This book continues the discussion and sharing of best practices we introduced with the books "...NET Enterprise Solutions ... Best Practices for the connoisseur, ISBN: 0-620-33013-9" and "NET Enterprise Solutions ... Interoperability for the Connoisseur, ISBN: 0-620-234680-9. Unlike its predecessors, this book is not focused on technology, but instead takes a critical look at how we typically build information technology solutions, how we define the modus-operandi of the team and the product life cycle.

- Why are so many solutions failing before they reach a “happy” client?
- Why are so many solution teams stressed before they ship their solution?

We do not have the answer and will probably never find the necessary oracle … but we nevertheless take a look at four typical software solution teams, building their own spaceship and flying to Pluto therein.
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... the **evangelists** of information sharing, technology and leadership in the **community**.

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Flying rocks are the roaches of space

Preface
Foreword

I first learned of Willy-Peter’s idea to write this book in December 2005, when we had both just completed a mammoth, but fun, poker scalability exercise at the Microsoft MTC technology centre in Redding UK. My good friend Willy-Peter Schaub, drew me aside to tell me he was planning to write a book to illustrate and share how our real life IT projects get implemented, but using a Sci-fi theme to convey this message. On returning home, Willy shared the idea with Geoff Bruce who immediately could not let this opportunity to share his talents and experience by teaming up with Willy to write this book. This was an extremely ambitious undertaking!

As they described the book, I became intrigued. The scale of what they were planning had never been attempted before, yet the text was sorely needed. When they asked me if I would write the foreword, I immediately accepted, as my curiosity had been whetted. As they sent me each chapter to review, the significance of the book emerged. They were succeeding in their ambitious objective. So now that the book is complete, what is my opinion?

This is a brilliant book! It introduces the concepts of the IT SDLC with humour, using lessons gained in the trenches. The subject is enormously important, but before this book was written, SDLCs are usually presented using extreme “going in” positions. This made the importance of understanding all the dynamics of the various SDLC approaches difficult to communicate.

I have often discussed projects with Willy-Peter and it has been obvious that the majority of projects usually land up being developed using a healthy combination of methodologies, based on the stage that the project is in “Darwinian Natural Selection at work...”, but if at any stage we had to ask a team member if the project is using their chosen methodology, the usual answer is “no we are not using my methodology”. Usually the answer is that individuals tend to measure against “extremist or purist” conformance to their methodologies, even though the project in reality might be applying a significant portion of their chosen methodology. This can even be seen in politics where politicians usually sell their extremist views, but in reality when in power they tend to be more realistic and apply what is right for the given situation, be they Republicans or Democrats.

Software Engineering is a rigorous way of approaching any problem or problem domain. The concepts are simple, but its application can be powerful or destructive. This book shows how complex problems using enterprise architecture can be resolved by considering all the perspectives and aspects that must be addressed to understand each specific dynamic:

- Perspectives enable a dynamic to be viewed through the eyes of all of the people who need to be involved: the planner, owner, designer, builder, subcontractor, and functioning enterprise. These people and their different interests must all be understood if the result that is produced is to address their various needs.

- Aspects are the questions that must be asked to understand each problem domain. These questions are: what, how, where, who, when, and why. They need to be asked from each person’s perspective.

Since the dawn of computers, many application systems have been developed at a great financial cost, yet many projects do not get to see the light of day. This is due to the complexity of the dynamics surrounding systems development. The problems are endemic. Above all, the problem is due to the inability of business and IT people to communicate effectively and measure their effectiveness of delivery towards this goal for the duration of the project.

This is not a dry technical text. In these pages, Willy-Peter and Geoff have written a book that not only informs and instructs, but also entertains! This is why I love it. Not just for the book’s importance, but because it is fun to read.

James Pereira
Enterprise Architect of Barone, Budge and Dominick
**D-Day @ Pluto**

I am a survivor. That sounds a bit like the words of a song or am I imagining that? It was a freezing cold day in outer space, at a distant location on route to Pluto located 4637.6 million kilometres from home. I first woke Team Leader, Byteonaut 906 abruptly out of his deep hibernation sleep … He knew instinctively that something was wrong. As his senses returned and he recognised the anomaly, I prepared to wake the other members of the crew. Our Team leader had started the journey together with his son 67D and close friend 305, whereby both have aged 9.5 years since they departed from their dusty launch pad in the Groot Karoo semi-desert on a hot and sunny afternoon in 2106.

The Leader battled to focus his vision, first noticing his son sleeping peacefully in his byteonaut capsule creating a huge condensation cloud with every exhalation, then the heavy condensation covering and dripping from all of the internal surfaces of the space probe. "Don't wake him," he said to me, but the process had begun and if I stopped the process, he would have died a painful death. I suppose looking back it would have been better not to waken them, but … I was … lonely and didn't want to die alone. Ironic isn't it?

The environmental control systems were struggling to counteract the outside temperatures of -235 Celsius. The slight drop in environmental temperature and rise in humidity seemed to indicate a problem … but what was wrong? Our Leader struggled to his feet and dragged himself over to the cockpit, his muscles refusing to carry his aching body in an upright posture, even with the reduced artificial gravity. He stared at the flashing red lights on the Plutonium reactor panel indicating a system overload and the impending disaster. There was no time to stop it. What he did have time to do was start the process that would eject me from the ship, which is why I am able to tell this tale.

As our intrepid leader crawled back to the crew’s quarters the crew was now awake, well almost. 906 dragged himself onto the bunk bed of his son. He saluted his colleague and hugged his son one last time. They didn’t have the time to understand his strange gestures, but the look on his face said something was desperately wrong. None of them, not 906, nor 67D, or their snorting colleague 305 felt the meltdown of the plutonium core, the instantaneous implosion of their exotic home and the subsequent explosion of their spacecraft. The roman god of the underworld had not allowed 622 to reach the halfway milestone … planet “Pluto.” Oh by the way, my name is Black Box CPU EDBB and I have been repeating this story and the telemetry of the last few hours, over and O-o-o…

The commanders of the other probes were woken up and alerted of the disaster by their JCN onboard controllers. They all observed the shock rings and debris of the doomed space probe with dismay.

After nine and a half years of space travel, the loss of the space probe and crew reminded everyone of the hostile environment in which they had to survive on a daily basis and the imminent arrival at the outer edge of our solar system, the Kuiper Belt, Pluto and its companion Charon.

Commander 600 glanced out of the starboard porthole and watched the approaching object with a mix of admiration and fear.
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Steven Borg

We thank the following advice/information contributors, testers, readers and reviewers for their valuable comments and suggestions of this text. None of the errors, omissions and/or confusions in the pages to follow is their fault.


We welcome your comments and ideas for improving this material. This book contains a vast amount of experience gathered by the authors and contributors, and incorporates suggestions we have received from our readers of our previous book.

Willy-Peter
Geoff

I would personally like to thank my family for being patient and accommodating, during the construction phase of this project yet again … and no, I will no longer promise that this is the last journey through the exciting jungles of the world of bits and bytes.

Margie, thank you for supporting this initiative and involving your team in the review, discussions and revisions of this book. Without the support of the BB&D ADS team we would not have completed this venture. ADS “rocks”!

Peter, your critical views and challenges to the structure, content and objectives of the book have made us think and re-think the content and style over many months … as you know. Thank you for your ‘constructive critique’ and for finally buckling under the pressure and giving us the green light to launch this space journey 😊

Geoff, your efforts and excellent writing skills made this book what it is today. Thank you very much for your hard work, your relentless commitment, for all the interesting discussions and the fun we had while writing this book.

Willy-Peter

Thank you Willy-Peter for your kind words and encouragement during these past few years while I have become increasingly more involved in the BB&D Publications, initially with the editing and now as co-author. This ground-breaking publication with its radical approach is both challenging and exhilarating. With this in mind you will appreciate that as I thank the directors of BB&D, they too have bravely shared in our endeavour. Thank you, I feel privileged to be part of this daring adventure.

Geoff
Conventions in this book

This symbol highlights recommendations and guidelines.

This symbol highlights reference material.

This symbol highlights alerts.

This symbol highlights concepts.

This symbol highlights references of examples in the journey.

This book includes the following features in every chapter, which are both conducive to learning and quick reference of information.

- **Objectives** offer an outline of the concepts discussed in the chapter.
- **Notes**, indicated by the symbols above, highlight important information regarding the concepts introduced in the chapter.
- **Quick reference summary** of recommendations and ends with a brief review of the information covered in the chapter.

If you encounter a strange term or word, we recommend that you try a simple conversion routine that decrements each character by one. In other words if you stumble over **GVO**, try \((G-1)character\)(V-1)character\)((O-1)character), which results in **FUN**.

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**Corrections and Comments**

We have made every effort to ensure the accuracy of this book and of the demo and companion solutions. However if you have issues, comments or recommendations regarding this handbook, demo or the companion solutions, please email them to:

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Before we design we need to know what we are making

Defining the Context

Objectives

✔ Define the context of the mission
✔ Define high-level requirements and goals of the problem domain.
✔ Create a common vision and agree on viability of solution.
✔ Design and document the solution to meet mission objective.
✔ Design the actual solution to meet the mission objective.
**Introduction**

With this, we enter the phase in spaceship design called "defining the context", which projects of the software engineering, software development life cycle (SDLC), often refer to as the envisioning and planning phase.

**Figure 1 - Position within life cycle (Define Context - Planning)**

**Moment of Truth**

Morpheus tapped on the open door of Thor, manager of Quality Assurance. He asked, "Got a moment?"

Thor was obviously deeply involved in something, but he looked up, saw the strain on his face, and said, "Of course. What's on your mind?"

Silently Morpheus went in and fell into the visitor's chair and his tension increased visibly. "I have a meeting with all the trainees chosen for the Pluto project. This is the decisive moment. After today there will be no turning back."

"Morpheus, my friend, this whole thing has been your dream. You sold it to our director's here at CC&E, they sold it to the Space Agency, who then sold it to the President and the budget committees, and now you need to sell it once again. It may be a moment of truth, but it's more your moment of triumph."

"Yes, yes, but I need for these 'software engineers' to look at the reality from the outset. I will ask them to lay it all on the line. It's the old bacon and eggs thing; the pig is committed, but the chicken is just involved."

"And you want them to realise that they are the pigs?"

"Yes... No..."

"No not pigs. They are heroes. They had all the odds spelt out to them at their interviews, right?"

"Yes, but..."

"No buts. You get out there and sell your heart out. Of course, I know you want them to have a complete picture; you will give it to them. At the end of it, they will all willingly give you their best, no matter the cost... or the risk. We are all counting on you."

Morpheus stood and Thor followed suit and moved out from behind his desk. He grabbed Morpheus's hand and they shook hands with an exchange of friendship and support greater than any words could have said.

**Moment of Triumph**

"We at CC&E want to congratulate you all for being selected to be part of the teams to go to Pluto. Whether it is a true planet or not has been argued for years, but there is no doubt that you are about to set out on one of the most difficult journeys that humankind has yet attempted. You need to realise at the outset that you will have the backing of this company. It has a great track record of success in project management - why else would the Space Agency have selected us to manage the Pluto projects..."
“... and that ends my speech.” Morpheus had given an inspiring talk. He had explained that they were part of an organisation with a rich history of success. He explained that part of their success was the 'Triple D' - Definition, Delegation and Dedication.

Definition was for well defined targets with complete and clear documentation, Delegation for the delegating of responsibility to all levels of those teams, and Dedication was to the sharing of ideas and internal methodologies through their huge Knowledge Base and the powerful search engine that went with it. But it was more than just technology, it was also the availability of numerous experienced people all willing to assist and explain what was in the database.

In spite of the brilliance of his oratory, not everyone was convinced by Morpheus's arguments. He would have been very concerned if he had heard the comments by two members of one of the groups, “What an old-fashioned way of doing things. All the latest information is available on-line.”

“Yes we will be way ahead of the others, because we will stay connected with the community on the Net.”

The irony of this was that Morpheus had actually encouraged everyone to make use of all sources of knowledge including the public domain, but stressed the value of the personal contact and specialised knowledge available within the agency.

Mission Context … the fascinating briefing by Space Agency

It all began back in 2104 on April 1. The samples obtained from unmanned trips to Pluto, scientists had proved that the elusive material, Emerald Crysoyte was available there in commercial quantities, but the unstable nature of this amazing substance needed the presence of intelligent life to persuade it to release itself from the host granite with which it has a symbiotic association. This they believe has something to do with intelligence being preferred to static strength by the precious crysolyte.

The space agency announced an ambitious project in the national newspaper to embark on a manned flight to the planet of Pluto and back and invited companies to attend a briefing session. Weeks later, after many meetings and competitive corporate wrangling, CC&E was awarded the tender to recruit and train a team of rather special people. This resulted in the group that Morpheus had so ably inspired; gathering at the Space Agency briefing conference centre and the briefing began.

The mission was to build four manned space probes to explore the planet Pluto and its satellite Charon with the key objectives presented as follows, listed in terms of importance:

1. Retrace the historical flight and telemetry of the New Horizon space probe from Earth to Pluto, which left planet Earth back in 2006
2. Send four independent space probes to the planet Pluto
3. Each space probe operated with a minimum of two and maximum of five byteonauts1 each
4. To perform a surface composition mapping of Pluto and Charon
5. To perform surface temperature analysis of Pluto and Charon
6. To land at least one byteonaut on the surface of Pluto and to
7. Observe Jupiter while using gravity assist to sling shot past the giant planet

The constraints defined by the agency were primarily around budget and launch information. The primary launch window was set for February 2106, followed by a flight of 9.5 years duration, 2 weeks stay at Pluto and an 11.5 years return cruise. Any slippage past the launch window would result in a doubling of the time for both journeys and would most likely result in a scrapping of all the missions. Each team was to receive one Atlas V662 first and second stage rocket, with a Delta 5 solid rocket third stage to launch the space probe into outer orbit. In addition, when in orbit, each team would attach to a modified space shuttle equipped with a lander-module and a base station for landing on Pluto. Each space shuttle would wait in outer space for a space probe ready to accelerate it on

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1 Byteonaut is the equivalent of an astronaut in the world of bits and bytes.
its mission past Jupiter and to Pluto. (The shuttles would be pre-launched and refuelled in space as it would not be feasible to launch the total mass in one go.)

In order to integrate seamlessly with the space exploration programs and mission control the agency required each space mission to divide into the following phases:

1. Mission lead up during which the space probe and cruise control vehicles are constructed and tested and the byteonauts selected and trained for the extended space journey.

2. Launch phase of the space probe and cruise control vehicle, and the union with the shuttle in outer orbit and sent to Pluto.

3. Cruise Phase during which space crafts are checked, instrumentation is checked, trajectories are calibrated and corrected by mission control and observations of space objects and planets is conducted.

4. The Arrival phase which incorporates the observation of Pluto and Charon, the landing on Pluto and the preparation for the return flight.

5. Call 2 Action phase, during which the space journey is analysed, findings documented and guidelines formulated for the return journey.

Some shocking principles concluded the overview. The definition of the quality bar was set at a sheer impossible level, as there would be no scope for error during the 21-year journey. Due to the extended flight durations and distances covered, the four space probes would need to be self-reliant, as mission-control could never timeously initiate any assistance or rescue.

They were all stunned and when hardly any questions were raised, the briefing was concluded. It was difficult to absorb the challenge of a manned space mission to Pluto, an overall mission duration of 21 years and a total distance of 9275.2 million kilometres in hostile environments. Any mistake would be fatal, while any delay during the mission would increase the mission from 21 years to infinity, with the distance escalating exponentially, but the concept of four teams, independently competing to be the best, was exhilarating and the challenge sharpened their interest and they crowded around the notice board to see the composition of each team.

Two of the teams consisted of friends and this seemed to please them, but the other two teams were a selection of various personality types and while this didn’t engender the same level of joy there was an acceptance of the choices.

An exciting, yet ludicrous and perplexing mission … just the right challenge for the four mission teams comprised of “software engineers.”
At this point Morpheus identified the four teams as T1, T2, T3 and T4. Not all the members of the teams would actually go on the space trip, but they had chosen and announced who the ones were who were going. He then encouraged them to choose names for their teams. In the same vein he suggested as they became familiar with each other to choose monikers or nick names to suit there individual characters. He wanted them to have a strong team identity and he encouraged them to choose an organisational methodology that suited the team style.

Morpheus was the appointed solution observer and mentor of the predefined space exploration life cycle and overall watchdog. He sat quietly in the briefing room looking at the others leave with a mixture of terror and excitement, pondering about the past few hours since entering the space agency building. After walking into the briefing room, he felt out of place, alienated and overwhelmed with the technology humming in many of the rooms visible to the passing visitors. The initial explosion of new names of specialists and information that bombarded Morpheus, was slowly being digested and arranged by his neural brain, making him feel more at ‘home’ and relaxed. As a result, the digestion of the information and analysis thereof was becoming more structured and constructive, awakening the free flowing and entrepreneurial thinking that made Morpheus the strong analyst, designer and mentor that the CC&E teams had grown to appreciate.

Realising that we know nothing and most importantly, not feeling alienated or inferior about it, allows us to filter out the bombardment of “noise” and to focus on the task of establishing how we acquire that information.

Envisioning the solution

T1 Envisioning - Team “Dynamic”
Morpheus first visited the T1-team. He encountered an environment in which all team members were engaging in interactive analysis and team discussions on a number of whiteboards, visually recording the casual discussions between team members and stakeholders of the space agency.

The team explained to him that they deployed a number of fact-finding options, including the analysis of existing documentation, interviewing stakeholders, shadowing users in specific space program environments, such as mission control and satellite tracking, focus-group discussions and surveys. Surveys proved immensely time consuming in terms of preparation, collation and analysis of results; however, the shadowing proved most valuable. In addition, it was most difficult in terms of minimising impact on existing environments and recording of “actual” behaviour. The latter proved challenging as the specialists often changed their behaviour while being shadowed.

Impressed by the interaction amongst the team and stakeholders, the visual models exploding on the walls, and especially the energy and passion displayed by the team members, Morpheus continued his journey through the remainder of the team areas.

Visualisation of information, through models and prototypes, promotes understanding and entrepreneurial thinking. Keep models simple and remember that humanoids can remember up to 7 key points effectively … thereafter brain drain & filtering occurs.

T2 Envisioning - Team “Tickers”
It immediately became apparent to Morpheus that the T2-Team was operating in a very structured manner and it reminded Morpheus of the military planning environment he was involved in many, many moons ago.

They had not been working together long enough for them to have chosen their nick names, so we will use their ID numbers to identify them. T2-7, the dominant project manager, welcomed Morpheus and guided him through the team work-area, introducing him to each team member and stakeholder they encountered. The manager appeared to enjoy introducing him to the team, which snapped to attention the minute he crossed their privacy zone.

