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Topic (iii): Innovation and related issues

## **Statistics New Zealand is Agile – Continued Implementation of AGILE Process at Statistics NZ**

### **Supporting Paper**

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## **I. Introduction**

1. Statistics NZ invests significantly in the development of software applications (assets) to support its delivery of many of New Zealand's key official statistics. Thus any improvements that can be made to its software development processes will have a real benefit to the organisation's efficiency and effectiveness. With these drivers in mind and also those of customer and IT staff concerns about project delivery (ie the length of time required, high cost and scope uncertainties) IT Solutions team have been investigating better ways to develop its applications.
2. This paper provides information on the background on AGILE processes and methodologies, reasons for the introduction of AGILE at Statistics New Zealand, challenges, successes and benefits of adoption and future directions.

## **II. BACKGROUND**

### **A. AGILE**

3. The agile movement for better software development practices was launched in 2001 with the AGILE Manifesto, a set of principles that deliver:
  - Customer satisfaction by rapid, continuous delivery of useful software
  - Working software is delivered frequently (in weeks rather than months)
  - Close, daily cooperation between business people and developers
  - Regular adaptation to changing circumstances.

4. Today the software industry develops new systems predominantly with so-called AGILE methods. The software is built and delivered incrementally in short iterations. AGILE approaches have proven to be more efficient by delivering software faster and more effective by delivering software that is of higher quality and value to the business.



Figure 1: The SCRUM AGILE process. Statistics NZ began adoption of AGILE by using SCRUM , one of the many AGILE frameworks..

## B. Software Development Life Cycle

5. The Software Development Lifecycle (SDLC) was introduced in Statistics NZ in 2004 after an external review had shown that the IT project delivery had CMMi Capability Level 1 (Management by Heroics). The aim was to improve this rating and therefore increase the credibility of IT. The SDLC process has been gradually updated in 2006 and 2008, with better templates, tools and training in place however some complex issues remained unsolved:

- (a) The SDLC process itself was seen as a waterfall process. It was hard to find a way to depict the iterative nature of the new process. A training programme was put in place, but many seemed to conclude that it was too rigid and did not comprehend that iterations were encouraged. A waterfall SDLC implied less team collaboration and co-operation and no shared ownership, so this also affected morale.
- (b) The software requirements for a solution were hard to complete and then obtain approval. There was “analysis paralysis” where the analysis became far too detailed and so the owner was less happy to approve the solution. For this reason, project elaboration seemed to take too long and become too expensive.
- (c) Often requirements were drawn up without consultation with the developers. This contributed to the low morale of the developers, who wanted to have input and a chance to innovate.

- (d) Priorities were often only discussed with business users at the start of the development and then again when the completion date was near. It was very difficult to change requirements to reflect new findings and better understanding of the problem.
- (e) The templates were designed to be generic and conform to best practise. Unfortunately, this meant that there was a learning curve in understanding their use. This initial frustration led to a lack of support for the templates.
- (f) Business confidence in IT effectively delivering a full solution had been therefore very low. This meant co-operation from the business was diminishing and morale in IT was low.

### III. Implementation

#### A. Pilot Projects

6. The original advocate of AGILE in Statistics NZ was David Bales (Development Section Manager in Applications Development and Support division). He saw AGILE as an approach which had the potential to help Statistics NZ address its software development issues and to contribute to a more collaborative approach between IT Solutions staff and the rest of the business. He encouraged IT Development teams to use SCRUM AGILE. The first project was the Introduction of Selective Editing into Overseas Trade, it was a project which had to be completed within a very short timeframe, to a very tight budget. This was delivered successfully and to the satisfaction of the Business Unit (Business Indicators) and started Statistics NZ down the AGILE path.

7. Once AGILE was used by the development teams, the developers' morale changed. They were very quickly enjoying their work and working together as a team. Test team and Business Analysts decided to undergo formal training. Each group found the training very inspiring and so that led to many discussions around incorporating the Testers and Business Analyst roles into the SCRUM team.

