We create digital tools to explore academic research in new ways.

KDL PRACTICES: Team, Systems, Data and Models
Part 1
King’s Digital Lab

Digital researchers and data experts

We create digital tools to explore academic research in new ways.

Dr. Arianna Ciula

Deputy Director of King’s Digital Lab
Senior Research Software Analyst
@ariciula
arianna.ciula@kcl.ac.uk
Ciula and Smithies (forthcoming), Sustainability and modelling at King’s Digital Lab.
**Team Roles**

**Research Software Engineering roles** around:
- Research and analysis
- Design (UI/UX)
- Development
- Management

(of projects and of systems)

See the website of the [Research Software Engineers Association](http://www.researchsoftwareengineers.org).

**Alignment to Agile DSDM**


Image ©Agile Business Consortium Limited.
Promotion process aligned to the RSE continuum.

Structure of Team Role Description

Role (e.g. Analyst; Software Engineer; Project Manager; UI/UX Designer) - Senior & Principal

Overview
- Position Purpose
- Key Relationships
- Position Duties

<table>
<thead>
<tr>
<th>Responsibilities</th>
<th>Key Duties</th>
<th>Time %</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td>....</td>
<td>....</td>
</tr>
</tbody>
</table>

SFIA Alignment (see https://sfia-online.org for detailed information about Levels of Responsibility & Professional Skills)

SDLC Roles

Person Specifications (essential and domain specific skills)
<table>
<thead>
<tr>
<th>Responsibilities</th>
<th>Key Duties</th>
<th>Time %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Implementation</td>
<td>● Produce technical solutions, using tools and methods including but not limited to TEI-XML, high-level programming languages, RDBMS software.</td>
<td>10%</td>
</tr>
<tr>
<td>Research Analysis</td>
<td>● Deploy existing domain knowledge, or rapidly accumulate more, to understand the computational algorithms, requirements and interfaces involved in a research programming project.</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>● Produce solution overview documents, detailing technical requirements, timelines, and cost, suitable for inclusion in funding bids.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Work with colleagues across the institution (including both eResearch and IT) to produce ontologies, data models, and documentation to support the production of technical research outputs.</td>
<td></td>
</tr>
<tr>
<td>Project Management</td>
<td>● Take responsibility for the design and delivery of technical solutions, and their integration into wider institution technical frameworks and strategies.</td>
<td>20%</td>
</tr>
<tr>
<td>Teaching</td>
<td>● Contribute to training initiatives organized by eResearch teams, including introductory research analysis courses.</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>● Provide online and face to face support, and associated documentation, for staff and students using software built or supported by eResearch teams.</td>
<td></td>
</tr>
<tr>
<td>Personal research</td>
<td>● Develop a personal research agenda, capable of generating external funding, as either PI or Co-I.</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>● Contribute to conferences, research papers, and research projects.</td>
<td></td>
</tr>
<tr>
<td>Research Development</td>
<td>● Work with colleagues across the institution (including both eResearch and IT) to produce technical outputs (code, databases, web applications, databases).</td>
<td>5%</td>
</tr>
<tr>
<td>System, Software, and Data</td>
<td>● Monitor eResearch systems and tools, and patch / upgrade as required to ensure security and performance.</td>
<td>5%</td>
</tr>
<tr>
<td>Maintenance &amp; Support</td>
<td>● Produce technical and end user documentation to aid the use, support, and maintenance of eResearch systems and tools.</td>
<td></td>
</tr>
<tr>
<td>Self-directed learning</td>
<td>● Maintain and improve skills in research software engineering through independent study and training courses.</td>
<td>5%</td>
</tr>
<tr>
<td>Community outreach</td>
<td>● Build or maintain relationships across the UK and international eResearch, eInfrastructure, and RSE communities.</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>● Attend community events such as seminars and workshops.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Contribute expertise to internal and external committees and working groups.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Contribute to department and institution meetings and events.</td>
<td></td>
</tr>
</tbody>
</table>

**Example of analyst role**
Ciula and Smithies (forthcoming).
Solution Development Architecture

Graph by B. Maher, T. Ong, M. Vieira, and T. Watts (KDL).
Framework for Django projects

