APPENDIX B-1
Second-Tier Research Questions

The main research questions were:

• What are the factors and barriers critical to the adoption and diffusion of data-exchange standards across their target population?
• What can be done to facilitate and accelerate the adoption of data-exchange standards across their targeted population?

These questions laid the groundwork for the development of the conceptual frameworks/models. The formulation of the second-tier research questions emerges from the conceptual frameworks/models. These questions make theoretical assumptions more explicit and can inform a researcher about what they want to know most or first. These second-tier research questions can also point towards data gathering devices and can feed directly into data collection (Miles & Huberman 1994, pp. 22). For example, in this research, the second-tier questions acted as a starting point for the interview agenda questions.

The second-tier questions based on the innovation-centric model included:

• What impact do the motivations for development of a standard have on the adoption and diffusion of a standard?
• What impact does the nature of the development process have on the adoption and diffusion of a standard?
• What impact does the diversity and balance of development participant have
Appendix B

on the adoption and diffusion of a standard?

• What impact does involvement of tool providers (software vendors) during the development process have on the adoption and diffusion of a standard?
• What impact do revisions and the time taken for the approval and publication process have on the adoption and diffusion of a standard?
• What impact do the costs, benefits and level of support have on the adoption and diffusion of a standard?
• How is the ROI of a standard established?
• What impact does carrying out a ROI analysis on a standard have on the adoption and diffusion of a standard?
• What are the barriers to the adoption and diffusion of a standard?
• What impact do standardization issues have on the adoption and diffusion of a standard?
• What impact do the standards characteristics have on the adoption and diffusion of a standard?
• What impact do the characteristics of the adopting community/organizations have on the adoption and diffusion of a standard?

The second-tier questions based on the adopter-centric model included:

• What impact does an organizations characteristics have on the decision to adopt a standard within an organization?
• What impact does a standards characteristics have on the decision to adopt a standard within an organization?
• What impact do environmental characteristics have on the decision to adopt a standard within an organization?
• What is the decision criterion for adopting a standard within an organization?
• Who was the final decision maker?
• What impact does pre or post implementation investment appraisal (ROI analysis) have on the decision to adopt a standard within an organization?
• What are the outcomes of the decision on whether to adopt the standard or not?

Reference

APPENDIX B-2

Phase One Interview Agenda

This interview is divided into 5 sections based loosely on the lifecycle of a standard. The interview aims to address the following:

• The factors that influence the development of standards
• The factors that affect the adoption and diffusion of standards
• The factors that affect the adoption of a standard from an organizational decision making perspective.

Name: ________________________________
Organization: __________________________
Position: _______________________________
Email: _________________________________

<table>
<thead>
<tr>
<th>DEF STAN 00-60</th>
<th>NATO Codification System</th>
<th>ISO 15926</th>
<th>ISO 10303-224</th>
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</thead>
</table>

Sections

Section A – Background

Section B – Conception and Development

Section C – Adoption and Diffusion

Section D – Organizational adoption and implementation

Section E – Tool Provider Involvement
Section A: Background

A.1 Which of these titles best describes you or your organizations’ involvement with the standard?

<table>
<thead>
<tr>
<th>Standard developer</th>
<th>Adopter / User of the standard (Customer)</th>
<th>Implementer</th>
<th>Tool Provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section B &amp; C</td>
<td>Section D</td>
<td>Section D (Possibly E)</td>
<td>Section E (Possibly D)</td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A.2 Which stage of the standardization process best describes the current status of the standard? Conception, Proposal, Drafting, Approval, Publication, Implementation and use

A.3 At what stage in the standardization process did you or your organization start to involve with the standard?
- Why at that time?
- How was that decision reached? Probe- any cost/benefit analysis done

Section B: Conception and Development

B.1 Who would you say were the main individual(s) or organization(s) that initiated the idea for the development of the standard?
- What is their role in relation to the standard? (Probe - Owner, potential user, funder, tool provider)
- Probe impact on development (IMPACT – positive, negative, both or none at all.)