8. Key enthusiasts have worked with their colleagues in IT Solutions Group (internal IT team) and Business Units to progressively and successfully implement AGILE processes and methodologies project by project. The result is that IT Solutions have continued to embrace the AGILE way of working through projects such as Census 2011, Better Economic Statistics (BES<sup>t</sup>)<sup>1</sup> and Business ToolBox<sup>2</sup>.

#### Benefits

9. Analysis of the benefits across these 3 AGILE projects has identified eight key factors contributing to the benefits being realised:
- (a) Buy in and commitment to the AGILE processes and methodologies by all project teams.
  - (b) Product owner participation - regularly and continuously. This helps ensure value is delivered.
  - (c) Time-boxing of iterations - focuses the team and delivers efficiency.
  - (d) A well maintained and visible product backlog makes the project scope visible and engages stakeholders.
  - (e) Brief daily meetings motivate the team and are essential for good communication.
  - (f) Good working relationships assisting productivity.
  - (g) Integrating analysis and testing activities into the development phase raising the quality of the software and lowering the amount of rework.
  - (h) Accurate measures of progress and defect rates - these are vital when prioritising work for future iterations.

<sup>1</sup> The scope of BES<sup>t</sup> project is development of new processing platform for micro-economic statistics)

<sup>2</sup> Business Toolbox is interactive web toolset for small businesses (<http://www.stats.govt.nz/businesstoolbox>)

## Challenges

10. The introduction of AGILE in the first projects has proved significant benefits but also revealed some challenges:

- (a) Alignment of AGILE method with the corporate business planning processes.  
The AGILE method promotes Just In Time analysis. However, the business planning process requires a high level estimates in order for the Statistics NZ Board to be able to prioritise and approve a programme of work. In the Statistics AGILE SDLC we incorporated business planning tasks to be done prior to any real AGILE SCRUM Sprint 0 work.
- (b) Impact on testing and business analysis.  
The SCRUM documentation seemed to suggest that a Tester would sit with the Developer during unit testing and give guidance only. We were able to establish that the other testing – integration testing, system testing and user acceptance testing – should also be included in the sprint and that these tasks could still be done by a specialist Tester. Similarly, a Business Analyst would be required to fully define the User Stories.
- (c) Impact on infrastructure services.  
AGILE requires Just In Time analysis and so often requests for infrastructure services would come with little advanced warning. The solution for business planning was to have an initiation phase that preceded the AGILE SCRUM phases and this solution also alleviates the problem for infrastructure services.
- (d) Cultural change in IT and business teams.  
The AGILE culture is a seachange. It's about collaborating to find solutions, feeling like a valued team member, being responsible for a delivery as a group and not just as an individual. It's about being empowered to be innovative and it promotes using common sense over blindly following a process. We found that people generally respond well to really working together in the Agile way. Some adjustment is required though. This adjustment may be far harder that for some individuals than others.
- (e) Deployments through environments.  
At Statistics NZ we have developed a very robust deployment process with four separated environmenents: Development, Test, UAT and Production. It is designed to protect the Production environment. The AGILE SCRUM framework requires that each iteration delivers right through to Production. Our deployment process did not enable the deployment through the environments in the iteration timeframe. There is currently a project examining the options for improving our deployment process.
- (f) Team co-location.  
AGILE SCRUM teams work best when co-located. We have been using technology extensively to overcome this problem and we try to co-locate where possible.

## B. Full implementation of AGILE Software Development Lifecycle

11. All these findings were incorporated into the development of AGILE SDLC, below. They also highlighted that in order to progress the adoption of AGILE processes and methodologies more widely the support of the whole IT Solutions Group and organisation was required.

