



Standardising humanitarian data for a better response: The Humanitarian eXchange Language

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CASE STUDY



The **Humanitarian Innovation Fund (HIF)** supports organisations and individuals to identify, nurture, and share innovative and scalable solutions to the challenges facing effective humanitarian assistance. The HIF is a programme managed by ELRHA. www.humanitarianinnovation.org

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Front cover photo: Chautara, Sindhupalchok (20 May 2015): Aid workers continue to work into the night as the temperature cools down from a daytime high of 38 degrees Celsius. The Emergency Telecommunications Cluster offers a reliable, shared internet and vital communication services to the response community, allowing them to respond around the clock. Credit: OCHA

Back cover photo: April 2015, North Kivu, DRC: The beneficiaries walk over to the IOM personnel to check their fingerprints. Once the fingerprints are recognized, they will receive the food stamp card. Credit: OCHA/Nadia Berger



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HIF-ALNAP case studies on successful innovation

This study is one in a series of 15 case studies, undertaken by ALNAP in partnership with ELRHA's Humanitarian Innovation Fund (HIF), exploring the dynamics of successful innovation processes in humanitarian action. They examine what good practice in humanitarian innovation looks like, what approaches and tools organisations have used to innovate in the humanitarian system, what the barriers to innovation are for individual organisations, and how they can be overcome.

About the case studies

Case study subjects are selected from a pool of recipients of grants from the HIF. The HIF awards grants of between £20,000 and £150,000 to support the recognition, invention, development, implementation and diffusion stages of the innovation process. The HIF selects grantees on the basis of a variety of criteria designed to achieve a robust representation of the range of activity in humanitarian innovation.

The case study subjects are chosen to reflect innovation practice in the humanitarian system. They cover information communication technology (ICT) innovations and non-ICT innovations, and they offer a balance between innovations that have reached a diffusion stage and those that have not. They also reflect the wide geographic range of the areas where innovations are being trialled and implemented. (For more information on the methodology and criteria used to select case study subjects, see the forthcoming 'Synthesis report' for the case study series).

About HIF-ALNAP research on successful innovation in humanitarian action

These case studies are part of a broader research partnership between ALNAP and Enhancing Learning and Research for Humanitarian Assistance (ELRHA) that seeks to define and understand what successful innovation looks like in the humanitarian sector. The ultimate aim of this research is to improve humanitarian actors' understanding of how to undertake and support innovative programming in practice. This research partnership builds on ALNAP's long-running work on innovation in the humanitarian system, beginning with its 2009 study, *Innovations in International Humanitarian Action*, and draws on the experience of the HIF grantees, which offer a realistic picture of how innovation actually happens in humanitarian settings.

Innovation is a relatively new area of work in humanitarian action, yet it is one that has seen exponential growth in terms of research, funding and activity at both policy and programming levels. While the knowledge base around innovation in the humanitarian sector is increasing, there remain a number of key questions for humanitarian organisations that may be seeking to initiate or expand their innovation capacity. The HIF-ALNAP research has focused on three of these:

Primary research questions

What does successful humanitarian innovation look like?

What are the practices organisations can adopt to innovate successfully for humanitarian purposes?

Secondary research question

What are the barriers to innovation in the sector and how can they be mitigated?

The case studies will be used to produce a synthesis document that addresses these three questions. The outputs of this research are aimed at humanitarian organisations interested in using innovative practices to improve their performance, as well as organisations outside the humanitarian sector, such as academic institutions or private companies, seeking to engage in innovation in humanitarian action.

1. About this case study

Organisation	United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA)
Partners	HIF, the ICT4Peace Foundation, IOM, OCHA, Save the Children, UNHCR, UNICEF, USAID, WFP and the World Bank
Project	Humanitarian eXchange Language (HXL)

Grant	Start date	Grant period	Total HIF budget	Location
Implementation	1 December 2013	12 months	£143,166	New York, Geneva

HXL (pronounced 'hek-sil') is a product and process innovation that aims to improve coordination across agencies responding in a humanitarian crisis, through a more efficient and effective system of collecting and sharing data. Led by the UN Office for the Coordination and Humanitarian Affairs (OCHA) with the support of a number of partners, HXL is a data standard¹ and bundle of software tools branded as 'a simple standard for messy data'. It aims to facilitate the exchange and merging of data across agencies to create a more complete and accurate operational picture of a crisis.

HXL itself has gone through a number of technical iterations. Two ideas were tested during the HIF grant period: Linked Open Data and Hashtags. Both have the same goal in mind (harmonisation of data to enable more comprehensive analysis) but focus on different degrees of change. With the first idea, Linked Open Data, the HXL team attempted to move the humanitarian community past its reliance on Excel spreadsheets to a system where the links between data are innate in how the data are presented. Linked Open Data is an extension of the worldwide web, whereby users are provided with a standardised way of expressing data so relationships between data points are clear. This allows computers to consistently report the meaning of hyperlinked data, which in turn facilitates cooperation. During the early implementation of Linked Open Data, the HXL team encountered challenges gaining wider uptake and took a step back to reassess the core problem.

This led to the development of a second idea: Hashtags. Hashtags require a smaller-scale change, focusing on creating commonality across spreadsheets without asking users to change their headers or titles or needing to agree on a common terminology. The advantage of the Hashtag solution is that it achieves harmonisation without requiring a significant change in practice among information management officers (IMOs). IMOs simply add a row of hashtags, very similar to those used in social media, to their datasets. In this way, software could then be developed to address the next level of data-related problems (e.g. cleaning data, merging data, facilitating analysis of data).

Overall, the innovation process has been successful in creating enhanced learning and evidence. Given the extremely iterative nature of the process and the fact that two ideas were brought through to the implementation stage, the diffusion stage had not fully commenced at the time of writing.

This case study was conducted on the basis of a review of key documents and interviews with 10 informants, including project partners and other stakeholders, over a period of three weeks in October and November 2015.



Photo: OCHA Field Coordination Officer Jayne Mbakaya chairs a coordination meeting at Agok in Warrap state, southern Sudan on 23 June 2011. Thousands of residents of Abyei town have settled in Agok after being displaced by armed clashes on 20 May. Credit: OCHA / Dan DeLorenzo.

2. The Problem

On 12 January 2010, a 7.0 magnitude earthquake shook the small island nation of Haiti. The response was immediate, with hundreds of local and international organisations launching operations. OCHA is responsible for coordinating humanitarian response activities, including the collation and sharing of information on the response. In the case of Haiti, this meant compiling response data from an estimated 600 agencies.

To be useful, data must be compiled, reconciled, validated, analysed and disseminated within hours or days². Yet, in order to achieve this, IMO for OCHA and partner organisations had to manually compile datasets to fit specific requests.

This challenge is not unique to the Haiti Earthquake; it has been acknowledged over and over by field staff and IMOs. At the level of the humanitarian sector, using data to compile an accurate common operational picture of a crisis is very difficult, and using them in a timely manner is close to impossible. ‘It’s sand in the gears of humanitarian operations [...] I think it’s an unseen and large inefficiency in humanitarian operations’³.

Most agency field staff still rely on simple Excel spreadsheets to compile data. Moreover, each agency has its own mandate, objectives, projects and programmes, operational terminology and working language, leading to very diverse forms, which are difficult to exchange and merge between agencies. Standardisation efforts are challenging in the humanitarian sector, as defining a common vocabulary can easily become very political⁴. Issues can arise at all levels, on everything from country names⁵ to how to refer to the affected population⁶.

‘Collecting and integrating data to optimise the response efforts in such a heterogeneous [...] environment is challenging [...] Widely varying transliterations of place names and differences in units of measurement for humanitarian interventions add further difficulties to the task of compiling a common operational picture’⁷.

OCHA and other organisations have tried to address this problem through multiple data collection and management systems, such as the Common Request Format, the Multi-Cluster/Sector Initial Rapid Assessment framework, the Single Reporting Format and Common Operational Datasets. However, for the most part, owing to limited uptake, these initiatives have enabled the problem to persist by creating more silos. Therefore, to merge data, ‘copy and pasting’ must often be done by staff who are very familiar with the data and operational context⁸.

