facilities.

NOTE 1 – The local healthcare facilities are patient-care points of first intervention and may include clinics, hospitals, ambulances, regional health sites and primary healthcare centers [4].

NOTE 2 – The community facilities provide social welfare and community services, typically in, but not limited to, rural and remote areas. It is expected that basic and enhanced health services for communities be not limited to those provided at home and in local healthcare facilities.

In the personal health domain, an eHealth system is used by professionals to provide medical services, and also used to provide healthcare service such as movement and health monitoring for individuals.

In the public health domain, an eHealth system is used by public health organizations to provide public health services, utilizing anonymous personal health data retrieved from personal health domain in order to make analysis and take decisions.

3.3 eHealth ecosystem

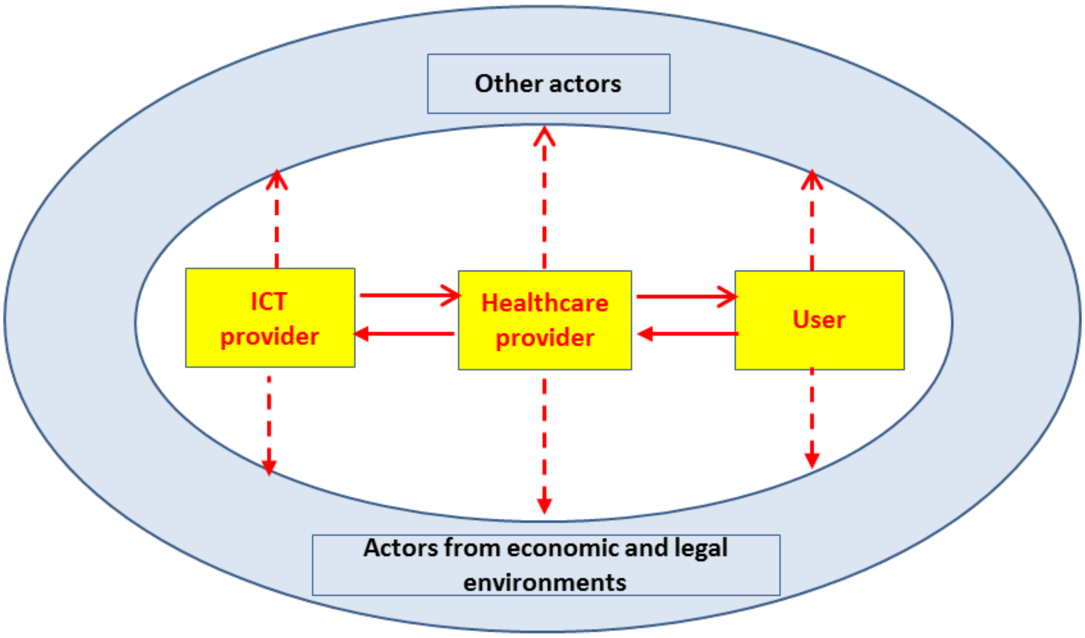
According to concept of eHealth mentioned-before, an eHealth ecosystem contains three consideration points for the practical deployment. The eHealth ecosystem needs to be developed to sustain the expected eHealth services and this implies the implementation of the required functional features using ICT, the so-built infrastructure constituting an eHealth system. The ecosystem also needs to be flexible enough to evolve in line with the development of new information and communication technologies or services.

Secondly, the eHealth ecosystem involves different roles impacting the ecosystem stakeholders, such as citizens, research professionals, hospitals, health-related business actors and governments. The exact roles and benefits of actors in the ecosystem should be taken into account in order to adapt the system to variety of actors and using scenes.

Thirdly, eHealth is aimed at supporting both personal health and public health. Each of these two health domains has its own ecosystem. The personal health domain benefits from an ecosystem mainly from a business model flexibility viewpoint, whereas the public health domain benefits from it also from a governmental viewpoint, as well as from the perspective of not only individual nations but also of global health.

The ecosystem for personal health is characterized by integrated services provided by the actors of the ecosystem. **Figure 9A** shows a high level view of the ecosystem for personal health with the involvement of «User», «Healthcare provider» and «ICT provider» as the key actors. In the ecosystem, these key actors interact with other actors, including those from the economic and legal environments, such as insurance companies, regulation entities and legal entities.

Figure 9A: High level view of the eHealth ecosystem for personal health with its actors



The three key actors of the eHealth ecosystem for personal health are characterized as follows:

- ICT provider: Offers ICT facilities that store, retrieve, process, transmit or receive information electronically.
- Healthcare provider: Implements and offers eHealth services to be used by the User.
- User: Consume eHealth services.

The ecosystem for public health is more complex than the ecosystem for personal health, and encompasses all aspects of the society: it is characterized by a multiplicity of interactions among the numerous actors of the ecosystem, including healthcare institutions, social services, educational institutions, urban planning agencies, public health agencies and so on. The large diffusion of the ecosystem for personal health and the large aggregation of data operated by the eHealth services may benefit the ecosystem for public health, e.g. for a global health surveillance service, through the use of anonymous personal health data.

4) Use cases in APT region

4.1 eHealth overview in China

There are urgent requirements for eHealth in China. China's total healthcare costs in 2011 is 2.43 trillion RMB, accounting for 5.15 per cent of the Gross Domestic Product (GDP), and China's population health state is serious, such as the number of chronic disease and sub-health patients, according to the definition of health by the WHO, the health population in China is just 15 per cent of the total population, 15 per cent in a disease status and the rest 70 per cent in a state of sub-health. Chinese government is making efforts to prevent of chronic disease, On May 8, 2012, Ministry of Health and other 14 departments jointly issued the Work Plan on Prevention and Treatment of Chronic Disease (2012-2015), which put forward that, it shall take strengthening the prevention and control of chronic diseases as the important content of improving the people's livelihood and forging the medical reform, and take effective measures.

The Rise of Mobile Health

Mobile technology has an important contribution to the medical field, and can bring benefits for the livelihood of people, government, industry, and technology development. Chinese mobile medical applications market is growing rapidly. Some research firms estimate the size of the Chinese mHealth market is about 1.86 billion RMB, which is up to 17.7 percent over the last year. They also predict the mobile medical market in China will exceed 10 billion RMB by the end of 2017.

They also predict rapid growth in the Chinese wearable medical devices market. The wearable medical equipment market in China reached 420 million RMB, and will exceed 5 billion RMB by 2017 according to data published by some consulting company.

Remote monitoring devices represent a fast-growing part of the mHealth sector. According to a report jointly author by GSMA and the consulting company, the Chinese medical monitoring services market will reach $1.2 billion by 2017, with over 90 percent of the revenues coming from chronic disease management solutions.

eHealth standardization in China

The standardization activities in China has been initiated in China Communications Standards Association (CCSA), the items and directions involve the eHealth, wireless BAN (Body Domain Network), telemedicine, etc.

4.2 eHealth activities in Japan

Japan is leading the aging society of the world and the ICT for eHealth services. The number of aging population has increased and the costs of the social medical insurance system are changing the direction of the health services in Japan. eHealth technologies provide the efficiency of treatment at medical facilities and functions for preventive healthcare, such as health check and monitoring at home.

Three typical practices of eHealth services are described in the following clauses; Mobile Health System from NTT, BAN-enabled Portable Health Clinic (NOTE 3) from NICT and Social Infrastructure Solution from NEC.

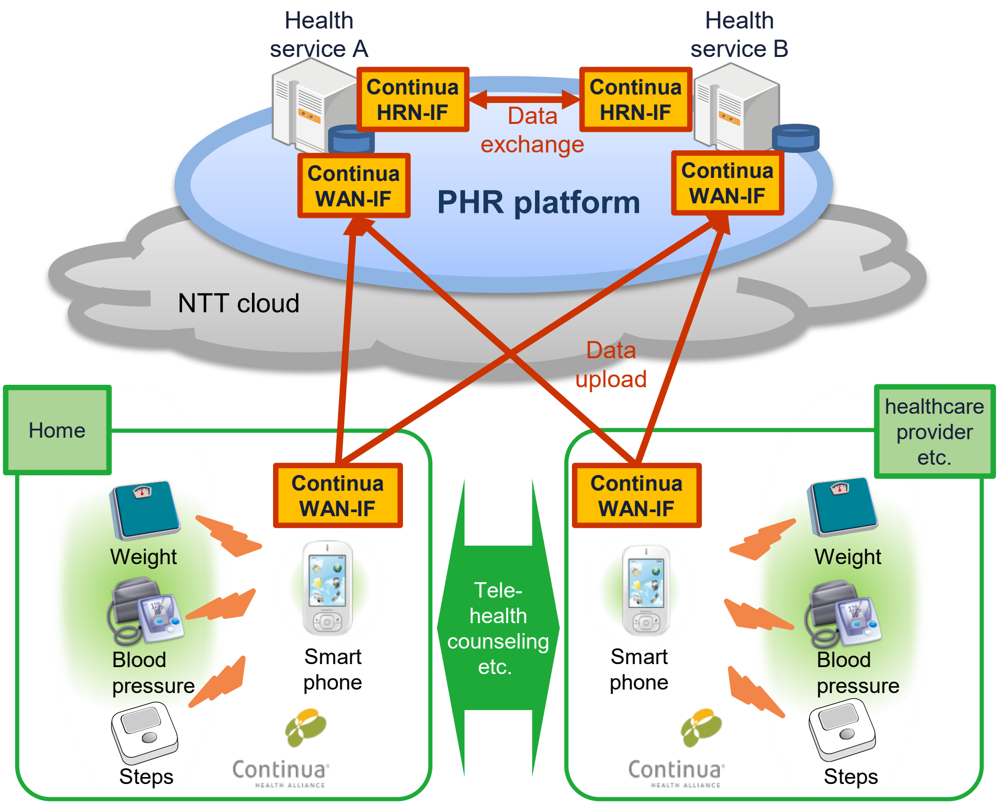
NOTE 3 – The term BAN is described in the FG M2M deliverable "D0.2: M2M enabled ecosystems: eHealth".

4.1.1. Easy and Convenient Health Checkup with Mobile Health System

Mobile Health System for home care support is used to reduce the amount of commuting by both doctors and patients to and from hospital by uploading health data. A system provided by NTT Corporation is suited to such situations that people share healthcare devices and smart phones (as data upload gateway). The system conforms to Continua Health Alliance Design Guidelines, which is the ITU-T H.810 standard made from a global industry standard for health data.

There are 3 steps application scenarios in Mobile Health System. Step 1 is providing regional clinical pathways between medical providers and home care support providers. Step 2 is ensuring continued medical service and healthcare in disaster areas. Step 3 is providing health check services to developing countries deficient in medical resources. Service flow of Mobile Health System is 1) citizens take health check by using Healthcare devices (weight, blood pressure, steps, etc.) at home or healthcare center, 2) Healthcare devices upload health data to health check services thorough smart phone, 3) Health check services report who has a possible of illness to Medical institutions, 4) Medical institutions recommend taking medical consultation to citizens.

Figure 10A: Overview Mobile Health System



4.1.2. Affordable BAN-enabled Portable Health Clinic toward eHealth M2M service

Portable Health Clinic (PHC) was introduced to develop models for social information infrastructure by Kyushu University in Japan and Grameen Communication's Global Communication Center (GCC) in Bangladesh (Note 4), and the associated body area network (BAN) is provided by NICT, Japan. It was prototyped as a portable-clinic box equipped with major diagnostic tools integrating a simple equation to categorize patients into four groups depending on the level of action or attention required.

The BAN-enabled portable health clinic (BAN-PHC) allows a coordinator to wirelessly and securely gather all measured data from medical devices and sensors (**Figure 11A**). The automatic data retrieval removes human error and reduces time spent on manual data copying. Once data are collected in the coordinator, they are sent to a backend local server for categorization and further remote diagnosis. BAN-PHC consists of **an attaché case equipped with BAN-enabled measurement devices, its coordinator, and a local backend server (a note PC), and connects to a database in network for remote diagnosis (Figure 12A).**