**Dependencies**
- pip
- Python
- Django
- Bower
- SCSS

**Languages**
- JavaScript

**Frameworks**
- Django
- django-rest-framework

**Views**

**Compilation**

**Testing**
- unittest
- TravisCI
- Tox

**Continuous Integration**
- Run Tests
- Run Compilers
- Git push
- Check CI
- Fabric

**Deployment**
- VMWare
- Apache mod_wsgi
- nginx uWSGI

**Host**
- Redis
- elasticsearch or Solr
- PostgreSQL
- vagrant

Graph by
B. Maher,
T. Ong, M. Vieira and
T. Watts
(KDL).
**Software Development Life Cycle**

- **Initial Contact**: Partner gets in touch with their project idea.
- **Evolutionary Development**: Focused on communication, collaboration and flexibility as we develop the project in increments.
- **Internal Assessment**: We review whether the project would be a good fit for KDL.
- **Kick Off**: If funding is approved, we confirm how we’ll work with our partner.
- **Requirements Assessment**: We discuss requirements with the partner and produce a product quote.
- **Deployment**: In stages, after each increment, allowing for regular testing and refinement in each development/deployment cycle.
- **Release**: The partner signs off a Service Level Agreement and the project goes live.
- **Funding Application**: If needed, we assist with incorporating KDL’s involvement in the application.
- **Post Project**: Ongoing hosting and maintenance for a set period under the terms of the Service Level Agreement.
Alignement to Agile DSDM Process

Smithies and Ciula (forthcoming).
Smithies and Ciula (forthcoming).
Project Management & Communication Tools

- Active Collab
- Slack
- G Suite for Education
- Code repositories

King's Digital Lab
Team, Systems, Data and Models

MaDiH, RSE Training, King's College London, 2 July 2019
Project Management & Communication

Quarterly Timebox meetings

Monthly Team meetings

Fortnightly Timebox meetings

Weekly Project Planning meetings

Daily Standup (Slack channel)
5 year strategy to increase covered costs
- 2017-18 KDL target via research bids: ca £1.5M >> target % cost recovery
- 2018-19 KDL target ca £1.4M

Funding spread 2018-19: ca. £20M
- 10 Large (£500k-1M)
- 5-10 Medium (£100k-£500k)
- 2-5 Small (£50k-£100k)
- 5-10 Seed / exploratory (£5k-£50k)

Diversified portfolio of funding providers
King's Digital Lab  Funding status

<table>
<thead>
<tr>
<th></th>
<th>10</th>
<th>5-10</th>
<th>2-5</th>
<th>5-10</th>
<th>TARGET (2018-2019)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>&gt;£500k+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td></td>
<td>&gt;£100k+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small</td>
<td></td>
<td></td>
<td>&gt;£50k+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seed</td>
<td></td>
<td></td>
<td></td>
<td>&gt;£10+</td>
<td></td>
</tr>
</tbody>
</table>

- **External**: Yellow
- **KCL A&H**: Green
- **KCL King's Digital Lab**: Blue
- **KCL others**: Red
- **Bids in progress**: Grey
- **Still available**: Light grey

MaDiH, RSE Training, King’s College London, 2 July 2019
Smithies and Ciula (forthcoming).
Archiving & Sustainability Approach

Maintenance under costed SLA
Usually 5-year

Migration
College ITS microsite service or to external host (another HEI or commercial provider)

Static conversion
Maintained public access but reduced functionalities

Dataset deposit
KDL CKAN, institutional technical systems, external repositories

Minimal archiving & storage
Minimal storage (for two years minimum) for project website (VM) and data on KDL infrastructure as well as web archives. A placeholder page is shown at a project URL with description, metadata, and links to snapshots.