B.2 What were the main drivers/motivations behind the development of the standard? (Probe – market driven, government driven)
- Probe impact on development

B.3 What is/was the makeup of the development participants? (SDO’s, the adopter and user community/organizations, government, tool providers (certification and accreditation bodies, software vendor, trainers), consultants, researchers, etc)
- Do you perceive a balance of participation by the stakeholder groups affected by the standard?
- Probe impact on development
Is there a formal or informal alliance between the development participants?
  - Probe impact on development

What type of development process was followed? (Structured or unstructured)
  - Probe impact on development

How long has the development process from conception to publication taken or expected to take?
  - Were/have there been any hindrances or barriers to the development of the standard? (Delays, competing standards)
  - If yes, why and how were these overcome?

Was the standard developed from any existing standards? If Yes, Please state what they are.
  - Probe impact on development

Have there been any reviews or revisions of the standard? If yes, when and why?
  - Probe impact on development

What are the main funding sources for this standard?
  - Probe impact on development

What were the main costs of developing the standard? Were there any unexpected costs?

What are the expected benefits of the standard?
  - Have these been established or evaluated or established in any form of Investment appraisal techniques?
  - If yes, How? (e.g, ROI, CBA, TCO)
  - If no, why not. (Probe – would you like to have some sort of indication in the future, would you do it in the future)

Were any tools required for the development and/or implementation of the standard? If Yes, what were they? (e.g certification, software, training)
B.13 Were you or your organization involved in development of any specific tools for the standard? (If No, go to B.17 if yes, continue below)
   - What were they and what were your considerations for going into the development of tools for this standard?
   - What trade-offs were involved? (costs/benefits)

B.14 Have any activities been carried to encourage/support uptake of the standard?
   - If yes, what are they? (promotion and awareness, Information and communication channels, pilots or demonstrations)
   - Do you think this has been beneficial to the adoption and diffusion of the standard?
   - Have they been beneficial to any adopting organizations?
   - Do you think it is worth investing time and money to ensure the development and adoption of the standard

B.15 Has there been any form of support from other parties during the development and adoption of the standard? (e.g Government, NSB) How?
   - Probe impact on development

B.16 Did the development of the standard meet your expectations?

B.17 What in your opinion are the main barriers to the development of a standard?

B.18 What in your opinion are the main factors that facilitate the development of a standard?

Section C: Adoption and Diffusion (Rate of Uptake)

This section seeks to determine the impact (positive, negative, both or none at all) of the following factors on the effective adoption and diffusion of the standard, and the relative importance of these different factors. The importance will be determined by using a five-point Importance scale. (Hand importance scale sheet to the interviewee).

<table>
<thead>
<tr>
<th>Very Important</th>
<th>Quite Important</th>
<th>Fairly Important</th>
<th>Slightly Important</th>
<th>Not Important at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

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C.1 Has there ever been any concern that there might not be uptake or adoption of the standard? If no, why?
   - If yes, what were your concerns and how were they overcome/ avoided?

C.2 Have there been any hindrances to the successful uptake of the standard?
   - If yes, what were they and how were they overcome?
   - Could more have been done to overcome them

C.3 What impact do the following factors have on the adoption and diffusion of a standard, and how important do you think the following factors are in impacting the adoption and diffusion of the standard?

3.1 Role(s) of the initiator(s) of the development of the standard
3.2 Drivers for development of the standard
3.3 Type of development process
3.4 Revisions
3.5 Funding Agreements
3.6 Costs
3.7 Time taken for the development of the standard
3.8 Stakeholder participation (balance and diversity)
3.9 Type of alliance
3.10 Involvement of tool providers / vendors
3.11 Focus of the standard
3.12 Brand identification
3.14 Pilots or demonstrations
3.15 Promotion and awareness e.g launch days, seminars, workshops
3.16 Information and Communication Channels
3.17 Support – e.g govt or NSB’s
3.18 Pre or Post investment appraisal (ROI, CBA, TCO Business case, real world examples)
3.19 Intellectual property agreements

C.4 How important do you think the following standard characteristics factors are in impacting the adoption and diffusion of the standard?