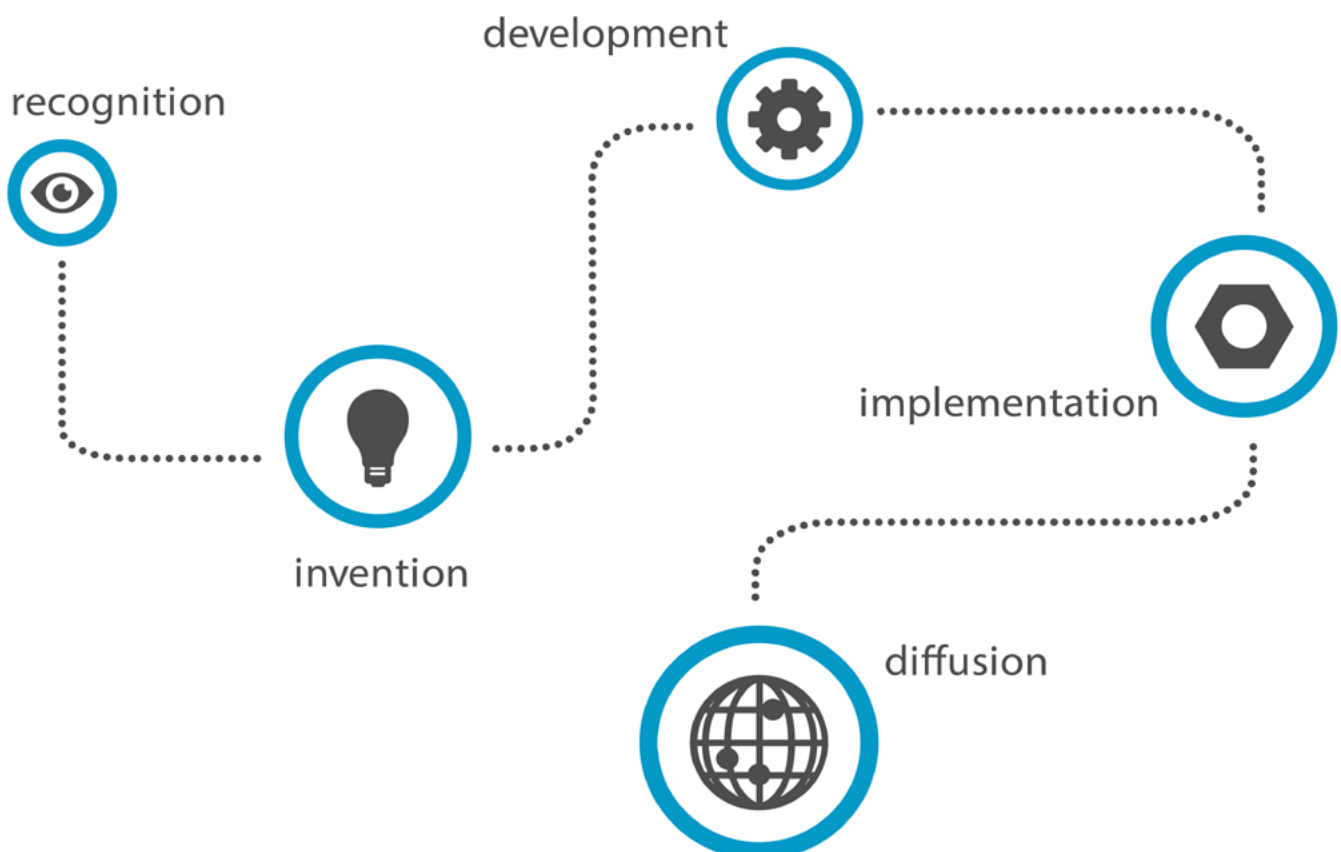
3. The innovation process

The stages through which successful innovations progress are often unpredictable and dynamic in nature, but there are often similarities. It is therefore useful to understand this innovation process when trying to capture why particular innovations succeed or fail.

There are various models to describe the innovation process, but HIF uses a model based on five stages:

- **Recognition** of a specific problem, challenge or opportunity to be seized
- **Invention** of a creative solution or novel idea that addresses a problem or seizes an opportunity
- **Development** of the innovation by creating practical, actionable plans and guidelines
- **Implementation** of the innovation to produce tangible examples of change, testing it to see how it compares with existing solutions
- **Diffusion** of successful innovations – taking them to scale and promoting their wider adoption

These five steps provide a useful archetype for the innovation process and are used in the HIF case study methodology. But they come with the caveat that innovation is complex and non-linear, and that identifying deviations from this model is just as important as (and possibly more so than) confirming the applicability of the model itself. The HIF-ALNAP case studies will seek to map in greater detail the chronology of these stages and how they overlap and interact for each HIF grantee.



3.1 Recognition



The initial problem HXL sought to address was an inability to quickly compile a common operational picture in a humanitarian crisis. IMO's throughout the humanitarian sector had recognised this issue across several crises over a period of at least five years, including in responses in Haiti, Pakistan, the Philippines, and West Africa.

However, a mixture of elements seems to have hindered recognition of the problem by a wider audience. Compiling a common operational picture is a problem that involves at least three types of actor: IMO's, individuals responsible for data entry and reporting, and members of senior leadership. In this case, problem recognition had occurred largely at an individual level, with IMO's only noticing facets of the broader problem in their own work. It was principally IMO's who saw the immediate benefits of finding a solution yet they lacked the resources to try to develop a solution to address the whole of this problem.

In contrast, those in leadership positions possess the necessary resources and can create the right incentives, but did not have a clear understanding that there was a problem. During the early recognition phase, many IMO's lacked the ability to help those in leadership positions understand the inefficiencies of spreadsheet production. IMO's also lacked a means of demonstrating potential cost benefits of better data coordination. The inefficiencies, both in cost and time, of spreadsheet creation were not resonating with leadership. As one interviewee stated, management are more concerned with the end product – a presentable, compiled spreadsheet – than the time and effort required to get it to this point. Some steps, such as 'beautifying' spreadsheets, offer visible benefits; others, such as improving data collection and merging, are much harder to demonstrate. One issue might have been that IMO's were going to management with the small problem (e.g. 'Compiling and merging data is time-consuming') rather than the bigger issue (e.g. 'We are not able to provide a quick and accurate big picture of a crisis because data across organisations are not comparable').

Furthermore, IMO's lacked valuable evidence that could support their pitch to senior leadership, in particular the cost of the lack of data standardisation. This cost was (and to a degree still is) not well understood. As the innovation team indicated, the problem recognition stage would have benefited from a study of these costs so that a clearer case could have been made. Instead, for HXL, it appears as though the mounting interest in the issue of data within the humanitarian sector in 2011-2012 created the broader push to examine data collection and standardisation issues⁹.

Even with this rising awareness, the transition from recognition to invention required a tipping point of someone who felt responsibility for the whole of the problem and had the necessary time and capacity to work on a solution. Such an 'owner' was found in 2011, when, after years working as an IMO in the field, CJ Hendrix moved to OCHA and was provided the time to work on larger information management challenges.

In doing so, Hendrix determined that,

‘[The sector] needed some kind of data exchange to allow for data to be moved around without requiring a new reporting burden. That was always the problem. There were all these different attempts to come up with, sort of, mother of all systems, that everybody would contribute to, so that we could have this common operating picture, and share data, but it just ended up being an additional burden, which no one has time for, so it would fail. So I said, “Let’s find a way to just get data out of the existing systems easily, and into some kind of common format’.¹⁰

This was the impetus for the Linked Open Data solution.

However, as explained further below in relation to the development stage, this initial solution stalled. The technical competence of intended users, IMOs and data entry personnel was mismatched with those expected for the Linked Open Data solution¹¹. In addition, Linked Open Data did not resolve the core humanitarian data problem: the heterogeneity of humanitarian terms and definitions¹². This issue proved to be fundamental and needed to be resolved before issues around extracting, merging, cleaning and analysing data could be tackled.