They had already split the team into the analysis, design and construction groups, with the analysts engaged in brainstorming and sessions with stakeholders. The designers were busy with detailed documentation and the construction engineers were servicing their tools in the background. Team

2 In Greek and Roman mythology, Morpheus is the god of dreams.
leader T2-1 controlled the actions of each team member and interaction between the distinct functional areas, keeping an eye on and controlling of the entire environment at all times. The team had agreed at the start that it would be very difficult to figure out all the details and the scope of the solution and jointly agreed to use a stringent control process.

Morpheus was comforted by the controlled and clinical manner that this team was operating in, although the dotting of the i’s, crossing of the t’s and ticking of all tasks on a formal process chart made him wonder whether that level of control and associated effort was needed.

T3 Envisioning - Team “Churn”
Passing the T3-Team work area, Morpheus saw an environment that at first appeared very energetic.

While the other teams were applying a varying degree of analysis, team T3 believed that the requirements were straight forward and without further delay commenced with the construction of the framework of the space probe.

The analysts and designers conducted short interviews with random space agency staff, but then appeared to adopt a passive backseat position in the team environment. The construction engineers were already busy with piecemeal construction of the space probe and did not react positively to analysts walking into their area.

Upon closer inspection it became apparent that although there was an immense amount of energy and activity, interaction was minimal and models existed only in the minds of the creators. There was no clear cooperation between team members, or visible unified design or action plan.

Lack of interaction during the analysis and design phase can lead to misunderstanding of information and often result in projects that end with a bug storm, scope creep and implosion of team spirit.

Morpheus had an uneasy feeling about the team. He wondered if they were focusing on correct tasks at the right time. Based on his current observations, this team would probably have the highest risk factor.

T4 Envisioning - Team “GjsfGmz”
After the two “seemingly” controlled and one extremely energetic environment, Morpheus decided to visit the T4 team area, wondering what other environment style he would encounter.

Before he entered the team area, he viewed the huge notice on the door “GjsfGmz War Room” … pondering over what GjsfGmz³ meant and why anyone would name a solution team area as a war room.

³ We actually wanted to keep it a secret for much longer, however, for the less-analytical and more-critical reviewers this naming convention was a challenge. To short-circuit the analysis we suggest that whenever you see a strange term, use the formula character=visual character-1, in other words FBIZ = (F-1)(B-1)(Z-1) => EASY.
The environment was different to the rest. The analysts were reviewing existing documentation and reports of interviews and the shadowing of subject experts from the areas such as management, space physics, interplanetary travel, space vehicle maintenance and astronauts.

The whiteboard is an excellent analysis and design tool. Correcting mistakes and making alterations take a minimal effort with little impact on the overall product life cycle. Costs skyrocket and schedules move out when modifying actual components.

The designers were visually translating the analysis feedback to high-level models on the whiteboards covering the entire team room walls, while the construction engineers were working on what appeared to be proof of concepts.

What impressed Morpheus were the visual models. The analysts, designers, construction engineers and subject experts discussed them all in a very interactive manner. It was apparent that the entire team worked as one “team,” with a unified vision and goal, with continuous communication and effectively using visual aids to make all the available information accessible to all stakeholders.

Although the team appeared different to the rest, Morpheus realized that it was in fact a mix of the T1 and T2 teams.

The different team approaches to envisioning

Morpheus left the area, not as worried as with the previous team environment, but not quite comfortable with the high degree of interaction. The work environment seemed to stifle the enthusiastic energy seen with T3, but also appeared less structured than the T1 and T2 environments.

While Morpheus was dreaming about the eventual space travel, setting foot on Pluto and returning to Earth after an impeccable mission, the solution teams switched their focus from definition of the scope and the analysis of the objectives, requirements, constraints and existing information, to the actual planning and design of the final solution, the space probes.

Let us have a quick look at the four teams and relate them to stereotype teams we would find in the information technology and software engineering space:

T1 … Agile style team, focused on modelling and writing code in quick increments. Focus is on delivery, not process.

T2 … Process style team, focused on process, dotting all i’s and crossing all t’s. Focus is on process, not delivery of solution.

T3 … Chaos team … developers know best, design is not needed. Let’s start writing the code and cross the bridges as they appear.

T4 … Disciplined and experienced team, focused using the best of T1 & T2. Focus is on process and delivery, with many short delivery periods.

Envisioning Fact Finding Deliverables

Morpheus knew that it was time to explore the four different product teams and environments again, to get an understanding of their modus operandi, status and challenges. By now, each team should have a sound understanding of the problem domain to be resolved, the scope and be able to identify the core challenges and risks.

The good news is that teams T1, T2 and T4 delivered a vision & scope, a risk assessment and a project structure document to Morpheus.

It is important to realise that the core deliverables of the envisioning phase form the foundation of the forthcoming design phase:
The core and minimal deliverables after the envisioning phase are:

- Vision & Scope documentation
- Risk Assessment documentation
- Project Structure documentation

Perusing the deliverables made it apparent that:

- The **Vision & Scope** document ... outlines the objectives and the constraints of the problem context that the eventual solution is addressing. It is a consolidation of findings and decisions, forming the first formal agreement by all stakeholders of the solution team and the basis of whether to proceed with the solution lifecycle or abort.

- The **Risk Assessment** document ... defines the known risks to date, categorised in terms of factors such as probability, severity and exposure. It is normal to prioritise the risks in terms of severity, naturally highlighting the top 10 that are likely to hinder the overall success of the solution. It is imperative that the team monitors and proactively actions these risks as early as possible in the solution lifecycle.

- The **Project Structure** document ... defines the preferred team approach and management approach going forward, such as administration, standards, team resources, constraints. It forms the mandate of the team as to how they will be working as a team going forward.

Team T4 delivered additional working prototypes demonstrating some of the concepts and ideas, which the team investigated. While the effort of creating these prototypes is an additional strain on the solution team, Morpheus immediately saw the value of the prototypes, which in essence is another form of visualising the “thinking” to date.
Prototyping allows a simulation of the problem domain to be resolved and are excellent alternatives to shadowing. The drawbacks of prototypes are the potentially high cost and the trend of adopting prototypes in production environments, impacting quality and maintenance risk.

Morpheus concluded his investigation by reviewing the deliverables of team T3, consisting of component shells, which according to rough sketches would form part of the huge puzzle making up the final spaceship. He was amazed that the team had already managed to produce parts of the space ship and wondered how this team had managed to understand the complex requirements and commence with construction after such a short time, without any of the immense envisioning effort that the other teams were investing.

The teams all confirmed that the project was viable and proceeded to the next phase, labelled “planning,” while Morpheus was investigating the deliverables of the “envisioning” phase.

**Planning the solution**

Morpheus was amazed with the different team and management approaches he encountered in the four team-areas during the initial envisioning stage. He had decided to call a meeting of the combined teams and as he entered, there was a jovial buzz from the members of the teams. Perhaps it was his imagination, but he felt that there was just no urgency amongst them. This did nothing for his mood, which was black.

As he stood to speak, the assembled byteonauts and the other team members became silent almost immediately. He came straight to the point, “Thank you all for coming to yet another meeting. I know that the time is precious, but I am concerned that some of the teams are already lagging behind. Also, I have been looking at the statistics of the use of our Knowledge Base and frankly, I am surprised. Do you honestly think that you will find designs and plans on building a spaceship on the Internet? If you do, do you think that they will be based on personal and real experience or simply somebody’s imagination?

The knowledgebase forms part of the repository of information. Another important artefact is the design documentation, which should be FACTCVR, i.e. Feasible, Accurate, Complete, Traceable, Consistent, Verifiable and Required. This is to ensure that we can avoid missing, conflicting, infeasible, overlapping or ambiguous specifications, which will prove detrimental for the final solution.

“I know how easy it is to access information from the public domain, but sometimes the sources are questionable and their integrity doubtful, but now I can announce the scoop of the century. We have dramatically enhanced our internal knowledgebase. Not only have we downloaded all the...
valuable knowledge on building space ships, from the space agency, but we have connected to the Extra Terrestrial Virtual Brain, so now we can all access the phenomenal Extra Terrestrial Technology we call ETT. Now that is real and practical experience."

"Of course, we shouldn't generalise, however it is an accepted fact that Alien Technology is superior, after all they found us before we found them, but human methodology is better.

"This is the mix that makes the combinations of human and alien in the makeup of the teams work so well."

"I am not saying not to use the public information - far from it. You know that I encourage it, but I am saying that our own information is accurate, safe and guaranteed." Morpheus had paused to give opportunity for comment, but there was only deathly silence so he relaxed and said more calmly, "It's early days yet and there's plenty of time to come up to speed, but remember - if you start slipping behind it will take twice the effort to catch up. The simple solution is not to fall behind. If you are concerned about anything, speak up sooner than later."

"From time to time I will drop in unannounced and since you are now starting with the planning stage feel free to discuss your plans with me while I am there."

### Planning - Team “Dynamic”

When Morpheus made his promised visit, he found that the team work area was much the same as before, with interactive discussions, workshops and interviews of stakeholders and area specialists creating a vibrant atmosphere. The team leader had an analytical nature and as a result, he became known as Cy or Cypher. Slammer was a huge alien with a gentle nature which he compensated for by thumping the table to emphasise a point. Gopher was the willing helper who was always on the go, finding things for the team. This team had the wide range of various personality types and there always seemed to be someone suitable for any situation.

The business focused analyst team members were engaged in defining the actual mission and the space probe in terms of usage scenarios, often referred to as conceptual designing.

Whenever they completed a substantial number of definitions, they handed them over to the technically focused analysts who produced a logical design, viewing the usage scenarios from the team’s perspective.

More fully logically developed models from the wall diagrams, producing the input to the rest of the team who converted them into their physical representation and introduced the final view for construction.

It was interesting for Morpheus that they staggered the three streams of activities, not in a parallel manner and iteratively evolving the conceptually envisaged model into a detailed design of the space probe.

In essence, what the team was doing was to convert the high-level design into a detailed blueprint, whereby each level of abstraction had immense value to various stakeholders of the solution. His analytical mind formulated this picture:
Morpheus queried the overall progress and they referred him to a rough list of “things to do.” This appeared lean in terms of information, but nonetheless showed that the team was apparently making good progress.

**Planning - Team “Tickers”**

He greeted all the Tickers Team members. They hardly looked up and Morpheus realised that they were still working in the structured way as they had done in the previous stage.

Unlike team “Dynamic,” they were tackling definitions in a systematic manner and investing an immense amount of effort in completing each transformation of the high-level and the logical, to physical view. The leader was called ‘Watch’ as he was compared to a Swiss Watch because of his obsession for keeping to time and the precision he demanded from them. He insisted that everyone keep a copy of a plan to tick when an item was completed, someone joked behind his back, ticking the whole sheet on a clipboard in one go and they called him ‘Clip’. Another of the team was called Art. This was something to do with his obsession with the ‘Artful Dodger’, but even he wasn’t enough to sway the team from their determined approach.

Watch controlled the quality, the flow and the completion of each task with an iron-fist, allowing members to proceed only once the task had been approved by the relevant technical lead and then ticked off on the huge matrix of tasks on the main whiteboard.

The team had increased on three occasions since the inception of the project and was now four times the size of the other teams. The increase was necessary to allow the team to conduct the detailed planning and documentation tasks it had agreed to during the envisioning stage.

The team’s progress project plan was as detailed as the rest of the documentation, with Clip updating it methodically as tasks were completed.

A brief glance at the plan made Morpheus realise that this team was making progress, but would probably not be able to complete at the current pace.
He thought about introducing some techniques from the other teams, but he forgot the idea when
the public address emitted ear-piercing sirens, which brought Morpheus back to planet earth,
announcing the scheduled launch of a photographic surveillance satellite. It was amazing that
team Tickers did not even blink and continued their focused work, even though most stakeholders
left to watch the launch sequence.

Morpheus watched the spectacular launch as the ground started shaking. The two solid fuel
booster rockets kicked into action and began lifting the payload into space on top of the Titan IV
transportation rocket. At first, Morpheus could not see the rocket, hidden within the immense cloud
of exhaust smoke. Then suddenly it appeared out of the smoke, with its main engines and the two
booster rockets impatiently pushing the payload into outer orbit.

![Figure 8 - Titan IV launch](http://www.nasa.gov)

Soon the four teams would be sending their probes into space in a similar launch ... "would they be
ready and would each launch go as smooth as this launch?" Morpheus would have to wait for
another 19 months for the answer.

**Planning - Team "Churn"**

Morpheus arrived to a completely deserted team Churn work area, with everyone scattering off to
watch the launch of the surveillance satellite.

It gave him the opportunity to peruse the pieces of space probe components littering the
workspace. They had completed some phenomenal construction and using some imagination
Morpheus could already visualise certain areas of the space ship.

As the team members started returning to the work area, Morpheus had some interesting
conversations with some of the engineers. The team was definitely not focused on a collaborative
design, with every engineer producing quick isolated designs in their specific areas of focus and
some even constructing components.

None of the engineers seemed concerned about the overall assembly ... they would start worrying
when they eventually came to the point of assembly, which was more than 12 months away
according to the rough schedule, pinned on the team’s announcement board.

The leader was called ‘Fly’ - he was always flying off on different tangents. There was Messy Nessy, a
female alien who lived up to her name and Dr Woo who was always trying to get a date with her,
which was ridiculous as he was old enough to be her father and was actually Fly's son. These distortions in age manipulation introduced to human-kind thanks to ETT\(^4\). Ness mistook Woo's interest as his way of helping her to understand human ways of working and she asked him, "Is there some plan in the way things are happening?"

"Yes of course. What we are doing is to develop as many parts as quickly as we can. Then we have real things to demonstrate and visualise; not simply vague ideas. Once we have most of them we can easily see what is missing. Of course not everything will fit and may need some rework, but at least we can see it all coming together."

"You know Woo that is exactly the way we work back on my home planet called Ourous. It worked for us so I’m feeling somewhat at home here."

"And you managed to build a spaceship that got you here."

"Yes, but that was more good luck than good management."

Morpheus wondered if the comical stickers next to the main entrance were placed there as some form of humour, or as a way to emphasise how this team operated. He was hoping that the former applied, because the stickers bore slogans such as "Specifications are for the weak and timid" and "It is a good day to die … let’s ship the code." These were not very comforting to the outside observer.

### Planning - Team “GjsfGmz”

This team was operating using an interesting team and management process. As Morpheus walked into the by now familiar team area, he studied the interesting graphs that were printed on a large A1 sheet and pinned against the wall on a highly visible area of the room.

![Team 2 Planning Phase Plan](image)

The entire team assembled every morning for a "hot-tub" meeting at 07:30 for exactly 15 minutes, giving Knight, the team lead, an update of tasks completed since the previous meeting, which tasks were next in line and a mention of any impediments for the day that may influence progress.

Regular team gatherings, referred to as "hot-tubs", "scrum"s or simply a daily 5-min coffee/tea break promotes team spirit, cooperation and especially information sharing.

Other than this peculiar meeting, “GjsfGmz” operated similarly to team ‘Dynamic,’ where business focused analyst team members worked with the conceptual design. They in turn dished out substantial chunks to technically focused analysts who commenced work on the logical and physical design. In parallel the construction engineers were prototyping concepts for the analysts, ensuring that the decisions made by the designers were sound and finding resolutions to any issues the designers could not resolve on the whiteboard. They had chosen the names of Chess pieces for their monikers. ‘Rook’ was for the one who loved to put every task into the chart with perfect square blocks. Then there was the one with all the angles whom they called ‘Bishop’ and the official leader was of course ‘Knight’ or ‘White Knight’ as he was sarcastically called by some of his team.

\(^4\) Extra Terrestrial Technology
Prototypes are active models that can be seen, touched, felt and experienced by all solution stakeholders, promoting creativity based on continuous and rapid feedback, acceleration of solution construction and continuous evolution through adaption to change and changing requirements.

Figure 10 - Staggered Blueprint conversion with prototyping

The team worked in close collaboration with each other, with no hierarchy as was evident with team “Tickers,” and focused on the delivery of the planning phase deliverables. They had the typical list of things to do, but what they did was to select a few of these, just enough to complete in a short period and then they gave their undivided attention to these few items. They often exchanged tasks amongst themselves in order to meet their planned short term goals.

The high visibility of the planning phase progress and all information relevant to the solution resulted in an extremely agile team, capable of responding quickly to challenges and resolving all issues as a team, rather than leaving members of the team sweating in the corner. Bishop was the master of research and discovered many answers in the knowledge base and public domain.

The space agency stakeholders were extremely cooperative with this group, as they made them feel part of the team, being involved in most of the brainstorming and issue resolution workshops, together with space agency experts.

**Thoughts on the different team approaches to planning**

The teams completed the planning phase at different times.

Team “Churn” formally completed the phase mid September 2104, although construction had started in conjunction with the planning back in July 2104. The planning phase deliverables concerned both the space agency and Morpheus, as it was a collection of rough notes, which did not appear to define a consolidated solution.

Team “Dynamic” was next, submitting their planning phase deliverables to the space agency at the end of September 2104. The deliverables pack included comprehensive documentation, visual models and a revised risk assessment, which the team wanted to workshop with the space agency and a detailed construction plan for the way forward. Based on the plan the team would conclude construction, final assembly and testing well ahead of the launch date.

The following month Team “GjsFGmz” submitted their planning deliverables, which additionally included functional prototypes of the main space probe assemblies and a detailed product backlog list of tasks to complete during the construction phase. Morpheus listened patiently as Knight explained that they would start construction with a defined backlog, which they would decrement as they completed each task and that the team goals were more important than individual achievements.
The techniques they had experimented with in the planning stage were being formalised. The objective was to reduce the backlog to zero and to do so as quickly as possible; however, what appeared strange to Morpheus was that the team didn’t have a complete plan, but only had a plan for what would be completed in the first month of construction. At first, this seemed to be a way to gloss over proper planning, but at the end, they would put in more overall planning than if they had done it all up front.

Team “Tickers” was the last to submit in December 2104, whereby the amount of information and detail was overwhelming to the space agency engineers, taking receipt of the mountain of neatly bound design documents.

Team Dynamic and team GjsfGmz were operating similarly, with a focus on an agile and interactive design, using the Knowledge Base to great effect, but also involving stakeholders and area specialists to ensure rapid information acquisition and problem domain understanding. Team GjsfGmz even went one-step further and invited end-users of the space agency programs, the astronauts, to obtain first hand information on the usage, support and maintenance of the space solutions in the remote and unforgiving environments. Team Tickers were also focused on information gathering, analysing and documenting, but to a much more rigid and detailed manner. They used the Knowledge Base almost exclusively for all of this.

Morpheus noted how in varying degrees the three teams all identified the various roles of the space program, used the knowledge base as well as seeking advice from long-term astronauts for an in-depth insight into the space program and the intricacies around spacecraft. They all consulted area specialists for specialised topical information, and third-party vendors for systems produced and supported outside of the space agency.

It was important to profile the stakeholders and to plan the information gathering strategies appropriately. More information and detail was not advantageous if the source of the information was questionable and as more information was gathered, the more complex it became to coordinate the task, the analysis and documentation efforts.

Morpheus knew that there was simply no perfect way of gathering, analysing, designing and documenting a solution and only time would tell if the agile methods used by teams Dynamic and GjsfGmz, or the formal methods used by Tickers or the extreme and liberal method used by Churn would be successful.