4.1 Relative advantage
4.2 Compatibility
4.3 Complexity
4.4 Stability
4.5 Developed from any existing standards

C.5 Were any specific technologies used to develop or implement the standard?
   - Did any characteristics of these technologies impact the adoption and diffusion of the standard?
   - How important were these characteristics in facilitating the adoption and diffusion of the standard?
Compatibility
Security
Scalability
Reliability
Maturity
A standard in its own right

C.6 Did any characteristics of the adopting community/organization impact the adoption and diffusion of the standard?
- How important were these characteristics of the adopting community/organization in facilitating the adoption and diffusion of the standard?
  Size and type
Community / Organizational culture

C.7 How would you best describe the current adoption and rate of uptake (diffusion) of this standard as a whole? (very good, good, fair, poor, very poor) Why?

C.8 What in your opinion are the main barriers to the adoption and diffusion of standards?

C.9 What in your opinion are the most important factor(s) in the adoption and diffusion of standards?

C.10 Do you have any other general perspectives or comments on the effective adoption, diffusion and evaluation of [Military] [ISO] standards?

Section D: Organizational Adoption and Implementation

D.1 Have you or your organization been involved in the implementation of this standard within an organization? Which organization?
  - What was your role?
  - Why did you or your organization get involved?
  OR
Have you been involved with implementing the standard within your own organization?

D.2 Who initiated the idea to adopt the standard within the organization?

D.3 What were the motivations or drivers for adopting the standard?
  - Probe impact on adoption decision

D.4 Were there any other external pressures or drivers for adopting the standard?
  - What were they?
  - Probe impact on adoption decision
D.5 What was the size and type of organization?
   - Probe impact on adoption decision

D.6 Was the organization involved in the conception or development of the standard?
   - Probe impact on adoption decision

D.7 Did the organization have a history or record of adopting standards?
   - Probe impact on adoption decision

D.8 Which of these adopter terminologies do you think best describes the organization's attitude towards adopting this standard? (Innovator, early adopter, early majority, late majority, laggard) Why?
   - Is this indicative of the organization's general culture towards adopting standards?
   - Probe impact on adoption decision

D.9 Was there availability of resources to implement the standard? (Skills, support, training)
   - Probe impact on adoption decision

D.10 Did the organization have standards with similar functions already implemented and being used? (installed base, sunk costs)
   - Probe impact on adoption decision

D.11 Were any other competing standards considered during the adoption decision-making process?
   - If yes, why was this standard adopted in preference to any competing standard?

D.12 What were the main costs associated with the adoption of the standard? (Implementation costs-hardware, software, maintenance costs, Consultancy fees, Employee training, Organizational restructuring, Standard body membership fees..e.t.c)
   - Were they expected, or were there hidden costs?
   - Would prior knowledge of these costs have helped/hindered the adoption process in the organization
D.13 What were the benefits associated with the standard? (Improved business operations, development of new material and future sales, cost optimisation, influence on regional and international bodies, safety, increased commercial viability, legal compliance, improved data exchange...e.t.c)
- What were the most important benefits?
- Were they realised in the expected time frame.
- Did the benefits outweigh the costs?

D.14 Was any pre or post-implementation evaluation carried out?
- If yes, how was this carried out? (e.g ROI, CBA, TCO)
- If no, would this have helped the adoption process

D.15 Were there any barriers to the adoption of the standard within the organization? If no, why?
- If Yes, what were the barriers to the adoption of the standard within the organization? (Resistance to change, cultural issues, organizational politics, resource scarcity, user buy-in, difficulty in identifying costs and benefits, poor planning, reliability of the technology, security concerns, loss of intellectual property.)
- What were the most significant barriers
- How were these barriers overcome? (Securing support, conducting a value assessment e.g. business case, pilot project, joining standard development committees, training e.t.c)

D.16 Were any pilots or demonstrations carried out during the adoption and implementation phase?
- Probe impact on adoption decision

D.17 Was there a point person or project manager who championed the adoption of the standard within the organization?
- Probe impact on adoption decision

D.18 Were any of these characteristics of the standard an important factor in the adoption decision-making process within the organization? (Maturity, relative advantage, compatibility, complexity, trialability, observability, characteristics of the related technology - recommendation of the standard, security, scalability, reliability, maintainability, maturity, flexibility)
D.19 Was the current level of adoption and diffusion within the stakeholder community taken into account (Network effects)?
  - Probe impact on adoption decision

D.20 Was support for the standard available? (Sponsorship/funding, promotion and awareness, software, information channels & communication, other resources)
  - Probe impact on adoption decision

D.21 Who was the final decision maker(s) with regards to adopting the standard?
  - Are you aware of what the decision criteria was? Strategic, financial, technical, policy.