This constituted a second round, or phase, of problem recognition. As David Megginson, who was to become the standard lead, the person who leads the HXL standard, explained, this second round of problem recognition involved a more realistic, incremental approach to tackling the core problem of data compilation in a crisis:

‘So, instead of saying, “How can we create a brave new world where everything’s automatic with a push button?”, we said, “Well how can we make the IMO’s jobs, even 25% easier?”[...] So we didn’t set out to change the world, we just set out to make it slightly more efficient. That was our big story, and that was our big shift on HXL, when we made that decision’.¹³

3.2 Invention



At the beginning of the invention stage for Linked Open Data, Hendrix discussed the problem of data coordination with colleagues and they came up with the idea for an exchange language, as opposed to a new format¹⁴. The idea could have easily stayed at this stage. As David Megginson stated,

‘[Brainstorming is] an enormously fun time, because it’s a lot of talking, you get a lot of smart people together [...] It’s also a dangerous time, because you’re not running any risk of failure, so you have to get out of that phase, and I think that it’s easy to get into and hard to exit.’¹⁵

What helped push the idea forward was that Hendrix and his colleague, Andrej Verity, conceptualised the idea and structured it so it could be presented to others.

In November 2011, at a discussion session at Crisis Mappers' Conference, Hendrix presented the idea. The session was attended by practitioners and academics. Carsten Kessler, an academic, suggested a Semantic Web¹⁶ approach be used, an idea that other session participants seemed to support¹⁷. Hendrix brought the idea back to OCHA and was able to secure a small budget line to allow Kessler to elaborate the concept into a prototype.

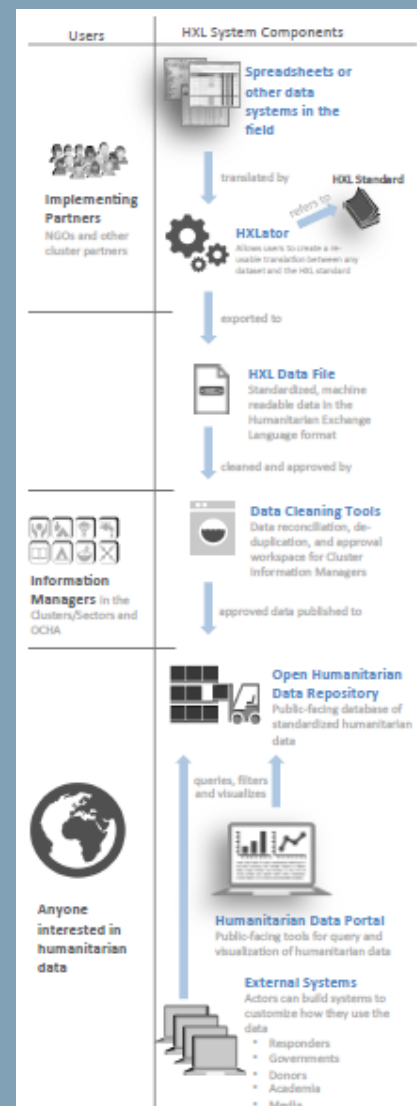
Following the concept of Linked Open Data, OCHA aimed to develop a Semantic Web technology using the Resource Description Framework (RDF)¹⁸ as a data model. In a nutshell, this is a system like the web but it can understand how pieces of information relate to each other and why things are linked because clear standards for how data are to be presented are followed. All this with the added element that data would be open access.

'The goal of HXL is to automate many humanitarian data processes, saving valuable time for staff in the field and improving the information flow for decision-makers who have to allocate resources for response activities.'¹⁹

For this to work in practice, while respecting the realities of the humanitarian sector and humanitarian work, OCHA decided four elements needed to be put in place:

- HXL Standard: the uniform way of talking about things;
- HXLator: a translation tool for field staff. Field staff upload their spreadsheets and are walked through the process of coding their data (HXLating their data)²⁰. This removed the need for training but may be perceived to increase reporting requirements. To overcome this, users could 'reuse an existing translator: once the translation process is complete, HXLator stores the translator the user has created, so that it can be re-applied to a new (or updated) spreadsheet of the same structure'²¹.
- Middleware and HXL database: a system for extracting non-HXLated data directly from humanitarian agency databases, translating it into HXL data and loading it all into one common Triplestore database. This is a database that allows the storage and retrieval of data structured so that the system understands the relationship between data²².

Fig. 1: High level review of the HXL system components



- Dashboards and other user tools: data cleaning tools, data visualisation tools and summaries developed²³ to provide a ‘benefit’ or ‘carrot’ to users²⁴.

In 2012, sample UNHCR data were used to test this solution. Although this ‘end-to-end proof-of-concept’ proved successful²⁵, the Linked Open Data solution started to stall. HXL ‘was stuck in a technical realm’²⁶. It is at this point that there was a change in management. Sarah Telford, the new programme manager, worked to improve HXL’s visibility within OCHA and identified the HIF as a potential source of funding to support this.

Soon after the start of the HIF grant, OCHA drafted ‘Developing Humanitarian Data Standards: An Introduction and Plan for 2014’²⁷. This document laid out clear roles and responsibilities for the Working Group, Technical Team and Programme Team. The plan also mapped what work had been done so far, identified the key decision points for the Linked Open Data solution and set specific milestones for the whole of the project by team.

The Working Group was established in late January 2014. Sarah Telford, David Megginson and CJ Hendrix drafted a long list of potential members. This was narrowed using a loose set of criteria, such as wide representation (e.g. from donors through to NGOs); mid-level staff who worked on the line between policy and management; and technology²⁸. Initially, the group continued forward with the idea of a Linked Open Data model. However, as explained below in the development stage, they quickly decided to take a step back.

This was the true pivot in this innovation process. In returning to the problem, the Working Group recognised that a number of smaller problems underpinned the inability to carry out a timely compilation of data in a crisis. Rather than propose a complete solution for this higher-level problem, that may be perceived as a completely new system and potentially an additional reporting burden by those who did not have the same view of the problem, the Working Group focused on resolving the smaller issues so as to build up support step by step. A more user-centred design approach was adopted at this time (see Table 1). Although personas, or ideal end-users, were not explicitly defined, all Working Group members had a thorough understanding of the problem, the humanitarian context and the potential end-users.

Table 1: Sample from HXL hashtag dictionary

Cluster	District	People affected	People reached
#sector	#adm1	#affected	#reached
WASH	Coast	9000	9000
WASH	Mountains	1000	200
Education	Coast	15500	800

Source: OCHA (2014) 30 second HXL Tutorial

To start, the Working Group and Technical Team chose to focus on the lack of a shared language for data and identified Hashtags as a more user-friendly solution that would help address this. Borrowed from social media²⁹, the hashtags would be used as standard codes. Through the HXLation process, IMOs would not be required to adapt their spreadsheets. Instead, they would only add a row to their spreadsheet, between the headers and data, and insert in each column the correct hashtag, matching up headings to the HXL dictionary of hashtags³⁰ (see the yellow row in Table 1).

This ‘beautifully’ simple solution³¹ was easy to explain and understand. As OCHA explains,

‘This simpler, more loose model will not ensure 100% data interoperability, but has a much higher chance of adoption’³².

Table 2: HXL Hashtag design considerations

Design considerations	HXL Solution
Most humanitarian organisations use spreadsheets for data-sharing and are swamped by reporting demands.	HXL works with existing spreadsheets by simply asking that a row be added ³³ .
Staff may not have time for or access to training.	No additional skills are required from teams: simply add an additional row of HXL hashtags to the data you're already exporting, and then others will be able to analyse and integrate them more easily.
Each agency has different working languages and terminology; getting them to agree on a standard vocabulary would be very challenging.	Column headers do not need to be changed. 'Now, whether the text at the top of the column reads "Number affected" or software for cleaning, validating, analysing, mapping or visualising the data can automatically recognise the hashtag #affected and use the figures below accordingly' ³⁴ .
Every crisis and activity has different data requirements.	HXL offers a dictionary of hashtags that can be mixed and matched to suit particular reporting needs.
Sometimes organisations collect types of information that no one else has.	Columns can be left untagged, or you can invent your own hashtags.
In large scale crises, hundreds of organisations may respond and need to coordinate. Yet, Each of these organisations uses a different system to handle the data about their activities, ranging from full-fledged enterprise information management systems to relational databases to simple spreadsheets ³⁵ .	Hashtags are so simple they can be added to any system.
Some spreadsheets are very detailed, showing many levels of granular detail.	Attributes work like hashtags, but they start with +, adding detail to the 'higher level tag' (e.g. #org+funder+code). Software processing HXL data may ignore any attributes it does not recognise and simply process the core hashtag.
It is impossible to anticipate all the types of data you may have from a crisis.	The Standard has created recommended formats for new tags to avoid confusion across datasets and with future tags.