Figure 11A: BAN-enabled portable health clinic

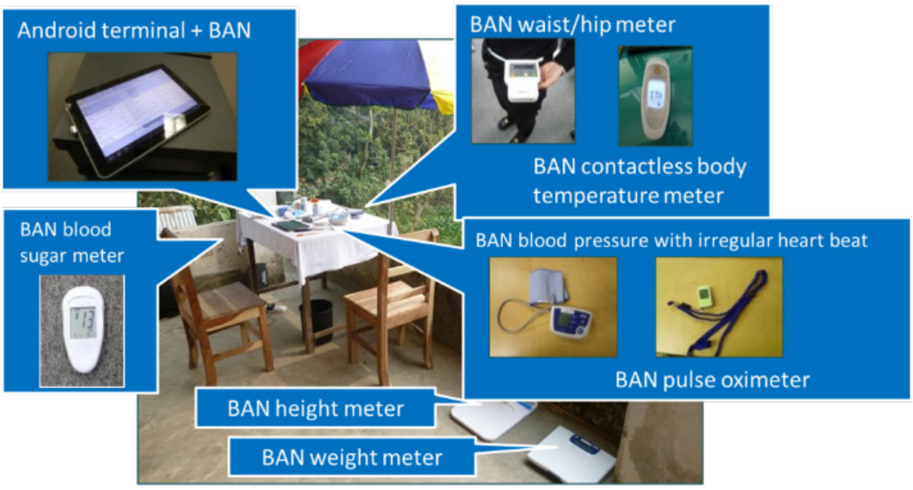
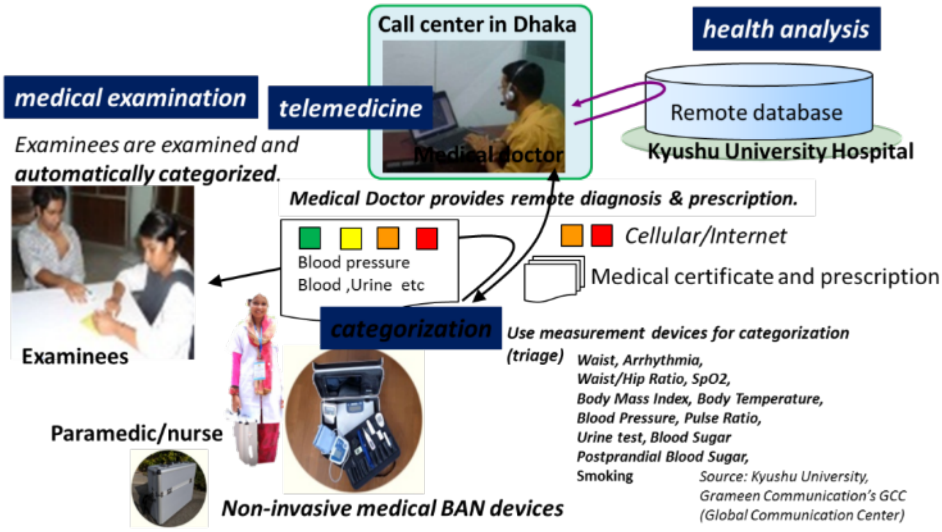


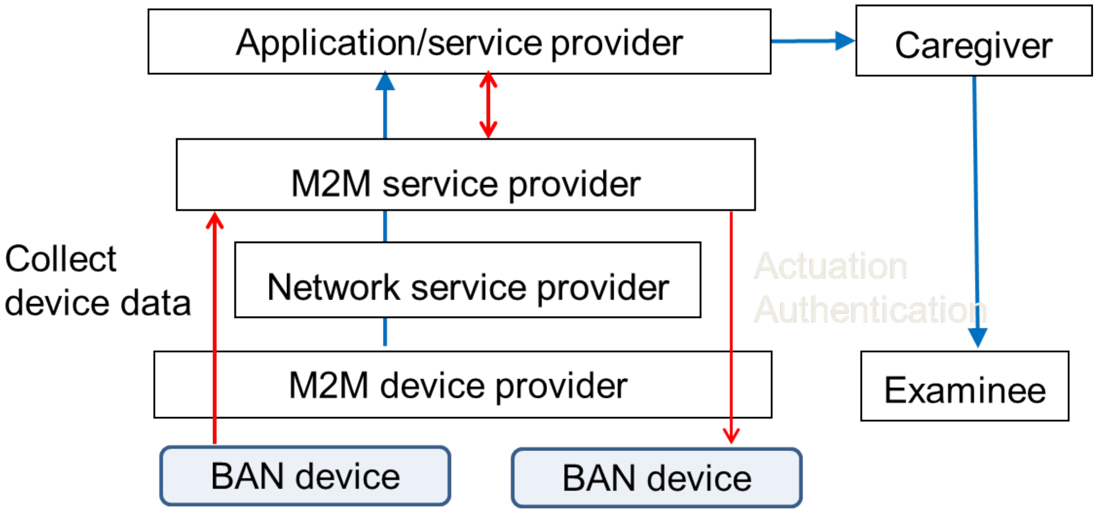
Figure 12A: BAN-enabled portable health clinic



The BAN-PHC health checkup and remote diagnosis was conducted in FY2012 and FY2013 for more than 15,000 subjects. With the assessment of the health checks and diagnoses, actual usefulness was proved (Note 5).

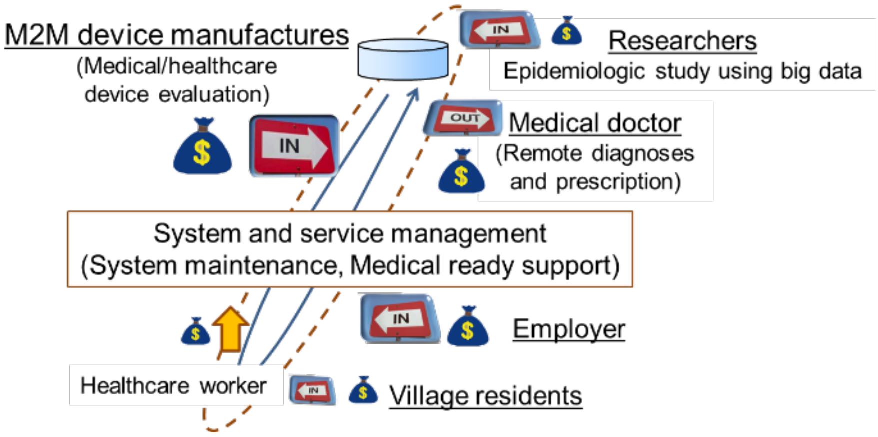
An M2M-enabled eHealth has a potential to improve the scalability of healthcare services and to reduce operation costs by introducing additional roles in the ecosystem. BAN-PHC plays roles in automatically upload not only medical/healthcare data to the backend database, but also operation data, such as the use count of each device to the device manufacturer. It plays an important role in the M2M-enabled ecosystem to increase the use of various data.

Figure 13A: Ecosystem of M2M-enabled BAN-PHC



An M2M-enabled eHealth combined with BAN-PHC increases the number of users and provides equal opportunities to caregivers, such as medical doctors, for medical/healthcare consultation and to users to select one from available caregivers in the M2M service. (**Figure 13A**) In addition to these advantages, it strengthens an affordable business model by involving a group of M2M device manufacturers who receive automatic analysis for durability and ease of use of their own devices (**Figure 14A**).

Figure 14A: M2M-enabled BAN-PHC business model



NOTE 4: the project name is "Development of the fastest database engine for the era of very large database and experiment and evaluation of strategic social services enabled by the database engine" in funding program for world-leading innovative R&D on science and technology (FIRST).

NOTE 5: Yasunobu Nohara, Eiko Kai, Partha Pratim Ghosh, Rafiqul Islam, Ashir Ahmed, Masahiro Kuroda, Sozo Inoue, Tatsuo Hiramatsu, Michio Kimura, Shuji Shimizu, Kunihisa Kobayashi, Yukino Baba, Hisashi Kashima, Koji Tsuda, Masashi Sugiyama, Mathieu Blondel, Naonori Ueda, Masaru Kitsuregawa, and Naoki Nakashima, "Health Checkup and Telemedical Intervention Program for Preventive Medicine in Developing Countries: Verification Study", JOURNAL OF MEDICAL INTERNET RESEARCH, 2015, Jan 28; 17(1).

4.1.3. SmartCare Solutions based on M2M/IoT platform

SmartCare Solutions are provided by NEC Corporation. M2M/IoT platform technology plays key role for SmartCare solutions in order to collect various kind data and analyze the data. M2M service platform solves various problems and provides basic functionality for M2M services. Interfaces are prepared for many different kinds of devices to be connected with the platform. Interfaces are provided for realizing a wealth of M2M services. Utilizing cloud services enables systems to be built more rapidly and economically. Offers support for building systems from small-start to large-scale configurations, and M2M solution reduces system operation cost and man-hours.

Individual healthcare services can be improved by using a broad range of health information such as weight and blood pressure, consumed calories when eating out, and heart rate while jogging in order to gain a complete and individualized understanding of a person's health.

Figure 15A: SmartCare solution for wellness

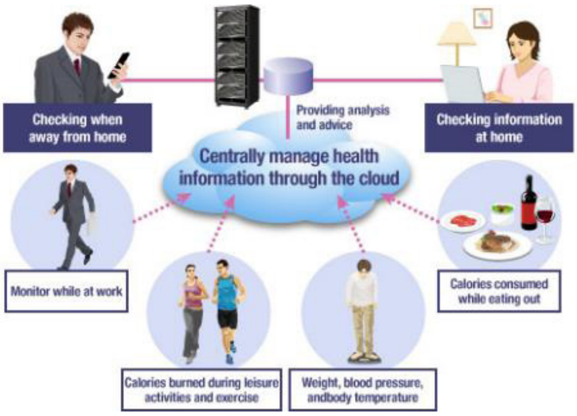
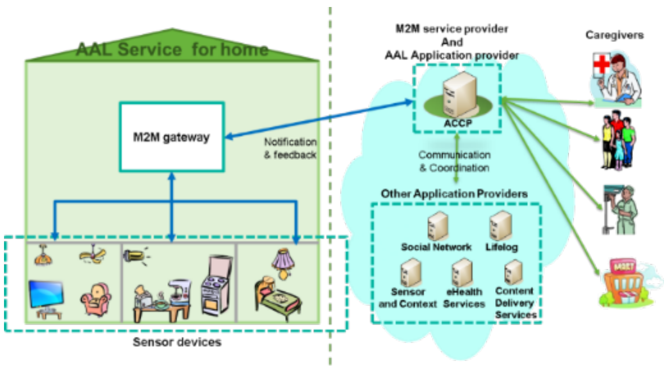


Figure 16A shows SmartCare solution for Ambient Assisted Living (AAL). AAL can provide assist for the elderly people, or people who are handicapped in any way, to live a fully independent life. Technology is seen as one possibility for shaping our future in times of demographic change and living longer. It is seen as a possible means to keep ourselves healthy and active for even longer.

There are several scenarios of AAL service; depending on the user's symptoms and condition, AAL scenarios correspond to each situation.

Figure 16A: SmartCare solution for AAL



The basic Information flow of this solution is following,

1) Monitoring: Some kind of sensors (temperature, moisture, lights/emergency call switch on/off, electronic lock door, smoke etc.) can obtain measurement results or status on equipment embedded sensor devices and also sends these parameters or status to M2M gateway through the wired or short range wireless local network.

2) Interpretation: M2M gateway can interpret what kind of sensor sent information and identify the user and gather the parameters or status information and assemble this information into specified data format. M2M gateway uploads this information to an Advanced Care Coordination

Platform (ACCP) through the wired network (NGN, ISDN, PSTN etc.) or wireless network (GSM, 3G, LTE, WiMAX etc.).

3) Identity Management: ACCP can accept the monitored information by several M2M gateways and can manage the user identification.

4) Distributed Access Control: The information related with one user can be uploaded to an ACCP from several M2M gateways through the most suitable access network (wired/wireless). The ACCP can connect and control the distributed access network.

5) Communication & Coordination: ACCP can obtain and analysis the parameters or status information sent by M2M gateway in order to analysis the result of the monitoring. And ACCP can communicate with other Application provided by other providers (ex. eHealth application, Lifelog application, that is typically to capture their entire lives, or large portions of their lives as digital data with computer devices, Social Network application etc.) and can coordinate with other Application.

6) Feedback: ACCP can get the analyzed result from Caregivers and can obtain the feedback from other Application providers. ACCP can integrate the instructions according to this feedback and can send to M2M gateway. ACCP can also send to Front End Tools for Caregivers or Patients.

7) Analysis: M2M gateway can receive the instructions integrated by ACCP through the network. And M2M gateway can analyze the received instructions for the user. Front End Tools can also receive the instructions and Caregivers or Patients can analyze the received instructions.

4.3 Health Data and Government Multi Purpose Card (GMPC/MyKad) in Malaysia

The GMPC, replaces the current Malaysian National Identity card, which was a laminated plastic ID card with images of the fingerprints on the card [b-GMPC/MyKad]. This identity card is issued to all Malaysians over the age of 12 years that they must carry at all times. At the moment there are 17 million identity card holders in a total population of 21 million. Another function of the card is to replace the current Malaysian driving license. The third application if passport information which allows the card holder to exit and reentry Malaysia using "autogates", which verify the holders fingerprint biometrics with the cards, check a blacklist and log the exit and reentry date and time details. The fourth application is the critical health information of the cardholder such as blood type and allergies; it also records the latest hospital visit data. Additional non-government applications include electronic purse (MEPS e-cash), automatic teller machine (ATM) and public key infrastructure (PKI) applications. The GMPC contains two-biometrics type of data, a digitized color photo of the cardholder and the minutiae (fingerprint characteristics).

Health Data on GMPC includes several data that are (1)demographic data (next of kin), (2)static health data (blood group, allergies, immunization, implants, chronic disease/disabilities, current medication, insurance/third party payer), (3)dynamic health data (visit episode).

Figure 17A: GMPC/MyKad by using IC chip

Figure 18A shows Malaysia scenario of integrated health services including GMPC.