12. These discussions eventually led to the formalised AGILE SDLC. A small team of enthusiasts across IT Solutions, led by Leigh Street, was established with the aim to prepare methodology which would bring together best from AGILE SCRUM and SDLC and adopt it to the Statistics NZ needs. AGILE SDLC then gained legitimacy across the whole of the IT Solutions group, by encouraging each group to have their input and encouraging them to take ownership of the process too. The Testers, Business Analysts and IT Delivery Managers completed external AGILE training which was tailored for each specialist field. At the same time, the business units were having their own experiences with the AGILE SCRUM Development teams. It took them very little time to see the benefit of having a resource allocated to the SCRUM team,

collaborating in all the daily discussions, planning and retrospective meetings. They were also very happy with the level of transparency it provided and with the regular deliveries.

13. The AGILE SDLC outlines the roles (who does what, see Figure A.2, Appendix), order of execution (when to do it) and outcomes (what will be produced). It incorporates the Business Planning process up front and outlines the initiation and planning phases. It was required in order to support the way in which AGILE processes and methodologies were utilised within Statistics NZ, and to facilitate alignment with other corporate processes such as the business planning round and project management methodologies.

14. The AGILE SDLC was presented to the IT Management team and signed off by the CIO in December 2009. The next step was to formalise AGILE with the wider organisation, so an AGILE paper was written detailing the AGILE SDLC methodology, experience from pilot projects and benefits for organisation. In June 2010, this was presented to the IT Advisory Group (ITAG) which has noted progress and endorsed proposed future direction. The CIO, Matjaz Jug, presented an early version of this process to senior IT management at Statistics Canada, Statistics Sweden and ABS, this was very well received.

15. During the development of the Statistics NZ IT Strategy 2009-2012 (IT Strategy) two key action points were developed in relation to the continued review and adoption of agile processes and methodologies for Statistics NZ. These are:

- (a) Under Goal 2 - Partnership, Collaboration and Cooperation
  - Action 2.1.5 - Continue the implementation of agile communication process (eg stand-up meetings) to improve the quality, effectiveness and frequency of communication and consultation
- (b) Under Goal 6 - Efficiency and Effectiveness
  - Action 6.1.4 - Employing continuous improvement strategies across processes used in service delivery such as Smart Method, ITIL, CMMi, AGILE. This will incorporate a review of these processes in conjunction with the Statistics NZ business areas to determine appropriate implementations of IT best practices for Statistics NZ.

## IV. Benefits

### A. Organisational alignment

16. There is much industry discussion on the benefits associated with adopting AGILE processes and methodologies. Summarised, AGILE development accelerates the delivery of initial business value, and through a process of continuous planning and feedback the product owner is able to ensure that value is continuing to be maximised throughout the development process.

Benefits	Reflects Value
Transparency	<b>Integrity</b> – "...we are transparent in the methods we use" <b>Communicating</b> – "...We communicate with one another clearly, transparently and with respect."
Collaboration and Communication	<b>Connecting</b> – "...We connect the information we have with the needs of the community... We know we achieve better results when we work with others..." <b>Communicating</b> – "...We communicate with one another clearly, transparently and with respect."
Regular Feedback	<b>Connecting</b> – "...We know we achieve better results when we work with others, sharing ideas, information

	and best practice.”
Improved Morale	<b>Leading</b> – “...We provide direction, share our vision, and focus on what’s important. We are confident and assured; take ownership while accepting accountability and responsibility; and role model behaviours that empower others.”

Figure 2: AGILE benefits mapped to Statistics New Zealand’s organisational values

## B. Project Management Office (PMO)

17. Our PMO is a strong advocate of the SCRUM AGILE framework. They see all the improvement they wanted to make in transparency and collaboration being supported by AGILE and the AGILE culture. Statistics NZ has chosen Prince 2 as our Project Management methodology and see that SCRUM AGILE can easily dovetail with Prince 2. Project Managers need to take care to establish ways of trying to keep sprint durations in line with reporting periods. They also need to align their sprint release schedules with these reporting milestones. More work can be done in streamlining management effort and we will continue to work on this.