3.3 Development



The Working Group and Technical Team carried both the Linked Open Data and the Hashtag solutions through the development stage. Yet, even prior to the establishment of the Working Group, cracks had started to show in the Linked Open Data solution. Two main shifts in understanding occurred within the OCHA Data Team at this stage: an acceptance of the level of change possible and an adjustment in tone in terms of how change would be achieved.

From the outset, the OCHA Data Team acknowledged that this solution might be too complicated. As stated in the HIF Grant Application,

‘Even if the community decides RDF is too difficult, we can move to an easier standard (CSVs or XML) and still rely on most of the same technical infrastructure and work processes... As we explore the take up of HXL as RDF over the course of the grant period, we may need to readjust our ambition. This would mean not abandoning HXL as RDF but starting with HXL as CSVs, then as XML, and then as RDF overtime’³⁶.

This statement also captures the team’s attitude towards adoption: it may be necessary to concede to breaking up HXL into smaller pieces to make sure end-users understand and buy into each element. The OCHA Data Team envisioned a stepped process, but clearly overestimated what level of ambition was appropriate for each step. In a way, Linked Open Data was the ideal model and the end goal, and the Hashtag model, a first step in the right direction.

In the Grant Application, OCHA goes on to say:

‘[We] are attempting to move from a community that mostly uses Excel spreadsheets or shares data by embedding it on websites to a linked open data ecosystem. Essentially this is going from a one star system to a five star system in one leap’³⁷.

This last statement also highlights the change in tone that occurred during the evolution of the solution. Planning documents state that ‘OCHA and humanitarian partners need to agree on data standards’³⁸ and ‘[OCHA] will lead a community standards effort to define a Humanitarian Exchange Language’³⁹. Yet, at the time of writing, the HXL Hashtag approach was explained as follows:

‘Unlike most data standards, HXL is cooperative rather than competitive. Competitive standard typically considers the way you currently work to be a problem, and starts with a set of demands [...] For HXL, we reversed the process and started by asking how you’re working right now, then thought about how we can build a cooperative standard to enhance it’⁴⁰.

Although it is still too early to assess the overall success of this innovation (see section on success below), this more cooperative approach to solution design and OCHA’s adoption of a facilitation role seems to have had considerable positive effects on the quality of the solution and how members of the Working Group received it.

This change seems to have occurred soon after the Working Group was established. Alternatives

to the Linked Open Data approach were discussed at one of the group's earliest meetings, and the decision was quickly made to switch to a tabular model (like Excel spreadsheets). The Technical Team was likely finally convinced to revisit its solution when even Working Group members with high technical competence found it difficult to understand and explain the Linked Open Data solution⁴¹. Other members admitted to being hesitant about testing the solution themselves.

The Hashtag solution came some time later through incremental advancements. This was not a planned process, 'but a series of happy accidents of the kind that happen when you bring motivated people together'⁴². Table 3 captures some of the key steps in the refinement⁴³ of the Hashtag solution. The Working Group would brainstorm approaches and refinements on their calls and the Technical Team would attempt to develop concrete samples of these (e.g. sample datasets or software), which would then be reviewed by the Working Group and discussed on their next call.

Table 3: Steps in the refinement of the HXL Hashtag solution

Refinement steps	How this came about
Shift to tabular model	The Working Group (WG) agreed to use spreadsheets instead of linked-data graphs.
Addition of codes	The WG decided it would make the most sense to add a code at the top every column in a spreadsheet.
Location of codes	The WG discussed whether to put the HXL codes in their own row or into the text headers themselves. David Megginson proposed using the same row, with headers like '01002 Organisation name', where the number would be a unique code and the text could be customised. The WG decided to have a separate row for the codes.
Nature of codes	The WG then discussed whether the codes should be numbers (e.g. 01002) or text (e.g. 'org'). The standard lead initially pushed for numbers, as these would be easier to manage and not language-specific, but the rest of the WG preferred text.
Addition of #	<p>Once the WG had decided on text, Megginson half-jokingly suggested putting hash marks in front, so the codes would look like Twitter hashtags (e.g. #org). The WG enthusiastically accepted the suggestion, seeing how they could take advantage of a concept people already understood.</p> <p>عدد الأشخاص المتضررين</p> <p>Megginson canvassed the hashtag idea in multiple one-on-one discussions during the Open Knowledge Foundation meeting in Berlin in July 2014, and received a unanimously positive and enthusiastic response from the data community.</p>
Functionality of #	Later, the standard lead realised that the '#' characters in the HXL codes (now called 'HXL tags' or 'HXL hashtags') would make the row of codes distinct enough for software to detect the location of the tags automatically. The WG agreed to put the hashtags after the last row of headers in spreadsheets. This neatly solved the problem of having to tell software where the headers of the spreadsheet end and the data start.
Explaining the standard	John Crowley, from the World Bank, suggested the hashtags could be printed on laminated postcards for people to take out into the field..
Addition of attributes	<p>Attributes work like hashtags, but they start with +, adding detail to the 'higher level tag' (e.g. #org+funder+code).</p> <p>Software processing HXL data may ignore any attributes it does not recognise and simply process the core hashtag.</p>

When the Working Group and Technical Team moved to the Hashtag solution, a number of decisions were made related to scope. First and foremost was the decision to narrow the focus of HXL to only 3W data (Who is doing What Where information sheets compiled by OCHA). This was a crucial decision as these sheets are no longer political.

It was laid out in the standard plan that the Working Group would aim to develop the HXL standard and make the HXL prototype into a workable solution⁴⁴.

However, as stated in the final Grant Report,

‘The important lesson learned here is that different people and governance are needed for different stages of a standard’s development. During the initial months, broad representation from many stakeholders can help pool expertise and build consensus, but the actual technical work of constructing the standard does not require broad representation, but instead, a high level of personal commitment and an interest in detail’⁴⁵.

In user-centred design you have to ‘understand what people really need rather than what they’re asking for, and understand the politics of it, especially if you’re doing any UN work. You have to understand the politics around what you’re building, and the political landscape you’re going to have to navigate to get it through. That’s the real genius, is that they’ve actually managed to get HXL and HDX through the politics’

Sara-Jayne Terp, Former Director of Data Projects at Ushaidi

Participation in the Working Group dropped off once its activities became more technical. Nevertheless, the group never cancelled a meeting. To keep less technical members informed, monthly half-hour meetings were put in place and the core Working Group discussed its work over more bilateral means (e.g. Skype, email). Notes from Working Group meetings were shared via a shared Google Drive account and email. This restructuring helped the group maintain momentum without it becoming exclusive⁴⁶.

Andrej Verity made a call to IMO’s in OCHA field offices and Clusters for sample 3W data. Using these, the Technical Team tested drafts of the Hashtag solution. This process helped identify data that were missing and data not widely needed⁴⁷. The Alpha version was launched in mid-2014.

- HXL tagging conventions: how to add HXL hashtags to a spreadsheet;
- HXL tag dictionary: a base list of recommended hashtags for humanitarian datasets (http://hxlstandard.org/standard/1_0alpha/).

3.4 Implementation



In the implementation phase, members of the Working Group took on the Alpha version of the Hashtag solution and started to play with it, with some testing the hashtags against their own agency data and others testing them against open data. There was a sense of excitement about the solution within the group.