There were simply too many ingredients and interdependencies, which would make such a decision highly academic. At the end of the day, the team needed to decide what worked best for its team environment, its team members and the way that the team operated. Each team and each team member was different.

Morpheus was most comfortable with the way team GjsfGmz approached the planning phase, because the team had visual access to the status of the project, to the latest models and most importantly contact with each other. The daily “hot-tub” encouraged interaction. It resulted in most of the team members having a sound understanding of the overall system, and who was responsible for which components.

The visual burn down charts were initially regarded with suspicion, but quickly became the team’s health and progress thermometer.

The fact that Team GjsfGmz also delivered a complete and up to date set of documentation and associated prototypes instilled a lot more confidence with the space agency, than the detailed and seemingly over engineered solution by Team Tickers.
The stakeholders regarded Team Churn as slightly arrogant. The engineers were always far too busy building components, to have an interactive discussion with them and fellow team members. The wave of construction deliverables was astounding; however, Morpheus was concerned that the support and maintenance of the solution would prove to be complex and costly, while the lack of design documentation and visual models might hide potential challenges until it was too late.

It was all the more critical because the teams were to split up and the final construction would take place in the sponsoring countries.
Conclusion

What is apparent when reviewing the teams is that the bigger the team, the more difficult it becomes to keep everyone involved. Figuring out all the details in a complex project is challenging, making it important to develop a feature list and a joint vision as early in the project cycle as possible. Face-to-face communication and visual reporting brings the team closer together.

It is impossible for us to get everything right the first time and the epiphany that there is no such thing as a perfect solution is an important realisation for all stakeholders, whether they are disciplined, pedantic or chaotic.

With information technology, we don’t normally view decisions about the virtual world as life threatening and the strategies of “let’s fix it when it breaks” and “let’s worry about it when it becomes an issue” are predominant. In space, we view things rather differently. There is no second chance and subsequently all issues and decisions are critical. The result is space agency solutions that are in a position to endure under the harshest conditions, and exhibit long-term survival, adaptability and business value.

Some key concepts to consider are therefore to:

• **Maximise**
  - Usage (re-use) of mountains, rocks and pebbles,
  - Involvement of pigs and area specialists and
  - Discussions, not exposure, with ants and termites early in the lifecycle, and so maximise the understanding of problem domain and coverage of expectations.

• **Minimise**
  - Involvement of chickens and especially seagulls,
  - Exposure of pigs to vultures, else politics and “noise” slows down progress and more specifically kills entrepreneurialism.
  - Changes to rocks and pebbles, else mountains become potential volcanoes.
  - Complexity during analysis and design, and so minimise risk during construction, deployment and stabilisation phases, as complexity has the nasty tendency to feed on itself and escalate.

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5 Mountains ... existing solid solutions and experience.
6 Rocks ... important artefacts making up the mountains.
7 Pebbles ... important third-party artefacts.
8 Pigs ... committed to the event, i.e. bacon of the breakfast required some serious commitment by pig(s).
9 Ants ... environment, workers and users using, thriving and reliant on the mountains and their services.
10 Termites ... same as ants, but creating small extensions to the mountains.
11 Chickens ... involved, but not committed, to the event, i.e. eggs of the breakfast required involvement by chicken(s).
12 Seagulls ... continuously injecting waves of information, especially acronyms; and generally creating unnecessary noise and confusion.
13 Vultures ... interested in the event, feeding on casualties and scavenging information.
14 Volcanoes ... existing solutions that are potentially unstable.
Quick Reference Guidelines

Fact Finding Milestones
- **Envisioning** … Definition of high-level requirements and goals of the solution, involving all stakeholders such as the sponsor, the customer and the team. Defines a common vision, agreement on the problems to be resolved, scope and if solution is valuable to the business.
- **Planning** … Creation of a collection of visual models and requirements documentation, defining the blueprint of the solution.

Information Categories … **to be investigated and documented**
- **Business** … how does the business environment work?
- **Application** … what services exist, how do they interact and are there interdependencies?
- **Operations** … what is needed to operate the business environment?
- **Technology** … what technologies are needed to create & support the business?

Gathering Techniques
- **Focus workshops** … Formal Joint Requirements sessions and brainstorming to generate ideas.
- **Shadowing** … observation of users performing frequent business tasks.
- **Interviewing** … One-on-one meeting between a team member and stakeholders. Quality of information gathered depends on skills of interviewer and interviewee
- **Surveys** … Set of questions used to gather information, such as satisfaction surveys. Surveys are labour intensive and complex to create, avoid leading, loaded and open-ended questions.
- **Sampling** … analyse existing documentation, other evidence and systems.
- **Prototyping** … gathering of information by simulating the business environment.

Deliverables / Artefacts … **of the fact finding phase**
- **Analysis**
  - Vision & Scope document
  - Risk Assessment
  - Project Structure Document
  - Optional supporting artefacts
- **Design**
  - Documented and categorised requirements
  - Application Architecture
  - Logical and physical data model
  - Logical and physical object model
  - Presentation model
  - Security specifications
  - Risk Assessment

Design Goals
- Feasible
- Accurate
- Complete
- Traceable
- Consistent
- Verifiable
- Required

Epiphanies
- There is no such thing as one perfect envisioning and planning process.
- It is difficult to figure out all the details in complex projects.
- Prototypes assist in the analysis and understanding of requirements.
- Posting progress reports visually keeps the solution team informed and focused.
- Involving subject experts ensures rapid and comprehensive information gathering.
I think that reading should be 5.7 and not 7.5

Mission Leadup

Objectives
- Construct the solution as per specifications.
- Test solution using a variety of test strategies to ensure specifications are met.
Introduction

We are entering the “mission leadup” phase, which in the software engineering software development life cycle is often called the construction phase. It is important to note that the byteonauts have entered the construction, not implementation phase, which implies that they are creating and testing the solution, but not releasing it for final acceptance testing and release into production. The effort and passion invested during this phase is often evident during the stabilisation and maintenance phase, which in the case of the byteonauts means the difference between returning from outer space and turning into space junk orbiting our glorious sun.

From theory to practise

Morpheus and Thor were sitting at the top of launch pad X#25, watching the sunrise over the restless Atlantic Ocean.

Morpheus was deep in thought when Thor asked, “So Morpheus, how are the four teams progressing?”

A few long seconds passed, before Morpheus took a deep breath. “Some are doing well, but I have an important change for them to consider. The space agency has given me an essential variation order. They are paying a lot for it and we must incorporate it into the plans. There is apparently another project on the go for the building of several unmanned communication space stations, to be spread out along the route to Pluto, to act as relays when our ships go into the shadow of a planet, moon or asteroid. They want us to now add a ‘Black Box’ that connects to all the ships systems to constantly record all the data and save the last few hours of it. If there is some sort of disaster, this will be ejected. The space stations will send a drone to seek out the black box and take it to the station where the data will be uploaded and relayed back to Earth. All our planning is complete, but I can’t say ‘No’ to the agency. It also concerns me that none of the teams have shown any real apprehension for the long and hazardous journey, but their enthusiasm
and their endless passion impresses me. I will have to rely on that when I tell them about this change."

"Morpheus, no one is perfect. I know you prefer to allow your team leaders to dictate the methods they use, but if you see something, just a word or two from you can make a big difference to fill in for small cracks in someone's character. Give them some guidance, highlighting the dangers and ensuring that the benefit of your own valuable experience is built into all the spaceships."

Morpheus didn't comment, which was his way, but he really appreciated his friend's advice. They both continued staring at the rising sun for a few more minutes. The moving light of the dawn descended slowly down the 50m vertical frame of the retired launch pad where 15 years earlier, Morpheus and his crew were strapped into the tiny capsule on top of the rocket which took them into outer orbit, to the moon and back to Earth. He would never forget the technical failures in the life support system, which nearly cost them their lives on the return journey. In space, human or technology failures are unforgiving and usually the crews never return to tell the tale.

Thor dropped Morpheus off at the space agency airport, where he boarded a two-seater F-15 Eagle Training Jet and settled in behind the serious looking air force major, nicknamed "Fearless Bat". After a few in-the-air refuelling manoeuvres, some spectacular high altitude flying and a typical Navy aircraft carrier style bone-crunching landing, Morpheus finally arrived in a remote airfield of Minsk, Russia. They were providing the lion's share of the sponsorship and were hosting two of the teams.

**Construction**

**T1 Leadup - Team “Dynamic”**

Cypher welcomed Morpheus as he strolled into the construction area, carefully sipping on the steaming hot chocolate in his favourite "Moon Mug". The Dynamic team was in the middle of a status workshop, with Slammer questioning each engineer as to the progress, or in some cases the lack thereof, continuing to thump his huge fist on the table to demonstrate his dissatisfaction.

"Gopher, where are the latest automated test results and cross reference to construction units?" They were obviously not in the briefing file, because Gopher slipped out to the printing room to collect the latest summary and exception reports.

Morpheus noticed that the team was constructing components of their spaceship in a quick succession of deliverables, i.e. many small parts, working off rough sketches stuck on the walls in a disorganised manner.

Slammer came up to him and smugly explained, "It looks a little like a skeleton of a spaceship at the moment, but we think that the most important thing is that each part should fit perfectly into its
neighbouring component, testing it first before mounting it into its final place in the ship. That interface is the first thing that we define and once it’s defined, we will not change it. We will change the inside bits if we need to, so as not to force it. We also know that the interface is as strong as it can be, because we won’t rework it to make it fit.”

Morpheus said nothing. Slammer was a little annoyed, not understanding this aspect of Morpheus’s character, and it added to his frustration.

Later over coffee Cypher was the target for an outburst of anger from Slammer, but as a wise and experienced leader he let Slammer have his catharsis and after he had relaxed, he drew out from him what were his problems. Top of the list was the way Morpheus seemed to ignore him. Cypher explained, “I’ve known Morpheus longer than you have. He won’t waste words; he has a low reactor personality, not responding unless asked an actual question. It’s not that he doesn’t appreciate what we have done. If he didn’t then we would know all about it, but if you want a reaction from that type of person ask a question. You will see that you will get a full response.”

“Really? I’ll bear that in mind. I think I’ve met others like him and I’ve not realised it. Thanks.”

So the spaceship was taking on shape. Unit and component testing was highlighting issues, which the team resolved as part of the construction cycle.

As shown, the team constructed component after component, testing each one before releasing it to the assembly team and continuously updating the technical documentation and blueprints of the spaceship. Components with dependencies were dealt with in a serial manner, while others were constructed and tested in parallel. The continuous testing and rapid assembly created a vibe of enthusiasm and the team was confident that they would complete the spaceship and pass all regulatory system and integration tests with flying colours. However, the fact that the overall status was not always visible at each stage of the mission lead up phase, concerned Morpheus, and as witnessed in the status meeting, was driving Slammer to the brink of a nervous breakdown.

Finally, Morpheus broke the news to Cypher about the ‘Black Box’ change. He considered it carefully and very seriously. Then he brightened up, “You know that all the components are unit tested individually and then in combination with associated parts. All the electronics are in place for this testing. I am sure that with very little trouble we can make these into permanent features and feed the data to your black box. Let’s find Sparks. He will be able to tell us straight off.”

They found Sparks pouring through his circuit diagrams and Cypher carefully explained the change to him. “You know I’ve had this in the back of my mind all along,” he said, smiling, “I did most of my training in an avionics company and there we always had a ‘black box’. I have planned it in from the start, especially when you asked for continuous testing - almost like its standard practice, if you know what I mean?”

Morpheus was about to leave, as he always did, with a quiet reassurance that they would be a success, when as he was striding off to the next team, Gopher came running over to him. “Morpheus,” he shouted, “we have been discussing the black box thing amongst ourselves and we saw that the spec calls for a homing radio beacon to be fitted into it. Well we had this brain wave - if it has a homing beacon, why can’t it transmit the data repeatedly instead. If it cannot be rescued, that’s not essential; all you need is the data.”

Morpheus was astounded with this insight and he thanked Gopher profusely, saying that he would definitely share this with the agency and the other teams. It instantly reaffirmed his confidence in
the ‘Dynamic’ team. He zipped up his artic jacket and made his way over to the assembly hall of team “Tickers.”

A continuous update of documentation will ensure the recording of all information and that a complete set of documentation will accompany the final solution. This is an invaluable asset to the maintenance and support teams.

**T2 Leadup - Team “Tickers”**

Morpheus arrived at the assembly hall of Team Tickers, where he drew another cup of hot chocolate from their machine. As he was cautiously taking a sip, Ticker arrived to greet him. He dusted off the snow and peeled himself out of the warm clothing. “How is it going Ticker”, Morpheus asked … a question he would regret for the next 3 hours, during which Ticker and Checker bombarded him with accurate, clinical and endless status information.

With a feeling of great dread, he broached the subject of the new and additional requirement. The two team-members actually went pale as they pictured how many documents would change and need checking all over again. He tried to make light of it giving them the ideas that the previous team had suggested, but all he got for his trouble was a cold stare. He decided to leave it with them to discuss it at one of their many production meetings.

The status update and the clinical construction hall had actually given Morpheus a feeling of comfort and the impression that the team had everything under control, but when he saw the reaction to the change he wondered and asked himself, where was the active participation and passion, which impressed him with the “Dynamic” team?

Morpheus visited each team within the “Ticker” assembly hall. He studied all of the Swiss-like diagrams covering the walls, and noticed that there were few construction and testing resources, but many grim looking resources checking and “ticking” checklists. Art was cross checking all checklists, making notes on both his Pocket-PC and Tablet-PC which accompanied him 24x7, and all this, confirming that progress was often much slower than anticipated.

The assembly hall was clinically clean and ordered, giving the impression of a highly organised and high quality environment. The spaceship was looking great, however, only the hull existed. The focus was on excellence. Dotting the “i’s” and crossing “t’s” had cost the team valuable time.

As it was during the planning phase, the construction was based on a serial process, with team members often standing around, waiting for a component to be tested before they, or the
component, could proceed to the next step. Ticker was enforcing this, at times frustrating progress, with Art double-checking.

Morpheus enjoyed yet another steaming hot chocolate, while Ticker gave him a final debriefing. Although Morpheus was concerned with the overall progress, the team maintained adamantly that they will complete the spaceship and pass all regulatory system and integration tests. He then asked, “Will you also be able to do my change?” The team seemed to assume the question was rhetorical as they didn’t answer.

“Fearless Bat” was waiting for Morpheus, with a fully fuelled plane. The crystal blue sky awaited the twin-engine plane, the batty pilot and the cold and exhausted Morpheus.

The trip to South Africa will remain with Morpheus for the rest of his life, especially the spectacular landing in the arid and dusty airstrip between the beautiful mountains of the Groot Karoo. The huge mountains, valleys and stunning canyons were as dramatic as any found in the world, hidden to the public by impenetrable geography, but not to Fearless Bat who took the scenic route. Morpheus was wondering what the maintenance engineers would think, when they found the marks left by him as he clutched onto his ejection seat for dear life.

**T3 Leadup - Team “Churn”**

The entry into the “Churn” team area was like day and night, compared to the previous construction and assembly halls he had visited.

A clean and orderly environment is not only appealing for the ad-hoc visitor, but also creates a more appealing and productive environment for the occupants. Would you leave your favourite car at a garage that looks like a dog’s breakfast?
Fly and Woo, both dressed in shorts and t-shirts were having a raging argument, while Nessy was sleeping on a desk which looked as if a super cell tornado had passed by. When Fly noticed Morpheus, he left Woo arguing with himself, and greeted Morpheus.

In the background, the “Churn” team was constructing components of their spaceship in a seemingly chaotic manner. There were components everywhere, no sketches or diagrams ... the spaceship assembly area looked like a scrap yard.

Morpheus asked sarcastically, "Where is the construction being done?" The others thought it was a joke and they laughed heartily. He introduced his change request and no one batted an eyelid. What was one more problem compared to the many others they had not yet solved.

Morpheus asked each of the team leaders separately when they were alone, "How far along are you?" He received a wide variety of estimates that had much more to do with the individual’s character whether pessimistic or optimistic, than with actual measurement. He then asked, "How do you know what to do and how or when to do it?"

This question was answered more consistently and he was told more or less, "When someone has a problem we all gather around and help. We have a great team spirit and we always come up with the solutions on a collective basis."

"Do these solutions get written down or recorded?" Morpheus tried to probe the methodology, to see if there was one there.

"Oh somebody will do it," was the typical response, but he could not pin down who that somebody was.

Throughout the process, there was a lack of status tracking, a lack of visual aids and the blatant lack of integrated testing that gave Morpheus sleepless nights for a long, long time.

There was also no trace of the spaceship. Instead, the engineers were frantically assembling pieces all over the assembly hall.

Morpheus confronted Fly, who was peacefully puffing on his handmade pipe and spreading blue puffs of smoke into the sterile assembly area. Fly could not understand why Morpheus was confused and concerned with the chaotic assembly, with no evidence of documentation or stringent testing of the critical components. Pointing to the nuclear power unit, lying next to a pile of components labelled life support system, Morpheus wanted to highlight violations of the space agency standards but his voice was gone. He swallowed hard, hoping to regain his composure, but instead he froze ... staring at the life support system ... a similar system which failed and nearly cost him his life in outer space.

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Figure 19 - Construction based on a chaotic construction and test concept
Fly and Woo dragged Morpheus away from the assembly hall, back to the control room. They were overly confident that they would complete the spaceship and pass all regulatory system and integration tests, although the regular arguments around testing and assembly challenges had caused a decline in the harmonious team spirit.

What worried Morpheus more than anything, but he couldn’t tell them, was that this particular team had saved his bacon on many previous occasions. They were talented people. His gut was telling him to close them down, but he had no decision data. For all he knew there was a complete and highly functional space craft buried in the chaos.

Nessy finally woke up, snorted in her alien way until fully awake, and turned to Morpheus, Fly and Woo as they entered the control room. “Morpheus, we are building what we believe is crucial for the launch. Whatever we are unable to complete, can be completed when and as needed, during the cruise years in space”.

Morpheus stared at Nessy in disbelief and he decided that his policy of non-interference and leading by example, allowing the teams almost a free hand, was not working for this team. He said sternly with a hint of steel in his voice, “I want you to clean up this place. When I come again, I want to be able to eat off the floors. Make sure that all the re-work that you have needed to do has not weakened the structure and basic integrity of the ship and engine mountings in particular. You’ve heard of ‘designed by committee’. Well every component here has been designed by a ‘different committee’. Sometimes you test and sometimes you don’t. There is too much iterative re-work. Get some order into how and what you design and construct… test and document everything. Put everything onto a table, a jig or a stand and then test it thoroughly. If you don’t pull up your socks, no matter what the agency inspectors say, I will personally not approve your ship as space worthy.”

Never leave a “red” flag scenario unnoticed or “park it” until a later stage, because truly “red” flag issues have a tendency of festering on issues and becoming worse and often entrenched over time.