## C. Enterprise Architecture

18. The IT Architecture team have been working towards an agile architecture. The Architect is a member of the SCRUM team and may attend the daily stand up meeting as required. He articulates an easy-to-understand model of the system, so that the rest of the team are facilitated to innovate and produce the best solution. The Architects have used a Conceptual Modelling Approach to provide this simplified concept for everyone. The teams then find that their User Story development (AGILE items of work) compliments this structural view of the system that the Conceptual Model helps provide.

## D. Great feedback from internal customers

19. As part of the review of the efficiency and effectiveness of IT Solutions processes, we have sought feedback on the increasing adoption of our implementation of AGILE. Our customers are enthusiastic about AGILE. Having worked with IT Solutions on AGILE projects, they say they have:

- (a) More visibility of project progress, issues, risks, effect of changes. Hence, better reporting and management;
- (b) More confidence in IT Solutions and better relationships;
- (c) More collaboration with IT.

## E. Better metrics

20. The AGILE SCRUM framework includes some great ways of keeping things very visible and visual. For example, at each daily stand up meeting, the team members will look at a “Storyboard”, showing the progress of the “stories” through the environments. This is very effective for understanding.

21. Gathering metrics and displaying them in chart format is also done on the storyboard. These metrics, collected so regularly, are very powerful, not only for comprehension, but also for comparison and continual monitoring and improvement. They enable us to understand how much work we can do in a sprint and therefore to give better estimates. Because our estimates can be trusted, our business units have much more confidence in the IT Solutions group.

Here are some examples of the Burndown Chart and Sprint Velocity.