Step 1: Access health portal & perform Health Reimbursement Agreements (HRA);

Step 2: (Choice 1) Contact call center;

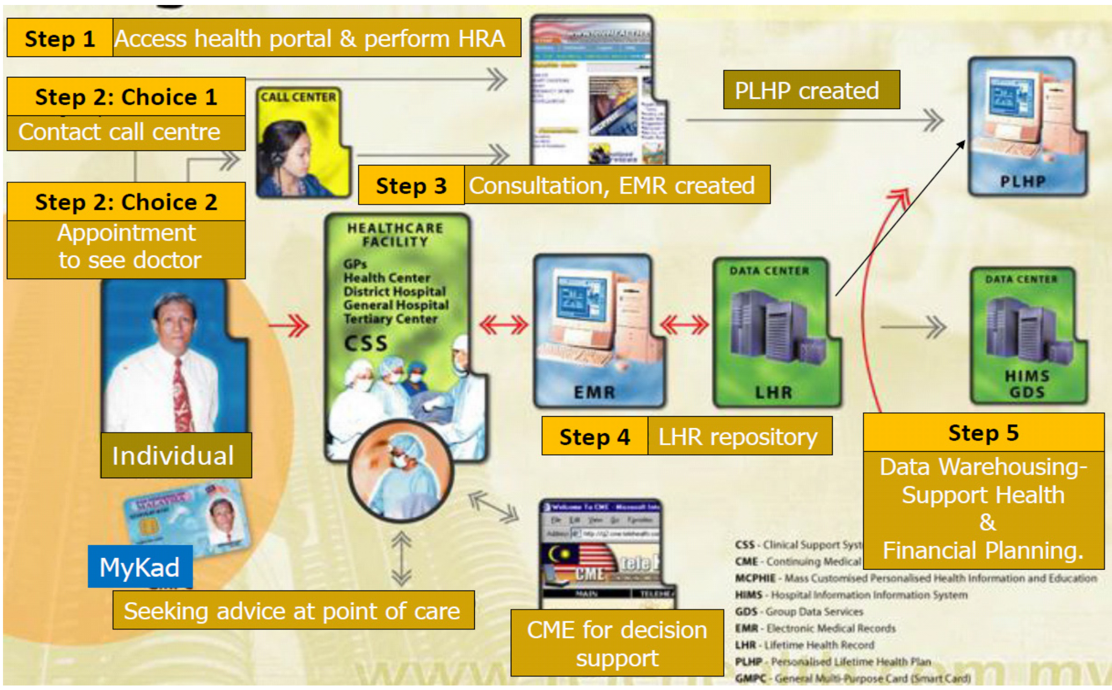
Step 2: (Choice 2) Appointment to see doctor;

Step 3: Consultation, Electric Medical Record (EMR) created;

Step 4: Lifetime Health Record (LHR) repository;

Step 5: Data warehousing support health & financial planning.

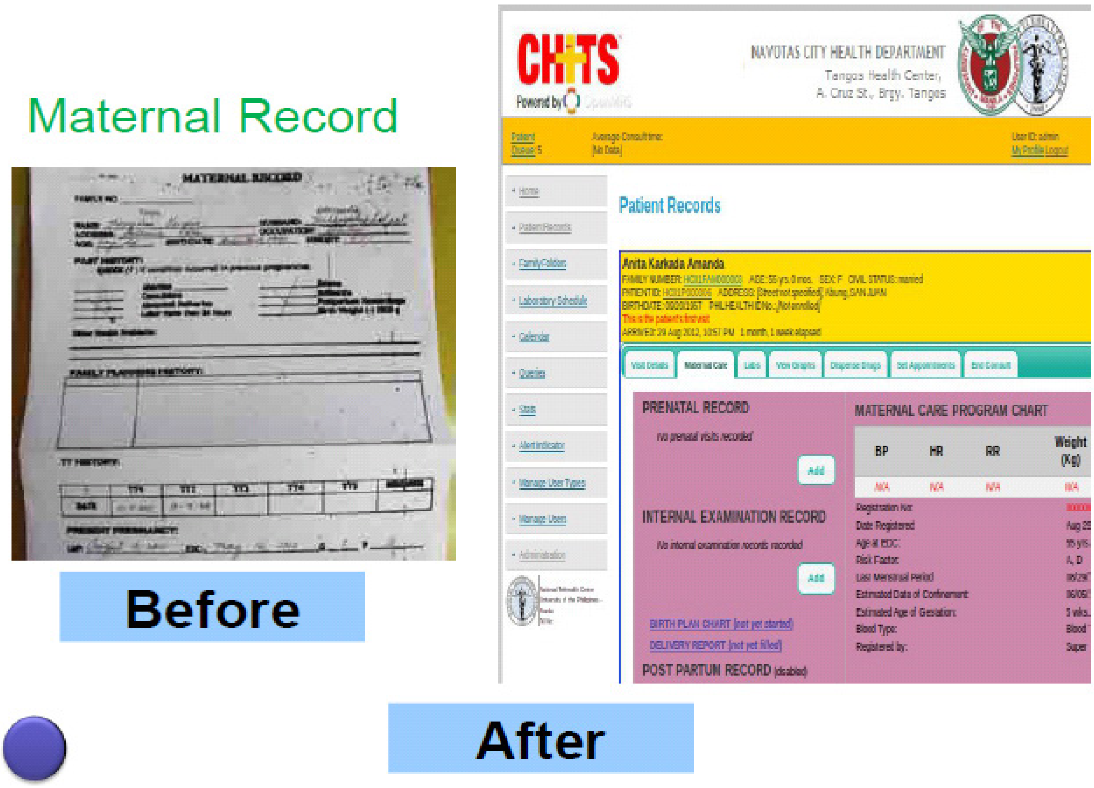
Figure 18A: Malaysia scenario of integrated Health services



4.4 eHealth activities in Philippines – Telehealth and eMedicine by NTHC

These realities mark public health in the Philippines [b-Telehealth]. The country's geography and lack of resources compound the problem of data collection and use on the ground. This poor information management system prevents the development of well-planned and targeted strategies to combat the Philippines' health problems, to reduce inequity in healthcare access and improve the overall health of Filipinos, especially those who live in the poorest and farthest communities. The Community Health Information Tracking System (CHITS) is an electronic medical record system developed by the NTHC to improve health information management at the Regional Health Unit (RHU) level. It was developed alongside health workers and features a workflow much akin to what is employed in local health centers nationwide. It is also built to gather data and generate reports which health workers need and decision makers require. CHITS is made up of several components which are envisioned to lead to the collection and delivery of good quality data. CHITS is primarily a capacity-building program which instils relevant health information systems components among health workers. By using free and open source software, CHITS makes itself flexible and compliant to the needs of RHU's and local health centers as well as the Department of Health (DOH). Once installed, CHITS becomes a platform for the facility to explore other eHealth applications such as telemedicine and eLearning.

Figure 19A: CHITS (The Community Health Information Tracking System)



4.5 National Electronic Health Record (NEHR) in Singapore

The NEHR is an integrated healthcare record centered on each person. It extracts and consolidates in one record, all clinically relevant information from their encounters across the healthcare system throughout his/her life. Secure "real-time" access to patients' NEHR by authorized clinicians and healthcare providers.

NEHR project in Singapore was started by Ministry of Health Holdings (MOHH) from 2008. The initial action is to create roadmap of NEHR architecture.

After approval of NEHR architecture, the concrete development of NEHR was started from April 2009. In this time, the roadmap to develop this system by April 2015 was settled.

Figure 14shows the concept that medical and healthcare information is exchanged among several institutions in Singapore. Private General Practitioners (GPs) have EMR in Clinical Management System (CMS). And also EMR is used in Community Hospitals, other ILTC Intermediate and Long-term Care (ILTC), public healthcare, polyclinics and Ministry of Defense. NEHR will enable strategic vision of patients moving seamlessly across the healthcare system, receiving coordinated patient-centric care at the most appropriate settings.

Figure 20A: eHealth system in Singapore (from MOH Holdings)

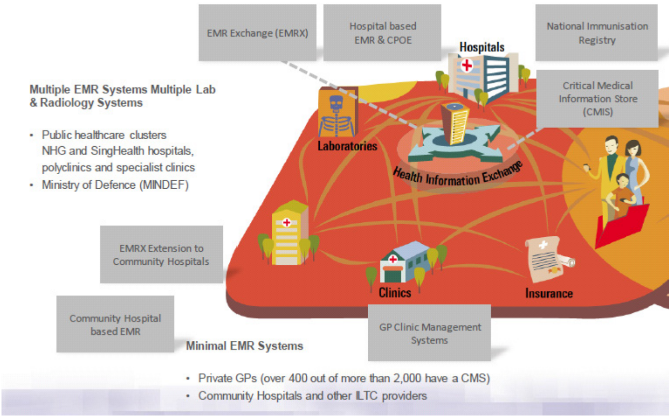
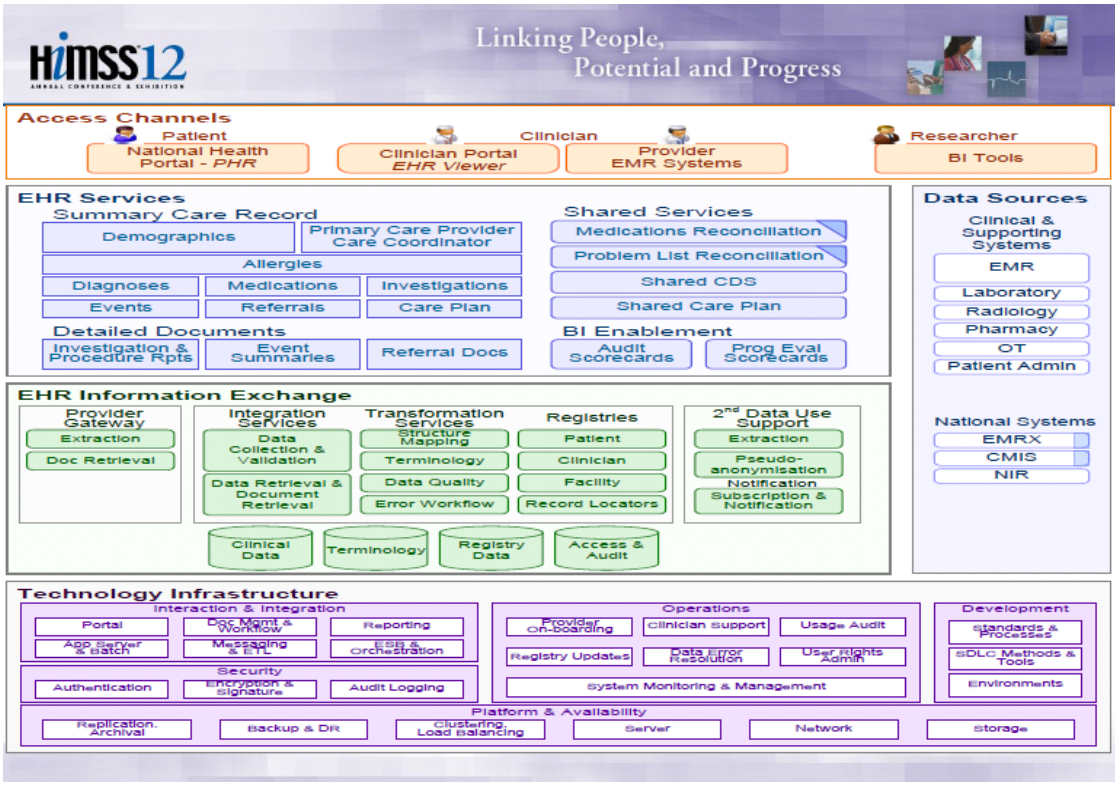


Figure 21A indicates the NEHR architecture based on fundamental scope. The bottom part of this architecture shows technology infrastructure sets functions of Electric Health Record (EHR) information Exchange above technology infrastructure. It enables a lot of EHR services and informs these services to stakeholders via Access Channels indicated on top of this architecture. It is considered that patients can access to EHR services in the future. This architecture includes Data sources on right part of this figure that have not only data from clinical systems but also national systems.

Figure 21A: NHER Architecture (from MOH Holdings)



5) Related international standardization activities

This section provides a brief idea of current activities of international or regional standard bodies. The major SDOs are listed below, but it does not limit to the following organizations.

5.1. ITU-T

Some Study Groups have a direct bearing on eHealth systems to specify standards. Consequently, many ITU Study Groups address issues supporting eHealth, such as quality of service (Study Group 12), mobile telecommunications networks (Study Group 13), multimedia coding and systems (Study Group 16), security issues (Study Group 17), and others.

Table 7A: Related international standardization activities at ITU

Document number	Deliverable title	Ver.	Date
ITU-T / Y.2065	Service and capability requirements for eHealth monitoring services (Y.EHM-reqts)	1.0	2013-11
ITU-T / H.642.1	Multimedia information access triggered by tag-based identification – Identification scheme	1.0	2012-06-29
ITU-T / H.642.2	Multimedia information access triggered by tag-based identification – Registration procedures for identifiers	1.0	2012-06-29
ITU-T / H.642.3	Information technology – Automatic identification and data capture technique – Identifier resolution protocol for multimedia information access triggered by tag-based identification	1.0	2012-06
ITU-T / H.810	Interoperability design guidelines for personal health systems	1.0	2013-12-14
ITU-T / X.1080.1	eHealth and world-wide telemedicines- Generic telecommunication protocol	1.0	2011-10-14
ITU-T / X.1081	The telebiometric multimodal model- A framework for the specification of security and safety aspects of telebiometrics	2.0	2011-10-14

The Focus Group on the M2M service layer (FG M2M) studies activities currently undertaken by various Standards Developing Organizations (SDOs) in the field of M2M service layer specifications to identify key requirements for a common M2M service layer. FG M2M identifies a minimum set of common requirements of vertical markets, focusing initially on the health-care market and application programming interfaces (APIs) and protocols supporting eHealth applications and services, and draft technical reports in these areas.

The Focus Group does not intend to duplicate other efforts and benefit from existing work and expertise. Therefore, FG M2M aims at including vertical market stakeholders that are not among the traditional ITU-T membership, such as Continua Health Alliance and the World Health Organization (WHO) for health-care, and will collaborate with M2M communities worldwide (including research and academia), SDOs, forums and consortia.

FG M2M produces five deliverables as output of the activity. Deliverables are as follows.