The HXL Technical Team was also opportunistic at this time, looking for openings to field-test HXL. For instance, when deployed to the Nepal earthquake response, Andrej Verity, from OCHA Field Information Services, actively tested HXL while compiling 3W data. In the evenings, Verity and David Megginson would have working sessions. Verity would share what he was doing and where he was running into problems. Megginson would capture the feedback and make adjustments to the standard. This was a period of rapid and iterative development and implementation. During the Nepal earthquake response, Megginson developed a data-cleaning tool and was able to help Verity identify problematic data at the touch of a button.

However, the boundaries between development and implementation began to blur when HXL was used during the Ebola response.

‘The rising importance of the Ebola crisis changed the nature of our community consultation from simply soliciting feedback to dealing with new incoming requirements in an urgent and fast-changing situation’⁴⁸.

New tag requests by the Standby Task Force and others were tracked and openly shared on the HXL standard website⁴⁹. The Technical Team and Working Group saw it as important to make these available – even if they would not be formally incorporated into the Beta version – so as to give the humanitarian data community a chance to comment on specific extensions and allow other data communities to use the same tags to improve interoperability⁵⁰.

During the Ebola response, the U.S. Disaster Assistance Response Team (DART) approached David Megginson. Megginson had already fostered a relationship with the team and they self-identified as a practice case for HXL. Megginson was asked to help the Guinea Infection Protection and Control Pillar⁵¹ generate a more complete picture of the response. DART needed a way to regularly pull together and clean spreadsheets that partners were producing on their own. Megginson, who assisted both virtually and in person, developed a common spreadsheet template with embedded Hashtags. He worked with DART on raising awareness and acceptance of the template with partners and getting them to start supplying data in this format⁵².

The work in Guinea, and more broadly within the Ebola response, helped identify the need for an additional layer of granularity in the coding, which later became Attributes⁵³. Furthermore, this field test put into perspective some of the difficulties IMO’s face. Data took months to come rather than weeks and partners needed to be encouraged to provide updates. There are a number of issues at play here but more fundamentally the HXL team has observed that individuals tasked with data entry and reporting may not understand its importance or, in some cases, why it is their responsibility, making establishing a habit difficult.

Soon after, the Beta version of the Hashtag solution was launched via the HXL website and promoted through a handful of blog posts. To accompany the launch of this version, the Working Group and Technical Team developed:

- HXL postcard: a small index card for information-management practitioners with the essential information needed to produce HXL-tagged data;
- HXL tagging conventions: in-depth information about the Hashtags for software developers;

- The refined version of the HXL tag dictionary;
- Classification codes: recommended taxonomies and code lists for use in HXL-encoded datasets⁵⁴.

The standard lead has also created a rudimentary HXL Proxy⁵⁵. Oriented toward individuals with a higher level of technical competence, this online tool enables users to upload datasets, go step-by-step through the process of tagging and then validate or visualise their data automatically⁵⁶.

3.5 Diffusion



At the time of writing, not all interviewees agreed if the diffusion phase had truly started. The Working Group and Programme Team openly communicated with potential end-users throughout the innovation process but placed greater importance on users with a higher technical competence. From January 2014, the wider community was engaged via a public forum⁵⁷ and mailing list. The HXL website was used to very transparently share learning. The Working Group sees the HXL index cards as an effective communication tool with potential users. This approach of focusing on potential early adopters seemed appropriate as it helped foster HXL champions and matched the collaborative nature of the digital humanitarian community.

Nevertheless, some Working Group and Technical Team members believe a crucial element of the diffusion stage was the creation of ‘carrots’ for those responsible for data entry and reporting. These are not likely to be early adopters and would on average have less technical competence. Currently, it is still difficult for these actors to understand the benefits of investing time in HXLating their data. The standard stays hidden in spreadsheets.

In July 2015 OCHA received a significant grant from the Paul G. Allen Ebola Program. The aim of this is to integrate data systems and offer data services to partners across West Africa⁵⁸. A proportion of the funding will be dedicated to the development software tools to bring HXL out of the shadows. The Working Group has transitioned to a Governance Group comprised of key potential users and early adopters of HXL. One of its principal tasks is to identify, define, prioritise and help develop HXL-based tools. So far, this list still focuses on data-cleaning, mapping and data visualisation tools. However, according to the standard lead, HXL could also be used to facilitate combined reporting. For instance, all data could be stored in a single spreadsheet and, by using the appropriate filters, staff could easily fill management or donor requests.

4. Was this a successful innovation process?

Inherent in all innovation processes is some degree of failure. This presents a challenge to understanding what contributes to a good innovation process: even successful processes will experience difficult pilots or setbacks in design or diffusion. The HIF-ALNAP research on innovation processes therefore distinguishes between a good innovation – an output of an innovation process that leads to measurable gains in effectiveness, quality and efficiency – and a good innovation process. This research defines a successful innovation process through three criteria:

Table 4 Criteria of success for innovation processes

Increased learning and evidence	There is new knowledge generated or an enhanced evidence base around the problem the innovation is intended to address, or around the performance of the innovation itself.
Improved solution	The innovation offers a measurable, comparative improvement in effectiveness, quality, or efficiency over current approaches to the problem addressed by the innovation.
Adoption	The innovation is taken to scale and used by others to improve humanitarian performance.

The research team used evidence collected for this case study to assess the success of the HXL innovation process against the above three criteria. HXL was highly successful in terms of increased learning and evidence. However, as the implementation and diffusion phase started much later than expected, the innovation process can be rated only moderately successful as an improved solution at this time. As diffusion is in its earliest stages, it is still too early to confidently assess the criterion of adoption.

Increased learning and evidence

During the HIF Grant period, the HXL Technical Team and Working Group took a number of steps to keep the innovation process open and inclusive at a policy and technical level. Early in 2014, a Working Group, consisting of a range of organisation representatives, was established to develop the standard⁵⁹. Initially, this group provided significant input on the policy and the general structure and scope of the standard; it later shifted to cover more technical issues. The group moulded to fit these changes while still ensuring learning was shared and all members could stay informed of progress at their specific level of interest.

Additionally, technical learning was captured, consolidated and disseminated, often through the Google Groups mailing list and GitHub. In late 2014, the HXL Technical Team started to develop a HXL Cookbook⁶⁰, giving practical examples of how the HXL standard and tools can help automate common data validation, cleaning, transformation and analysis tasks for IMOs.

Although only four blog posts⁶¹ were created for a more general audience, the Programme Team was assigned responsibility for outreach and shared learning through more informal means (e.g. phone calls, conferences).

Improved solution

Although it is early to assess if the HXL Hashtags are an improved solution overall, it is clear the system is perceived as being better in touch with the working reality of IMO than the Linked Open Data solution and that it is an improvement over relevant current practice. Therefore, HXL is currently moderately successful in having developed an improved solution.

As shown during the Ebola response, the hashtags are appropriately lightweight⁶². The adoption of a user-centred approach to design (as Table 2 illustrates) was crucial.

Early adopters, specifically information managers beyond the Working Group, see HXL as an improved solution. This is demonstrated by some of these users actively championing the standard. Simon Johnson, from the British Red Cross, for instance, has formally endorsed the HXL Proxy⁶³ and compiled a number of use cases to help others understand the potential application of HXL⁶⁴.

Moreover, pilot participants expressed great confidence in the HXL Hashtag solution. Early versions of data-cleaning, merging and data visualisation tools are appreciated – for instance in the Nepal earthquake response, where the HXL data-cleaning tools were used. Data validation was automated, making this step quick and easy. Moreover, the OCHA Field Information Services Team stated that the Nepal 3W was the cleanest 3W they had ever seen produced⁶⁵. These tools are viewed as helping to make IMOs' work more efficient.

Nonetheless, other levels of end-users have not yet been fully reached. The HXL team understood early on that, to ensure take-up and active use of the standard among humanitarian workers with lower technical competence, it would need to develop tools that clearly showed the benefits of HXL. The development of these is scheduled to commence in 2016 using the Paul G. Allen grant.

Adoption

The HXL standard lead has received a number of requests for information on how to use the innovation. However, understanding the need for sustained support in the initial phases of uptake, the HXL Technical Team has been selective in which leads to follow. For example, the team supported UNHCR in HXLating all its refugee data. Although the technical step of adding HXL tags took only a number of hours and the political step of gaining approval was prompt, the HXL team needed to match up its work with the organisation's software development and deployment cycle. Therefore, as a whole, the process took six months.