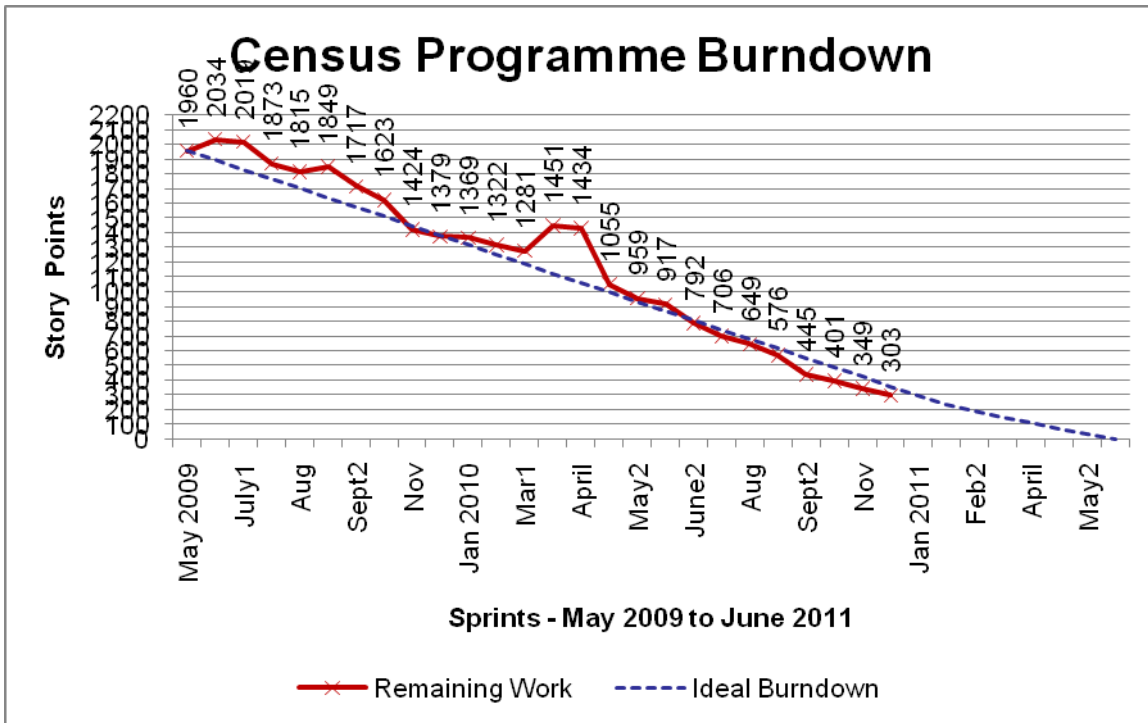


Figure 3: 2011 Census Burndown chart

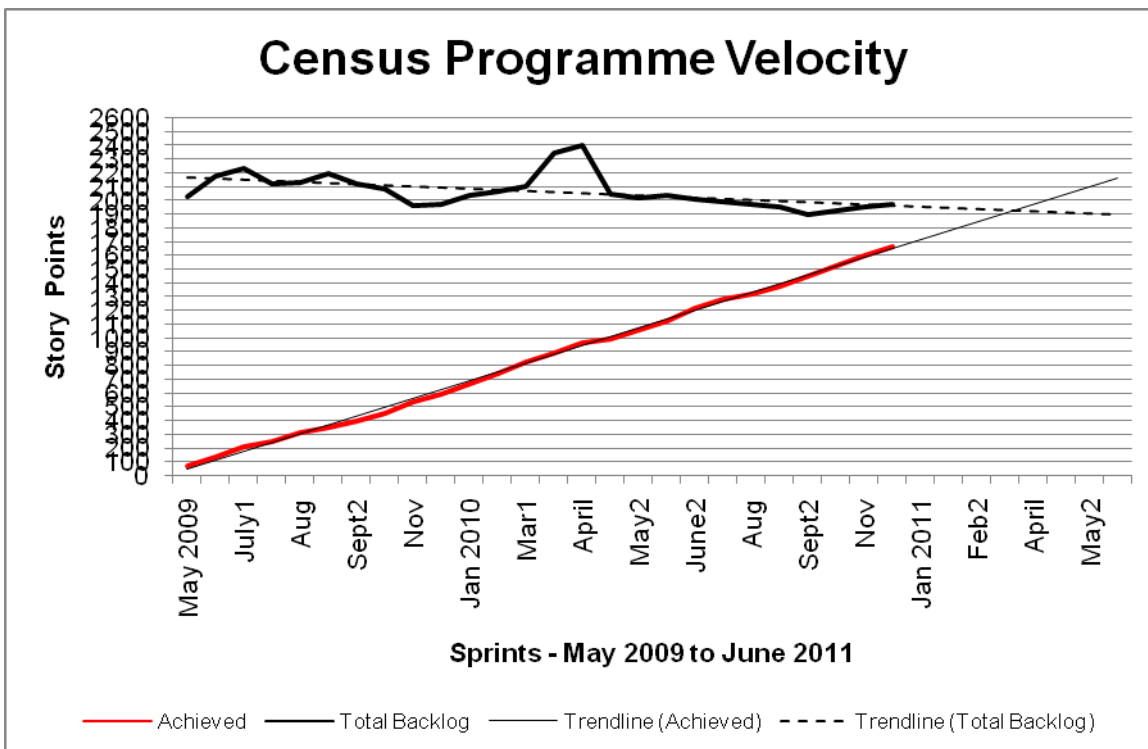


Figure 4: 2011 Census Velocity Chart

22. These charts enable the following reporting, which you can see is very detailed and informative. This one comes from the 2011 Census:



Figure 5: 2011 Census metrics, February 2011

The velocity is a very valuable figure to use for future estimates.

## V. Future plans

### A. AGILE Business As Usual

23. We are in the process of implementing AGILE as business as usual, in 3 steps:

#### Step 1: Continue to build AGILE expertise for IT Projects

Continue with teams using AGILE. Roll it out to those in IT Solutions who still haven't tried it.

Continue AGILE training for IT (in-house and external) and work on induction programmes.

Collaborate with the business to identify training opportunities that will better equip them to work with IT Solutions whenever there is an IT component in their project. Develop coaching and the mentoring programmes.

Run AGILE SDLC workshops.

Assume all new development projects will use AGILE, unless explicitly stated at the time of writing the Business Case.