– D0.1: M2M standardization activities and gap analysis: eHealth;
– D0.2: M2M enabled ecosystems: eHealth;
– D1.1: M2M use cases: eHealth;
– D2.1: M2M service layer: requirements and architectural framework;

– D3.1: M2M service layer: APIs and protocols overview.

Details of FG Smart can be checked in ITU-T website (http://www.itu.int/en/ITU-T/focusgroups/m2m/Pages/default.aspx). FG M2M service layer has concluded in December 2013 and relevant study groups in ITU succeeded that work.

5.2. WHO

The WHO's eHealth unit works with partners at the global, regional and country level to promote and strengthen the use of information and communication technologies in health development, from applications in the field to global governance. The unit is based in the department of Knowledge Management and Sharing in the cluster of Health Systems and Innovation.

http://www.who.int/; http://www.itu.int/pub/ehealth/en/.

Table 8A: Related international standardization activities at WHO

Document number	Deliverable title	Ver.	Date
-	International Classification of Disease (ICD)-10	10	2007
-	National eHealth Strategy Toolkit	-	2012
-	Global Observatory for eHealth series	-	-
-	Connecting for Health: Global Vision, Local insight	-	-

5.3. CEN/TC 251

The Comité Européen de Normalisation or European Committee for Standardization (CEN) is a standards development organization made up of 31 national members developing pan-European standards. CEN has a Health Informatics Technical Committee (TC 251) which coordinates the development of standards for eHealth. According to its business plan and recent activities, the focus of CEN/TC 251 is primarily on technologies at the content level rather than dealing with communication technologies. CEN/TC 251 is further broken down into working groups such as Working Group IV, which focuses on the interoperability of data among devices and information systems.

http://www.cen.eu/cen/Pages/default.aspx

Table 9A: Related international standardization activities at CEN/TC 251

Document number	Deliverable title	Ver.	Date
EN 1068	Health informatics – Registration of coding systems	2005(E)	2005-04-17
EN 12264	Health informatics – Categorial structures for systems of concepts	2005(E)	2005-04-29
EN 12435	Health informatics – Expression of results of measurements in health sciences	2006(E)	2005-12-14
CR 1350	Investigation of syntaxes for existing interchange formats to be used in healthcare	1993	1993-07-01
EN 13940-1	Health informatics – System of concepts to support continuity of care – Part 1 :Basic concepts	2007(E)	2007-05-10

Table 9A: Related international standardization activities at CEN/TC 251 (continuación)

Document number	Deliverable title	Ver.	Date
EN 14463	Health informatics – A syntax to represent the content of medical classification systems – ClaML	2007	2007-10-07
EN 14485	Health informatics – Guidance for handling personal health data in international applications in the context of the EU data protection directive	2003(E)	2003-11-13
EN 1828	Health informatics- Categorial structure for classifications and coding systems of surgical procedures	2012(E)	2012-09-14
CEN/TR 15253	Health informatics – Quality of service requirements for health information interchange	2005	2005-11-13
CEN/TR 15299	Health informatics – Safety procedures for identification of patients and related objects	2006	2006-12-05
CEN/TS 15260	Health informatics – Classification of safety risks from health informatics products	2006-	2005-10-24
EN 12251	Health informatics – Secure User Identification for Healthcare- Management and Security of Authentication by Passwords	2004(E)	2004-06-21
CEN/TS 14822-4	Health informatics – General purpose information components- Part 4: Message headers	2005	2005-03-26
EN 1064	Health informatics- Standard communication protocol- Computer-assisted electrocardiography	2005+A1	2004-12-17
ENV 12612	Medical informatics – Messages for the exchange of healthcare administrative information	1997	1997-03-11
ENV 13607	Health informatics – Messages for the exchange of information on medicine prescriptions	2000	1999-07-29
ENV 13609-2	Health informatics – Messages for maintenance of supporting information in healthcare systems – Part 2: Updating of medical laboratory-specific information	2000	1999-07-29
ENV 13730-2	Healthcare Informatics – Blood transfusion related messages - Part 2: Production related messages (BTR-PROD)	2002(E)	2001-10-18
EN 12381	Health informatics – Time standards for healthcare specific problems	2005(E)	2005-01-20
EN 13609-1	Health informatics – Messages for maintenance of supporting information in healthcare systems – Part 1 :Updating of coding scheme	2005(E)	2005-03-15
EN 14822-1	Health informatics – General purpose information components – Part 1 :Overview	2005(E)	2005-08-16
EN 14822-2	Health informatics – General purpose information components – Part 2: Non-clinical	2005	2005-08-16
EN 14822-3	Health informatics – General purpose information components- Part 3 :Clinical	2005(E)	2005-08-16

Table 9A: Related international standardization activities at CEN/TC 251 (continuación)

Document number	Deliverable title	Ver.	Date
EN 15521	Health informatics – Categorial structure for terminologies of human anatomy	2007(E)	2007-10-07
EN 1614	Health informatics – Representation of dedicated kinds of property in laboratory medicine	2006(E)	2006-08-14
ENV 12443	Medical Informatics – Healthcare Information Framework (HIF)	1999	1999-11-07
ENV 12537-1	Medical informatics – Registration of information objects used for EDI in healthcare – Part 1 :The Register	1997	1997-02-09
ENV 12610	Medical informatics – Medicinal product identification	1997	1997-03-11
ENV 12611	Medical informatics – Categorial structure of systems of con-cepts – Medical devices	1997	1997-03-11

5.4. ISO/TC 215 – Health informatics

ISO's Technical Committee 215 also addresses health informatics. ISO/TC 215 focuses primarily on electronic health records. Various Working Groups (WGs) within TC 215 address topics such as data structure, messaging and communication, security, pharmacy and medication, devices, and business requirements for electronic health records. For example, ISO/TS 25237:2008 addresses pseudonymization principles and requirements for privacy protection of electronic health records. Many of ISO's standards are collaborations or endorsements of standards developed by other standards organizations such as HL7 or IEEE. For example, ISO/HL7 27931:2009, "Data Exchange Standards – Health Level Seven Version 2.5" establishes an application protocol for electronic data exchange in healthcare environments.

http://www.iso.org/iso/iso_technical_committee?commid=54960.

Table 10A: Related international standardization activities at CEN/TC 251

Document number	Deliverable title	Ver.	Date
ISO 18104	Health Informatics – Integration of a reference terminology model for nursing (ISO 18104:2003)	First edition	2003-12-15
ISO/TR 12309	Guidelines for terminology development organizations	First edition	2009-12-15
ISO/TR 14639-1	Capacity-based eHealth architecture roadmap – Part 1: Overview of national eHealth initiatives	First edition	2012-05-15
ISO 17115	Vocabulary for terminological systems	First edition	2007-07-01
ISO/TS 22789	Conceptual framework for patient findings and problems in terminologies	First edition	2010-06-15
EN ISO 10781	Electronic Health Record-System Functional Model, Release 1.1 (ISO 10781	corrected version	2012-10-15

Table 10A: Related international standardization activities at CEN/TC 251 (continuación)

Document number	Deliverable title	Ver.	Date
EN ISO 11073-20601	Health informatics – Personal health device communication - Part 20601: Application profile – Optimized exchange protocol (ISO/IEEE 11073-20601:2010)	First edition	2010-0501
EN ISO 13606-5	Health informatics – Electronic health record communication – Part 5: Interface specification (ISO 13606-5:2010)	First edition	2010-03-01
ISO 21090	Health Informatics – Harmonized data types for information interchange (ISO 21090:2011)	First edition	2011-02-15
ISO/IEEE 11073-20101	Point-of-care medical device communication – Part 20101: Application profiles – Base standard	First edition	2004-12-15
ISO 13119	Health informatics – Clinical knowledge resources – Metadata	First edition	2012-11-01
ISO 13606-1	Electronic health record communication – Part 1: Reference model	First edition	2008-02-15
ISO 13606-2	Electronic health record communication – Part 2: Archetype interchange specification	First edition	2008-12-01
ISO 13606-3	Electronic health record communication – Part 3: Reference archetypes and term lists	First edition	2009-02-01
ISO/TS 13606-4	Electronic health record communication – Part 4: Security	First edition	2009-10-01
ISO 13606-5	Electronic health record communication – Part 5: Interface specification	First edition	2010-03-01
ISO/TS 14265	Classification of purposes for processing personal health information	First edition	2011-11-01
ISO/TR 14292	Personal health records – Definition, scope and context	First edition	2012-03-15
ISO 17090-1	Public key infrastructure – Part 1: Overview of digital certificate services	Second edition	2013-05-01
ISO 17090-2	Public key infrastructure – Part 2: Certificate profile	First edition	2008-02-15
ISO 17090-3	Public key infrastructure – Part 3: Policy management of certification authority	First edition	2008-02-15
ISO 18308	Requirements for an electronic health record architecture	First edition	2011-04-15
ISO/TR 20514	Electronic health record – Definition, scope and context	First edition	2005-10-15
ISO/TS 21091	Directory services for security, communications and identification of professionals and patients	First edition	2005-12-15
ISO/HL7 21731	HL7 version 3 – Reference information model – Release 1	Corrected edition	2012-10-15

Table 10A: Related international standardization activities at CEN/TC 251 (continuación)

Document number	Deliverable title	Ver.	Date
ISO/TR 22221	Good principles and practices for a clinical data warehouse	First edition	2006-11-01
ISO/TS 29585:	Deployment of a clinical data warehouse	First edition	2010-05-17
ISO/TR 21730	Use of mobile wireless communication and computing technology in healthcare facilities – Recommendations for electromagnetic compatibility (management of unintentional electromagnetic interference) with medical devices	Second edition	2007-02-15
ISO/IEEE 11073-10101	Point-of-care medical device communication – Part 10101: Nomenclature	First edition	2004-12-15
ISO/IEEE 11073-10201	Point-of-care medical device communication – Part 10201: Domain information model	First edition	2004-12-15
ISO/TR 11487	Clinical stakeholder participation in the work of ISO TC 215	First edition	2008-12-01
ISO 12967-1	Service architecture – Part 1: Enterprise viewpoint	First edition	2009-08-15
ISO 12967-2	Service architecture – Part 2: Information viewpoint	First edition	2009-08-15
ISO 12967-3	Service architecture – Part 3: Computational viewpoint	First edition	2009-08-15
ISO/TR 25257	Business requirements for an international coding system for medicinal products	First edition	2009-09-01
ISO 10159	Messages and communication – Web access reference manifest	First edition	2011-12-15
ISO/TS 27527	Provider identification	First edition	2010-08-01
ISO 11073-30200	Health informatics – Point-of-care medical device communication – Part 30200: Transport profile – Cable connected (ISO/IEEE 11073-30200:2004)	First edition	2004-12-15
ISO/IEEE 11073-30300	Point-of-care medical device communication – Part 30300: Transport profile – Infrared wireless	First edition	2004-12-15
ISO 11073-90101	Point-of-care medical device communication – Part 90101: Analytical instruments – Point-of-care test	First edition	2008-01-15
ISO/TR 11636	Dynamic on-demand virtual private network for health information infrastructure	First edition	2009-12-01
ISO/TR 16056-1	Interoperability of telehealth systems and networks – Part 1: Introduction and definitions	First edition	2004-07-01
ISO/TR 16056-2	Interoperability of telehealth systems and networks – Part 2: Real-time systems	First edition	2004-07-01

Table 10A: Related international standardization activities at CEN/TC 251 (continuación)

Document number	Deliverable title	Ver.	Date
ISO/TS 16058	Interoperability of telelearning systems	First edition	2004-07-01
ISO/TS 21298	Functional and structural roles	First edition	2008-12-01
ISO/TR 22790	Functional characteristics of prescriber support systems	First edition	2007-12-01
ISO 27799	Health informatics – Information security management in health using ISO/IEC 27002	First edition	2008-07-01
ISO/TR 11633-1	Information security management for remote maintenance of medical devices and medical information systems – Part 1: Requirements and risk analysis	First edition	2009-11-15
ISO/TR 11633-2	Information security management for remote maintenance of medical devices and medical information systems – Part 2: Implementation of an information security management system (ISMS)	First edition	2009-11-15
ISO/TS 22600-1	Privilege management and access control – Part 1: Overview and policy management	First edition	2006-08-01
ISO/TS 22600-2	Privilege management and access control – Part 2: Formal models	First edition	2006-08-01
ISO/TS 22600-3	Privilege management and access control – Part 3: Implementations	First edition	2009-12-01
ISO 22857	Guidelines on data protection to facilitate trans-border flows of personal health information	First edition	2004-04-01
ISO 27799	Information security management in health using ISO/IEC 27002	First edition	2008-07-01
ISO/IEEE 11073-20601	Personal health device communication – Part 20601: Application profile – Optimized exchange protocol	First edition	2010-05-01
ISO 11073-91064	Standard communication protocol – Part 91064: Computer-assisted electrocardiography	First edition	2009-05-01
ISO 18232	Messages and communication-- Format of length limited globally unique string identifiers	First edition	2006-04-01
ISO/TR 21089	Trusted end-to-end information flows	First edition	2004-06-01
ISO/IEEE 11073-10404	Personal health device communication – Part 10404: Device specialization – Pulse oximeter	First edition	2010-05-01
ISO/IEEE 11073-10407	Personal health device communication – Part 10407: Device specialization – Blood pressure monitor	First edition	2010-05-01
ISO/IEEE 11073-10408	Personal health device communication – Part 10408: Device specialization – Thermometer	First edition	2010-05-01