See King’s Digital Lab (2019), Archiving and Sustainability.
## Archiving & Sustainability Approach

<table>
<thead>
<tr>
<th><strong>Maintenance under costed SLA</strong></th>
<th>See project templates example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Migration</strong></td>
<td><a href="http://isr.cch.kcl.ac.uk/">http://isr.cch.kcl.ac.uk/</a></td>
</tr>
<tr>
<td><strong>Static conversion</strong></td>
<td><a href="https://clip2006.cch.kcl.ac.uk/clip2006/">https://clip2006.cch.kcl.ac.uk/clip2006/</a></td>
</tr>
<tr>
<td><strong>Dataset deposit</strong></td>
<td><a href="https://data.kdl.kcl.ac.uk/dataset/frh3">https://data.kdl.kcl.ac.uk/dataset/frh3</a></td>
</tr>
<tr>
<td><strong>Minimal archiving &amp; storage</strong></td>
<td><a href="http://www.ahds.ac.uk/">http://www.ahds.ac.uk/</a></td>
</tr>
</tbody>
</table>

See King’s Digital Lab (2019), [Archiving and Sustainability](https://data.kdl.kcl.ac.uk/dataset/frh3).
Smithies and Ciula (forthcoming).
Alignement to Agile DSDM

### Timebox Planning

<table>
<thead>
<tr>
<th>Timebox</th>
<th>Days Left in Timebox</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 27, 2019</td>
<td>June 10, 2019</td>
</tr>
<tr>
<td>Team Size</td>
<td>% Non-project Time</td>
</tr>
<tr>
<td>9</td>
<td>20.00%</td>
</tr>
<tr>
<td># of Work Days per Week</td>
<td># of Projects Sprinting</td>
</tr>
<tr>
<td>4.00</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>SG BM</td>
</tr>
</tbody>
</table>

---

**Project**

<table>
<thead>
<tr>
<th>ID</th>
<th>Label</th>
<th>Name</th>
<th>Priority</th>
<th>Budget</th>
<th>Deadline</th>
<th>A</th>
<th>B</th>
<th>P</th>
<th>L</th>
<th>O</th>
<th>A</th>
<th>D</th>
<th>U</th>
<th>Role</th>
<th>AC</th>
<th>NJ</th>
<th>PC</th>
<th>SC</th>
</tr>
</thead>
<tbody>
<tr>
<td>870</td>
<td>evolution dev</td>
<td>African Rock Art Project</td>
<td></td>
<td></td>
<td>97.3%</td>
<td>97</td>
<td>43</td>
<td>749</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>988</td>
<td>post-project</td>
<td>AfM: Art of Making in Antiquity</td>
<td>-</td>
<td></td>
<td>66.6%</td>
<td>66</td>
<td>43</td>
<td>17</td>
<td></td>
<td></td>
<td>10</td>
<td>5</td>
<td></td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>688</td>
<td>evolution dev</td>
<td>Applying AI to storytelling - bringing computational r</td>
<td>M</td>
<td></td>
<td>34.6%</td>
<td>34</td>
<td>43</td>
<td>35</td>
<td>71</td>
<td>6</td>
<td></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>663</td>
<td>evolution dev</td>
<td>Archetype</td>
<td></td>
<td></td>
<td>102.7%</td>
<td>102</td>
<td>43</td>
<td>1</td>
<td>-4</td>
<td>-1</td>
<td></td>
<td>0</td>
<td>0</td>
<td></td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1101</td>
<td>pre-project</td>
<td>Arkives</td>
<td></td>
<td></td>
<td>0.0%</td>
<td>0</td>
<td>43</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>0.5</td>
<td>0.5</td>
<td>0</td>
</tr>
<tr>
<td>1111</td>
<td>pre-project</td>
<td>CCEC rebuilt: Clergy of the Church of England Datab</td>
<td></td>
<td></td>
<td>0.0%</td>
<td>0</td>
<td>43</td>
<td>0</td>
<td>43</td>
<td>1</td>
<td></td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0.5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>785</td>
<td>post-project</td>
<td>CERJBU: The Cambridge Edition of the Works of Ben</td>
<td></td>
<td></td>
<td>65.7%</td>
<td>65</td>
<td>43</td>
<td>11</td>
<td>0</td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td></td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>799</td>
<td>evolution dev</td>
<td>Community of the Realm in Scotland, 1249-1424 ICE C</td>
<td>24.5%</td>
<td></td>
<td></td>
<td>24.5</td>
<td>24.5</td>
<td>10</td>
<td>24.5</td>
<td>0</td>
<td></td>
<td>3</td>
<td>5</td>
<td>3.5</td>
<td>0</td>
<td>0</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>871</td>
<td>evolution dev</td>
<td>CultureCase Refreshed site integrated with CultureD</td>
<td>95.2%</td>
<td></td>
<td></td>
<td>95.2</td>
<td>95.2</td>
<td>10</td>
<td>95.2</td>
<td>0</td>
<td></td>
<td>3</td>
<td>5</td>
<td>3.5</td>
<td>0</td>
<td>0</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>1070</td>
<td>pre-project</td>
<td>Cursive Hieroehros (Thebes)</td>
<td></td>
<td></td>
<td>0.0%</td>
<td>0</td>
<td>43</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
King's Digital Lab  
**Software Development Life Cycle**