D.22 Is the standard still being actively used in the organization as specified/agreed?
  - Is it regarded as being a success? How (cost savings, wider potential market, improved technological image, e.t.c...)?

D.23 What in your opinion are the most important barriers to the decision to adopt a standard within an organization?

D.24 What in your opinion are the most important factor(s) in the decision to adopt a standard within an organization?

D.25 Do you have any other general perspectives or comments on the effective adoption, implementation and evaluation of standards within an organization?

D.26 Were you or your organization involved in the development of any tools/software for the standard?
  If yes, include section E

Section E: Tool Provider Involvement

E.1 What stage in the standardization process did you decide to get involved in the development of tools for the standard?
  - Why did you get involved at that time?

E.2 What were your considerations for going into the development of tools for this standard?
  - Was this established in any formal Investment appraisal? How?
E.3 Were there any challenges in being involved with the development of tools for the standard?
   - What were they and how were they overcome?

E.4 Were there any benefits in being involved in the development of tools for the standard?
   - Were they expected?

E.5 What were the main costs in being involved in the development of tools for the standard?

E.6 Are you or your organization committed to the continued uptake of the standard? Why

E.7 Do you believe there will be successful adoption and diffusion of the standard across its targeted stakeholder group? Why?

E.8 Do you have any concerns that there may not be uptake of the standard? Why?

E.9 What in your opinion are the main barriers to the effective adoption and diffusion of standards?

E.10 What in your opinion are the most important factor(s) in the effective adoption and diffusion of standards?

E.11 Have you or your organization been involved in the implementation of the standard within an organisation?
   If yes see section D

Do you have any final comments or questions?

Thank you for your time.

END OF INTERVIEW
APPENDIX B-3

Phase Two Interview Agenda

Building on the results of the first case studies, this interview aims to identify the following:

• The factors that impact the adoption and diffusion of PLCS
• The factors that affect the adoption of PLCS within an organisation
• The factors that impact the general adoption of STEP (ISO 10303)

This interview is divided into 5 sections based on the roles of the interviewees.

Sections

Section A – Background
Section B – Developer questions
Section C – Software vendor questions
Section D – Implementer questions
Section E – End-user questions

Section A: Background

A.1 Name:

Organization:

Position:

Email:
Appendix B

A.2 Which of these titles best describes you or your organization’s involvement with the standard?

Standard developer

Section B

Software Vendor

Section C

Implementer
(Involved in implementing the standard within an organization)

Section D

End-User

Section E

A.3 If you have more than one role which would you say is your main role?
(Go to relevant section first, and do no more than two sections for each interviewee)

Section B: Developer Questions

Development initiators and drivers

B.1 When did development of PLCS begin?
B.2 Who would you say were the main individual(s) or organization(s) that initiated the idea for the development of PLCS?
- Did they have a history of involvement in the STEP community
- What is their role in relation to the standard? (Probe - Owner, potential user, funder, software vendor)
- Did this have an impact on the adoption of PLCS? If yes, is it positive, negative or both. Why?

B.3 What were the main drivers/motivations behind the development of PLCS? - Probe impact on adoption

Development process

B.4 Which stage of the ISO development process best describes the current status of PLCS? (Proposal; preparatory; committee; enquiry; approval; publication, review, or implementation and use)

B.5 How long has the development process from conception to publication taken or expected to take?
- Had work been done on PLCS before it became part of the ISO process?
- Was the standard developed from any existing standards? If Yes, Please state what they are.
- Were there any delays in the development of PLCS?
- If yes, what caused these delays and how were they overcome
  - Probe impact on adoption

B.6 Was there a high degree of learning during the early stages of development? If yes, what were the main learning areas?

B.7 Have there been any reviews or revisions of PLCS? If yes, when and why? - Probe impact on adoption

B.8 What were the main funding sources for the development of PLCS?
- Was the funding consistent
  - Probe impact on adoption
Dynamics of the development team

B.9 What is/was the makeup of the development participants? (the adopter and user community/organizations, government, tool providers (certification and accreditation bodies, software vendor, trainers, consultants, researchers, etc)
- Did you perceive a balance of participation by the stakeholder groups affected by PLCS?
- Did you perceive a balance between academics and strategic business owners?
- Was there a full time dedicated developers or were they part time?
- Was attendance consistent?
- Was there a clear lead of the development teams?
- Was there a final decision maker? Who?
- In your view, was there any dominant stakeholder group?
  *Probe impact on adoption*

B.10 Were Small to Medium Enterprises involved in the development of PLCS? *Probe impact on adoption*
- If yes, how did you engage the SME’s?
- If no, why not?