He left the stunned team members and stormed off to the F-15 waiting to return him back to the space agency in Florida. Finally, when he relaxed, he began to enjoy the flight and started with his report of the three teams, their environment and his perceived status of all three space ships.

As they crossed the Karoo and then the Namib Desert, Morpheus stared at the brown and arid world below. He focused on his laptop and the status reports, as Fearless Bat left the African continent behind them, with the blue and calming Atlantic below and ahead.

**T4 Leadup - Team “GjsfGmz”**

Not surprisingly, the “GjsfGmz” assembly hall looked like a chessboard. The teams were working on ordered components, with neat yet detailed illustrations covering the design rooms. Morpheus inspected each diagram, looked at the status charts he observed before and noticed immediately that the team had made immense progress since his last visit.

Knight welcomed Morpheus and suggested that he join them for their daily “hot tub” meeting. The complete team had assembled in the main design room.

Bishop led the meeting, not Knight as might have been expected. Since there were some other newcomers besides Morpheus, he gave a little introduction before the meeting started.

He said, “I want to take a moment to explain again my role and that of Knight. He is the boss all right, but he is accountable to the clients - the Space agency, but I control the production through this meeting. We have a fixed amount of work to achieve in a short time. This is our only responsibility, not the full backlog of things to do; that is Knight’s worry, not ours. Our concern is, no matter what, we deliver what we have on our plates for these short two weeks, no more, no less. Now in order to ensure we are on track we meet every day to report - not to the boss and the client, but to each other, so that we can together get the job done, so let us get on with it. Abe you’re up first.”

Each member gave a short update of progress since the previous meeting, a confirmation of work planned for that day and in some cases highlighting impediments, which may hold them or other team members up unnecessarily. Morpheus did not recognise one of them. He was obviously a new member of the team. When asked to share he said, “It’s like being at a treasure hunt, finding out what must be done. I have been thrown into the deep end, but hello, I can’t swim.”
Everyone else thought that this was so very funny and they all were rocking around with laughter.
Rook came to his rescue, "We may appear to be disorganised and it may be hard to find a
detailed written spec, but we write the spec on our minds and notes, when we need it, in discussion
groups, with the stakeholders and other experts. After this there is a team who follows up and
documents all that we have done."

The young man was not yet satisfied, "You mean you document what you have done, not what we
must do?"

This time Bishop explained, "At least then the documentation is accurate. Isn’t that worth
something?"

Suddenly the light shone through, "Yes I suppose that is true, and you say the experts are telling us
step by step what we should be doing? At least you can ask for an explanation if it’s not clear. You
can’t do that with a document." He smiled as he saw the wisdom of the approach.

Communication is the key! It encourages an exchange of information, sharing of
responsibilities and often resolves issues, which would otherwise grow into relentless
monsters, appearing at the most inopportune moments.

Although the meeting was quick, Morpheus was amazed at the enthusiasm and passion that was
bubbling through the conversations. The team was able to discuss issues before they became
frustrating impediments and it was interesting to note that most issues were resolved through the
discussions.

After the meeting, Morpheus was glad as they migrated to the canteen. Bishop stood next to
Morpheus and explained the progress chart amongst the many covering the wall.

"The ultimate goal is to build a spaceship, of course, but as a goal, it is impossible to see the detail.
Our planning defines the whole process in terms of short-term deliverables, fully constructed and
tested - complete. The approach is to focus on a small subset of these deliverables, then to
construct and test, for nine or ten days straight. All the teams work together, testing on their test
benches, each type capable of performing the stringent tests in sequence as per the test cases
defined in the functional specs. The tests must pass until the last planned test in the sequence fails.
This is by design since it means the test is working and then the next step in the construction can
proceed. The engineers continue with construction again until all test sequences pass. Then the
deliverables are considered ready for fitting into the ship or into parent components."

An important aspect was that because all the teams worked to the same time schedule - in waves
of production - if one failed; they all failed, but as a rule, this was not the case. Each delivery
presentation every two weeks or so, was an occasion of pride and pleasure in a job well done.

The method encouraged sharing of the load and skills, to meet the deadline. The down side was
that it was difficult to reward the diligent, but the team members put the shirkers in the spotlight at
the hot tub meetings.
It was time to introduce his news about the change to the requirements and Morpheus wondered how this team would handle it. He called a meeting with Knight, Rook and Bishop and told them. They accepted the news with a matter of fact attitude.

Knight said, “I will add this to what we call the overall or product backlog. This would not affect production in any way since they were working with their small subset and there is an unwritten rule that this will not change. On the ‘product backlog’, we will first assess the change and introduce it in a planned way.”

“Yes, we continuously juggle with the product backlog anyway,” said Bishop, “so change is part of the process and since each wave of work is an entity in its own right, there is no noticeable change at the construction level.”

Morpheus then shared the way that ‘Dynamic’ were planning it and Bishop agreed that it was a good idea, but since many of the components that would need to communicate with the ‘Black Box’ had already been accepted as completed, there would be an issue, but he stressed that this was an aesthetic issue, not a technical problem.

The “GjsfGmz” team made a positive and harmonious impression, with team members assisting other members to complete their tasks in cases where issues or time slippage threatened the overall progress of the solution. Each team member was aware of what the rest of the team was doing, the issues experienced and were therefore in a position to assist pro-actively where needed.

It was a far more intuitive and enjoyable working environment, compared to the chaos and arguments Morpheus experienced in his recent visit to the “Churn” team. There was a far better “team life” compared to any of the other three teams and it was blatantly evident that this team was having fun.

As with the “Dynamic” team, the “GjsfGmz” process updated the technical documentation in parallel to the testing and construction; they performed non-dependent tasks in parallel where possible.

In the assembly hall, the spaceship was being assembled along the same lines adding the tested components regularly and constantly, with automated system tests continuing throughout the night. Every morning, Rook produced a detailed set of reports detailing the progress and problems experienced with the daily assemblies, the nightly test sequences and the completion of tasks identified in a report labelled “Solution Backlog”.

Morpheus was surprised to notice that team members would pickup a coffee, tea or hot chocolate and head straight for the reports, before returning to their stations. Because the work was ‘bite-sized’, there was an air of confidence about them, without the stress of an overwhelming backlog.
of work. Their only ‘backlog’ was what they needed to accomplish in ten days. The steady stream of measurable outputs pleased everybody.

Morpheus ducked as he walked out of the team area, avoiding a barrage of multi-coloured stress balls that appeared out of nowhere, followed by a cheer and clapping of the “GjsfGmz” testing team. Another presentation of deliverables was about to happen yet again.

It was probably not surprising that the “GjsfGmz” team was to be the first to roll their spaceship to the space agency quality assurance centre for stringent quality assurance.

<table>
<thead>
<tr>
<th>Construction Phase Deliverables</th>
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<tbody>
<tr>
<td>The end of the construction is not the end of the project, but rather the beginning of the implementation phase. In due course, the project would expose the byteonauts to the implementation phase, but the stakeholders must first accept the solution. The failure to release solutions into production due to technical faults or in the worst case, not meeting the business requirements is a stage of hard work and other hardships and often brings over-confident solution teams back to reality. If the solution doesn’t meet the business requirements, there is no value for the solution stakeholders, the business, and therefore there is no value in the ailing solution.</td>
</tr>
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The core and minimal deliverables after the construction phase are:

- Solution comprised of production ready components
- Solution test components, used to test and validate the solution components
- Revised and complete technical documentation for solution
- Test results matched against business requirements and associated test cases
Test Strategies

The most important epiphany that Morpheus identified during this phase of the program is that testing is a main pillar of a successful solution. Test early and thoroughly to avoid discovery of errors, issues and discrepancies late in the solution cycle, as the later the discovery the more expensive and the less likely that a resolution can be implemented timeously.

![Diagram of testing strategies]

A small unit of work is typically tested with “Stub” tests validating that the constructor is satisfied that it is compliant with the specifications. Once enough units of work are completed and can be assembled into a component or program, the testing moves from stub to “Unit” tests, which validate a complete solution or complete subsets of the solution.

Once the entire solution is complete, the unit tests are escalated to ‘System/Integration’ tests, which validate the entire solution. As with stub and unit testing, the system and integration tests are focused on verifying that the solution meets the specifications, mainly from a technical perspective. In parallel to unit, system and integration tests, the ‘Functional’ tests validate the solution from a functional perspective, validating whether each component, program and solution meet the functions they were designed for. ‘Test Use Cases’ typically forms the test map and test checklist for the functional tests.

Morpheus wondered if he should share his concerns with the way the “Churn” team construction manner and testing, or visible lack thereof with Thor.
Conclusion

It is important to realise that each solution team is different, comprised of a number of volatile ingredients such as management, team members, team dynamics, the way-of-doing-things within the team, methodologies, guidelines, policies, standards, mandates and the historical baggage each of us drags around and introduces to the team.

Some solution lifecycles are highly structured; others are more agile, while others may remind us of complete chaos. Yet each has a right for existence and if implemented correctly by the appropriate team, it will result in a solution that meets, or even exceeds stakeholder requirements and expectations. In other words, there is more than one road and mode of transportation leading to good old Rome.

As Morpheus explained to Thor, all teams seemed to make good progress, but while that was obvious, as the byteonauts realised that they did not understand or misunderstood the requirements, if any were available in the first place, each team faltered in terms of completing outstanding items. What differentiated each team from the others was the manner in which they identified and handled common construction issues.

- The Dynamic team noticed this dilemma late in the lifecycle and resolved this through ad-hoc whiteboard sessions. The result was a rapid burn down at the end of the project.
- The Tickers team noticed the deviation in requirements and actual implementation late in the construction phase, too late to make the necessary adaptations for the launch.
- The GjstGmz team noticed early in the lifecycle and resolved through focused whiteboard sessions. The result was a rapid burn down, i.e. completion of requirements in the middle of the project.
- The Churn team apparently did not encounter this dilemma as all engineers were happily building what appeared important to them, with limited communication amongst the team and practically no communication with the stakeholders and subject experts.

While each team had the right to decide the way it would operate as a team, the methodology used by the "Churn" team made them appear arrogant and aloof, but subject experts were concerned that key concepts and solution requirements were not being considered adequately. Communication was essential regardless of the modus-operandi. In his reports and at debriefings, Morpheus recommended to all teams to communicate openly with all stakeholders of the solution.

Using the term, 'The Churn Team' may be a misnomer. Are they a team or simply a group of individuals? The art of managing any group of people is to acknowledge and harness their strengths and abilities (through training, recognition, utilisation, and the occasional challenge),

- As a team,
- As a part of the team,
- And as individuals.
Quick Reference Guidelines

Differentiating between construction and implementation:
- System construction: Development, installation and testing of solution components.
- System implementation: Installation and delivery of solution into production

Construction phase artefacts:
- Solution comprised of production components implementing business requirements.
- Solution test components, used to test and validate the production components.
- Revised and complete technical documentation for the solution and its components.
- Supporting test documentation matching results to business requirements/test cases.

Standards, Guidelines, Policies, Mandates:
- Standard: Categorise into mandates, policies and guidelines.
- Guideline: Definition of preferences, leave final decision to user.
- Policy: Define preferences, with connotations of derivations.
- Mandate: Define requirements, which must be strictly adhered to.

Common Methodologies:
- Microsoft Solutions Framework (MSF), with CMMI and Agile derivations.
- Rational Unified Process: focused on iterative solution development, visual modelling, and validation of quality and management of solution change.
- smartProcess, iterative spiral SDLC\(^\text{15}\), based on the Microsoft Solutions Framework.
- Agile: focuses on people rather than processes. Team is given the flexibility (agility) to select from a variety of tools and techniques of their choice.
- Scrum: an Agile process enforcing simple rules that allow teams to rapidly organise their environment, producing solutions with evolving architectures. Advantages include increase speed of construction, alignment of individual and organisation objectives, creation of a culture driven by performance and most importantly enhancing quality of the team life.
- Extreme Programming (XP), suited for small, but critical construction. Focus is on efficient communication, reducing errors by bringing the complete team of stakeholders together.

Common Testing Strategies (see page 50 for more testing)
- Stub: Test and validate construction and as a subset of a solution.
- Unit: Test and validate the complete solution (all programs/components).
- Functional: Test and validate that components perform the functions they were designed for.
- System/Integration: Test and validate on an entire solution.
- Non-Functional: Test and validate non-functional requirements, such as stability and load.
- User Acceptance: Test and validate, allowing solution users to review and accept the solution.
- Pre-Production: Test and validate the solution in a production-like environment.
- “Other” Testing and validation including regression, black box, disaster recovery, failover, compatibility, performance, scalability, reliability, volume and stress testing.

\(^{15}\) SDLC: Software Development Life Cycle
The greatest and most crucial deliverable is the control of those mighty engines

Launch

Objectives

- Test solution using a variety of test strategies to ensure business requirements are met.
- Verify that solution meets the agreed quality specifications.
- Release the solution into the production environment.
Introduction

We are entering the "mission launch" phase, which in the software engineering software development life cycle is often referred to as the release phase. The teams and space agency are jointly testing the solution using a variety of test strategies to ensure all functional and non-functional requirements have been met, while the quality assurance team is verifying that the agreed quality specifications have been met. A "thumbs up" by all parties implies green lights for the launch, anything less would announce disaster for the solution.

Once, and only once, all i's have been dotted and t's crossed, the solution is ready to be released into the production environment. In this case, the release is the launch of the spaceship into outer orbit, the first step on its long journey to Pluto.

Following the installation of the spaceship, the story of this chapter begins with the spaceships of each team making its journey from the assembly hall to the launch site at a steady 0.5km per hour. During the roll-out journey lasting between 1 and 2 days for the four teams, the access platforms were secured, allowing subject experts physical access via a system of platforms and lifts at different levels.

A set of pre-defined quality assurance investigations and visual inspections would give the space agency an initial go, no-go decision. They would also give the communications engineers an opportunity to conclude a pre-launch sequence to verify that the ground equipment at the space agency is capable of receiving and transmitting telemetry through the chain of data links located around the world at strategic operation centres.
Pre-Launch Sequence

T4 Release - Team “GjsfGmz”

Morpheus, feeling really on top of the world was smiling as he walked down the passage to Knight’s office. He was about to congratulate him on his team’s success and to announce to them their nominations, when he heard Knight having an enormous argument with Rook. He was about to turn around and return at a more opportune moment when Rook stormed out of the office. He didn’t even acknowledge Morpheus, as if he had not even seen him. It was not a good time to be there and Morpheus went off to the executive lounge. The hot chocolate was the same, but at least he would have some privacy and he organised a video face to face call to Thor. It was Thor’s turn to be away doing a quality assurance presentation to the sponsors in Minsk.

“I am sorry to call you at this hour,” he said when he saw Thor’s casual appearance, “but I thought I could use you as an impartial sounding board. I seem to be doing that a lot on this project.”

“What is it? You know, I don’t mind at all.”

“Well you know that “GjsfGmz” is our best performing team and I have just stumbled into the two best people, Knight and Rook, of all people, having a flaming row.”

“Not surprising at all,” said Thor in his calm and reassuring way, but it shocked Morpheus a little.

“You mean you could see it coming?”

“Well Knight or White Knight, as the team sarcastically calls him when he is not around, is a showman. He is a ‘Look at Me, Look at Me-type’. He jumps high for all to see him, but he comes down with a kick to the side and someone gets hurt. Look at the beginning of a project he’s perfect; quickly cleaning up the opposition. He’s a trail blazer. If he comes to a dead-end, no problem, he goes back a bit and down another way. He’s great for that, but the end-game is when the infrastructure comes in. If the bridges and roads, that are being built, hit a dead-end, you can’t just pick them up and go another way. Now White Knight’s side-kicks - excuse the pun - they are perfect for that. Rook has been surveying the scene and planning far in advance. Bishop too is a long term thinker but has been defending the team. If Knight exposes a pawn or two by jumping around, not Bishop, he has the whole team covered. Now when Rook and Bishop start operating they have long strides and sweeping moves, but they watch each other’s backs. Together they are devastating.”

“You mean up ‘till now White Knight has had it all his own way, but that is over. Bishop and Rook are the real leaders now?”

“I wouldn’t have put it like that, but yes, that’s exactly it. And Knight won’t like it. He’s fighting for something he hasn’t lost and never had.”

“Do you think I should interfere?”

“No, there’s a new beginning for them just around the corner and they will all need each other’s skills again. It is better they sort themselves out now, before they are cooped up in a space ship together.”

“That’s what is worrying me.”

“You have many speeches over the next few weeks. Don’t point fingers, just explain how professional differences of opinion can sometimes get personal, but they must all learn that its personality clashes and not that important. They must get over it.”

“Thanks Thor I’ll let you relax. Thanks for your understanding.”

It’s important to ask ‘why?’, but never assume the ‘why’. An outside observer may see some strange code or construction and assume that it is an error. It might be in the midst of a debugging move and an accusation at that stage might mean a bug goes undiscovered, but a wise word could lead the way to a breakthrough.

Morpheus went back to his original plan, to announce the good news to the team. He found Knight, Bishop and Rook chatting away. Rook had found Bishop and cried on her shoulder. She thought it might need a woman’s touch and she somehow patched things up. It was a brilliant time to make his announcement. Their team had the approval and the mission was a go. It confirmed their positions as byteonauts. They needed to get the team ready for the pre-launch press conference and picture session. It was to be on December 23, 2105 T-55 days and counting...
Morpheus watched with pride as the spaceship "GjsfGmz" was the first to leave the assembly area and slowly rolling out to launch pad XIII in Florida, with "Dynamic" and "Tickers" already half-way to their respective launch pads in Minsk.

The space ship and launch tests sequences were integrated with the existing space probe lifecycle program. Morpheus was pleased to see that no showstoppers, no critical and no urgent issues were reported during the daily status workshops, which continued until each spaceship was finally cleared for launch.
Morpheus studied the test lifecycle diagram that hung in the "GjsfGmz" quality assurance area. "Bishop, would you mind explaining this diagram to me please?" Morpheus asked. "With pleasure", replied Bishop and she began to elaborate. "We have split our prototype and the solution testing into three main areas, namely construction, construction - pre-release, both concluded successfully, I'm happy to say, and the release phase, which we are busy with at the moment."

Bishop took a sip of warm lemon tea and continued. "The important message lies at the top of the diagram, where each phase identifies impediments and show-stoppers, which result in the solution virtually slipping back into a twilight zone before being resolved. Not only are we passing these issues to the team, but also to the prototype team."

Morpheus remained quiet, while another few sips of tea were enjoyed, before Bishop continued. "The prototype team is able to investigate the issue, trial resolutions on the prototype and guide the solution team accordingly. The main advantage is that changes are tested on the prototype, avoiding costly and often detrimental experimentation on the final solution."

"That's interesting. Now I finally understand what the second spaceship is all about in the assembly hall."

"Be aware, however, that the prototype is exactly that and cannot, or rather should not, be used as a solution substitute or deployed in production."

"Why not?" asked Morpheus, although he knew the answer.