#### Step 2: Evolve AGILE for IT Projects

Continue to learn and evolve the AGILE techniques we are currently using.

Attempt to co-locate where we can and to ensure that everyone on the team is involved early enough.

Identify and trial some other forms of AGILE which may be more appropriate for IT Support where the time boxing (sprints) is not appropriate. Continue development of tools to support processes.

#### Step 3: Adopt AGILE in a wider sense

Work collaboratively with PMO to encourage the use of AGILE Project Management methodologies across all projects where appropriate.

Identify and trial some other forms of AGILE which may be more appropriate for Business BAU type projects.

Set up a Community of Practise group to share ideas and improve processes.





Figure 6: 3 step plan for Agile Business as Usual

## **B. AGILE Business As Usual Achieved to Date**

25. Currently, in 2011:

- (a) The AGILE SDLC is the primary method for software delivery. Our IT development teams are mostly AGILE SCRUM teams. We have 4 teams in Christchurch, 3 teams in Wellington and 1 team in Auckland. SCRUM teams are cross-functional with Developers, Testers, Business Analysts, Architects, Methodologists and Subject Matter Experts working together on a daily basis. Our longest running SCRUM team is now co-located with the business unit. We use many of the templates from the original SDLC, and we also use the review and approval mechanism that was established at that time.
- (b) It was revealed that SCRUM is not so suitable for projects where there is a high degree of certainty in the tasks e.g. we've done exactly the same thing before; for example IT support or some business tasks. Another AGILE framework KANBAN is more appropriate for this work. Currently, we are using KANBAN in 3 areas:
  - i) The BEST project has a cross-functional IT development team all using SCRUM AGILE and the subject-matter unit using a KANBAN framework. The IT project monitors the two storyboards alongside each other at the sprint planning meeting and retrospective meetings. We have found this mix-and-match approach to be very successful.
  - ii) The IT Application Support team
  - iii) 3 Statistical Methods teams, using KANBAN for their day to day work.
- (c) Many Developers, Testers, Business Analysts have taken on the role of the SCRUM Master. Many have also been formally trained. We often rotate the role of SCRUM Master. We have run a training session for the business first level leaders, so that they can understand the benefits.
- (d) We have just begun an AGILE Community of Practise (CoP) which includes both business and IT advocates for AGILE. At the inaugural meeting of this group, In February 2011, we had 40 people spread across our 3 locations.
- (e) Last, but most important: we have delivered all our IT projects successfully when using AGILE SDLC.

26. We will continue to focus on training, mentoring and coaching. We are encouraging the AGILE CoP to continue to focus on these programmes. For example - we envision mentoring and coaching ladders, so that individuals can attain certain levels and then become a mentor to the level below.

27. We will continue to work on the 3 step plan for our AGILE Business As Usual scenario. We have completed many of the 3 step tasks, some of the tasks will be ongoing, and we are reviewing and revising some tasks as we learn more.

## VI. Conclusion

28. Our adoption of AGILE methodology is an example of innovation, initiated by enthusiastic staff who have been involved in project delivery and had direct experience with SW development process at that time. Organisation-wide deployment of this innovative approach however wasn't an easy exercise. Wide consultation, a lot of training and cultural change were required to overcome challenges and enable Statistics NZ to become more agile.

29. AGILE has been a great success for Statistics NZ. It solved some issues we were having and provided us with some real benefits to transparency, delivery and collaboration. It aligned with our organisational goals and our PMO direction. In dealing with the challenges AGILE presented we were able to improve our existing processes and our communication. We are now working in an AGILE Business As Usual environment for IT and encouraging the business units to use AGILE as much as possible. We look forward to making further advances by promoting an AGILE Community of Practise. This CoP will be tasked with creating and managing training and coaching programmes, and ensuring continuous improvement.