B.11 Were software vendors involved in the development process? *Probe impact on adoption*

B.12 Were subscription fees paid by the different stakeholder groups involved in the development of PLCS? If yes, were equal fees paid? *Probe impact on adoption*

B.13 Were there any Intellectual Property Agreements? *Probe impact on adoption*

Standard characteristics

B.14 Does PLCS have any competing standards?
- If yes, has PLCS got clear advantages over its competing standards?
- Has this been proven?
  *Probe impact on adoption*
B.15  Do you have an understanding of the ARM, AIM and MIM structure of PLCS? - *Probe impact on adoption*

B.16  Have you done any PLCS mapping? - *Probe impact on adoption*

B.17  Has the reference data library for PLCS been developed? - *Probe impact on adoption*

B.18  Some implementers and end-users of STEP think application protocols like PLCS are complex. Do you agree or disagree with this view? Why? - *Probe impact on adoption*

B.19  Are you aware of the cost of purchasing PLCS from ISO? - *Probe impact on adoption*

B.20  What are the expected benefits of PLCS?
   - Have these been established or evaluated or captured in any form of Investment appraisal techniques?
   - If yes, How? (e.g. ROI, CBA, TCO)
   - If no, why not?
   - *Probe impact on adoption*

B.22  Are you aware what the main implementing technologies of PLCS are?
   - Do you think the use of EXPRESS has an impact on the adoption of STEP application protocols like PLCS?
   - Do you think the use of Part 28 (XML) has an impact on the adoption of STEP application protocols like PLCS?
   - What technology characteristics are important to encourage adoption of standards like PLCS? (Security, scalability, reliability, maintainability, maturity, flexibility)

B.23  Are there software tools available to implement PLCS? - *Probe impact on adoption*
Communication Channels and Marketing

B.24 Have any activities been carried to encourage uptake of PLCS?
   - If yes, what are they? (e.g. Launch days, pilots or demonstrations)
   - Do you think this has been beneficial to the adoption and diffusion of PLCS?
   - Have they been beneficial to any adopting organizations?

B.25 Is there a website devoted to the development and progress of PLCS?
   - *Probe impact on adoption*

B.26 Do you think it is worth investing time and money in these activities to ensure the development and adoption of PLCS?

**STEP community**

B.27 Do you think there politics within the STEP community? - *Probe impact on adoption*

B.28 How is STEP marketed? - *Probe impact on adoption*

B.29 Is there an impartial body able to test and verify whether software vendor’s products are compliant with STEP? - *Probe impact on adoption*
   - If no, do you think this would be of benefit?

B.30 How does the STEP community keep up with new and emerging technologies? - *Probe impact on adoption*

B.31 Are there any success stories on the general adoption of STEP?
   - If yes, how can these stories be accessed?
   - *Probe impact on adoption*

**ISO**

B.32 Do you think the brand identification of ISO standards has an impact on adoption?
B.33 Do you think end-user perceptions of ISO have had an impact on adoption PLCS?

B.34 Do you think there is bureaucracy within the ISO? - Probe impact on adoption

**General**

B.35 Has there ever been any concern that there might not be uptake or adoption of PLCS? If no, why?
   - If yes, what were your concerns and how were they overcome/ avoided?

B.36 Have there been any hindrances or barriers to the successful uptake of PLCS?
   - If yes, what were they and how were they overcome?

B.37 What in your opinion are the main barriers to the uptake of STEP?

B.38 What in your opinion are the main factors that facilitate the uptake of STEP?

B.39 Do you have any other general perspectives or comments on the effective adoption, diffusion and evaluation of STEP?

**Section C: Software Vendor Questions**

C.1 At what stage in the ISO standardization process did you decide to get involved in the development of tools for PLCS?
   - Why did you get involved at that time?