More technically able users have been adopting HXL, either by simply embedding the hashtags in their standard spreadsheets⁶⁶ or by actually designing platforms that compile and visualise data into dashboards⁶⁷. A number of organisations beyond the humanitarian sector have also shown interest in the Hashtag approach⁶⁸.

Like many innovations, the success of HXL relies on the right incentives being in place for key actors. To gain adoption, HXL must consider how senior leadership, as well as individuals responsible for inputting data and reporting, perceive the problem and what may motivate them to support the solution.

Those responsible for data entry may not see the bigger picture issue of achieving an integrated understanding of a crisis and may not see why it is their concern. Yet they are a key player in the success of HXL. Data must be inputted and shared correctly and on time for a coordinated picture

of a crisis to be generated. If incentives are not created for data entry specialists, any solution – no matter how good for other actors – could fail in the long run. This was understood by the innovation team very early in the initiative, but delays in the production of a workable solution meant that perks, in the form of tools, for this actor are only going to be refined in 2016. Some early prototypes have been developed but these are still oriented to very technically advanced users.

Leadership, be these internal managers in the field or at headquarters, or external actors such as Cluster leads, need high-quality and timely information to help their decision-making. They make reporting requests to IMO in the hopes of gaining information that will help with issues such as the coordination of responses. Leadership has the power to create incentives or disincentives to resolving this problem and adopting potential solutions. But a crucial role of leadership is facilitating support for the solution at a higher institutional level. In order to gain the support of senior leaders, HXL sees the first step to achieving adoption as ‘being present’ when senior leadership encounter data problems, so they may propose their already established solution. This will hopefully help build a case for HXL when the organisation as a whole considers wider data issues.



Photo: Super Typhoon Hayan. ICT center set up at the city hall for people to get access to relatives and friends outside the city. Tacloban, Philippines, 10 November 2013

Credit: Photo: WFP / Gwyneth Anne Palmos

5. What are we learning about innovation?

Drawing on research from the humanitarian sector and beyond, including previous case study material, HIF has identified a range of factors generally held to be fundamental to successful innovation processes. An important part of the case study research lies in testing, through the experience of the HIF grantees, the extent to which these propositions hold true in humanitarian settings.

- **Managing relationships and setting common objectives**

Innovation always involves multiple actors – partners, implementers and end users – all of whom can change over the different stages of an innovation process. Assigning specific time and resources to managing these relationships and ensuring common objectives across the different stakeholders of an innovation will contribute to a successful innovation process.

- **Dividing tasks and responsibilities**

Given the complexity of many innovation processes, a clear division of tasks and responsibilities between individuals and organisational units is important for developing a successful innovation.

- **Resourcing an innovation**

Working in innovation requires flexibility to deal with the unknown, and this is particularly so with an innovation in the humanitarian sector. Budgets and resource plans therefore need to be suitably flexible to accommodate several possible outcomes (e.g. the need for further trials) as well as likely deviations from the original plan.

- **Flexibility of process**

At its heart, managing an innovation process is about creating space for flexibility. Processes featuring flexible timelines, feedback loops for adaptation during the piloting phase and individuals resourced to execute changes in response to emerging results will be more likely to succeed.

- **Assessing and monitoring risk**

Innovation processes in humanitarian action need to have an appropriate relationship to risk. We expect processes will be more likely to produce improved solutions and achieve uptake when they include an assessment of the different risks that might have an impact on the effectiveness of the innovation, as well as a strategy or plan to monitor and adjust development in light of changes in these risks on an ongoing basis.

- **Drawing on existing practice**

Knowledge of existing practice and experiences is expected to contribute to more effective innovations through a better understanding of past attempted solutions, an accurate initial understanding of the problem or opportunity addressed by the innovation and an awareness of potential users and their needs.

Findings for these six propositions are presented in the graphics on the next few pages.

Managing relationships and setting common objectives

How this factor worked in this case study

Relationship management and setting common objectives evolved considerably throughout the innovation process of the HXL case study. In the early stages of the Linked Open Data, efforts were made to manage relationships and set common objectives but these were not made in a sustained fashion. Outreach was more sporadic. CJ Hendrix would periodically arrange for him and Carsten Kessler to meet with other agencies but this was primarily *ad hoc*⁶⁹.

In 2014, with the shift in management and the allocation of the HIF Grant, managing relationships and setting common objectives shifted. The Programme Team was responsible for outreach with other humanitarian organisations and other parts of OCHA⁷⁰. David Megginson, the standard lead, actively called stakeholders and potential users to inform them about HXL and update them on progress.

HXL also established a Working Group that consisted of partners, implementers and users from within and beyond the UN. Though responsible for the development of the standard at a policy-level (e.g. issues such as scoping), this group also helped considerably in the management of relationships and setting common objectives with a core group of potential end-users.

Challenges

For a considerable period of the innovation process, OCHA attempted to hold a leadership role in the standard initiative, rather than the role of a facilitator.

The Working Group met on a biweekly basis from late January⁷¹. This shifted in the summer of 2014 as the group transitioned from the policy level to the technical details of the standard⁷². At this point, the working group approach became cumbersome and was slowing progress⁷³. To remedy this, meetings were changed to a monthly basis and focused on broad issues. Ad hoc meetings were put in place with small numbers of Working Group members interested in specific details of the standard⁷⁴.

How this factor related to the performance of the innovation process

In the HXL innovation process, the common recognition mid-way through the process that the problem needed to be reassessed seemed to reaffirm the Working Group's and the Programme Team's common objective. This may have helped congeal support for the project within the Working Group. In technology-focused innovations at least, it does appear that having wider input at all stages of the innovation process is important to build support for the decisions made. OCHA's shift to a facilitation role was crucial for this. This attitude seems to have contributed to all three success criteria.

Continuing from this, the shift in how the Working Group members engaged in the process seems to have been very important in maintaining progress. The two-pronged approach of monthly and ad hoc meetings allowed members as much or as little engagement as they were able to provide. If bi-weekly meetings had been maintained for all Working Group members, interest and engagement would likely have waned, compromising the development of HXL champions who were eager testers and pilot participants – something that is crucial for the development of an improved solution. Furthermore, these champions will be vital in the diffusion phase, which will have knock-on effects on the success criterion of adoption.

The Programme Team's role of reaching out to potential end-users proved valuable during the implementation stage. The DART team in the Ebola response self-identified as a perfect practice case for HXL because of conversations previously had with David Megginson. This certainly played a role in the development of an improved solution (e.g. the collaboration with DART helped hone the Alpha version of Hashtags, identified the need for Attributes, identified some operational challenges that would need to be kept in mind). These 'self-identified users' may be a first step to the success criterion of adoption. HXL could aim to capture and communicate these examples to help convince other potential adopters.

Resourcing an innovation

How this factor worked in this case study

Interestingly, the HXL team had a resource plan for the lifetime of the innovation that included a tactical use of the HIF grant. The Programme Team understood standard initiatives are ‘long odd bets’ – they are long, multi-year undertakings that may take time to show uptake⁷⁵. This can make it difficult to secure funding for such initiatives.

By 2014, OCHA was considering taking on data as a primary responsibility; thus HXL and its sister project HDX⁷⁶ were put under the microscope. The HIF Grant period, which provided the initial package of funding to the project, was therefore treated within the Technical Team as ‘make it or break it’ for HXL. The HIF funding period permitted the team to ‘externally validate’ the project – show the value of HXL to OCHA by gaining support outside the organisation. OCHA budgets are discussed in the autumn so the team aimed to have demonstrated the potential value of the innovation by September 2014⁷⁷. It was hoped that OCHA would then buy into the initiative and be willing to make the long-term investment.

To a large degree, this strategy paid off: HXL was internally funded by OCHA in 2015, but only sufficiently to ‘hold it over’ until more significant funding was found. OCHA then received a significant grant in July 2015 from the Paul G. Allen Ebola Program. A proportion of the funding will be dedicated to the development of software tools for non-technical potential users of HXL.