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## APPENDIX

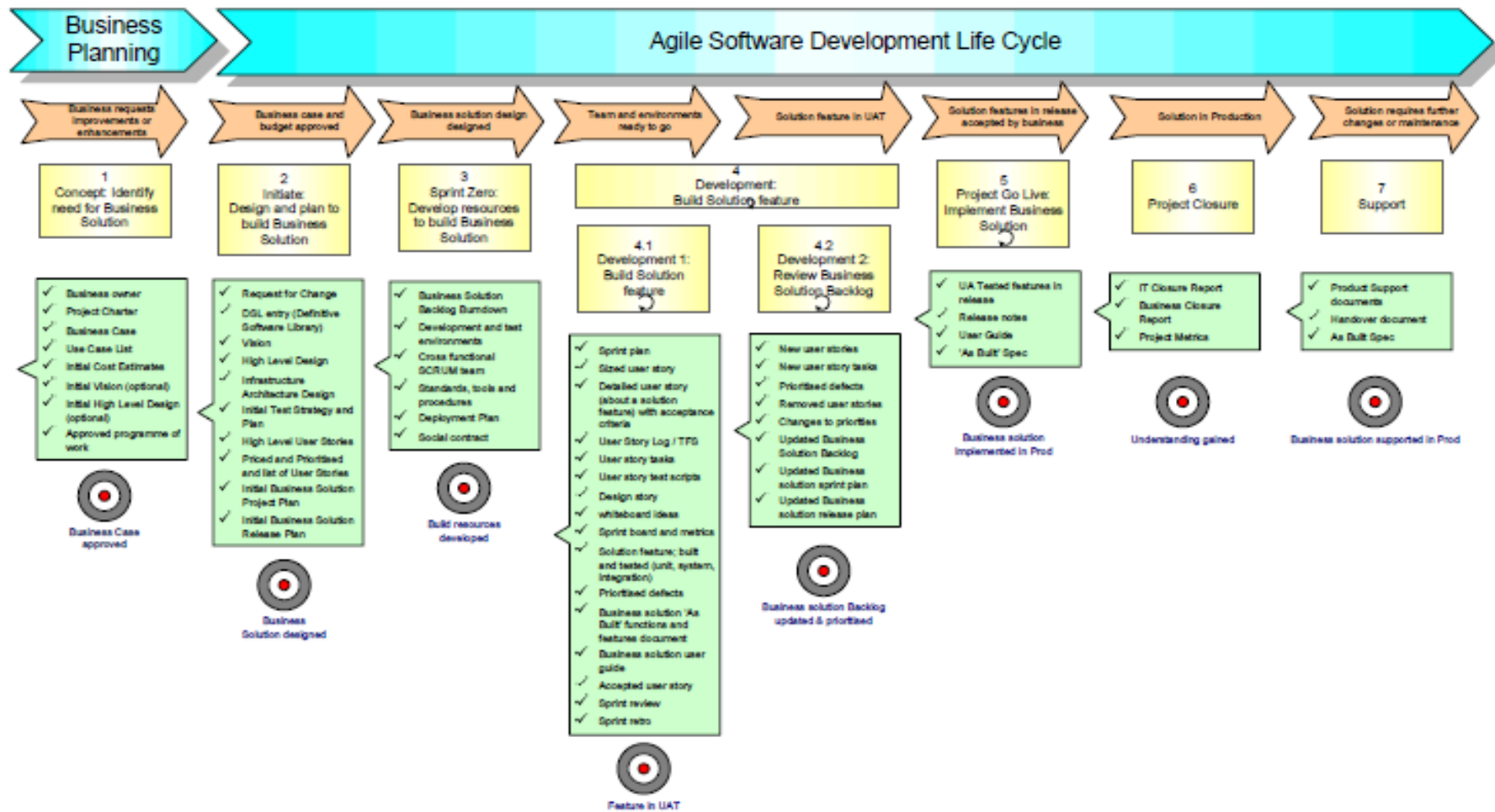


Figure A.1: AGILE SDLC – artefacts and milestones.