Bishop thought about it carefully, noticing the frown on Morpheus' forehead. "The prototype is fully functional; however, it was never engineered according to the complete specifications or quality assurance guidelines, as we are using it for experimentation."
With no show-stopper issues raised throughout all test iterations, the team started additional “what if” scenario testing, further honing the skills of the byteonauts, resulting in a 3 day slippage towards the end of the pre-launch sequence.

If in doubt, test and re-test, even if it means a slippage of the release of the solution. Once a solution is committed to production, first impressions last, and issues, no matter how insignificant, are difficult to address.

Rook finally got together with his two brothers and his parents to say good-bye to them. Morpheus knew him as the professional, competent and disciplined team leader of team “GjstGmz” and realised just how human he was when he saw him hugging his brothers and sobbing throughout the farewell. Rook had realised that he would most likely not see his father ever again and when he would finally hug his brothers again they would all be around 20 years older ... it broke his heart.

**T3 Release - Team “Churn”**

As Morpheus walked to the planning room, which early in the project had degenerated into a communal restroom, where he expected to find the laidback “Churn” team and he wondered what they were doing in the afterglow of the long period of hard work. Predictably, they were having a bit of a party. The music was the first thing to announce this and then the chatter and buzz of conversation ever increasing in volume, to compete to be heard over the hubbub, was the next. When he walked in several groups of people shouted, inviting him to join their chatter, to settle some argument or to add some insight to their irrelevant discussions. Morpheus gave them all a wave and smiling shook his head. He was looking for the team leaders. They should be the first to know. He found Fly, Ness and Woo doing down-downs at a table at the back of the room. He guessed that they had started the party.

Fly saw him and made a chair appear from nowhere and he went out to meet him. He seemed to want to throw his arms around Morpheus, thought better of it and shook his hand, pulling him to the table. Fly said, “I heard they have chosen us to be the byteonauts for our ship.”

Morpheus wondered how they had heard, but realised that resourcefulness was the hallmark of the team. He simply confirmed it and congratulated them raising a glass that had appeared in his hand as miraculously as his chair. He wondered if they would remember the details of the pre-launch and launch dates, so he wrote them on his card and gave it to Fly, making sure that he slipped it into a pocket.

The next time he saw them it was December 30, 2105, T-48 days and counting. They were proudly representing their team at the pre-launch press conference and picture session.
Morpheus and Thor were busy discussing the progress as they watched the BMM television station covering the space ship, named “Churn”, rolling out to the remote launch pad in the arid and hot Karoo desert in South-Africa. It was the only team to launch their space probe from the African continent.

As with team “GjsfGrnz” the stringent space ship and launch test sequences were performed raising no show stoppers.

Certain concerns were raised by the quality assurance team, which the team agreed to address and resolve before the final change control cut-off date. The last days of January were extremely stressful for the team, which was working in excess of 100 man hours\textsuperscript{16} per engineer to complete all outstanding issues.

The launch approval was granted with many “what if” scenarios unresolved and a degree of “cross your fingers”, which made this event a stressful period for the team.

It was clear to Morpheus that the engineering estimates were very optimistic and that the engineers were battling to define the true measure of the work required. Would the decision to clear this team for launch, in light of the many unresolved scenarios, come back to haunt them?

**T1 Release - Team “Dynamic”**

Morpheus finally escaped from the “Churn” celebrations and made his way to the Dynamic Team head quarters. He wondered how they would be handling the post-project emotions. It was strangely silent as he entered the project area. It was clean and tidy - of course, it would be - and then he heard a sneeze and this started someone coughing. He followed the sounds and he found the team leaders, Cypher, Slammer and Gopher, consoling themselves with cups of lemon and herbal tea. Pillboxes and medicine bottles were clearly visible. They had all simultaneously come down with colds and flu. The rest of the team had some well deserved time-off, as a reward for the great effort they had made to clean up after the removal of the ship for final appraisal.

Morpheus smiled to see them all looking so miserable, although they put on brave faces when he came in. He remembered how often at the end of a long stretch of hard work he too would succumb to bouts of flu after fighting it off throughout the busy period.

He was glad that he had brought good news and it would brighten up their day. He told them that they had been successful and that they had better be healthy again for January 1, 2106 T-45 days and counting ..., when they should proudly represent their team at the pre-launch press conference at the space agency and picture session with numerous BMM reporters snapping picture after picture and documenting the conference.

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\textsuperscript{16} 1 man hour is typically defined as 1 actual hour of effort, rather than elapsed time.
Their space ship, named “Dynamic”, was slowly rolling out to the central launch pad number II in Minsk, Russia. Stringent space ship and launch test sequences were performed, raising only minor system anomalies which the team addressed before the final change control cut-off date on February 1st. The next 15 days took forever and the team continued enhancing the interior of the spaceship, under continuous scrutiny of the test and quality assurance team.

Beware of scope-creep, especially when a solution is making excellent progress. The tendency to add new features and improve the solution is human nature, but also a human downfall as it introduces bugs and instabilities to an often stable solution. If scope change is approved, it is imperative that test sequences including stub, unit, system and acceptance tests are repeated in their entirety.

T2 Release - Team “Tickers”

Morpheus walked slowly towards the planning room. He did not have good news for the Tickers Team. As he approached he heard Art shouting, “Watch, it was your QA-testers that couldn’t get their act together and respond fast enough with their results. We couldn’t get on with our job. We wasted time simply waiting for their results, and Clip: your checkers were forever on our backs - have we finished this? And - have you finished that? How could we do anything with all of them on our backs?”

As Morpheus walked in, he saw Art pouring over his computers, with the other two who had half turned their backs to Art and standing back to back to each other. If body language said anything, it was that no one was taking responsibility and Art thought that somewhere in his data he would find the answer.

“Hey you three, come on now, lets have some hot chocolate. I don’t have good news, but I think you know that already, but I do have some advice.” His arrival changed their mood and they gratefully put their differences aside and went through to the tearoom.

“I know it is important to analyse what went wrong, but only for the purpose of learning how to do it in the future. It should never be done to lay blame or to make recriminations; not in this company anyway.” Morpheus knew that this team was one of the best the company had and he didn’t want them to find fault with each other. “Art, be honest. The reason you were so late was that all the planning was done up front. There was no way in your methodology to re-plan or to adjust to new requirements or unplanned impediments. Am I right?”

“Yes I guess so, but I would like to have seen that from our data,” said Art.

Morpheus wanted them to start looking forward so he said, “Come on Art, it’s written on every page. From the first day, that you started slipping behind, you just had no way to change your plan. That was the problem. Instead of looking at your failed project rather look at the successful projects to find out why they succeeded.”

Morpheus had hinted at the reason why he was there, but it was necessary for him to spell it out, “By now you must realise that your project has not been accepted outright, but only provisionally. You know that your submission was late and they are still working through your huge pile of documentation. We need to accept that they may reject it, but also to plan in case they do accept, so they chose the byteonauts - the three of you. You must be ready on January 5, 2106, T-40 days and counting … to represent your team at the pre-launch press conference and subsequent picture session.”

On the day, they were there looking rather gloomy as if anticipating the decision to come. They proudly saw their spaceship starting the long journey to central launch pad number I, and this brightened their spirits greatly. In the far background, the “Dynamic” spaceship was already positioned at launch pad II, with an army of engineers working on the exterior making it look like a termite hill in the African bush.
The team had been pressured to release the space ship and stringent space ship and launch test sequences made it apparent within days that the space ship had been over engineered in most areas, while vital life support systems were incomplete and unstable.

Morpheus was flown over to a crisis workshop with the team, with Fearless Bat enjoying every second of the high altitude and speed-record challenging flight across the Pacific in the F-14 Tomcat flying at 2.34 Mach with its variable sweep wings locked against the fuselage like a hawk in attack flight, slowing only for the annoying air-refuelling points. The twin Pratt & Whitney turbofan engines delivered their promised thrust with the afterburner kicking in occasionally when Fearless Bat noticed unused fuel.

Morpheus staggered into the workshop room, happy to be walking on solid ground and fearing the return trip. Ticker extended his hand to greet him and immediately bombarded Morpheus. "Why are we not getting launch clearance? Why is our quality product not passing the tests?" Ticker asked with a trembling voice. It was evident that the team was highly stressed and bordering on a complete panic meltdown.

Morpheus thought about the answer long and carefully and slowly began detailing the reasons for the space agency not signing the launch clearance certificate.

"One, the completed space ship was of a high quality, but it was over engineered in a number of areas."

"Two, the space ship lacked a number of the minimal quality assurance features, such as the Black Box we introduced during the construction phase."

"Three, the test teams and quality assurance teams do not believe that the list of impediments can be resolved in time without slipping beyond the launch window."

Ticker interrupted … "Why can we not take the risk and accept full responsibility? We could resolve many of the critical issues before the launch window ends."

Morpheus once again pondered over the question and concluded his list of 103 points, as he read the following statement. "We all agreed to a minimum quality bar, which in this case was not met. We, the space agency have overall responsibility for each team and in this case the risk of system failure or an unacceptable increase in mission time is too great and we are not granting a launch clearance certificate."
**Launch Sequence**

**T1 Release - Team “Dynamic”**
Team “Dynamic” was the first of the four to be launched into orbit on schedule on February 15th at 12:00.

Lift-off took place from Minsk space complex and one minute after lift-off, the solid rockets were discarded, while the first stage continued to burn. Approximately 5 minutes and 2 seconds later, exactly to plan, the first stage stopped working, and it was discarded. Three seconds later, the second stage engine ignited taking the spaceship into a high-Earth stationary orbit at an altitude of 40,000 kilometres, where it docked with the awaiting shuttle and preceded its long journey towards Pluto.

**T2 Release - Team “Tickers”**
Team “Tickers” watched the launch of team “Dynamic” with pride and then returned to their launch pad with sadness to continue the disassembly of the ill-fated spaceship.

**T3 Release - Team “Churn”**
An enormous plume of smoke engulfed the launch pad on February 16th at 13:00 as the spaceship “Churn” pierced its way into outer space, joined its space shuttle and settled into its long journey towards destination Pluto.

The huge plume, made up of the solid rocket smoke and tons of red Karroo sand, would continue to hang over the beautiful semi-desert, signalling the first successful space program launch from the African continent.

**T4 Release - Team “GjsfGmz”**
Staring out of the port hole, commander Rook was pondering over his epiphany that there is no such thing as a perfect solution, just as the Delta 5 solid rocket and Atlas V662 first stage erupted in a deafening roar.

“GjsfGmz” lifted off on February 18th at 04:00.

Within minutes, the horizon started to curve and the Atlas V662 second stage announced the departure from home and the beginning of a 20+ year journey.
Conclusion

We realised in the previous phase that solution teams and solution lifecycles differ amongst teams, some structured, some agile and some often too chaotic for most of us.

Morpheus made the following observations, which he shared with Thor:

- Team “Dynamic” were noticeably nervous as they waited for the launch.
- Team “Tickers” were agitated with the testers and obviously knew that their solution was lacking crucial features.
- Team “Churn” were terrified and frantically busy with final preparations. The crew's pulse, blood and stress levels triggered numerous alarms as they were waiting for the final countdown.
- Team “GjsfGmz” were the only team that appeared calm, waiting for the launch with excitement.

“So what is your take on these observations”, asked Thor, as he poured a glass of Cabernet-Sauvignon from the estate Lbopolpq, with a wonderful aroma, for each of them.

“Well, without getting into any scientific explanation, my core analysis can be summarised in the following points”. Morpheus took another whiff of the wine aroma and enjoyed another long sip of the wine, before he wrote the following points on the whiteboard behind Thor’s desk:

- Most teams build systems only towards the end of the development cycle.
- Construction estimates are often inaccurate, especially in the early phases of a project.
- Prototypes offer an agile experimentation environment, giving tangible and visual feedback to all stakeholders.
- Construction and testing are two separate domains and must not be done by the same team members.
- Early and continuous testing avoids the dreaded bug storm and results in stable solutions early in the solution lifecycle.
- Excellence and automation is hard to sell to the construction team. It is viewed as unnecessary control.
- Excellence and automation is hard to sell to stakeholders. It is associated with cost and additional time.
- Automation is no replacement for human intuition.

Morpheus summarised the points to Thor as follows:

“What becomes apparent is that testing is a part of any solution and most importantly, must form part of the overall solution. It needs to be structured and managed. Poor testing is as dangerous as no testing, as crucial observations and findings are often lost in a lack of control and communication process, or worse, hidden by inadequate tests or observations thereof.”

“Prototyping not only assists in the visualisation of the problem domain, but also assists with the investigation and resolution of impediments identified by testing.”

He concluded by writing the following epiphany on the whiteboard, using a permanent marker:

- Test early, continuously, often and thoroughly.
- Prototyping is a great concept ... use it!
Quick Reference Guidelines

🛠 Prototyping
- Information gathering technique
- Provides insight into process, process flow and implications
- Effective communication medium for solution stakeholders

🛠 Acceptance Test (see page 38 for more testing)
- Verification testing - simulated environment with simulated data
- Validation testing - live environment with real data
  - System Performance
  - Peak workload performance test
  - Procedure validation test
  - Backup and recovery test
- Audit testing - verify system is error free and ready for operation
Detailed and Accurate Documentation is the ONLY Support for a Ship in Distress.

Cruise Phase

Objectives

- Transfer of solution to operations.
- Publishing of solution knowledge base.
- Validation of operational system, ongoing maintenance and support.
Introduction

We are entering the “cruise” phase, which in the software engineering software development life cycle is often referred to as the stabilisation phase.

The solution is transferred from the construction team to operations and operational maintenance and support. In addition, the solution repository is published, ensuring that there is an easy access to corrective knowledge, used by the maintenance and support teams. The most important aspect of this phase is that we never, ever disengage from a solution without confirming that the solution meets all the agreed business, functional and non-functional requirements.

“GjsfGmz” commander looked ahead to 9 years of cruising through space as endless and harsh as the Namib Desert. The time has come to become one with the spaceship, to co-exist and survive as one.

All three spaceships “Dynamic”, “Churn” and “GjsfGmz” were on course, with “Curn” leading “Dynamic” by one day and “GjsfGmz” by 4 days. As in the above image, the moon glared at the byteenauts with an eerie and concerning stare. Commander of “Dynamic” stared at the king seen sitting on the moon, reminding him when he gazed at the moon in Namibia, hoping that it was a lucky omen to be greeted by the crystal clear moon.

There was no time for relaxation. All teams used the first 12 months to complete final enhancements, space probe checkouts, system calibrations, trajectory correction simulations and scenario rehearsals for Jupiter fly-by and subsequent 9 years journey.
Cruising through stabilisation and maintenance

**T1 Cruise - Team “Dynamic”**

"Morpheus calling team Dynamic... Morpheus calling team Dynamic... Over." Morpheus was staring at the communications console impatiently.

"Where is team dynamic?", wondered Morpheus, knowing that his signal would take 1,400 seconds to reach the crew and another 1,400 seconds for the response message to arrive.

The space byteonauts of “Dynamic” were woken a few times by the onboard computer to evade unknown space debris, to resolve technical issues, and finally to monitor as the spaceship began its slingshot around Jupiter. The crew never got an opportunity to sleep and rest for extended periods, resulting in raised stress levels.

Eventually the radio crackled, breaking the icy silence. The digital calendar showed 12 February 2107, 13:01.

“Space control, this is Cypher. Space craft Dynamic, travelling at 85,000km, executing final calibrations for the fly-by sling-shot manoeuvre. All systems go... Over.”

“Space control, this is Cypher. Space craft Dynamic has completed the fly-past. We are switching to hyper sleep mode. Please give our love to our families and our regards to the other two teams. Good night and see you at Pluto... Over and Out.”

Cypher knew that they would be fast asleep when the signal would finally hit the tracking stations. He greeted his team mates, threw a final glance at the photo showing his family and toggled the main hyper-sleep activation switch. 33 minutes later the space craft was as quiet as a morgue, travelling towards Pluto. No-one, other than the onboard controller, took any notice of Saturn, Uranus and Neptune as the space craft passed each planet.

While Morpheus and Thor were analysing the telemetry data being received, they realised that the space craft was travelling at 0.269 speed of light and 69.39 times the speed of sound. Truly, it was an amazing, yet terrifying concept.

The team had delivered immense successes with a constant level of effort while constructing the space craft. During the journey, the success rate began declining, while required effort for maintenance and support gradually increased. The reason appeared to be the hostile environment, confined space and away-from-home stress levels, difficulty of servicing and enhancing their space craft and ad-hoc suspension of space sleep to perform maintenance while on route to Pluto.

**T3 Cruise - Team “Churn”**

February 16, 03:01 ... no news from space craft, "Churn", although the space craft was scheduled to arrive at Jupiter on February 14th.
Throughout the 13 month journey, the team lived in their space suits responding to system alerts, resolving runtime issues and dropping back in controlled light sleep. The morale of the team was low, as their physical state was negatively impacted by the frequent system alerts, the repair space walks and the subsequent rescheduling of their deep sleep sequences.

“Space control, this is Fly. Space craft Churn travelling at 85,500km, executing final calibrations for the fly-by sling-shot manoeuvre. All systems go... Over and out.”

The lack of deep sleep and confined working areas resulted in raised levels of stress, desperation and inefficiencies... resulting in further man-made issues, repairs of anomalies, sporadic system crashes, construction of missing components and numerous space walks to maintain the constantly degrading hull. No one noticed the small trail of minute spherical objects trailing behind the space craft in regular intervals.

While the team showed an increasing success rate, the effort required for support and maintenance grew exponentially. The effort required continued to grow during the space journey, while the success rating began to decline rapidly.
For Morpheus it became apparent that the chaotic construction phase, the lack of each unit and system testing and the last rush of activities did not result in a complete and stable spaceship.

**T4 Cruise - Team “GjsfGmz”**

The space byteonauts of “GjsfGmz” were woken only once when the onboard computer picked up an anomaly and then again when the spaceship began its sling shot calibrations for the Jupiter fly-past. The team observed Jupiter while gravity assisting passed the giant planet.

Knight was making tons of notes … “how does this pen actually work in near zero-gravity”, he asked himself.

Since he was an inquisitive creature, he became sidetracked in investigating the pen, using the Extra Terrestrial Virtual Brain knowledgebase. Paul Fisher and Associates invented the pressurized space pen in 1965, which was tested and selected by the American and Russian space agency. The gas pressure forces the ink against the roller ball, ensuring that the pen can write normally, upside down, in freezing, boiling and gravity free vacuum conditions … even underwater and over grease. “Truly amazing” … Knight greeted Rook and Bishop, and disappeared into the hyper sleep room.

Once the observations were complete and the data sent to Earth, the team switched from deep to hyper-sleep until it reached Pluto.