Table 10A: Related international standardization activities at CEN/TC 251 (continuación)

Document number	Deliverable title	Ver.	Date
ISO/IEEE 11073-10415	Personal health device communication – Part 10415: Device specialization – Weighing scale	First edition	2010-05-01
ISO/IEEE 11073-10417:	Personal health device communication – Part 10417: Device specialization – Glucose meter	First edition	2010-05-01
ISO/IEEE 11073-10471	Personal health device communication – Part 10471: Device specialization – Independant living activity hub	First edition	2010-05-01
ISO/TS 11073-92001	Medical waveform format – Part 92001: Encoding rules	First edition	2007-09-01
ISO 12052	Digital imaging and communication in medicine (DICOM) including workflow and data management	First edition	2006-11-01
ISO/TR 13128	Clinical document registry federation	First edition	2012-07-01
ISO/TR 17119	Health informatics profiling framework	First edition	2005-01-15
ISO 17432	Messages and communication – Web access to DICOM persistent objects	First edition	2004-12-15
ISO 18812	Clinical analyser interfaces to laboratory information systems – Use profiles	First edition	2003-03-15
ISO 20301	Health cards – General characteristics	First edition	2006-11-15
ISO 20302	Health cards – Numbering system and registration procedure for issuer identifiers	First edition	2006-12-01
ISO 21090	Harmonized data types for information interchange	First edition	2011-02-15
ISO/TS 21547	Security requirements for archiving of electronic health records – Principles	First edition	2010-02-15
ISO/TR 21548	Security requirements for archiving of electronic health records – Guidelines	First edition	2010-02-01
ISO 21549-1	Patient healthcard data – Part 1: General structure	First edition	2004-05-15
ISO 21549-2	Patient healthcard data – Part 2: Common objects	First edition	2004-05-15
ISO 21549-3	Patient healthcard data – Part 3: Limited clinical data	First edition	2004-05-15
ISO 21549-4	Patient healthcard data – Part 4: Extended clinical data	First edition	2006-11-15
ISO 21549-5	Patient healthcard data – Part 5: Identification data	First edition	2008-04-15

Table 10A: Related international standardization activities at CEN/TC 251 (continuación)

Document number	Deliverable title	Ver.	Date
ISO 21549-6	Patient healthcard data – Part 6: Administrative data	First edition	2008-04-15
ISO 21549-7	Patient healthcard data – Part 7: Medication data	First edition	2007-06-15
ISO 21549-8	Patient healthcard data – Part 8: Links	First edition	2010-06-15
ISO 21667	Health indicators conceptual framework	First edition	2010-12-01
ISO/TS 22220	Identification of subjects of healthcare	Second edition	2011-12-15
ISO/TS 22224	Electronic reporting of adverse drug reactions	First edition	2009-10-15
ISO/TS 25237	Pseudonymization	First edition	2008-12-01
ISO/TS 25238	Classification of safety risks from health software	First edition	2007-06-15
ISO 25720	Genomic Sequence Variation Markup Language (GSVML)	First edition	2009-08-15
ISO/TS 27790	Document registry framework	First edition	2009-12-01
ISO/TR 27809	Measures for ensuring patient safety of health software	First edition	2007-07-15
ISO/HL7 27953-1	Individual case safety reports (ICSRs) in pharmacovigilance – Part 1: Framework for adverse event reporting	First edition	2011-12-01
ISO/HL7 27953-2	Individual case safety reports (ICSRs) in pharmacovigilance – Part 2: Human pharmaceutical reporting requirements for ICSR	First edition	2011-12-01

5.5. Continua Health Alliance

Continua Health Alliance is a non-profit multi-stakeholder group working on standards to develop end-to-end, plug-and-play connectivity for personal connected health. Continua is dedicated to the development of Design Guidelines and test tools to expedite the deployment of interoperable personal connected health devices and systems aiming to improve health management, clinical outcomes and quality of life.

http://www.continuaalliance.org/

Table 11A: Related international standardization activities at Continua Health Alliance

Document number	Deliverable title	Ver.	Date
-	Design Guidelines 2 Terminology	2013	2012-01-23
-	Design Guidelines 3 System Overview	2013	2012-01-23
-	Design Guidelines 4 Common TAN/PAN/LAN Interface Design Guidelines	2013	2012-01-23
-	Design Guidelines 5 TAN Interface Design Guidelines	2013	2012-01-23
-	Design Guidelines 6 PAN Interface Design Guidelines	2013	2012-01-23
-	Design Guidelines 7 Sensor-LAN Interface Design Guidelines	2013	2012-01-23
-	Design Guidelines 8 WAN Interface Design Guidelines	2013	2012-01-23
-	Design Guidelines 9 HRN Interface Design Guidelines	2013	2012-01-23

5.6. GS1 Healthcare

GS1 is a global non-profit standards association comprised of member institutions from several countries. The focus of GS1's standardization effort is primarily supply and demand chains. GS1 Healthcare develops global standards to "help healthcare companies improve the accuracy, speed, and efficiency of the supply chain and care delivery". GS1 has been involved in supply chain data standardization in a number of industries but more recently expanded into the healthcare area.

http://www.gs1.org/healthcare

Table 12A: Related international standardization activities at GS1 Healthcare

Document number	Deliverable title	Ver.	Date
-	Healthcare GTIN Allocation Rules	7.0.0	2011-04-28
-	GS1 GLN in Healthcare Implementation Guide	1.2	2012-06-01
-	Global Traceability Standard for Healthcare	1.0.0	2009-02
-	AIDC Healthcare Implementation Guide	1.1	2010-12
-	EPC global Pedigree Messaging Standard	1.0	2007-01-05
-	GS1 General Specifications	13.1, Issue 2	2013-06
-	GDSN Trade Item Extension: Healthcare	2.8	2012-02-10

5.7. DICOM Standards Committee

The Digital Imaging and Communications in Medicine (DICOM) standards are standards for exchanging medical images. More specifically, they are about a file format and standards of transmission and other aspects for exchanging medical images and associated information between medical imaging equipment made by different manufacturers. The DICOM standards are widely adopted in equipment and information systems used in hospitals, imaging centers, and in providers' offices to produce, display, store, or exchange medical images.

http://medical.nema.org/.

Table 13A: Related international standardization activities at DICOM Standards Committee

Document number	Deliverable title	Ver.	Date
Part 1	Introduction and Overview	PS 3.1	2011-08-10
Part 2	Conformance	PS 3.1	2011-08-10
Part 3	Information Object Definitions	PS 3.1	2011-08-10
Part 4	Service Class Specifications	PS 3.1	2011-08-10
Part 5	Data Structures and Encoding	PS 3.1	2011-08-10
Part 6	Data Dictionary	PS 3.1	2011-08-10
Part 7	Message Exchange	PS 3.1	2011-08-10
Part 8	Network Communication Support for Message Exchange	PS 3.1	2011-08-10
Part 10	Media Storage and File Format for Media Interchange	PS 3.1	2011-08-10
Part 11	Media Storage Application Profiles	PS 3.1	2011-08-10
Part 12	Media Formats and Physical Media for Media Interchange	PS 3.1	2011-08-10
Part 14	Grayscale Standard Display Function	PS 3.1	2011-08-10
Part 15	Security and System Management Profiles	PS 3.1	2011-08-10
Part 16	Content Mapping Resource	PS 3.1	2011-08-10
Part 17	Explanatory Information	PS 3.1	2011-08-10
Part 18	Web Access to DICOM Persistent Objects (WADO)	PS 3.1	2011-08-10
Part 19	Application Hosting	PS 3.1	2011-08-10
Part 20	Transformation of DICOM to and from HL7 Standards	PS 3.1	2011-08-10

5.8. HL7 Inc.

Health Level Seven (HL7) is a standards development organization which issues international application layer healthcare standards for the electronic exchange and management of health information such as clinical data and administrative information. HL7 refers to the standards organization itself but is also commonly used to refer to specific standards the institution develops. HL7 dates back to the mid-1980s, when it was formed to develop a standard for hospital information systems. Like other standards organizations, HL7 is organized into Work Groups chaired by two or more co-chairs and responsible for defining some area of HL7 standards.

HL7 has many Work Groups, including groups addressing electronic health records, infrastructure and messaging, and imaging integration. The HL7 Clinical Document Architecture (CDA) serves as an XML-based markup standard defining the structure, encoding parameters, and semantics of electronic clinical documents.

http://www.hl7.org/.

Table 14A: Related international standardization activities at HL7

Document number	Deliverable title	Ver.	Date
-	CDA (Clinical Document Architecture)	R2	2005-05

5.9. epSOS

epSOS is European Patients Smart Open Services. This relatively young pilot initiative, funded partially by the European Commission Competitiveness and Innovation Programme, involves 23 European countries and seeks to create an interoperable patient summary system across Europe that is accessible to both Health Professionals as well as patients. The objective is a cross-border eHealth system whereby patient summary records, prescriptions could be accessed electronically regardless of where the patient was being treated in Europe. Europeans traveling as tourists, working in another country, or visiting another country as an exchange student etc. would benefit from this interoperability and electronic health data access.

http://www.epsos.eu/.

Table 15A: Related international standardization activities at epSOS

Document number	Deliverable title	Ver.	Date
D1.4.1	EED SERVICES including use cases for all services	1.0	2012-02-22
D1.4.2	Country status outline and template specification	1.0	2012-02-02
D1.4.3	EED SERVICES including specifications for all services	1.0	2012-09-11
D2.1.1	Legal and Regulatory Requirements at EU level	1.0	2012-02-24
D2.1.2	Standard Contract Terms for MS Document for Engagement of Pilot Sites	1.0	2010-01-31
D3.1.2	Final definition of functional service requirements – ePrescription	1.2	2010-03-26
D3.2.2	Final definition of functional service requirements- Patient Summary	0.6	2012-10-29
D3.3.3	epSOS Interoperability Framework	2.3	2010-01-15
D3.4.2	epSOS Common Components Specification	1.00	2010-07-16
D3.5.2	Semantic Services Definition	0.0.3	2010-02-16
D3.6.2	Final Identity Management Specification Definition	1.2	2010-06-25

Table 15A: Related international standardization activities at epSOS (continuación)

Document number	Deliverable title	Ver.	Date
D3.7.2	Final Security Services Specification Definition (Master Document)	0.4	2010-06-16
D3.8.2	Final National Pilot Set-Up and Deployment Guide	1.1	2010-09-17
D3.9.1	epSOS Pilot System Compontents Specification	1.0	2010-10-01
D3.9.2	Testing Methodology, Test Plan and Tools	1.0	2010-10-15
D3.B.1	epSOS2 Implementation Strategy	0.14	2011-05-20
D3.C.1	Proof of Concept Testing Strategy	1.5	2012-12-21

5.10. IHE

IHE is an initiative by healthcare professionals and industry to improve the way computer systems in healthcare share information. IHE promotes the coordinated use of established standards such as DICOM and HL7 to address specific clinical need in support of optimal patient care. Systems developed in accordance with IHE communicate with one another better, are easier to implement, and enable care providers to use information more effectively.

Optimal patient care requires that care providers and patients be able to create, manage and access comprehensive Electronic Health Records (EHRs) efficiently and securely. Integrating the Healthcare Enterprise (IHE) accelerates the adoption of EHRs by improving the exchange of information among healthcare systems. Its goal is to improve the quality, efficiency and safety of clinical care by making relevant health information conveniently accessible to patients and authorized care providers.

http://www.ihe.net/.

Table 16A: Related international standardization activities at IHE

Document number	Deliverable title	Ver.	Date
-	IT Infrastructure Technical Framework	10.0	2013-09-27

5.11. mHealth Alliance

The mHealth Alliance champions the use of mobile technologies to improve health throughout the world. Working with diverse partners to integrate mHealth into multiple sectors, the Alliance serves as a convener for the mHealth community to overcome common challenges by sharing tools, knowledge, experience, and lessons learned.

To accomplish this, the mHealth Alliance advocates for more and better quality research and evaluation to advance the evidence base; seeks to build capacity among health and industry decision-makers, managers, and practitioners; promotes sustainable business models; and supports systems integration by advocating for standardization and interoperability of mHealth platforms. The mHealth Alliance also hosts Health Unbound (HUB), an online knowledge resource center and interactive network for the mHealth community.

http://www.mhealthalliance.org/.

Table 17A: Related international standardization activities at mHealth Alliance

Document number	Deliverable title	Ver.	Date
-	Using Mobile Technology for Healthier Aging	-	2012-12
-	Leveraging Mobile Technologies to Promote Maternal & Newborn Health	-	2012-12
-	State of Evidence: mHealth & MNCH (One Page Review)	-	2012-12
-	mHealth Education	-	2012-06
-	The Role of mHealth in the Fight Against Tuberculosis	-	2012-05
-	Advancing the dialogue on Mobile Finance and Mobile Health	-	2012-03
-	mHealth: New Horizons for Health through Mobile Technologies	-	2011-06
-	Health Information as Health Care	-	2011-02
-	Amplifying the Impact: Examining the Intersection of Mobile Health and Mobile Finance	-	2011-01
-	Economics of eHealth	-	2010
-	Barriers and Gaps Affecting mHealth in Low and Middle Income Countries	-	2010-05
-	Sizing the Business Potential of mHealth in the Global South: A Practical Approach	-	2009
-	New Technologies in Emergencies and Conflicts	-	2009-12
-	mHealth for Development	-	2008-10
-	Wireless Technology for Social Change: Trends in Mobile Use by NGOs	-	2008-03
-	The State of Standards and Interoperabilty for mHealth	-	2013-03
-	Baseline Evaluation of the mHealth Ecosystem and the Performance of the mHealth Alliance	-	2013-02

5.12. GSMA

The GSMA mHealth programme is a market development project designed to support the proliferation of mHealth solutions that increase patient access to quality care whilst reducing costs. The programme includes the following work streams:

- Technology standards and interoperability;
- Policy and regulation;
- mDiabetes Campaign, which focuses on supporting member mobile operators, clinicians and governments to develop and implement mHealth best practices for diabetes, as a model for other non-communicable diseases;
- GSMA Pan-African mHealth Initiative, which focuses on launching services with member mobile operators and partners to support Millennium Development Goals 4, 5 and 6
- Market research, stakeholder outreach and events;

- Technical assistance to mobile operators and partners to launch mHealth services in priority markets.

http://www.gsma.com/connectedliving/mhealth.