Challenges

Resourcing was used strategically by the innovating team as a way of winning broader support within their organisation for the innovation. However, using the HIF Grant for internal advocacy created a ‘stop-go’ timeline. The project was given OCHA funding in 2015, but only enough to keep it alive until other funding was found. This slowed progress and may have hindered the standard’s momentum in terms of external diffusion and, consequently, adoption.

How this factor related to the performance of the innovation process

Funding played an important role in the HXL innovation. In a way, different grants have enabled the innovation to get over hurdles in the development, implementation and diffusion phase. Therefore, funding helps keep momentum. The relevance of 'momentum' to successful innovation, however, is much less clear. An innovation process can have momentum but is it moving in the right direction? Funding for the lifetime of the innovation, on its own, does not ensure this.

David Megginson did emphasise, nonetheless, the importance of flexible funding in the beginning of an innovation. With innovations, and especially with standards, results can take time to materialise, so it is important to have a funder who understands this.

'Standards are gambles [...] standards are [...] long odds gamble. Almost every standard fails [...] So that makes sense to be funded out of a normal operating budget. Standards work, when you know it's probably going to fail, but the payoff will be huge if it succeeds. [That] doesn't fit well into annual budgeting, at all [...] So that's why I think seed money from somewhere like HIF is so important [...] HIF is not necessarily looking at [...] a predictable product development. Innovation is dangerous, risky, highly prone to failure, and it needs a funder who understands that, who understands that if they place ten bets, nine of them are going to fail, but maybe the tenth is going to succeed so well it makes up for all of them.'⁷⁸

David Megginson, Consultant, HXL lead.

Flexibility of process

How this factor worked in this case study

The HXL innovation process was well planned yet sufficiently flexible to allow vital course corrections and to enable the innovating team to take advantage of important testing opportunities. A clear timeline was laid out in the standards plan. This included three clear milestones for all teams, clear timings for pilots, specific feedback loops and assigned responsibilities for the take-up of this feedback⁷⁹.

However, returning to the problem recognition stage was evidently not planned for.

Furthermore, as the project progressed, it became clear that the selected pilot sites were less than ideal, owing to changes in their respective contexts⁸⁰. In part because of the eagerness of the Working Group and the flexibility of the Technical Team, a number of additional pilot and testing opportunities were not just identified but seized.

Challenges

Lack of capacity proved a challenge as the project moved into the implementation and diffusion phase. Being essentially the only HXL staff during this time, David Megginson had to be selective as to what leads were pursued, which limited his ability to remain flexible and open to new opportunities as they arose.

How this factor related to the performance of the innovation process

Had the innovating team stayed fixed to its original plan, it is quite likely it would not have reassessed the core problem and adapted the solution. This flexibility was very important to the development of an improved solution and did lead to the generation of learning and evidence.

Additionally, being able to say 'yes' to unexpected pilot activities, such as the Ebola response, and provide support to piloters, such as in the Nepal Earthquake response, seems to have been crucial in moving the Hashtag solution quickly⁸¹ and effectively⁸² to its Beta version and thus to developing an improved solution. Early results seem to show that flexibility in the innovation process is also important for adoption. HXL took much longer to start repeating rewards during the Ebola response than expected.

'I would say that both trials (Nepal and Ebola) were technical successes. They were mixed on the business level, because the technical success, good technology alone is not enough to transform the way people work. But on a technical level they showed that the standard doesn't get in people's way, which is very important, so it didn't create resistance.'⁸³

David Megginson, Consultant, HXL lead.

Assessing and monitoring risk

How this factor worked in this case study

The Programme Team and Technical Team developed a risk matrix at the beginning of 2014. This was regularly reviewed and updated.

Challenges

The research did not identify any challenges relating to risk management and monitoring in this case study.

How this factor related to the performance of the innovation process

Interviewees did not identify assessing and monitoring risks as a key factor in the success of HXL. While risks were monitored informally throughout the process, the team avoided using heavier risk monitoring processes. While some challenges may have been avoided by a stronger approach to risk assessment and monitoring, it is impossible to determine this with any confidence.

‘Monitoring the risks and what you’ve discovered about the risks is critically important. We did it informally through 2014...the danger with making it too formal is people have attention for only so many formal processes.’⁸⁴

David Megginson, Consultant, HXL lead.

Drawing on existing practice

How this factor worked in this case study

HXL drew significantly from existing practice, in particular from a strong understanding of past solutions and potential users. CJ Hendrix identified the problem because of his experience as an IMO. He partnered with Carsten Kessler, who had the technical knowledge of the original solution, Linked Open Data. David Megginson was made standard lead in large part because of his past work on the technical development of International Aid Transparency Initiative (IATI). Megginson worked very closely with the heterogeneous Working Group that had deep understanding of how information is gathered, collated, analysed and used in the humanitarian sector.

Challenges

However, it cannot be said that the innovating team had an accurate understanding of the problem at the beginning of the innovation process. Indeed, facets of the problem were identified and compiled to create a more complete picture of the issue. Yet, other key aspects of the problem were not prioritised. As was highlighted in the description of the stages, during the development of the Linked Open Data solution by the two-person OCHA team, the project became too insulated. Although this was overcome with the restructuring of the project, it did take time for the standard lead, the Technical Team and the Working Group to reassess the problem and decide to work towards a 'minimum viable product'. A 'stepped' approach was necessary to start tackling the problem.

How this factor related to the performance of the innovation process

This innovation showed the importance of staying in touch with the problem and the potential end-user. Based on the excitement of technically competent end-users for HXL, it could be said that it is an improved solution.^a

Moreover, the Working Group was heterogeneous and highly skilled. Members knew to avoid political sensitivities, especially in the context of the UN, as this could significantly slow or even halt a standard initiative.

These learnings are being pushed even further as the project moves into its next phase with the Paul G. Allen funding. Early adopters and advocates for HXL (from outside the original Working Group) were invited to join the governance group for this phase.

'[One of the factors that contributed most to success was a] strong heterogeneous team of people who had field experience. I don't just mean out in the field, I mean people who had experience of the data sets, and of the users, and could go out and check. People who were used to design, it just needed that critical mass of the half a dozen people who knew what they were doing.'⁸⁵



Sara-Jayne Terp, Former Director of Data Projects at Ushaidi.

6. Emerging lessons for best practice in innovation

- In technology-focused innovations, in particular, it is important to foster champions. There are many benefits from building on people's passion for the topic area and excitement for the innovation. The latter must be fostered. For instance, early adopters must be encouraged or at least given the space to 'play' with the innovation.
- In technology-focused innovations, it appears that having wider end-user input at all stages of the innovation process is important for building support for the design choices made.
- Innovating teams are successful when they exhibit mutual respect amongst team members and a healthy level of trust or confidence. The practice of giving credit where it is due amongst an innovating team is useful for creating a positive environment that rewards contributions, which in turn supports the type of creative and proactive engagement that can support strong innovation processes.

Endnotes

1. Used in this case study to refer to set instructions on how to encode data in an interoperable way.
2. Kessler, C. and Hendrix, C. (2013) 'The Humanitarian eXchange Language: Coordinating Disaster Response with Semantic Web Technologies': <http://www.semantic-web-journal.net/content/humanitarian-exchange-language-coordinating-disaster-response-semantic-web-technologies> (p.4).
3. Interview with CJ Hendrix 26 October 2015.
4. Save the Children UK faced similar challenges in its efforts to standardise reporting categories for acute malnutrition programming. See HIF-ALNAP case study: Obrecht, A. (2016) 'Understanding the performance of emergency feeding programmes: Save the Children's CMAM Report' HIF/ALNAP Case Study. London: ODI/ALNAP.
5. Interview with Sara-Jayne Terp 27 October 2015.
6. Interview with Andrej Verity, 26 October 2015.
7. Telford, S. (2013) 'Humanitarian Innovation Fund Large Grant Proposal Application' (p.3).
8. Kessler and Hendrix (2013: 3).
9. This is illustrated in ALNAP's study 'Insufficient Evidence: The Quality and Use of Evidence in Humanitarian Action': <http://www.alnap.org/resource/10441>, and OCHA's 'Humanitarianism in the Network Age': <http://www.unocha.org/hina>.
10. Interview with CJ Hendrix, 26 October 2015.
11. This was identified through user research initiated by OCHA on data and analysis. There were three rounds of research between 2012 and 2014: research by the Economist Intelligence Unit, a survey through Relief Web and one-to-one interviews with humanitarian data stakeholders. The latter focused on how people use data and was designed with HXL and its sister project, HDX, in mind.
12. Interview with Sarah Telford, 28 October 2015.
13. Interview with David Megginson, 20 October 2015.
14. Interview with CJ Hendrix, 26 October 2015.
15. Interview with David Megginson, 20 October 2015.
16. Semantic Web 'provides a standardized way of expressing the relationships between web pages, to allow machines to understand the meaning of hyperlinked information': http://semanticweb.org/wiki/Semantic_Web.html
17. Interview with Carsten Kessler, 28 October 2015.
18. RDF has come to be used as a general method for conceptual description or modelling of information that is implemented in web resources. It is also used in knowledge management applications.