Maintenance and stabilisation efforts were minimal, whereby the support team back home continued to run with the hot tub sessions, experimenting and proving all suggested changes on their prototype before transmitting the instructions to the distant space probe, and updating the mission status.
The team process, in particular the prototyping, ensured that the teams success rating grew rapidly and began declining only slightly as the space conditions deteriorated the living standards for the crew. Actual support and maintenance effort grew slowly and again primarily because of the worsening environmental conditions.
“So, Morpheus, what do you think?” asked Thor as he stared at the large tracking screen. Sipping on a huge mug, filled with Camomile tea, Morpheus began rattling down what he believed were major mission milestones, baffling Thor with each statement:

- The probes passed the Mars trajectory at 93,541,000 kilometres from home, or 0.625 AU (Astronomical Units), on schedule in April 2106. It was further than any previous manned spacecraft and with a success rate of 3 probes out of 3 ... a remarkable achievement.

- The probes successfully completed all recalibration manoeuvres for the Jupiter pass-by and all required functionality. Although team “Churn” battled to meet all requirements, all teams completed the milestone.

- The probes successfully passed JF5, a small asteroid, in June 2106 at distances less than 90,000 km, returning invaluable telemetry and surface analysis data to mother Earth.

- February 2107 all three probes flung past Jupiter, gaining enough momentum to take them on the next part of the long journey to Pluto. The distance from Earth was now sitting at 5.83 AU’s, a distance too great to consider a rescue mission, should anything go horribly wrong with any of the three probes.
Both stared at the next expected milestones calculated by the space agency main controller… realising the magnitude of the mission and the million-and-one reasons that could mean disaster for any of the teams.

- Saturn       June 2108
- Uranus       March 2111
- Neptune      July 2114
- Pluto        June 2115

"We will be old men by the time these heroes arrive at Pluto", mumbled Morpheus, as he left the space centre tracking control room, heading for the cafeteria to enjoy another endless supply of Chamomile tea.
Conclusion

To the alert reader who is familiar to the software development lifecycle the concept of stabilising the solution, in this case a space probe, in a production and high-risk environment will most likely appear odd. Yes it is, however, it highlights that in many solutions there is no room for failure or "we will fix it later mentality", that are commonly used with information technology solutions. In our space mission scenario the stabilisation phase would typically have been completed back on mother Earth … we simply moved the goalpost to introduce an environment in which we have no option but to deliver a perfect solution and merged the stabilisation phase with the maintenance and support phase.

The purpose of the cruise phase, i.e. stabilisation phase, is to reduce the risk of releasing an incomplete or unstable solution to production. The solution team is focused not on construction, but on ensuring that the solution reaches a known state of quality during this phase, with the objectives of seamlessly releasing a complete solution into production. The core steps include the preparation, installation, training and enticing the solution user and solution owner to sign-off the solution. All teams clearly focused on these objectives handing over the solution, together with a repository of documentation, blueprints, prototypes and closure reports. These artefacts allow the post-implementation maintenance and support teams to maintain the solution and the agreed quality.

Enforce a few simple rules while transferring solutions to the operational support teams:

♦ Switch on reporting and tracking solutions to ensure that issues are handled by the operational support team, tracked from inception to closure and that visible statistics can be produced.

♦ Make the knowledgebase available to all solution stakeholders … information rules!

♦ Validate, re-validate and re-re-validate the functionality of the solution, ensuring that a complete and functional solution is released.

♦ Lastly, but most importantly, enforce a quarantine environment for construction staff, which has no reason to be within spitting range of the production environment. In the information technology world production computer rooms should be equipped with an anti-developer device, which disintegrates a developer entering a production environment with any electronic device or storage media.

After the stabilisation phase, the teams endured a quiet period, transferring responsibility of the solution to operational support. The minimum quiet period ranges from 2 weeks to 4 weeks during which adequate statistics and “feeling of comfort” can be gathered. The solution stakeholders should be stringently ticking off the requirements, quality and operational environments as outlined in the service-level agreement (SLA), which defines responsibilities of all stakeholders and a service in terms of quality and quantity.

When teams “Dynamic”, “Churn” and “GjsfGmz” reached the 5.8AU milestone, they effectively completed the stabilisation phase and handed control over to the space program control centres and the patient JOEJFP central controller units onboard of each space probe. There was no more scope for change at this point and therefore all teams flipped the switch from control to being controlled and entered into deep space hibernation sleep.
Quick Reference Guidelines

 Fired

 Solution Transfer Deliverables
 - Issue tracking and management system.
 - Published knowledgebase containing solution business and technical documentation.

 Post-Mortem Deliverables
 - Customer satisfaction survey.
 - Final versions of solution documentation, such as vision & scope, functional specifications.
 - Stakeholder and solution review, identifying areas success and of improvements.

 Service Level Agreement
 - Operations plan.
 - Acceptance criteria.
 - Responsibilities of all solution stakeholders.
 - Binds service provider to defined service, quality and quantity.
 - Constrains solution user and owner demands to agreed levels.
The next phase turns the page and opens the exciting potential of a new chapter

Arrival

Objectives

Determining if the solution has met the business solution
I am a survivor. That sounds a bit like the words of a song or am I imagining that? It was a freezing cold day in outer space, at a distant location on route to Pluto located 4.6376 million kilometres from home. I first woke Team Leader, Byteonaut Fly abruptly out of his deep hibernation sleep ... He knew instinctively that something was wrong. As his senses returned and he recognised the anomaly, I prepared to wake the other members of the crew. Our Team leader had started the journey together with his son Woo and close friend Ness, whereby all have aged 9.5 years since they departed from their dusty launch pad in the Groot Karoo semi-desert on a hot and sunny afternoon in 2106.

The Leader battled to focus his vision, first noticing his son sleeping peacefully in his Byteonaut capsule creating a huge condensation cloud with every exhalation, then the heavy condensation covering and dripping from all of the internal surfaces of the space probe. 'Don't waken him,' he said to me, but the process had begun and if I had stopped the process, he would have died a painful death. I suppose looking back it would have been better not to have awakened them, but ... I was ... lonely and didn't want to die alone. Ironic isn't it?

The environmental control systems were struggling to counteract the outside temperatures of -235 Celsius. The slight drop in environmental temperature and rise in humidity seemed to indicate a problem ... but what was wrong? Our Leader struggled to his feet and dragged himself over to the cockpit, his muscles refusing to carry his aching body in an upright posture, even with the reduced artificial gravity. He stared at the flashing red lights on the Plutonium reactor panel indicating a system overload and the impending disaster. There was no time to stop it. What he did have time to do was start the process that would eject me from the ship, which is why I am able to tell this tale.
As our intrepid leader crawled back to the crew’s quarters the crew were now awake, well almost. Fly dragged himself onto the bunk bed of his son. He saluted his colleague and hugged his son one last time. They didn’t have the time to understand his strange gestures, but the look on his face said something was desperately wrong. None of them, not Fly, nor Woo, or their snorting colleague Ness felt the meltdown of the plutonium core, the instantaneous implosion of their exotic home and the subsequent explosion of their space craft. The roman mythology god of the underworld had not allowed team “Churn” to reach the half-way milestone … planet “Pluto”. Oh by the way, my name is Black Box CPU EDBB and I have been repeating this story and the telemetry of the last few hours, over and O-o-o…

Cypher, Slammer, Gopher, Knight, Bishop and Rook were literally thrown out of deep sleep watching the afterglow and shockwave of the disaster with disbelief. Knight was trying to focus his eyes, battling with a severe headache and swollen limbs. “I hate the hibernation capsules and the medication they pump through our systems”, he mumbled as he dragged himself to the command centre.

After recovering from the loss of their byteonaut colleagues, teams 1 and 4 watched the approaching planet Pluto with mixed emotions. For one week, both teams deployed mapping and analysis equipment and began preparing for the landing on the icy planet. Both teams managed to rendezvous with the Lander module, deploy the base station and land on the icy surface.

“Why would anyone call this an ice planet,” wondered Rook, as he admired his DBU branded walking machine footprint.

“Knight, we should notify space control that we have landed on a sandy planet, rather than icy minor-pla…”, Rook had to take another deep breath, as the icy temperatures threatened to crush his lungs. “Sorry, I wanted to say minor-planet.”

“Let’s first assemble our deep space telescope, so that we can take a snapshot of planet Earth, as it crosses the path of the sun.”

Hours later, images of the footprint, the eerie landscapes of Pluto and a spectacular photo of Earth in front of the distant sun arrived back home.

The space agency met again at this historical time, to determine whether the mission was a success.

Morpheus and Thor spent many hours admiring the images, digesting the mission data, working out statistics and finalising the presentation that Morpheus would deliver to the space agency and the public community.
What does success actually mean? Have we met the project vision or the zero-defect quality bar, or are we delivering value to the business. Surely, the mission was a dismal failure to the stakeholders of teams two and three. While team three was close, team two never even moved off the mark and failed to cross the line of success. For both the mission was therefore unsuccessful, which leaves us with teams one and four.

**Meeting the Vision … the beginning of the end or the end of the beginning?**

*Morpheus’ Analysis and Presentation*

“We at CC&E are proud to announce that two of the mission teams have completed the journey to Pluto and have landed on the planet. We congratulate the mission control teams, the space probe teams and most importantly their families for the commitment, passion and patience of the most difficult journeys that mankind has ever completed. I will briefly convey the first mission data so that we can discuss the success of the mission, sign-off phase 1 and embark on the second phase of the solution to get our crews back home.”

Morpheus took a deep breath.

“It has been a long time since we first got together at the initial mission briefing and also a long time since saying goodbye to the mission crews in 2106.”

“The two images I would like to show you are the first man-made imprint on planet Pluto and an eerie black photo showing a tiny star in the background. If we zoom into the star, we will notice that it is our sun and that our planet Earth is passing in-front of the sun.”

Morpheus took a huge sip of Chamomile tea and coughed to clear his throat.

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17 The Hoba meteorite weighs approximately 50 tons and struck earth about 80,000 years ago. The meteorite consists of approximately 82.4% iron, 16.4% nickel and 0.76% cobalt. It can be found near Grootfontein, in the north-eastern region of Namibia.
“Ladies and gentlemen, this is the first image of our solar system from the outer edge and shows the hostile environment in which our mission teams are currently operating a long, long way from home. The image has been modified, cleaning up the noise and using false colouring to ensure that the entities appear clearer on the image.”

“Looking at the mission statistics we note that we started with four space probe teams, namely “Dynamic”, “Tickers”, “Churn” and “GjsfGmz”.

“Has anyone deciphered what “GjsfGmz” means? It is extremely relevant, because that specific space probe currently looks like one in the dark outer edges of our solar system, after travelling for 9 long years and covering in excess of 4,530 million kilometres.”

“The mission objectives we defined at the beginning of this adventure included the following, listed in no order of importance or priority:

- To send four independent and manned space probes to the planet Pluto.
- Each space probe was to be operated with a minimum of 2 and a maximum of 5 byteonauts\(^{18}\) each. At the end all teams decided on a 3 byteonaut crew, sharing analysis and design findings during the planning phase.
- We wanted the mission teams to perform a surface composition mapping and a surface temperature analysis of both Pluto and Charon.
- We also wanted at least one byteonaut to touch down on the surface of Pluto, whereby we currently have 6 byteonauts in the outer rims of our solar system.
- Finally we wanted all teams to observe Jupiter while using a gravity assist manoeuvre to sling shot past the giant planet.”

Morpheus entered a long period of silence, eyeing each person in the conference room and trying to determine the state of the audience.

“Please stop me if you have any questions.”

Morpheus strolled over to his tea cup and took another large gulp of Chamomile tea, while eyeing out the audience. Morpheus began to tremble as he switched to the next slide, “Mission Failures”.

“Team “Tickers” failed to meet the agreed ZERO QUALITY BAR, consequently did not pass the final acceptance and quality assurance tests and were not allowed to launch.”

“Team “Churn” made it all the way to Pluto, but for, at this stage, unknown reasons exploded on its final approach sequence to Pluto. We are in the process of locating the Black Box CPU, with its unique identifier E3D9C826-E579-4f5b-BE93-

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\(^{18}\) Byteonaut is the equivalent of an astronaut in the world of bits and bytes.
8F5EC07EDBBB in deep space and will perform a comprehensive post-mortem of the mission data once available.

"Can everyone please get up for a minute of silence, in memory of byteonauts Fly, Ness and Woo? They will be dearly missed."

Morpheus had to compose himself after the minute of silence, because had he not spoken out during the mission lead-up phase the “Churn” ship would never have been allowed to leave … and the crew would not have perished. This thought will haunt him to his dying day.

Thor was staring at Morpheus, knowing what he was going through … he wanted to, but could not assist his dear friend.

With tears in his eyes, Morpheus continued with the presentation, switching to the “Mission Successes” slide.

“We have managed to get two of the mission teams to Pluto and currently have 2 byteonauts in the Pluto orbit, doing housekeeping, while 4 of their colleagues are on the icy surface. Byteonaut Rook was the first to step onto the surface and the footprint shown at the beginning of this presentation was his.”

“In addition all three teams performed extensive Jupiter observations, whereby we are expecting the space agency to release another iteration of the Jupiter report in the next few days.”

“Surface and temperature analysis of Pluto is in process and we are expecting in excess of 6000 terabytes of ‘Pluto’ data to be transferred during the next few weeks. The analysis of Charon will proceed as soon as the necessary equipment has been deployed by the teams. Please note that we are not landing on Charon and therefore all analysis and observations will be done remotely from Pluto.”

“As summarised in your report the teams passed Jupiter in 2107, Saturn a year later, Uranus in 2111 and Neptune in 2114, arriving at Pluto in June 2115. The teams will spend the next 1-2 months on Pluto, completing the analysis tasks, preparing for the journey home and waiting for the instructions to return home.”

Morpheus was getting tired; his head was on the verge of exploding and his throat was as dry as the Namib desert from all the talking. He strolled over to his tea mug, gulping down the rest of the now icy cold liquid.

“Ladies and Gentlemen, space agency colleagues and byteonauts, we have all made huge sacrifices to get this far and I am proud of everyone. Although we only launched three of four space ships and had a catastrophic anomaly with spaceship “Churn”, we have managed to land four byteonauts on Pluto, successfully observed Jupiter and are in the process of observing and analysing both Pluto and Charon.”

“The achievement is phenomenal and we must all ask ourselves whether the mission was a success or failure. What constitutes a success? Is it achievement of all objectives? Is it achievement of crucial objectives? Or is it a personal and thus a biased decision?”
Morpheus paused and scanned the audience again.

"I cannot give you the answer. You must analyse the failures and successes of this mission and draw your own conclusion, whether to fail the mission or sign-off on a successful venture."

“So what are the next steps?”

Morpheus walked to the first row of the audience and began listing the four major steps that would need to be tackled from then onwards.

“Everyone must analyse the data and complete the satisfaction survey making recommendations as to what can be improved in subsequent phases.”

“Once we have aggregated the survey, we will complete the post-mortem report and submit to all stakeholders for perusal and sign-off.”

Morpheus began to raise the volume of his voice.

“Once and only once we have a sign-off of phase 1, can we proceed to phase 2. We need your survey feedback within 48 hours and the post-mortem will need to be distributed and signed within the next 3 weeks, to ensure that we can commence with phase 2.”

“Any delay with the sign-off will mean that the two space teams will be stranded in deep space. A terrifying thought!”

“... and that concludes my presentation.” Morpheus had given another inspiring talk and he was trembling with anticipation, nervously looking over to Thor, who was giving him the V for Victory signal ... with a huge smile on his face.

"Please can you digest the mission report distributed to each and every one of you and double-check that your personal details on the last page are correct. We need you to sign the report and then proceed to the survey stations to complete a survey, which will be used to complete the post-mortem report. The post-mortem report will be made available as soon as mission control has signed it off and declared the mission as a success or failure.”

There was deadly silence in the briefing room, with everyone trying to digest the information of immense magnitude.
Conclusion

Once the solution deployment is complete, and ownership transferred to the system users and operational support, the time has come to perform solution closure activities for the project.

The solution stakeholders must gather one final time to decide whether the solution objectives have been met and as a unified entity produce the solution sign-off documentation. The final gathering can be sub-divided into the following initiatives:

- **Solution user satisfaction survey.**
  The users have the opportunity to provide feedback to the solution teams, which forms a vital part of the post-mortem report.

- **Solution technical post-mortem.**
  The technical post-mortem gives the technical stakeholders the opportunity to reflect on the solution and identifies areas that can be improved in future projects.

- **Post-Mortem report preparation.**
  The post-mortem report consists of the vision/scope document, the functional specification, the customer survey analysis, the technical survey analysis, and recommendations for areas and processes that can be improved in future solutions.

Lastly, the solution lead must obtain solution user and solution owner sign-off, signaling the completion of the solution, approval of the solution and the time for the solution team to disengage and re-focus on the next challenge.

![Figure 43 – Mission / Solution Closure](image)
Quick Reference Guidelines

- Arrival Deliverables
  - Customer satisfaction report
  - Post-Mortem / Closeout report
  - Customer and Team project review report
  - Customer approval / sign-off
Back at 0:0:0:0:0:0:1 we analyse the information and draw conclusions for a brighter 127.0.0.1

## Call to action

**Objectives**

- Conduct a post mortem analysis
- Select the correct methodology
- Introduce seven solution ecosystem artefacts
Introduction

Teams “Dynamic” and “GjsfGmz” are on their journey home, which would last 9.5 years. Would the byteonauts be able to settle on Earth again? Will their bodies that are accustomed to artificial gravity be able to adapt to planet Earth again? Only time will tell...

Morpheus and Thor both continued staring at the setting sun for a few more minutes. The moving light of the dusk descended slowly down the 50m vertical frame of the retired launch pad where quarter of a century earlier, Morpheus and his crew were strapped into the tiny capsule on top of the rocket which took them into outer orbit, to the moon and back to Earth. Launch pad XIII in the distant background, from which team “GjsfGmz” started their successful mission, appeared restless, knowing that it would never be used again.

“So what is your take on the mission and the radically different operational environments”, asked Thor, as he poured them both another glass of Lbopolq Cabernet-Sauvignon. The wine had matured during the past few years and would mature for many more moons, before they would know the answer to the many unanswered questions.

The dark red colour of the wine and the pleasant odour drenched the atmosphere, while the sun vanished behind the horizon in an explosion of colours.

Can we use the space program as a template?

Firstly, in our humble opinion, what are the core space-program artefacts?

The space agency …

- Has a set of clear objectives, detailed delivery and product specifications and seemingly vast pools of budget and subject experts.
- Relies on known practices, hardware and software, whereby, more often than not, the latter is custom developed. Why use the latest and greatest processor, if the one made 10 years ago is half the size, brings half the complexity or less and delivers the requirements for the space probe driving around on Mars?
- It is constrained by a set of known restrictions, limitations, challenges and rules, for example, an astronaut cannot survive in outer space as there is no atmosphere - simple and catastrophic, but well known and defined.

In comparison the information technology industry …

- Has a set of reasonably clear objectives, but often incomplete and vague specifications, limited budget and a shortage of subject experts.
- Has to rely on constantly challenging practices, hardware and software solutions, often tied to commercial off-the-shelve (COTS) products, inheriting vendor restrictions, features and bugs.
- It is not constrained by business and technology industries, which are constantly striving for innovation and therefore often lack clearly defined rules based on experience and knowledge.