Table 18A: Related international standardization activities at GSMA

Document number	Deliverable title	Ver.	Date
-	A High Level Reference Architecture for Mobile Health report	-	2012-03-29
-	The SIM: The Key to Better Healthcare?	-	2012-03-28
-	GSMA Connected Mobile Health Devices: A Reference Architecture	1.0	2012-01
-	GSMA Understanding Medical Device Regulation: mHealth Policy and Position	-	2012-03-28
-	Evidence for mHealth	-	2012
-	GSMA mHealth Infographic: MDG 6- How mHealth is Supporting the Combat of HIV/AIDS, Malaria and Other Diseases	-	2012
-	Using mHealth to Support Universal Health Access	-	2012
-	Health Hotline Services in Emerging Markets	-	2012-05-30
-	Integrating Healthcare: The Role and Value of Mobile Operators in eHealth	-	2012
-	South Africa Mobile Health Market Opportunity Analysis Full Report	-	2011
-	Key Design Considerations for Service Development	-	2011-09
-	Framework for Technology Assessment for Mobile Health	-	2011-09
-	Mobile Health Services Marketing	-	2011
-	Mobile Health in the Pharmaceutical Industry	-	2011
-	Mobile Health in the Health Insurance Industry	-	2011
-	Policy and Regulation for Innovation in Mobile Health	-	2012-03-29

5.13. ETSI TC M2M

ETSI TC M2M is developing standards for Machine to Machine Communications. The group aims to provide an end-to-end view of Machine to Machine standardization, and will co-operate closely with ETSI's activities on Next Generation Networks, Radio communications, Fiber optics and Powerline as well as close collaboration with 3GPP standards group on mobile communication technologies.

http://www.etsi.org/technologies-clusters/technologies/m2m.

Table 19A: Related international standardization activities at ETSI TC M2M

SDO / No	Deliverable title	Ver.	Date
ETSI TS 102 689:	Machine to Machine Communications (M2M); M2M service requirements	1.2.1	2013-06-21
ETSI TS 102 689:	Machine to Machine Communications (M2M); M2M service requirements	2.1.1	2013-07-01
ETSI TS 102 690:	Machine to Machine Communications (M2M); M2M functional Architecture	1.2.1	2013-06-24
ETSI TR 102 691	Machine to Machine Communications (M2M); Smart Metering Use Cases	1.1.1	2010-05-18
ETSI TR 102 732	Machine to Machine Communications (M2M); eHealth Use Cases	1.1.1	2013-09-03
ETSI TS 102 921	Machine to Machine Communications (M2M); mIa, dIa and mId interfaces	1.2.1	2013-06-20
ETSI TS 102 921	Machine to Machine Communications (M2M); mIa, dIa and mId interfaces	2.0.11	2013-11-12

Annex 6: ITU-WHO National eHealth Strategy Toolkit

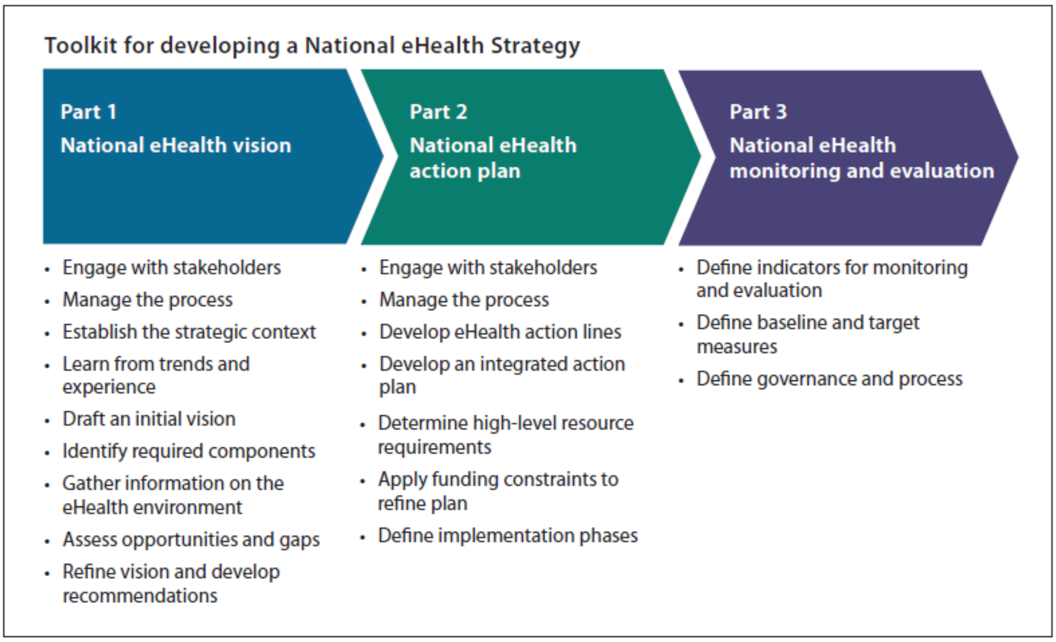
1) The need for national planning

[78]Experience has shown that harnessing ICT for health requires strategic and integrated action at the national level, to make the best use of existing capacity while providing a solid foundation for investment and innovation. Establishing the main directions as well as planning the detailed steps needed are key to achieving longer-term goals such as health sector efficiency, reform or more fundamental transformation. Collaboration between the health and ICT sectors, both public and private, is central to this effort. As the major United Nations agencies for health and telecommunications respectively, the World Health Organization (WHO) and the International Telecommunication Union (ITU) have recognized the importance of collaboration for eHealth in their global resolutions, which encourage countries to develop national eHealth strategies: this Toolkit supports those recommendations.

Ministries of health play a pivotal role, not only in meeting people's needs for care and protecting public health, but in preserving health systems through uncertain times. Ministries of information technology and telecommunications are key to development in all spheres, and can make a vital contribution to the health sector. Common goals and a predictable ICT environment enable coordinated action: building consensus on policy, facilitating better use of shared resources and involvement of the private sector, and investment in skills and infrastructure to improve health outcomes.

2) Purpose and audience

Figure 22A: Toolkit for developing a National eHealth Strategy



The National eHealth Strategy Toolkit is a resource for developing or revitalizing a country's eHealth strategy, from countries just setting out to those that have already invested significantly in eHealth. This includes countries that are seeking to build on promising results from pilot initiatives, establish foundations for scaling up eHealth projects, or update strategies to reflect changing circumstances. The Toolkit can be used by government health sector leaders in ministries, departments and agencies

[78] Hani Eskanar, BDT Focal Point for Question 2/2, ITU/BDT/IEE/CYB.

who will manage the development of an eHealth strategy. Its application requires a team experienced in strategic planning, analysis, communication and stakeholder engagement.

3) Overview of the Toolkit

The Toolkit is designed in three parts, with each part building on the work of the previous one:

Part 1: Develops a national eHealth vision that responds to health and development goals. Explains why a national approach is needed, what the plan will achieve, and how it will be done.

Part 2: Develops an implementation roadmap that reflects country priorities and the eHealth context. Structures activities over the medium-term, while building a foundation for the long term.

Part 3: Establishes a plan to monitor implementation and manage associated risks. Shows the progress and the results of implementation and aids in securing long-term support and investment.

Each section describes the activities required, along with practical advice informed by real-world experience.

Countries can undertake the entire set of activities, or those specific to their context and constraints. How the Toolkit is used, and the end result, will depend on a country's context, priorities and vision.

Toolkit available at: http://www.itu.int/ITU-D/cyb/app/e-health.html and http://www.who.int/ehealth.

Annex 7: Compendium of ready to implement eHealth services

[79]Due to the limited space, **Table 20A** presents brief information about working models of eHealth services already developed and implemented (or in process of implementation). The results are illustrated where possible.

Table 20A: eHealth services ready to be implemented

Country	Service	Results
Albania	eHealth in Albania	The integrated Telemedicine and eHealth Program (ITeHP) is a program that is under implementation by the International Virtual eHealth Foundation. It is planned to create 17 centers of telemedicine. Vodafone Albania, the mobile telecommunication operator, in collaboration with the Ministry of Health is planning to use mobile technology for telemedicine services in remote areas of the country. The foundation of the national telemedicine network is developed.
Algeria	SATeS to Support Telemedicine Development in Algeria	A governmental project sets up a national eHealth system with the support of the Algerian Society of Telemedicine and eHealth (Societe Algerienne de Telemedecine et e-Sante SATeS). The initial focus is on providing distance- training as well as a remote medical expertise to facilitate the work of the general practitioners.
Angola	Telehealth Project Brazil-Angola	Brazil and Angola Cooperation Program PROANGOLA. Initially a videoconference system was installed at the Clínica do Exército in Luanda followed by a practical demonstration of telecardiology system during a Screening for Hypertension and Diabetes involving 1,396 citizens in Huambo. Finally a Telehealth System is been designed by UFMG University Hospital to be implemented and operated, initially in seven municipalities, by the Angolan Army Health System.
Australia	the Implementation of Teledentistry for Rural and Remote Paediatric Patients in Victoria, Australia	Assessment and evaluation of Teledentistry (TD) effectiveness. The results indicated that one of the benefits of TD is that it can increase the capacity of the Dental facilities without adding additional dental chairs. The data also showed that >5 hours per week of additional clinic time would be available to see patients, when TD is implemented, that is important especially when demands for services are increasing and government resources are scarce.

[79] Contribution M. Jordanova [1], L. Androuchko[2], I. Nakajima[3], [1]Space Research Institute, Bulgarian Academy of Sciences, Bulgaria, Vice-Rapporteur Question 2/2, [2]International University in Geneva, Dominic Foundation, Switzerland, Vice-Rapporteur, Question 2/2; [3]Tokai University, School of Medicine, Japan, Rapporteur Q2/2.

Table 20A: eHealth services ready to be implemented (continuación)

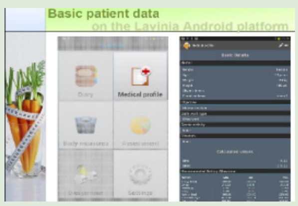
Country	Service	Results
Brazil	Implementing a Telecardiology Strategy in a Geriatric Institution   Tele ECG room	The objective is to implement telecardiology, through tele-ECG and specialized second opinion, for the monitoring and identification of potential cardiovascular diseases in institutionalized elderly people. Results: Implementing a tele-ECG method was quite an easy process, demanding only two training sessions to the staff in the geriatric facility. The latter take advantage of a 24/7 service, allowing to diagnose cardiac events and to have immediate specialized counselling. Moreover, the availability of onsite ECG facilities brings comfort and fast access to a clinical decision as patients do not need to go out for recording ECGs.
Brazil	Using Online Social Networks as a Support Tool to Reduce Psychoactive Drug Abuse	The objective was to create a page called “Getting Free from Drugs” (FLD) [Ficar Livre das Drogas] on an online social network where users of psychoactive drugs can sign up for treatment. A group was created on Facebook. The results from several months activity (July-September 2015) revealed that online social networks may serve as a support tool in tele-education for combating psychoactive drug abuse and can attract patients, since 64% of FLD Facebook page visitors began treatment for drug dependency. The service is helping to reduce the harm and ensure the well-being of the individual.
Cape Verde	Teleconsultation in VPH: Fighting Zoonoses	This activity is part of the project "Fighting stray dogs on Sao Vicente – A pilot project for the Cape Verdean Islands" co-financed by the European Union as a way to contribute to public health. The project provides for the castration, microchipping, deworming and aftercare of 10.000 dogs with the aim to control the canine population of the island, to make them more adoptable by the local families. The result is a decrease of zoonoses (erlichiosis, piodermitis, mycosis, etc.) that affects humans too, and thus improving public health.
Croatia	Tele-Cardiology Program	Telecardiology enables the remote exchange of data between Saipem doctors (45 sites) and specialist cardiologists (TelBios center, Milan) to facilitate management of cardiovascular conditions. The project brought a net optimization of 345000 Euro in 2013 and a million Euros in 3 years.
Hungary	Android Based Dietary Logging Application	Designed to support the life style change of cardio-metabolic patients. 