C.2 What were your considerations for going into the development of tools for this standard?
   - Was this established in any formal Investment appraisal? How?

C.3 Is there an impartial body able to test and verify whether your products are compliant with STEP? - Probe impact on adoption
   - If no, do you think this would be of benefit?
C.4 Some implementers and end-users of STEP think application protocols like PLCS are complex. Do you agree or disagree with this view? Why? - Probe impact on adoption

C.5 What are the main implementing technologies of PLCS?
- Do you think the use of EXPRESS has an impact on the adoption of STEP application protocols like PLCS?
- Do you think the use of Part 28 (XML) has an impact on the adoption of STEP application protocols like PLCS?
- What technology characteristics are important to encourage adoption of standards like PLCS? (Security, scalability, reliability, maintainability, maturity, flexibility)

C.6 Were there any challenges in being involved with the development of tools for PLCS?
- What were they and how were they overcome?

C.7 Were there any benefits in being involved in the development of tools for PLCS?
- Have these benefits been verified?

C.8 Are you or your organization committed to the continued uptake of PLCS?

C.9 Do you believe there will be successful adoption and diffusion of PLCS across its targeted stakeholder group? Why?

C.10 Has there ever been any concern that there might not be uptake or adoption of PLCS? If no, why?
- If yes, what were your concerns and how were they overcome/avoided?

C.11 Have there been any hindrances or barriers to the successful uptake of PLCS?
- If yes, what were they and how were they overcome?

C.12 What in your opinion are the main barriers to the uptake of STEP?
C.13 What in your opinion are the main factors that facilitate the uptake of STEP?

C.14 Do you have any other general perspectives or comments on the effective adoption, diffusion and evaluation of STEP?

Section D: Implementer Questions

These questions relate to the adoption of PLCS within an organisation.

D.1 Have you or your organization been involved in the implementation of this standard within an organization? Which organization?

- Why did you or your organization get involved?

OR

Have you been involved with implementing the standard within your own organization?

D.2 Who initiated the idea to adopt PLCS within the organization? - Probe impact on adoption

D.3 What are the motivations or drivers for adopting PLCS within the organisation?

- Do you think the need to use standards for data integration is generally understood throughout your organisation? - Probe impact on adoption

D.4 Is there any external pressures or drivers for adopting PLCS? What are they? - Probe impact on adoption

D.5 Were you or your organization involved in the conception or development of PLCS? - Probe impact on adoption

D.6 Does the organization have a history or record of adopting STEP standards? - Probe impact on adoption

D.7 Is there an availability of resources to implement PLCS? (Skills, support, training) - Probe impact on adoption
D.8 Does the organization have standards with similar functions already implemented and being used? - *Probe impact on adoption*

D.9 Were any other competing standards considered during the adoption decision-making process?
   - If yes, why was PLCS adopted in preference to other competing standard?

D.10 What were/are the main costs associated with the adoption of PLCS? (Implementation costs-hardware, software, maintenance costs, Consultancy fees, Employee training, Organizational restructuring, Standard body membership fees..e.t.c)
   - Were they expected, or were there hidden costs?
   - Would prior knowledge of these costs have helped/hindered the adoption process in the organization

D.11 What are the benefits associated with PLCS?
   - Has a value assessment of any sort been carried out?
   - If yes, how was this carried out? (e.g ROI, CBA, TCO, business case)
   - If no, would this have helped the adoption process

D.12 Are any pilots or demonstrations carried out within the organisation? - *Probe impact on adoption*

D.13 Is PLCS being marketed within the organisation?
   - If yes, how is it being done?
   - Has the standard been marketed at all levels? - *Probe impact on adoption*

D.14 Is there a point person or project manager championing the adoption of PLCS within the organization? - *Probe impact on adoption*

D.15 Are you aware of the current level of adoption of PLCS across its stakeholder community been taken into account?
   - Has this had an impact on the adoption decision within this organisation?

D.16 Is there support from the wider STEP community during the adoption of PLCS within this organisation?
D.17 Who is the final decision maker(s) with regards to adopting the standard?
   - Are you aware of what the decision criteria was? Strategic, financial, technical, policy.

