A Next Generation Cloud-based Health Care Platform – Towards Trust and an Infinite Possibilities

- Outline some of the issues in current systems.
- Define some of the key principles for future systems.
- Define an overall architecture for Cloud infrastructures in health care.
- Provide an example of the Governance/Security Policy.
- Provide an overview of the e-Health Platform.
- Example of a clinical service.

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Nurse Kate

- Healthcare Professional
- Invited user

Deirdre Drake

- Care Subject
- 82 years old
- House bound
- COPD (Chronic Obstructive Pulmonary Disease)

Sam Drake

- Site Creator
- Primary Carer

Prof Bill Buchanan

- Invited user

Nigel Drake

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PatientCloud:
Funded by EPSRC and TSB, and is a collaboration between C&W, Imperial College, Edinburgh Napier University, Kodit, GS1 and Ciperlab
Societal

- Lack of integration between assisted living, primary and secondary care
- Aging population
- Lack of information sharing across the public sector
- Strong demand to consume health care data
- Lack of integration with careers and trusted people

Technical

- Patient records are often static
- Different systems/formatting used for data
- Limited/difficult access methods ... typically Government infrastructures ... lack of trust
- Poor access control to data
- Data often aggregated and context is often lost

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Manager might ask: What’s the difference in length-of-stay between different age categories for June?

Consultant might ask: How does the Early Warning Score affect the length-of-stay?

Family friend might ask: In which ward is Deirdre?
Private Cloud – owned and run by an organisation

Community Cloud – shared by several organisation, with a common policy, compliance, mission, etc

Public Cloud – owned by an organisation selling a cloud infrastructure

Hybrid Cloud – two or more clouds
On-demand self-service. Consumers get server CPU, memory, bandwidth and storage resources whenever required.

Location independent resource pooling. Multiple customers use shared resources within the provider, without actually knowing where the exact location of these are.

Rapid elasticity. Consumers can easily scale-up and scale-down, whenever required.

Pay per use. All access to resources is monitored, and paid for either by advertising or usage. Payment methods: per user created, per hour usage (service), etc.
- Often localised
- Different systems/formats
- Poor access control
- Poor identity verification
- Cannot be aggregated
- Etc.

Data Storage (within the Cloud in buckets)

- Dynamic Patient Records
- Security Policy (including interdomain rights)

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[permit] [Medical Staff] [C | R] [Temp | SpO2 | HR | BP | RR | Pain] of [Patient26078] with [EWS] from [Chelsea & Westminster Hospital] for [*] records in [P2010-12-30T00:00:00] using [Data Protection Act]


A similar syntax is also applied to the request messages:

[Requester] [C | R | U | D] [Attribute] of [Object] with [Context] from [Owner] within [Start] to [End]

- { [permit | deny] This is part of the rule syntax which indicates the action of the rule. This defines whether a request meeting the rule criteria will be permitted or denied access.
- { [Requester] This identifies a request sender's role, e.g. GP, or pseudonym, e.g. 10420, or a combination of the two, e.g. GP10420.
- { [C | R | U | D] This defines detailed permissions for a requester to create, read, update and delete certain information.
- { [Attribute] This is a unit of information describing an object. An attribute may be a primitive data type, e.g. the pseudonym of an object as a string, or a complex data type, e.g. a person's ECG record for 45 seconds.
- { [Object] This is part of DACAR's system model. It refers to any entities in a healthcare scenario, about which information is held.
- { [Context] This identifies the reason why the information is being shared. The context governs the level of access and permissions associated with information exchange, and hence defines the priority accorded to information requests.
- { [Owner] This species a role with sufficient privileges to manage all aspects of an information source. The owner has the authority to allow or deny access to an information element, as required by legislation and defines responsibilities.
- { [N] records in [Time Window] This defines the number of records permitted over a period of time, where N can be any positive integer.
- { [Compliance] This refers to legislative requirements that support the exchange of information, such as the Data Protection Act, the Human Rights Act, the Freedom of Information Act and so on.
- { [Start] and [End] These identify the start and end of the date/time period over which information shown.
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Translation Gateway (Security Policy/ID Mapping)

Data Storage (within the Cloud in buckets)

Service A (EWS)

Domain B

Patient Cloud

SPoC

CW.CONSULTANT

CW.NURSE

Role-based security policies

[permit] [C&W.NURSE] [C | R] [Temp | SpO2 | HR | BP | RR | Pain] of [Patient26078] with [EWS] from [Chelsea & Westminster Hospital] for [*] records in [P2010-12-30T00:00:00] using [Data Protection Act]

[permit | deny] [Requester] [C | R | U | D] [Attribute] of [Object] with [Context] from [Owner] for [N] records in [Time Window] using [Compliance]
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