Table 20A: eHealth services ready to be implemented (continuación)

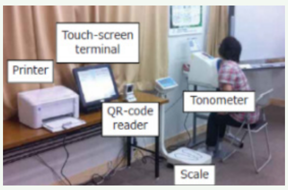
Country	Service	Results
Ghana	PSGH PREVENT Initiative Using M-Health Technologies to Combat Counterfeit Medicines	Once a sub-standard, spurious, falsely-labelled, etc. medicine slips through the supply chain and protective regulatory systems and enters the pharmacy; the harm has already been done. 8 of Ghana's largest pharma companies were the 'launch partners' of PREVENT. Each product participating at the PREVENT bears a unique code that a customer can check with a toll-free SMS hotline.  Scanners RFID Tags
Guinea	Application of ICTs, eHealth and cyber health to combat epidemic diseases (such as Ebola)	Public information system is introduced as one of the measures measures for the management of the Ebola epidemic. The goal is to supply inofrmation to citizens, receive a feedback, controll the chain of infection and eventually eliminate the disease swiftly. The measure take account of i) post-Ebola management and ii) prevention of any other epidemic or pandemic disease through training of staff and modernization of health infrastructures. Although the program is at its childhood, it has a huge potential. Q2/2 will follow it development and will offer support, if and when needed.
Haiti	Implementation of telemedicine in Haiti	Preliminary steps in establishing a telemedicine network connecting the university hospital and regional hospitals. Objective – to facilitate access to telecommunication infrastructures and services in rural and remote areas. Applications of a business models to be set up in order to facilitate access to telecommunication infrastructures and services in rural and remote areas.
India	24/7 Telehealth in the Himalayas 	This innovative Public Private Partnership is providing 24/7, quality, affordable, remote healthcare, to 34,000 citizens of Lahaul and Spiti (14,000 feet) in Himachal Pradesh. Urban teleconsultants were sensitized, for community interaction, while deploying cutting edge technology. An online appointment booking system facilitated patient friendly interaction. The patient CEPHIS was updated in real time. Personal interaction by telemedicine coordinators on both sides ensured that traditional human touch continued. In addition scheduled tele camps (virtual OP's) were organised in 15 different specialities and super specialities. In the first 35 weeks, 1964 teleconsults were provided including 153 emergencies. Tele laboratory services, TeleHealth Education tele cervical cancer screening programmes have been added.
Japan		Public health promotion program for remote health monitoring of elderly. Easy to use, installed in 10 temporary houses, improved blood pressure.

Table 20A: eHealth services ready to be implemented (continuación)

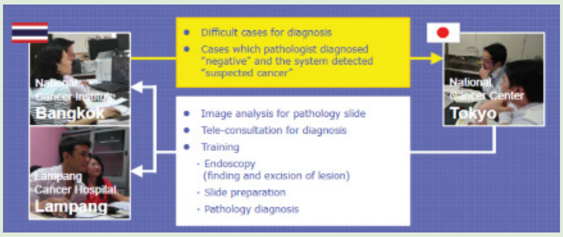
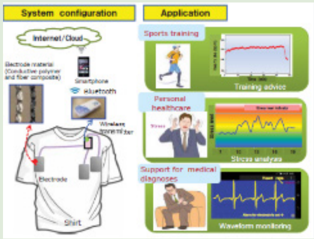
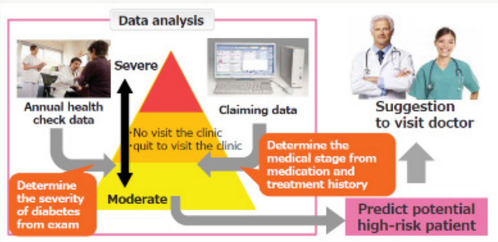
Country	Service	Results
Japan	Tele-pathology diagnostic support for Thailand	
Japan	Hitachi lifestyle changing program – Provides weigh loss method with weight and activities recording tools	
Japan	Tele-health counselling – based on measuring blood pressure, weight, pedo-meter – physical activity; electronic health records, wearable sensors	
Japan	Prevention of diabetes deterioration by data analyses obtained from health data checks	
Kosovo	Remote diabetic foot care	Started in 2009 in cooperation with The Netherlands 
Mali	Impact of Use of ICT Tools at the Gabriel Touré Hospital of Bamako	The OpenClinic software was implemented to improve quality of service and income. In 10 months has improved significantly the revenues of the hospital with a total of 446 054 837 XOF . This equates to a monthly average of 44,605,483 against 35,090,725 XOF before (1 euro = 655.9 XOF).

Table 20A: eHealth services ready to be implemented (continuación)

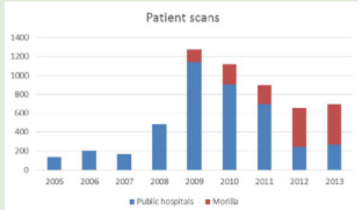
Country	Service	Results
Mali	Telemedicine programme (IKON)	Allowing rural doctors to share images (X-rays and mammograms) and patient information in a secure online environment with radiologists in Bamako for peer consultation. 
Mexico	Midwifery Education with Digital Competences for Mexican and Latin American Indigenous	In 2013 an online training in midwifery started. The course has 7 modules and a total of 100 hour training. 
Mongolia	Inpatients' Medical Records Installed on Mobile Interfaces 	This is a Natural Evolution of the Mongolian Tele-Assistance Medical Network. The purpose of this new step was to adapt the telemedicine system to the hospital environment and to develop appropriate mobile interfaces to provide quality real time information to every level of caretaker, from nurses to hospital management staff, when the patient is hospitalized. Interviews and a workshop were held beforehand to collect the users' requirements and each step of development was proof-tested with them.
Morocco	Challenges and Opportunities for Telemedicine in Morocco	1. Mobile health ultrasound patrol pilot project for diagnosis of pregnancies with risks in the region of Fes, Funded by Qualcomm Wireless Reach™. 2. Mobile health Tuberculosis in the city of Sala
New Zealand	TeleDOT: Directly Observed Therapy for Tuberculosis Using Telehealth	TeleDOT demonstrates the potential for technology to improve treatment delivery to Tuberculosis patients and achieves sustainable cost efficiencies
Nigeria	ICT for Maternal and Child Healthcare	Seven eHealth projects are focusing on maternal and child healthcare in four states in Nigeria.  Example of mobile community based surveillance mCBS.
Pakistan	Telemedicine application for Treatment of Eczema at Remote Beneficiary in Punjab	Since 2009 Mayo Hospital Lahore, organized a remote examination, diagnosis and treatment of various dermatitis. More than 2000 patients were treated and the treatment was provided free of cost and regular follow-ups were maintained.

Table 20A: eHealth services ready to be implemented (continuación)

Country	Service	Results
Peru	e-Mobile for Women in Rural Areas	e-PREVENTION's project aims at reducing maternal mortality and maternal health complications through increased access to appropriate healthcare information via mobile voice and text messages in local dialects by pregnant women in rural communities
Philippines	Implementing an Open Source Health Information System for a City Hospital in a Developing Country	Successful implementation of the whole I.T. infrastructure using Free and Open Source Software (FOSS) for a newly built 50 bed hospital to serve the healthcare needs of the local population of 250 thousand inhabitants –saving money and providing high quality service
Poland	Hearing Screening in Children in East Africa	Hearing screening in children in two African countries and remote diagnosis of hearing problems. Hearing screening was performed in the group of 395 children in Rwanda (195 children, average age 9, 8 yr.) and Tanzania (200 children, average age 7, 9 yr.). All children had videotosopic examination and pure tone audiometry performed on Sensory Examination Platform® with the Sennheiser HDA 200 audiometric headphones.
Switzerland	Mobile application + WoundDesk 	The evolution of the wound surface over the time is good predictive factor for wound healing. The mobile application +WoundDesk allows reliable, repeatable and reproducible measures. The accuracy is especially good for small irregular wounds.
Taiwan (Province of China)	A Mobile Ultrasound E-Learning System	An ultrasound diagnosis e-learning system for medical students and interns to enhance the skills of ultrasound diagnosis was developed. Images and operational procedures of ultrasound, are shown on mobile phones of medical students with less delay. This real time e-learning system provides interns with comprehensive learning scenes, including continuous operational procedures of ultrasound, and corresponding changes of images.
Thailand	Mobile Video Transmission System	IP Network Camera and MiFi are used. Bandwidth requirement ranges from 64-512 kbps; optimum setting (320x240 pixels, 4 fps) ≈ 140 kbps. Applicable in ambulances, dealing with disasters, etc.
Venezuela	SOS Telemedicina Venezuela	Reaching Remote and Disadvantaged Communities at Scale with ICT- equipping and connecting remote centres for primary care with medical specialists from the university to improve their capacity to deal with clinical problems, to provide distance education, to support technology transfer to these regions, to develop skills and to evaluate the benefits of Telemedicine.

More information about most of the listed eHealth services is available at https://www.medetel.eu/?rub=knowledge_resources&page=info. The virtual library is searchable by year, country and topic. Question 2/2 Vice-Rapporteurs M. Jordanova and L. Androuchko are actively contributing to its organization and regular update.

In addition to the above database, the readers are highly recommended to use the ITU-D Study Group Case Study Library http://www.itu.int/en/ITU-D/Study-Groups/Pages/case-study-library.aspx. This new initiative, allows members to submit, store and consult case studies on topics under study by the

Questions in the ITU-D Study Groups. Sharing and learning from each other's experiences is at the core of the mandate of the ITU-D Study Groups and through this new tool the remarkable wealth of information that are case studies will be available to all members. Improved features to search and filter have been put in place to make them more easily accessible.

Figure 23A: ITU-D Study Group Case Study Library

Implementation of eHealth services: Start ups

Table 21A outlines innitiatives that are either at the stage of planning or are star-up or are focusing on important issues not firmly related to Question 2/2 task. Yet, Question 2/2 will follow their development and will support the local staff with all its efforts and expertise. Question 2/2 will also inform its members and all interested parties in the development of these initiatives.

Table 21A: Initiatives that are either at the stage of planning or are star-ups

Service / Title	Summary
Creation of Health Information System (HIS), India	Status – planning. Focused on the necessity to connect/link primary, community and tertiary healthcare centres as well as hospitals into a HIS. Applications of HIS are discussed: a) Health surveillance system (ability to control the spread of diseases and thus to protect inhabitants); b) Health information dissemination through SMS; c) Innovative health monitoring devices to be used by ASHA's; d. Technological interventions in Transport Referral System – pregnant women & children.
Long duration of mobile phone usage and exposure to electromagnetic fields (India)	As on date, there is no conclusive scientific evidence to establish any adverse health effect from exposure to EMF radiation from mobile towers if the radiation is within the prescribed limits. Also, no direct relationship is established as yet between mobile phone use and increased health risks. Further investigations on high users and its possible health implications needs further detailed study/investigation by WHO and ITU. Mobile Handset Minutes of usage data from all service providers captured over 1 month duration from Billing data CDRs covering one month period of say from 1st October 2015 to 31st October 2015 through an administrative circular by ITU-D SG2.
M2M enablement in remote health management (India)	Machine to Machine Communication: Policy and Regulatory Initiatives taken by India on Machine to Machine Communication and Technical Report titled "M2M enablement in remote health management" from India is included in the paper.

Table 21A: Initiatives that are either at the stage of planning or are star-ups (continuación)

Service / Title	Summary
Liaison Statement from ITU-D Study Group 1 Question 22-1/1 to ITU-T JCA-COP on acti-vities related to child online protection	Rising the awareness on cyber security of children, parents. A survey, results from any further development will be distributed to Q2/2 members.

Annex 8: Importance of IMT2020 for developing countries

1) Introduction

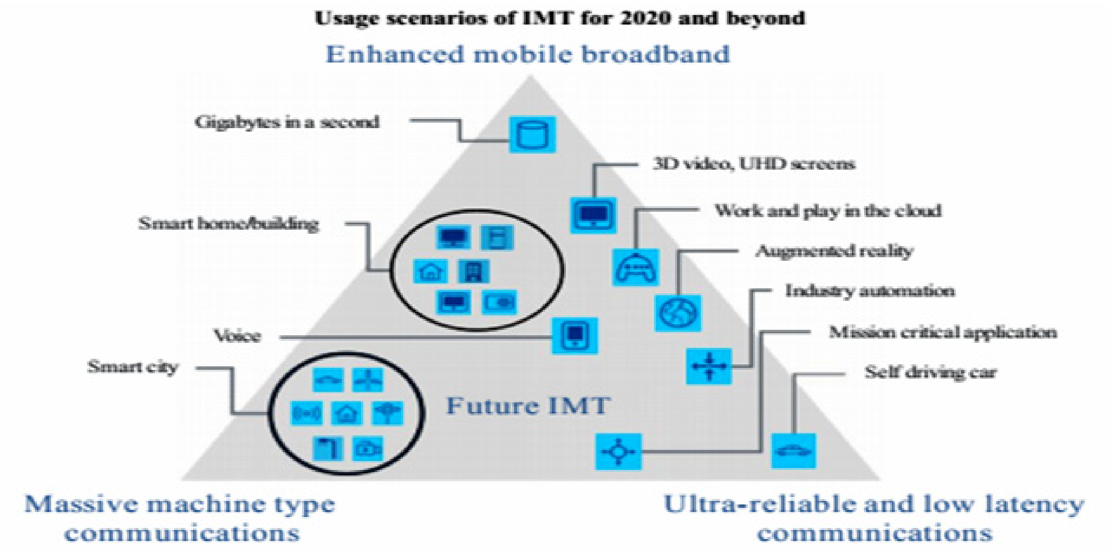
[80]Billions of increasingly smart and connected devices, data-rich personalized services, and cloud applications are driving the need for smarter and more powerful networks. The transition to IMT2020 brings communications and computing together and is a fundamental shift for the industry. The industry is looking to IMT2020 to provide the higher data rates (1-20 Gbps), lower latency and capacity needed to enable the Internet of Things (IoT), new service models and immersive user experiences. This will require immense processing and communications power provided by sophisticated silicon solutions.