## Roles

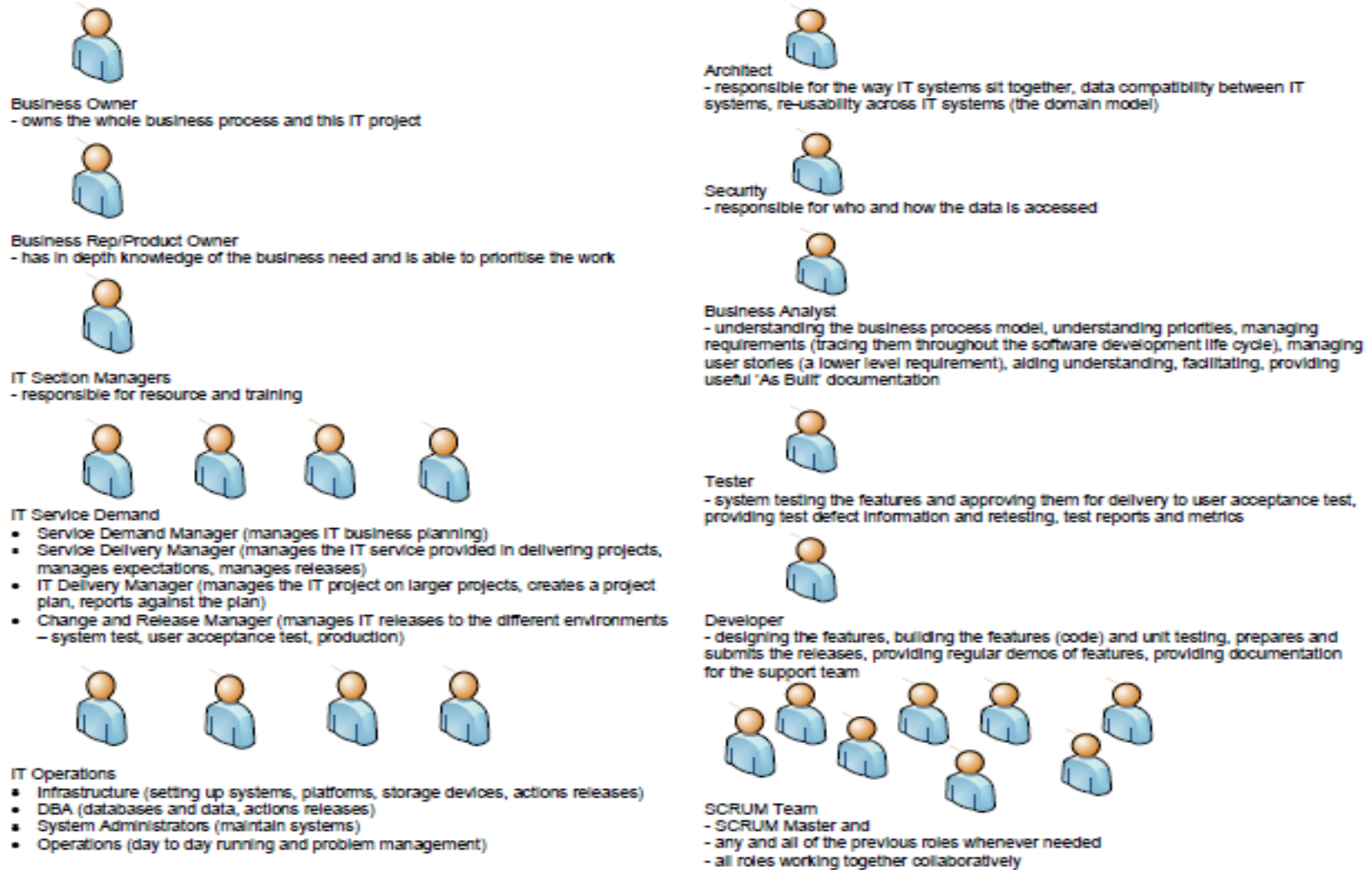


Figure A.2: AGILE SDLC – roles