- **Initial Contact**
  Partner gets in touch with their project idea.

- **Terms of Reference**

- **Internal Assessment**
  We review whether the project would be a good fit for KDL.

- **Feasibility**
  Requirements Assessment
  We discuss requirements with the partner and produce a product quote.

- **Product Quote**

- **Evolutionary Development**
  Focused on communication, collaboration and flexibility as we develop the project in increments.

- **Kick Off**
  If funding is approved, we confirm how we’ll work with our partner.

- **Funding Application**
  If needed, we assist with incorporating KDL’s involvement in the application.

- **Deployment**
  In stages, after each increment, allowing for regular testing and refinement in each development/deployment cycle.

- **Release**
  The partner signs off a Service Level Agreement and the project goes live.

- **SLA**

- **Post Project**
  Ongoing hosting and maintenance for a set period under the terms of the Service Level Agreement.
Software Development Life Cycle

**INITIAL CONTACT**
Please get in touch with us about your project idea! We encourage potential partners to provide as much information as possible but we’re happy to hear about concepts even in their early stages.

**INTERNAL ASSESSMENT**
Based on the information our partners provide, we consider whether the proposed project is a good match for KDL. This means considering things like requirements, timeline and how it might fit with our overall strategy.

**REQUIREMENTS ASSESSMENT**
We’ll have an in-depth discussion with you to understand your requirements. That then feeds into further internal assessment to produce a Product Quote, outlining high level requirements, our approach, and project costs.

**EVOLUTIONARY DEVELOPMENT**
This is when the actual development happens. We divide the project into increments (typically 4-8 weeks), deciding at the end of the previous increment which requirements we’ll focus on in the next increment. It’s further sub-divided into 2 week timeboxes, keeping the development highly focused. It includes regular testing during each increment, to catch bugs and other issues early when they’re easier to change.

Evolutionary Development is cyclical with Deployment, as the project moves back and forth between stages.

**KICK OFF**
If the project is funded, we’ll go over the plan for working together at the very start. We use an industry-standard Agile project management approach, which focuses on communication, collaboration and flexibility. This allows us to work with you to adapt to changing requirements.

**FUNDING APPLICATION**
The Product Quote will provide the majority of the information you should need to incorporate KDL into your funding application. We’re also happy to work with you to write and check technical cost and other relevant sections before submission.

Of course, we’ll skip this step if you already have funding available.

**DEPLOYMENT**
After each increment, we aim to deploy some portion of the project. This may be a public deployment, or it may be a case of making the functionality available to our partners only in the first instance.

**RELEASE**
Ahead of release we work closely with our partners to incorporate final changes and carry out final testing. At the release stage we’ll normally ask you to sign a Service Level Agreement (posted in the Product Quote), detailing the provision for ongoing hosting and maintenance of your project. When everything is ready we’ll agree a final release date with you, including any support needed for launch activities.

**POST PROJECT**
All of our projects incorporate consideration of long-term hosting and maintenance needs. The individual project requirements are outlined in the project’s Service Level Agreement, and we will contact you toward the end of this period to discuss the future of your project.

See KDL’s SDLC for RSE and KDL project templates.
We create digital tools to explore academic research in new ways.

Dr. Arianna Ciula
Deputy Director of King’s Digital Lab
Senior Research Software Analyst
@ariciula
arianna.ciula@kcl.ac.uk