What is IMT2020 and how it is different than previous generations of wireless standards? There are myriad answers to these questions, but from a technical perspective, there is one very significant difference. 4G, 3G and 2G were wireless innovations focused largely on improving the speed and efficiency of a connection between point A (a cellular network antenna) and point B (your cellphone or other device). IMT2020 is also about faster and more efficient wireless connectivity, but this time, it is also about computing capability. IMT2020 networks must be smarter, faster and more efficient to support the forthcoming billions of connected devices, data-rich personalized services, and cloud applications that will enable amazing new experiences – from telemedicine to self-driving cars – in our daily lives.

First and second generation wireless networks were focused on voice services, while the focus of 3G and 4G shifted toward data and mobile broadband. While the focus on mobile broadband will continue with IMT2020, support for a much wider set of diverse usage scenarios expected.

The three major usage scenarios include: (1) enhanced mobile broadband; (2) ultra-reliable and low-latency communications; and (3) massive machine-type communications, as shown in **Figure 24A**.

Figure 24A: Usage scenarios of IMT for 2020 and beyond



Source: ITU-R M.2083

2) Computing and communications will converge with IMT2020

IMT2020 will not be about simply increasing speed and capacity, but will also be about intelligence throughout the network to enable devices and the network to communicate more efficiently, transport

[80] Contribution Mr Turhan Muluk, Intel Corporation, United States of America.

data and content more quickly, and share computing resources. Intel plays a very important role to provide this intelligence.

IMT2020 will transform the way we interact with our world—bringing seamless connectivity and computing power to every person and thing across our society and environment.

Intelligent, flexible networks capable of connecting and integrating billions of intelligent devices will bring the IMT2020 future to life. We will witness a fundamental shift from personal communications platforms and their networks to computing platforms that give rise to a rich data economy.

Using fast wireless connections to cloud-based computing and data services, and to other connected devices, IMT2020 will enable a variety of new capabilities such as self-driving automobiles with intelligent traffic routing, smart cities, connected health innovations and more. Meeting this challenge and the capacity and efficiency demands of IMT2020 will require new approaches to network and device design.

3) Industry's role for making IMT2020 a Reality

IMT2020 is more than an evolutionary step forward for the industry. It encompasses many technologies and a much wider ecosystem than has ever been seen in the wireless and telecommunications industries. It's an inflection point, a place in time where we will see and experience everything being smart and connected. But in order for billions of people and machines to be connected, we need smarter, faster and more efficient networks. The ability to connect to each other, to our machines and to the cloud, and to derive actionable insights from the massive amount of data, will bring new experiences to our daily lives and transform businesses. This is why following three key areas are important: industry partnerships, end-to-end IMT2020-related hardware and software development, and supporting 5G standards-setting. We need to create end-to-end solutions from the device to the network to the cloud. We also need prototype solutions through efforts like Intel's IMT2020 mobile trial platform (http://blogs.intel.com/technology/2016/02/paving-the-road-to-5g-mobile-services) and work with standards-setting bodies such as 3GPP and IEEE on defining the IMT2020 standards to ensure a smooth path and entry to a faster and smarter pace of connectivity.

Advanced technology is necessary to power the seamless end-to-end interconnectivity of IMT2020 required to enable a smart and connected world. This includes, unique combination of computing, networking and wireless communications expertise to develop IMT2020 solutions that integrate intelligence across the entire network, from device to data center.

Industry is developing wireless radio access and device processing technologies for PCs, smartphones, tablets, wearables and many future connected devices and sensors. As part of this effort, it is important to provide an open, general purpose platform for network operators and investing in transforming the network in four key areas, including advancing open source and standards, enabling open networking platforms, building out an open ecosystem and accelerating trials and deployments. Intel is working for this objective together with other industry players.

4) Importance of IMT2020 for Developing Countries

IMT2020 will provide new applications and services both for developed and developed countries. Some of the IMT2020 applications will be much more important for the developing countries; such as smart transportation systems, eHealth, education, smart grid, agriculture etc. details can be seen below.

– **Smart Transportation Systems**

According to WHO (http://www.who.int/mediacentre/factsheets/fs358/en), 90 per cent of the world's fatalities on the roads occur in low- and middle-income countries, even though these countries have approximately half of the world's vehicles. IMT2020 will able to provide smart roads and smart vehicles to prevent the accidents. Cars will talk to each other to avoid accidents.

– **Smart Grid**

Access to electricity is a big problem especially in Africa. And IMT2020 will also help to this problem through smart grid.

– **eHealth**

According to Professor Mischa Dohler, Head of the Centre for Telecommunications Research in the Department of Informatics at King's College, London; "IMT2020 has the potential to remove geographic boundaries in the healthcare industry" (http://www.cto.int/media/events/pst-ev/2016/broadband_caribbean_2016/presentations/Chhotalal%20Vinodrai.pdf).

IMT2020 networks open up new avenues for the delivery of healthcare. Instead of bringing patients to a doctor for treatment, IMT2020 networks can connect patients and doctors from across the globe. Connecting more medical devices to IoT will enable doctors to monitor patients without the need for costly in-patient care. Digital imaging can be sent anywhere in the world for analysis, expanding access for patients who live far away from healthcare providers and lowering the cost of getting a second opinion.

There different health applications of IMT2020 (health monitoring, remote surgery, cloud applications etc.). As an example, Remote surgery will reduce the latency to enable remotely assisted surgery. Specialists are not available in many hospitals and could join a local surgeon remotely to perform procedures that require expert skills (https://5g-ppp.eu/wp-content/uploads/2016/02/5G-PPP-White-Paper-on-eHealth-Vertical-Sector.pdf). IMT2020's latency will be around one millisecond -unperceivable to a human and about 50 times faster than 4G. This will be critical, for example, if doctors are to command equipment to carry out surgery on patients located in different cities.

– **Education**

IMT2020 will enter the classroom and bring new ways of learning to students. Augmented Reality, Virtual Reality and Virtual Presence will mean that students will be immersed in a more visual and interactive learning experience where students and teachers may not necessarily be in the same location (http://gsacom.com/paper/5g-verticals-education).

– **Water Management and Agriculture**

IMT2020 will also bring a solution for smart water management and smart agriculture systems in developing countries. Such as sensors with wireless connectivity for crop fields can help optimize growing and minimize use of water and fertilizers through more targeted application.

There are different IMT2020 applications and vertical industries which are also very important for developing countries and details can be seen at "ITU-R WP5D Contribution 163" (healthcare, automotive, public safety, sustainability/environmental, education, smart city, public transportation, wearables, smart homes, smart grid, industrial etc.).

Table 22A: Example use cases and applications of IMT2020

Vertical industry	Example use cases and applications	Partners
Healthcare	Connected Care, Precision Medicine, Imaging and Diagnostics, Genomics/Big Data, Remote Surgery.	Medical Device Manufacturers, Insurers (public or private), Researchers, Ministries of Health.
Automotive	Engine alert and automatic maintenance scheduling, autonomous driving, collision avoidance, V2V.	OEM's, Researchers, Ministries of Transportation.
Public Safety	Enhanced Incident/disaster alert and response, real time traffic management.	Venues (i.e. stadiums, etc.), municipalities and governments, infrastructure vendors, operators, OEMs, etc.
Sustainability/ Environmental	Adaptive air sensors, water management systems, energy.	Researchers, Government Parks services, Agriculture.
Education	wireless real-time interactions, virtual and augmented reality interactions without visual delay.	School Districts, OEM's, Ministries of Education, Regulators, Researchers.
Smart City	Remote monitoring of roads and city infrastructure, smart meters/parking.	Service Providers, Universities, Local Municipalities, Federal Policy Makers, Utilities, etc.
Public Transportation	Flexible/adaptive bus/fleet management, Allowing more efficient routes.	Transit Systems, Operators, Municipal Governments, Researchers, etc.
Wearables	Fully connected devices (no need for a smartphone tether), tagged devices to assist with inventory management.	OEM's.
Smart Homes	Remote security monitoring and controls (i.e. locks, hi res camera surveillance, etc.)	Infrastructure Vendors, Heating and Cooling Systems, Cable Companies, etc.
Smart Grid	Smart 'end to end' power distribution networks with predictive analytics.	See Smart City.
Industrial	Sensors with wireless connectivity for crop fields can help optimize growing and minimize use of water and fertilizers through more targeted application.	Farmers/Agriculture, Ministries of Agriculture, etc.

Annex 9: Women's health wearable for the developing world

1) Attacking a health danger bigger than tuberculosis, malaria and HIV combined

[81]One-third of the humans on earth — more than 2 billion people — need to light a fire in order to cook. That typically means burning wood, charcoal or animal dung indoors. And that means toxic carbon monoxide and particulates inevitably spew into kitchens and inside living spaces.

This little-known but massive global health scourge — officially called household air pollution — contributes to 4.3 million deaths every year, according to estimates by the World Health Organization (http://www.who.int/indoorair/en). That's a staggering number: toxic fumes from cooking fires trigger more deaths than tuberculosis, malaria and HIV combined.

2) Using technology to warn of carbon monoxide (visual and spoken alerts)

GISB (http://www.grameen-intel.com) (Grameen Intel Social Business) a joint collaboration between Intel and the Bangladesh-based nonprofit Grameen Trust develops technologies that address major social issues facing billions of people in the world's developing nations. The vision of GISP is to develop affordable technology solutions to connect and improve people's lives around the world. More information can be seen at http://www.grameen-intel.com.

In small villages across India and Bangladesh, Grameen Intel is piloting a unique health wearable — it's a brightly colored bangle — with a tiny built-in carbon monoxide (CO) sensor (**Figure25A**, **Figure 26A** and **Figure 27A**).

Figure 25A: A woman in India cooking over a fire inside her home

Figure 26A: The carbon monoxide detecting bracelet, field tested in India

[81] Contribution Mr Turhan Muluk, Intel Corporation, United States of America.

Figure 27A: Health wearable bangle developed by Intel

When the sensor detects carbon monoxide at a dangerous level, a red LED flashes. The bangle also produces a voice warning, customized to the wearer's language, to open windows, open doors or get outside.

Women and expectant mothers in the developing world are at an especially high risk from foul indoor air. Women typically spend more time than men indoors or in kitchens. Babies can suffer low birth weight or other serious health complications from the effects of breathing indoor fire cooking fumes.

The bangle is currently called COEL for Carbon Monoxide Exposure Limiter.

Water resistant and made of molded gold, green or red plastic, its internal battery lasts for 10 months. It can be programmed to "speak" about 80 pregnancy wellness messages (in addition to CO alerts), and stores 32 megabytes of data. The device is not connected to the internet in order to maintain a lengthy battery life.

After initial trials in India, the Grameen Intel team in Dhaka will distribute more than 5,000 of the bangles to women in rural Bangladesh.

"It's beautiful… nobody would suspect that you're wearing a piece of high-tech", said Professor Muhammad Yunus. The Bangladeshi Nobel Peace Prize winner pioneered microcredit and microfinance for poor people in the developing world and founded the Grameen Bank.

As part of a commencement address in June at the University of California at San Diego, Yunus told students that he has been "very worried about maternal death in Bangladesh," and that he has been looking to Grameen Intel to find ways for applying technology to tackle the problem.

It's almost certain that in the face of 4 million lives lost annually due to indoor fire fumes, the benefits of the ultra-low-cost COEL wearable will be felt by people all across the developing world.

Annex 10: Composition of the Rapporteur Group for Question 2/2

Table 23A: Composition of the Rapporteur Group for Question 2/2

Name	Organization	Country	Email	Position
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Annex 11: The main activities of Question 2/2 proposed for the next four years

The main activities of Question 2/2 proposed for the next four years (2018-2021) are summarized below.

The Question shall:

– Take further steps to assist in raising the awareness of decision makers, regulators, telecommunication operators, donors and customers about the role of ICTs in improving healthcare delivery in developing countries.

– Encourage collaboration and commitment between the telecommunication sector and the health sector in developing countries, in order to maximize the utilization of limited resources on both sides for implementing eHealth services.

– Continue to disseminate experiences and best practices with the use of ICTs in eHealth in developing countries.

– Collect the information about the condition and social reception include legal and financial issue to manage eHealth in developing countries.

– Encourage cooperation among developing and developed countries in the field of mobile eHealth solutions and services.

– Support BDT's eHealth activities in cooperation with other U.N. agencies, such as WHO, in the field of non-infectious disease, infectious disease include Pandemics, mother and child in particular.

– In conjunction with ITU-T, provide the suitable guidelines on managing medical big data applications and/or AI deep-learning linking with networks, in particular on how to use such new technology.

– Introduce and disseminate ITU technical standards related to eHealth for developing countries.

The expected outputs are:

– Guidelines on how to draft the telecommunication/ICT part of an eHealth master plan.

– Guidelines with regard to the use of mobile telecommunications for eHealth solutions in developing countries.

– Collection and summary of the requirements and effectiveness of telecommunication infrastructure for the successful implementation of eHealth applications, taking into account the environment of developing countries.

– Dissemination of the technical standard related to the introduction of eHealth services in developing countries.

– Collaboration with ITU-T in order to accelerate the elaboration of technical standards for eHealth applications.

– Collaboration with the relevant BDT programme, if so requested, to support implementation of the telecommunication/ICT component of eHealth projects in developing countries, including advice on best practices on how to train developing countries in the use of the telecommunication/ICT component of eHealth projects.

– Sharing and dissemination of best practices on eHealth applications in developing countries using the ITU/BDT website, in close collaboration with the relevant BDT programme.

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