Upon closer inspection, we are therefore not comparing bits and bytes with bits and bytes, or apples with apples, posing a serious question around the feasibility of using the industry as a template.
Taking a huge step back and thinking laterally, we realise that a point-by-point comparison is therefore not feasible and most definitely not recommended. We can, however, identify and pinpoint the nuggets, the success stories as well as the failures of the space program, and learn from an industry that is developing solutions under conditions where there are simply no second chances.

Search for "Software Independent Verification & Validation (IV&V)" using www.google.com, which defines a system engineering process outlining methodologies for evaluating the correctness and quality of the software product throughout the software life cycle at the National Aeronautics and Space Administration (NASA).

**Adopting methodologies**

**Does a Methodology have an enforcing or empowering role?**

In more than 20 years, the promise of methodologies and process solving all of the industries challenges have come and gone, leaving a trail of ailing solutions, frustrated solution teams and immense expenditures spent on process definition, process-reengineering and process enforcement. Each methodology and process is a masterpiece in its own right and the right solution for the domain for which it was designed. However, the innovative and rapidly changing world of information technology has been, and will be, the kiss-of-death to these initiatives.

Rather than viewing a methodology as a silver bullet, we should embrace the methodologies and associated processes as one of the many artefacts that make up an information technology solution, and if used correctly, will add immense value to the solution.

The core learning over the years has been that any methodology and process must empower the team. Otherwise, the passion, the enthusiasm and finally the commitment evaporates in front of the solution stakeholder’s eyes. Too often, a great concept or solution is compromised by dictatorship, i.e. a military style project manager dictating who does what, when and more importantly how, or by Swiss democracy in which every team member must cast their vote before the project can advance to the next milestone. Team members will not take responsibility for and ownership of artefacts that have been forced upon them, whereas we automatically take responsibility and go the extra mile to meet estimations that we defined.

View Methodologies and process, as supporting artefacts and do not enforce them as policy. Empowerment of the solution team promotes passion, enthusiasm and commitment, which in turn leads to innovative, reliable and invaluable solutions.

We believe that any methodology has its good and bad days. It is important that the “team” has a say in the decision on which methodology it believes will support them the best and that the methodology and processes are adapted to the team environment and modus-operandi, ensuring that it supports the team, rather than that the team has to work within its constraints. At some stage, we received immense critique for adopting parts of the scrum methodology and restructuring the scrum meetings as requested by the team. Well, we may not have practiced purist Scrum, but gave the team an environment in which they could visually track progress or the lack thereof, spend interactive time away from the hectic coding and debugging environment that dominates any project and most importantly to voice their concerns, challenges and recommendations. As a team, we may have scored 1/10 for methodology purity, but, the team scored a 10/10 for delivering the successful solution within severe constraints and a hectic delivery schedule.

Reviewing our 4 teams, we should notice that each used a different methodology, namely CMMI, Agile, Extreme Programming and Scrum. While the team “Tickers” showed organization, clarity and Swiss-precision with their CMMI-style methodology, they failed to react to the scope creep, the black box, which crept in at the most inopportune time. As a result they failed to adapt to change and to pass the quality assurance and user acceptance testing, missing out on a challenging, yet awesome trip through our solar system.

Teams “Dynamic”, with their Agile-style and “GjstGmz”, with their Scrum-like approach, both demonstrated clean, organised and visually stimulating
environments, with managed quality assurance and testing procedures. Both managed to react to the “scope creep” and incorporate the new functionality, without affecting the final solution. Although both teams came to the launch date smiling, the “GjsfGmz” team was probably the more informed of the two, with each team member knowing the quirks of the solution, the overall status and the reliability of the solution. This was something very comforting to the byteonauts waiting for the huge candles to be lit behind them, lifting their space craft into outer orbit with little to no control from the instance the countdown reaches … “3, 2, 1, engine ignition, engines firing at full thrust, lift-off, we have a lift-off!”. 

The team that was the most confident, but most likely picked the wrong methodology for the task at hand was the “Churn” team. While the Extreme Programming (XP) methodology works exceptionally well for small, naturally aligned, experienced and competent subject experts, it is probably the most challenging environment to manage. It is very unlikely that the Space Agency would employ the XP methodology for “mission to Mars” probes. The well defined and long term requirements of the solution, the large number of entities that co-operate and contribute to the solution and stringent standards would stifle and frustrate XP-style teams, who are based on rapid and evolutionary solution processes.

The eventual bug that resulted in the demise of the space probe and byteonauts onboard was due to a malfunction in the power plant, a unit which should have been categorized as extremely important, designed, developed and especially tested more rigorously.

So “Which methodology do we recommend?” you must be asking yourself. The answer is unfortunately the typical IT answer … “it depends”.

It is obvious that methodologies are emerging, changing and disappearing at an increasing pace, which can possibly be contributed to the fact that methodologies are not cast in concrete, but evolving to suit existing environments. We as humans enjoy our comfort zone and trusted ways of doing things, which is probably the downfall of any rigid methodology, no matter how much potential it may have for the short to long-term.

We recommend that you review all methodologies available to you and choose one that suits and is capable of evolving into your ecosystem. The methodologies we encounter most often these days and therefore include in our decision matrix are: Capability Maturity Model Integration (CMMI), Extreme Programming, Agile (including MSF Agile) and Scrum.

Refer to these sites for more information on these methodologies:

- **CMMI**
  - [http://www.sei.cmu.edu/](http://www.sei.cmu.edu/)

- **Extreme Programming**

- **Agile**

- **Scrum**
Selecting the right methodology

The following graph shows the decision tree we use when evaluating which methodology is suited for a solution team as a base methodology. Why base? Well as eluded to many times before the teams are empowered to customize the methodology to suit their ecosystem, building on what adds value and avoiding what adds overhead to the team.

Impact from the solution ecosystem

As shown by the illustration “Figure 46 – Solution Ecosystem Artefacts” on page 76, the methodology empowers the solution ecosystem which includes tenets such as the solution team, the infrastructure, the architecture and the processes.
In turn, the ecosystem influences the methodology in organisations where the team is empowered to modify the methodology to suit their ecosystems and requirements. An empowered, mature and self-organised team requires effective collaboration and communication, adapted to their culture and processes, to be in a position to innovate, to be reactive to change and demonstrate accountability and, most importantly, responsibility.

**Solution Ecosystem Artefacts**

*Focusing on the top seven(7)*

As shown in the illustration we are going to highlight only seven (7) core solution ecosystem artefacts, we believe add value to any solution, whether a Rover solution for Uranus, a vehicle tracking solution for Terra or a book such as the one you are reading.

While any methodology, software development lifecycle or project management plan will need to cater for many more artefacts in a typical IT solution, we will focus on only seven to ensure that we do not exceed the Miller’s Magic 7 theory.

![Solution Ecosystem Artefacts Diagram](image)

Miller's theory outlines that the human working memory can hold up to seven bits of information at once. Refer to his whitepaper\(^\text{19}\) for more details if you are curious about the magical numbers seven … Seven Wonders of the World, seas and the days of the week.

\(^{19}\) The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information, by George A. Miller.
Looking at the seven (7) artefacts

Specifications

We recently walked past a project resource - one of the best - and overheard her say, ‘Well I suppose the system has limitations’. We felt like interrupting and saying that if the system had been specified right in the first place then it would not have limitations. Of course we restrained ourselves … but isn’t this a core issue?

The specification determines the methodology and sometimes demands it. There are a million and one things that we take for granted such as documented code, pairing, code churn, ease of use, look and feel, integration into the enterprise, rapid application development (RAD) and quick demonstrations. The methodologies supports and often saves us from defining all of this common plumbing and allows us to focus on the quest for answers on many typical solution questions such as outlined in the following table.

<table>
<thead>
<tr>
<th>Typical question from the community</th>
<th>Our humble opinion …</th>
</tr>
</thead>
<tbody>
<tr>
<td>How specific, how detailed, and how different is the specification from what we know.?</td>
<td>Specifications must be as detailed and business/technically correct as possible. The effort invested in the analysis and design phase, requires exponentially more effort in the construction, testing, stabilisation and maintenance phases if postponed.</td>
</tr>
<tr>
<td>How soon must we deliver?</td>
<td>No sooner or later than agreed. If done early, use the time for additional testing.</td>
</tr>
<tr>
<td>What changes will be injected?</td>
<td>Scope creep is a no, no and must be avoided at all cost, unless the specifications are revised accordingly and impact on resources, time and cost catered for accordingly.</td>
</tr>
<tr>
<td>Will changes be paid for, and how many?</td>
<td>Agree on change management, which includes cost, as early as possible.</td>
</tr>
<tr>
<td>Does the client want a passenger ship, power boat, tug boat, fishing boat, speed boat, pretty and good looking, modern, artistic, performance or presentation, powerful or fast, flexible or rigid, needs long or short term support, elegant or solid … the options are endless.</td>
<td>Specification and especially the visual designs should highlight the requirements. For example, the team must see and understand at a glance that they are building a rowing boat, and not a nuclear aircraft carrier.</td>
</tr>
<tr>
<td>Given enough time and resources we can make all of the above happen, but usually the client has a specific problem that needs to be solved. What is that problem?</td>
<td>If there is a specific problem, forget the bells and whistles, and focus on “the problem”.</td>
</tr>
<tr>
<td>Often this is lost in the clutter and detail and many budget cycles later the real problem is still there.</td>
<td>Clarity, clarity, clarity and simplicity, simplicity simplicity!</td>
</tr>
</tbody>
</table>
Typical question from the community | Our humble opinion …
--- | ---
What are our strengths and weaknesses? | Analyze and define both the strengths and weaknesses early. Work on both to improve the overall team environment.
Reinvent the wheel or reuse it? | Re-use!
What methodology suits us best? | Let the team decide!
Do we want or need to change? | If the answer is yes, clearly define the “why”.
How do we compare to the competitors, if any? | Competition is healthy and promotes innovation. We must compare ourselves to our competition at all times.
Do our systems work from the outset or is there a long settling in period. Why? | If there is a long settling period, ask yourself whether the specifications were comprehensive … in all likelihood they were not.
Will organization and planning make a significant difference? | Yes!
What rank do we place on all the above? | Specification, clarity and simplicity rule!
What is the most important requirement to us and what is the least? | Resolving business problems must be top of the pops!
Does our methodology and structure fit into today’s world? | Does it really matter? Methodology supports the team, not the world or vice versa.
Is development as we knew it on the way out? Should we be focusing more (or completely) on ‘off the shelf’ building blocks and concentrate on configuring or tailoring systems exactly to clients requirements? Should we be writing code that can do that? | No, although concepts come and go, the visions and especially the challenges have not changed much since the 80’s.
Should we be embracing XML and Web services much more since this is where everyone else is headed and writing utility programs to configure and build data and services? | No, adopt what adds value and opt for open standards where possible. However, do not change your success recipe by simply chasing new standards.

Table 1 - Typical questions from the community

The above are all valid questions, which need to be considered and answered when drawing up the rules of engagement for any solution team, which includes the business case, the specification and a continuous re-evaluation of our process, methodologies used and improvements, or lack thereof.

The most important objectives of the specification are to ensure that everyone has a clear understanding of the problem domain, the proposed solution, the dependencies, the constraints and that there is agreement between all solution stakeholders before the foundations are built. Would the professional engineering community start construction on a skyscraper, a bridge or a passenger aircraft without first agreeing on a specification and producing blueprints? We seriously doubt it, yet in the IT world, we are happy to proceed with scribbles on a piece of paper or cryptic notes on the back of a cigarette box … why?

An interactive team environment during the analysis and design phase leads to maximised exchange of information and minimises the possibility of misunderstanding of information and requirements.

A lack of cooperation and interaction, as was the case with the “Churn” team, results in an environment that would unsettle the most hardened observer. Oversights or misunderstandings entrenched during this phase of a project, often leads to perceived scope creep, integration challenges and an overall explosion of cost and effort in later phases of the project.

Team “GjsfGmz” demonstrated an interactive environment, with maximised information exchange and idea sharing.

An interactive day working on the whiteboard is often more productive than days-weeks of code churn, while a comprehensive and precise specification avoids misunderstanding and promotes productivity and maintainability.
Visual Designs

Figure 48 – Solution Ecosystem Artefacts: Visual Designs

If we, the human race, can visualise something, the battle is half won. Throughout the evolution of humankind, the skill of drawing has allowed us to visualise our thoughts, our experiences and our intentions, which are all vitally important ingredients for any solution.

Visual designing and the use of a variety of diagrams, identified by the solution stakeholders as valuable artefacts, will promote clarity and active discussions. Interactively discussing a complex business rule or a technical solution on a whiteboard is far more effective than covering the same topic in a text-only thesis. In addition, the “picture” of the solution imprints in the stakeholder’s mind and so delivers a very powerful and common blueprint of the final solution.

Figure 49 – Clarity through visual artefacts

Visual reporting, for example Scrum burn down charts, promotes clarity in terms of the solution status, allowing the team to react to changing trends. Once the team realises that it drives the solution and that the visual reports reflect their work, team motivation and co-operation begins to mushroom.

Would you rather track the financial indicators through pages and pages of statistical data, or by visual diagrams? Not sure what you instinctively answered in your mind? Well, most of us intuitively look at the financial indicator graphs, before we drill down to the relevant details.
Considering the environments of the teams “Tickers,” “Dynamic” and “GjsfGmz,” they all visually displayed the status, the design blueprints and other information, allowing all team members to obtain a quick and regular update through perusal of visual artefacts.

Visual designs and reports promote clarity.

All teams demonstrated visual designs, whereby teams such as the “GjsfGmz” displayed not only the design diagrams, but also progress charts visually and publicly. This supports interaction, spontaneous discussions and clarity throughout the project.

A picture is worth a thousand words, because the human mind thinks in terms of pictures, with the mind feeding on and clarifying information supported by visual diagrams, models and artefacts.

**Orderly Environment**

![Figure 50 – Solution Ecosystem Artefacts: Orderly Environment](image)

Considering the environments of the teams, the orderly environment of “Tickers” was an awesome sight, the slightly less orderly environment of “Dynamic” and “GjsfGmz” was energising, whereas the “Churn” environment raised concern from the beginning.

While it is not always practical to have a Swiss-style garage, with every hammer and screwdriver aligned and each nut and bolt in its correct department, a huge box filled with nuts, bolts, tools, old DIY artefacts and a general mess can be heart breaking and often counterproductive.

Why are we viewing the software development environment any differently? Why do some IT employee work areas resemble an experiment from hell? Would these individuals voluntarily enter a hospital, which had operating theatres looking the same, or would all of us start reversing as soon as we enter the hospital?
While many may disagree with an orderly environment, it promotes clarity, understanding and collaboration through clear and visible artefacts, producing improved interaction amongst team members and presenting an environment that is appealing to all solution stakeholders.

The danger of a chaotic, unorganised and unmanaged environment is that the stakeholders will be exposed to a variety of distractions introduced by chickens and pigs, which will eventually result in
frustration, chaos, over looked functionality and issues, and an environment that is not productive for all stakeholders and most importantly the solution.

Would the “Churn” team be on their way home at this stage, had more focus been dedicated to the overall quality and integrity of their space probe? The question is open to debate. However, too much testing and verification of facts is always too little, especially in solutions that have to endure in hostile and often unknown conditions for an extended period.

A clean and managed construction environment, with thorough quality assurance and testing environments, typically result in valuable and reliable solutions.

*Start that programme to keep the workplace clean and tidy.*

While the *Tickers* environment was bordering on a sterile operating theatre, the “*GjsfGmz*” setting presented an orderly environment. Not only are these situations more appealing to everyone working on the project, they are also normally more manageable.

It is important to implement an environment and processes, such as construction and testing, which will promote pride, clarity and manageability and to ensure that nothing is forgotten or more importantly over-looked.

Is it easier and more productive to assemble a spacecraft from LEGO, if the Lego blocks are all mixed in a large box or if they are neatly subdivided into the various dimensions and shapes?

**Technology is a hammer not a solution**

Possibly a major point that separates the information technology (IT) world from the space program is the concept that technology is a tool, not a solution. It is important to see technology as a set of tools, e.g. the hammer being one of the many tools needed to build a house, rather than viewing the hammer as the house.

The Information technology (IT) industry has powerful marketing strategies that are selling operating systems and custom off-the-shelf (COTS) solutions to the consumer base. Often a consumer will buy the latest hardware and latest software, often even waiting patiently in long queues for the next release of the products, only to settle back into a business domain that requires no more than a fraction of the processing power and functionality … why?

Step one in any solution must be to evaluate the actual business case for the proposed solution, to analyse and workshop the business problems to be resolved, to analyse and workshop hypothetical solutions that would address the business problems and add value to the business domain, to investigate the current and envisaged technology base and experience. Then and only then, the
next step is to investigate technology and technology solutions that may be used as building blocks or “tools” to create a solution for the business.

Some of the Pluto mission teams invested immense time and effort trying to understand the scope and the challenges of the mission, whereas others started construction immediately, based on “their understanding” of the business domain and the business problems to be resolved. Yes, space flight is space flight and flying to Pluto is the same as flying to Venus, only further and in the opposite direction …. Hello! If we view the space probe as a solution this leads us to answer yes, however, if we ask ourselves “which” space probe and then view the probes we know as blueprints, as tools to engineer the space probe required for the challenge at hand, we have to answer no.

Figure 54 – Technology is a tool, not a solution

We believe we are in the latter camp and will continue to view vendor technology solutions, vendor development solutions and industry trends, such as service-oriented architecture (SOA) as blueprint, frameworks and tools, but not solutions.

When talking about LEGO™, we may see the 1:50 scale huge space shuttle model in our minds, however, to get to that solution we need to realise and accept that LEGO™ delivers small pieces of plastic, which can be used to create the envisaged solution.

In the same vein … when talking about SOA, Frameworks, IDE, 3rd Party Tools and other gadgets, we may see the financial enterprise solution in our minds, however, to get to that solution we need to realise and accept that these artefacts deliver small pieces of functionality, useful perhaps to create the envisaged solution.

Technology is a blueprint, framework and/or tool … not the final solution.

Recognise and reward ideas that result in greater creativity and productivity.

Often solution teams, especially in IT, believe that a piece of software, an expensive solution, a reference architecture, a framework and/or a tool is the silver bullet … similarly to a handyman grabbing the hammer and commencing with construction work, before studying and understanding the requirements and final solution.

Every handyman knows that the successful finished product starts with accurate measurement and careful marking.

It is more important to understand the requirements, the constraints, the options and the variety of tools that are at the disposal of the team, than to commence with the hammer and nail, or in IT the keyboard and coding.
Looking back at the four teams, their modus operandi and their challenges, we believe that any team should consider the following nuggets, striving for an orderly, simplistic and successful solution environment that co-exists in harmony with all stakeholders:

**As an organisation, agree on:**
- eTalk
- Knowledgebase, containing:
  - What works
  - What does not work and why.
  - Nuggets and tools, i.e. frameworks and utilities.
  - Forum for “open” discussion … “I need advice on…”

**As a solutions team, agree on:**
- Methodology to govern the solution, which can and should be adapted to suit the team, not visas versa.
- Empowering the team stakeholders, especially when making estimates for tasks and deliverables.
- Using …
  - Visual designs, which must be available and preferably visible to all stakeholders.
  - Visual status reporting, that must be available and preferably visible to all stakeholders.
  - Technology as LEGO™ blocks to create the solution.
  - A clean and managed solution environment.
  - An agreed quality assurance and testing framework for the solution.