D.18 Are there any barriers to the adoption of PLCS within the organization? If no, why?
   - If yes, have any of the following barriers emerged within this organisation?
     (Resistance to change, “not invented here syndrome”, end-user attitudes towards STEP and ISO standards in general, Initiative overload, funding for change, organizational politics, resource scarcity, difficulty in identifying costs and benefits, poor planning of the project, reliability of the implementing technologies, security concerns, industry dictating what the MoD do, identifying the business processes that are impacted by the standard based system)
   - Are there any other barriers?
   - What are the main barriers?
   - Have any barriers been overcome? If yes, how?

D.19 What in your opinion are the main factors that could facilitate the uptake of a standard like PLCS within the organisation?

D.20 Do you have any other general perspectives or comments on the effective adoption, diffusion and evaluation of standards like STEP?

Section E: End-User Questions

These questions relate to the adoption of PLCS within an organisation.

E.1 How did you hear about PLCS?

E.2 Have you had previous exposure to PLCS? When and How?

E.3 Some implementers and end-users of STEP think application protocols like PLCS are difficult. Do you agree or disagree with this view? Why?
E.4 Are you aware of the benefits of PLCS?
   - Is it important for you to see the benefits quantified in a compelling business case?

E.5 Do you think there is a need for standards like PLCS in your work area?

E.6 Do you think there is a need for standards like PLCS in your organisation as a whole?

E.7 Do you think the need to use standards for data integration is generally understood throughout your organisation?

E.8 Do you think standards like PLCS should be mandated? Why?

E.9 Have you had to use other ISO standards? – Probe impact on adoption and use

E.10 Have you been to any pilots and demonstrations? Were they of any benefit?

E.11 Which is more important to you, understanding the standard, or having a system that works? Why?

E.12 Are there any barriers to the adoption of PLCS within your organization? If no, why?
   - If yes, have any of the following barriers emerged within this organisation?
     (Resistance to change, “not invented here syndrome”, end-user attitudes towards STEP and ISO standards in general, Initiative overload, funding for change, organizational politics, resource scarcity, difficulty in identifying costs and benefits, poor planning of the project, reliability of the implementing technologies, security concerns, industry dictating what the MoD do, identifying the business processes that are impacted by the standard based system)
     - Are there any other barriers?
     - What are the main barriers?
     - Are you aware if any barriers have been overcome? If yes, how?
E.13 What in your opinion are the main factors that could facilitate the uptake of a standard like PLCS within the organisation?

E.14 Do you have any other general perspectives or comments on the effective adoption, diffusion and evaluation of standards like STEP?

Do you have any final comments or questions?

Thank you for your time.

END OF INTERVIEW

APPENDIX B-4
Letter Sent To Research Interviewees

Dear [name],

My name is Josephine Wapakabulo, and I am a PhD student from Loughborough University currently based at LSC Group in Tamworth, working alongside Dr. Tim King and his STEP/PLCS team. I have been carrying out research into the development of standards such as PLCS, and am now undertaking a series of case studies to further my research into the adoption, diffusion and evaluation of ISO data-exchange standards and military standards.

Ultimately, by means of this case study approach, I hope to identify and document answers to questions such as: What are the motivations or drivers behind the development of these standards? Who are the stakeholders involved in the development and adoption of these standards, what form of alliances do they have, and why did they come on board? What are the factors that influence the rate of adoption (uptake) of these standard? What are the main costs, benefits and barriers associated with the development and adoption of these standard? What tools are used to support the adoption and implementation of these standards? What methods are used to evaluate the return of investment of these standard? and, is it worth investing time and money into the development of a standard to guarantee adoption?
On the advice of Tim, you have been identified as someone who would be able to offer insight into this research area, specifically with regards to [ISO15926 / NCS / DEFSTAN 0060 / ISO 10303-224 / PLCS]. This email is therefore being sent to you to request your time, experience and patience for an approximately 1-hour interview at a time and place that is amenable with your schedule between [date] and [date]. In addition, I would like to tape record the interview only to facilitate transcription in the interest of research analysis. I will be interviewing about five different experts for each of four different standards and complete anonymity as regards to sources of information will be upheld. Once I have compiled the results, I will send you a summary of the complete research findings.

Thank you for your time, and I look forward to your response.

Kind Regards,
Josephine Wapakabulo Thomas

**APPENDIX B-5**

**Research Code List**

Original list of codes based on the conceptual models:

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