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19. Telford (2013: 2).
 20. For step-by-step details, see Kessler and Hendrix (2013), Section 5.1.
 21. Kessler and Hendrix (2013: 8).
 22. Otherwise known as triples because they are comprised of three elements: subject-predicate-object.
 23. Telford (2013: 7).
 24. Interviews with Sarah Telford, Simon Johnson and CJ Hendrix.
 25. Telford (2013: 4).
 26. Interview with Sarah Telford, 28 October 2015.
 27. Megginson, J. (2014) 'Developing Humanitarian Data Standards: An Introduction and Plan for 2014': http://docs.hdx.rwlab.org/wp-content/uploads/HXL_Paper-forsite.pdf
 28. The Working Group originally comprised representatives from UNHCR, UNICEF, WFP, IOM, Save the Children, OCHA, the World Bank, USAID, ICT4Peace and HIF (Telford, S. (2014) 'HIF Grant Interim Report 1': 1). The composition did evolve over time, as is explained in the section on the development stage.
 29. Telford, S. (2014) 'Humanitarian Innovation Fund Interim Report 3' (p.2).
 30. http://hxlstandard.org/standard/1_0beta/dictionary/
 31. 'Personally I went into HDX, hunted down a couple of data sets, like literally, randomly picked some data sets, and then started HXL tagging them. So just saw if it held up, and the new standard is beautiful, it works. The old one, even I got confused with it' (Sara-Jayne Terp interview, 27 October 2015).
 32. Telford, S. (2014) 'Humanitarian Innovation Fund Interim Report 3' (p.3).
 33. http://hxlstandard.org/standard/1_0beta/tagging/
 34. Ibid.
 35. Telford (2013: 3).
 36. Telford (2013: 7-8).
 37. Note, this quote referred to Tim Berners-Lee's rating system, whereby Linked Open Data is the ultimate goal.
 38. Telford (2013: 7).
 39. Megginson (2014) 'Developing Humanitarian Data Standards' (p.4).
 40. <http://hxlstandard.org/questions/approach/>

41. Interview with Sara-Jayne Terp, 27 October 2015.
42. Email communication with Sarah Telford and David Megginson, 9 December 2015.
43. This list is not exhaustive; the purpose of this table is to show the iterative and incremental nature of the development of the Hashtags. Based on email communication with Sarah Telford and David Megginson, 9 December 2015.
44. Megginson (2014) 'Developing Humanitarian Data Standards'.
45. Telford, S. (2014) 'Final Report' (p.4).
46. Interviews with Andrej Verity, Sara-Jayne Terp, CJ Hendrix and David Megginson.
47. Telford, S. (2014) 'Humanitarian Innovation Fund Interim Report 2' (p.2).
48. Telford, S. (2014) 'Interim Report 3' (p.2).
49. <http://hxlstandard.org/standard/proposed-tags/>
50. Telford, S. (2014) 'Interim Report 3' (p.2).
51. Comparable to a Cluster.
52. Interview with David Megginson, 17 November 2015.
53. As explained in Table 3 above, Attributes work like Hashtags but start with +, adding detail to the 'higher level tag' (e.g. #org+funder+code). See examples here: http://hxlstandard.org/standard/1_0beta/dictionary/#attributes
54. http://hxlstandard.org/standard/1_0beta/
55. <https://proxy.hxlstandard.org/data/source>
56. See for instance, this example of a validated dataset for the Guinea IPC partners, used during the Ebola response: <https://proxy.hxlstandard.org/data/qK4vEu/validate>. The traffic light system indicates the type of error found (e.g. Error, Warning) and the following rows explain the problem in the data.
57. <https://github.com/HXLStandard/libhxl-python>
58. <http://www.paulallen.com/News/News-Articles/Ebola-RFP-Announcement>
59. Megginson (2014) 'Developing Humanitarian Data Standards' (p.7).
60. <https://github.com/HXLStandard/libhxl-python/wiki/HXL-cookbook>
61. Megginson, D. (2014) 'Standards Can Make Humanitarian Data Easier': <http://docs.hdx.rwlab.org/standards-can-make-humanitarian-data-easier/>; Megginson, D. (2014) 'The Path of Operational Data – Where HXL Can Make a Difference': <http://docs.hdx.rwlab.org/the-path-of-operational-data-where-hxl-can-make-a-difference/>; Megginson, D. (2014) 'Introducing HXL Hashtags for Humanitarian Data': <http://docs.hdx.rwlab.org/introducing-hxl-hashtags-for-humanitarian-data/>; Megginson, D. (2014) 'The Humanitarian Exchange Language Reaches Alpha': <http://docs.hdx.rwlab.org/the-humanitarian-exchange-language-reaches-alpha/>
62. Interview with David Megginson 17 November 2015.

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63. Johnson, S. (2015) 'British Red Cross Maps Team Endorsement of the HXL Proxy', letter to OCHA, 24 August 2015.
 64. Mimeo.
 65. Interviews with David Megginson.
 66. The Standby Task Force adopted the standard and used it in the Ebola response (Telford, S. (2014) 'Interim Report 3' and 'Final Report').
 67. See example of the Nepal Survey of Surveys: <http://nepalassessments.github.io/>, which was designed by Simon Johnson. For more information on this example and how these platforms can be easily cloned and adapted for other crises, see https://medium.com/@Simon_B_Johnson/concept-micro-websites-for-response-e66694dddefb#.t0r6qac7s
 68. 'The Open Contracting project is now proposing adopting the same hashtag approach, based on HXL's work' (Telford, S. (2014) 'Interim Report 3': 2).
 69. Interview with Carsten Kessler, 28 October 2015.
 70. Megginson (2014) 'Developing Humanitarian Data Standards' (p.7).
 71. Telford, S. (2014) 'Interim Report 1': 1.
 72. Telford, S. (2014) 'Interim Report 2': 4.
 73. Telford, S. (2014) 'Humanitarian Innovation Fund Final Report': 3.
 74. Telford, S. (2014) 'Interim Report 3': 4.
 75. Interviews with David Megginson and Sarah Telford.
 76. The Humanitarian Data Exchange, or HDX, is an open platform for sharing data. The goal of HDX is to make humanitarian data easy to find and use for analysis. HXL and HDX are two OCHA initiatives that complement each other but do not require each other to succeed. Thus HDX is not covered in this case study. For more information see <https://data.hdx.rwlab.org/>
 77. Interview with Sarah Telford.
 78. David Megginson interview, 17 November 2015.
 79. Megginson (2014) 'Developing Humanitarian Data Standards'.
 80. Interviews with CJ Hendrix and David Megginson.
 81. 'The alpha standard's adoption in a real-world crisis (Ebola) puts the HXL initiative ahead of where we expected to be by Q3 in one sense' (Telford, S. (2014) 'Interim Report 3': 3).
 82. Development of Attributes owed to the polishing of Hashtags during these pilots.
 83. Interview with David Megginson, 17 November 2015.
 84. Ibid.
 85. Interview with Sara-Jayne Terp 27 October 2015



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