*Kee**p pushing the design until it is through the complex and into the simple.*

Often frowned upon, the concept of simplicity promotes minimised maintenance, support, stability, predictability and rationalisation. While this leads to a team that understands and advocates the solution, the more important result is a reduced cost of maintenance and thus total cost of ownership.

Iterative whiteboard design and discussion sessions throughout the solution life, from inception, analysis, design, construction and maintenance, will promote sharing of information and an ongoing simplification evolution.
When it comes to planning, there can never be enough planning and never too much involvement, by too many. It is important that all solution stakeholders are involved in the planning and especially the estimations of required effort and time, as well as dependencies. In other words we are promoting the concept of empowerment, rather than the classic project management, where a small Quorum defines and enforces a constraint, such as duration and amount of resource effort required to complete one or more tasks.

Let us have a poker tournament in our next Scrum planning session…

Core of the agile scrum methodology is the **empowerment** of the “team” and this empowerment is never more important than during the scrum planning meeting. We do not have dictatorship in scrum driven projects, i.e. a military general style project manager dictating who does what, when and more importantly how. However, we also do not have Swiss democracy in which every team member must cast their vote before the project can advance to the next beachhead. It is important, and often difficult, to select a core set of team members who are able to estimate effort and most importantly represent the “team”.

**So what happens during these planning sessions?**

An average duration of such a planning meeting is 8 hours, broken into a 4 hour product backlog selection and a 4-hour sprint preparation meeting. In the first half the product backlog items, relevant for the next 14-day sprint are selected, prioritized and estimated by the team using the Poker cards … more on these cards in a minute.

The second half of the planning meeting is dedicated to selecting, prioritizing and estimating sprint backlog items for the next sprint, again using Poker cards.

*“Why play poker?”*, the Project Manager is asking in the back row.

Using the card values Ace=1, 2-10, Jack=11, Queen=12 and King=13, each team member in the planning session gets a set of poker cards. Each item is discussed and then everyone gets an opportunity to raise the card that is the most accurate estimation in terms of humanoid-days. At first there will be a wide variation of estimates, which requires a few more rounds of discussions and “poker play” until the team feels comfortable of the average estimate.

**So what are the rules of the game?**

The most important facet of Scrum we have learnt is that it is not a prescriptive methodology and that no-one should ever convince you otherwise. When creating the project and the project team you should have a ceasefire meeting to discuss
and agree on the rules of engagement for the specific instance of a project, which includes agreeing on the power game rules. The scrum master must blend into the team and adopt the team’s understanding of scrum and modus-operandi into the scrum methodology for that project … because scrum is supposed to be agile…

*If it is not working then something is missing. Track it down.*

Empowering the team will ensure that every team member is involved and committed to the tasks. A team that is directly involved in the analysis and especially the estimation and assignment of tasks, develops passion and commitment, often going to the extreme to deliver the solution within the timeframe and specifications it agreed to. We say, “They own the project.”

In contrast, a team instructed on what to do, when and how, lacks innovation and the energy that is often required during tough phases of the project or when release milestones are fast approaching.

The concept of scrum and the ability by the team to influence decisions and estimations has proven invaluable in project teams we have been observing. An interesting side effect observed in scrum-based teams is co-operation, interaction and an often-endless energy and commitment.

**eTalk**

![Figure 57 – Solution Ecosystem Artefacts: eTalk](image_url)

In a recent all-day discussion with a colleague, who is an exceptional architect, designer, developer, “thinker” - he is just a nugget himself - we discussed the concept of creating an eTalk language, which defines the guidelines, the rules, the best practices, the do’s and don’ts … in summary, the language of the team and organisation.

Imagine a senior technology subject matter expert moving from one organisation to another, or assisting another organisation with a solution. To be in a position to communicate effectively the expert needs to synchronise his understanding and communication language with the other organisation.

A component can mean a million and one different things, amongst the readers of this book. However when it is time to roll-up the sleeves and whiteboard a solution, it is vital that all participants talk the same language, spanning business, technology, tools and conceptual artefacts such as “Service Oriented Solution”, “Service Oriented Architecture” or “Patterns Based Architecture”.

What are these guys talking about?!? Well, this is where every organisation should create its own interpretation of the world, its own unique language, its techno speak or as we refer to it, eTalk. Anyone joining the organisation, permanently, temporarily, long or short-term can pick up the “eTalk guide to the organisation”, get up to speed with the “talk” and immediately participate.
without the normal confusion and more seriously misunderstandings that dominate technology discussions.

It is like the army ... a few weeks of gruelling breakdown and indoctrination of basics which will ensure that the talk between troops is the same and instinctive. Thereafter, specialisation and self-motivation re-enters. We need the same for technology, but the breakdown and indoctrination should be short and painless.

A consistent language (eTalk) shared by the stakeholders promotes understanding and minimises confusion and misunderstanding.

Part of eTalk is the definition of answers, boundaries and procedures to get to answers for many of the questions raised under “Table 1 - Typical questions from the community” on page 78, because we need answers to all these questions, many of which are biased by the organisational culture and procedures.

Most likely the most important artefact or foundation depending on your viewpoint, in eTalk is the concept of a knowledgebase. The teams in this story were exposed to the Extraterrestrial Knowledgebase (etKB) which shared experience, knowledge and reusable nuggets with the team, allowing it to make rapid progress based on historical, yet up to date, information.

Continuous and effective communication, as well as sharing of information, experience and nuggets is crucial for the rapidly moving and evolving world of ours.

The best way to establish a vocabulary is to keep asking questions.

Imagine assembling an army made up of soldiers from all countries in the world, speaking their home language and using their terminology and “slang”. It would probably be an army, which no matter how large and powerful, would fail to impress or conquer any enemy. It would probably collapse in chaos, confusion and inability to make any decision, primarily because communication would be limited.

Every army breaks down individuals and rebuilds them in a team environment and with a clear language and instructions. For such a team in trouble, to request a precise artillery strike, this is accomplished using a set of short instructions, which are not prone to mistakes or misunderstanding.
Thor tapped on the open door of Morpheus, and asked, "Got a moment?"

Morpheus was obviously deeply involved in something, but he looked up and seeing the strain on his face said, "Of course. What’s on your mind?"

Silently Thor went in and fell into the visitor’s chair and his tension increased visibly. "It seems such a long time ago that we had that discussion about the involvement of chickens and the total commitment of the pigs to a plate of bacon and eggs. How are you handling the loss of one of your teams?"

"Well before we started out it was always a real possibility, but that is my problem to live with, but do you feel some responsibility?"

"Well it was something that quality control should have picked up."

"Quality is something that touches every person and administration in an endeavour such as this. No one can divorce themselves from that responsibility and the QA department simply administers the level and application of the standards, but quality is a technical thing. The real responsibility is with production, with those who were lost as much as with anyone else."

"Yes, I know all that, but I can’t help thinking we could have done more."

"We all did what we had to do. We didn’t know then what we know now."

"Yes that’s true. Okay, thank you, but I will still be more careful in future."

They both stood up and shook hands expressing the silent appreciation they had for each other.

**Back to the future ...**

We have reached the end of this book and the end of yet another exciting exploration of technology. We thank you for accompanying us on our journeys and we look forward to welcoming you again soon.

![Artist's concept of the New Horizons spacecraft during its planned encounter with Pluto and its moon, Charon](https://example.com/new_horizons_concept.png)

*Figure 58 - Artist’s concept of the New Horizons spacecraft during its planned encounter with Pluto and its moon, Charon.*

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*Credit: Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute (JHUAPL/SwRI).*
Quick Reference Guidelines

- **Methodologies and process**
  - View supporting artefacts not enforced as policies.
  - Must empower the solution team.
- **Visual** designs and reports promote clarity.
- **Technology** view as blueprints, frameworks and tools, but not the final solution.
- **Clean and managed construction environments**, with thorough quality assurance and testing environments, typically result in valuable and reliable solutions.
- A consistent language (**eTalk**) shared by the stakeholders promotes understanding and minimises confusion and misunderstanding.
- **Simplicity** … nuggets in a nutshell:
  - Organisational nuggets
    - eTalk
  - Knowledgebase (etKB)
  - Solution team nuggets
    - Methodology adapted to suit the team, not vice versa
    - Empowering the team stakeholders, especially with estimations
    - Visual designs
    - Visual status reporting
    - Technology "LEGO blocks", viewed as tools
    - Clean and managed solution environment
    - Agreed quality assurance and testing framework
- **Methodology Decision Tree**
  - Only use CMMI if the client demands it
  - Only use CMMI if the plan cannot be improved
  - Only use CMMI if the client agrees to pay for any changes
  - Only use Extreme with good natured developers
  - Only use Scrum if you have good planners for the Product Backlog
  - Only use Scrum if you can plan deliverables for every sprint
  - Only use Scrum if you can have good input from stakeholders, unless the stakes are sharp.
  - Use Agile.
- **Scrum Poker Estimation Game Rules**
  - Agree as a team as to the card values and range, i.e. 1-13, 2-14, or double, etc.
  - Each player to place the card face down.
  - No cards are turned over until all cards have been played to minimise influencing others.
  - Each player makes his own estimate.
  - Never belittle a person’s estimate, but question extreme differences.
  - Don’t tolerate too much debate; rather replay the round until there is consensus.
Scrummage, also known as Scrimmage in American and Canadian football, means to skirmish.

**Light Weight Scrum Process Template**

**Objectives**
- Introduction
- Process Overview
- Preparations
- Artefacts
- Snapshot – “how to”
- Process Guidance Outline
Introduction

The Light Weight Scrum Process Template is a lightweight and scrum oriented process template for Team Foundation Server.

The objective of the community initiative developed and maintained by evangelists and MVPs of the VSTS/TFS product and the scrum methodology, is a process template that allows teams to adapt their ecosystem to deliver frequent and regular high quality software and business value.

Refer to the book Agile Project Management with Scrum, by Ken Schwaber, for more information on the Scrum methodology, as well as practical and invaluable guidance.

Authors

The following MVPs have contributed to this process template:

- Adrian Azocar, USA
- Steven Borg, USA
- Willy-Peter Schaub, South-Africa

Preparations

Software Requirements

- Visual Studio .NET 2005
- Visual Studio Team Explorer (VSTS Client)

Installation

- Ensure that you have unzipped the file 'v0.1.zip' to 'C:\'. You should now have a folder 'C:\LWSPT'.
- Open the Process Template Manager (Team | Team Foundation Server Settings | Process Template Manager).
- Click on the Upload Button and navigate to the folder in step 1.

Issues

- Please report all issues at http://www.codeplex.com/VSTSScrum/WorkItem/List.aspx

---

MVP: Microsoft Most Valued Professional
Process Overview

The Lightweight Scrum process template is focused on delivering high quality solutions, using a low-impact, visual and team collaboration process.

At the beginning of a project the project stakeholders create a prioritised and up-to-date product backlog, using backlog items. The product team is then able to select a set of highest priority backlog items in a sprint planning meeting and associating them with sprints.
While the product team proceeds to work through the list of backlog items assigned to the current sprint, daily scrum meetings ensure that the team communicates and synchronises their activities. At the end of each sprint the team demonstrates the sprint products to all product stakeholders, capturing and prioritising feedback during the Sprint Review meeting. The final step in each sprint is a Sprint Retrospective meeting, during which the team discuss how to improve the team environment and process, in other words the team ecosystem, in subsequent sprints.

**Artefacts**

Refer to Process Guidance Outline on page 102, which defines the online process guidance, available to all Team Project stakeholders.

**Overview**

**Concepts**

<table>
<thead>
<tr>
<th>Concept</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Guidance</td>
<td>The Light Weight Scrum Process Template is a light-weight and scrum oriented process template for Team Foundation Server.</td>
</tr>
<tr>
<td>Project Portal</td>
<td>The Project Portal stores artefacts such as documents, spreadsheets, and project plans.</td>
</tr>
<tr>
<td>Roles</td>
<td>Solution team members assume one or more roles as defined on page 95.</td>
</tr>
<tr>
<td>Source Control</td>
<td>The Team Foundation version control system stores artefacts such as source code and text.</td>
</tr>
<tr>
<td>Sprints and Items</td>
<td>Team members work on backlog items and a sprint defines a set of backlog items that must be completed during the sprint defined period of time.</td>
</tr>
<tr>
<td>Users and Groups</td>
<td>Each team member belongs to one or more groups, which enforce security privileges.</td>
</tr>
<tr>
<td>Visual Studio Team System</td>
<td>Visual Studio Team System provides tools and an environment that you can use to interact with the process guidance.</td>
</tr>
<tr>
<td>Work Item Database</td>
<td>All backlog items are recorded in a database, also known as the work item database. You can investigate the solution health and status by querying these backlog items and their state in real time.</td>
</tr>
<tr>
<td>Work Products</td>
<td>Work products include artefacts such as documents, spreadsheets, project plans, source code, and other tangible entities.</td>
</tr>
</tbody>
</table>

Table 2 – Artefact Overview: Concepts

**Iterations & Sprints**

The Scrum process template defines a number of predefined solution iterations, also known as sprints, which define a set of activities and solution features that must be completed within a predefined period of time (sprint).

Initially sprints will be focused on different deliverables such as analysis and design, development, testing and deployment. Shorter duration sprints reduce the margin of error in team estimates and provide fast feedback about the state and health of the solution. It is imperative that each sprint is concluded with a working piece of the solution, which can be demonstrated during the sprint review meeting.

![Figure 60 – Artefact Overview: Iterations & Sprints](image)

**Getting Started**

Once you have created a new Team Project based on the Light Weight Scrum Process Template Scrum for Agile Software Development process template, you must analyse and understand next steps for getting your team actively working on project. Initial tasks include:

- Setup of permissions
- Setup migration of source code, if applicable
- Setup migration of work items, if applicable
- Setup Check-In Policies
- Setup Sending of welcome Mail to Users
- Definition of backlog items
- Definition of sprints
- Definition of sprint/iteration length

<table>
<thead>
<tr>
<th>Concept</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exit Criteria</td>
<td>Critical tasks that must be completed for an iteration/sprint to be completed are marked as “exit criteria”.</td>
</tr>
<tr>
<td>Queries</td>
<td>Team Project queries are used to interrogate the database and data warehouse “real-time” to produce information about the state and health of the solution.</td>
</tr>
<tr>
<td>Reports</td>
<td>Team Project reports are used to interrogate the database and data warehouse and to produce reports about the state and health of the solution.</td>
</tr>
<tr>
<td>Work Item Types</td>
<td>Light Weight Scrum Process Template defines three work item types, namely backlog item, planning and impediment. Work items must be documented as detailed as possible, to ensure that queries and reports reflect the true state of the nation.</td>
</tr>
</tbody>
</table>

Table 3 – Artefact Overview: Getting Started

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyst</td>
<td>An analyst defines the business opportunity and business processes, providing business subject matter expertise to the team.</td>
</tr>
<tr>
<td>Architect</td>
<td>An architect investigates and defines the foundations of the solution, including operational, infrastructure and solution architectures, by dividing the system into separate and autonomous subsystems.</td>
</tr>
<tr>
<td>Developer</td>
<td>A developer implements the solution as specified by the solution specifications. During sprint planning a developer is also involved with the estimation of time and effort, as well as planning.</td>
</tr>
<tr>
<td>Project Manager</td>
<td>A project manager is focused on ensuring that the team delivers business value within the agreed schedule and budget. Apart from scheduling and planning, the project manager is also responsible for ensuring that the team has a “happy” and productive ecosystem.</td>
</tr>
<tr>
<td>Release Manager</td>
<td>A release manager plans and manages the release and deployment of the solution.</td>
</tr>
<tr>
<td>Scrum Master</td>
<td>A Scrum Master is responsible for ensuring that the team operates by the practices of Scrum, protects the team against over commitment and scope creep and facilitates the daily scrum. A Scrum Master is not a project manager.</td>
</tr>
<tr>
<td>Tester</td>
<td>A tester is responsible for discovering and communicating issues with the solution, as well as reporting all issues accurately and assisting the developers with the resolution of the issues. Tests include positive testing to validate that the solution meets the agreed business specifications, and negative testing to identify stability, reliability and functional discrepancies in the solution.</td>
</tr>
</tbody>
</table>

Table 4 – Artefact Roles

**Work Items**

**About work items**

Visual Studio Team Foundation records a unit of work in a database, used to track the status and health of the overall solution. The *Light Weight Scrum Process Template* defines four types of work items, used to assign and track work.

The work item database and metrics warehouse make it possible to execute real-time queries and to produce reports on project health.
**States**

Table 5 – Work Items: States

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active</td>
<td>An active task describes an element of work that needs to be done as part of the solution.</td>
</tr>
<tr>
<td>Closed</td>
<td>A closed task describes an element of work which has been completed and for which no further work needs to be done for the current solution.</td>
</tr>
<tr>
<td>Completed</td>
<td>A task closed as “complete” indicates that no further work needs to be done.</td>
</tr>
<tr>
<td>Deferred</td>
<td>A task closed as “deferred” indicates that the associated work cannot be completed in the current iteration.</td>
</tr>
<tr>
<td>New</td>
<td>A new task work item is created when an element of work is identified. Tasks can be focused on operations, analysis, design, and development or testing.</td>
</tr>
<tr>
<td>Obsolete</td>
<td>A task which is closed as “obsolete” defines an element of work that is no longer applicable to the solution.</td>
</tr>
</tbody>
</table>

**State Transitions**

<table>
<thead>
<tr>
<th>STATE</th>
<th>... to Active</th>
<th>as ... Deferred</th>
<th>... as Completed</th>
<th>as ... Obsolete</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>A new task is automatically created with an active state.</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Active</td>
<td>N/A</td>
<td>Item cannot be</td>
<td>No further work</td>
<td>Item is no</td>
</tr>
</tbody>
</table>
### User Story

A user story records a feature that is needed by an application from the user’s perspective, the history of the conversation that comes out during the conversations with the owner of the product and the test that will be used to make sure the story was coded correctly. Details of the user story can be added by creating linked user stories.

User stories record what the application is supposed to do in the language of the end users. They also drive the creation of the product backlog. The activity of creating user stories also helps developers to better understand the application from the perspective of the user, which makes for a better product.

### Review Item

A review item is used to define code, design, sprint or sprint retrospective review. Review items can either be used to call for a review or to record the information from a review that has already happened. Reviews are used to ensure quality through interaction between members of the team or between the team and the end-users.

Code and design reviews are used by the team to help ensure the quality of the application. These reviews are called by individual developers or architects to ensure consistent coding and design practices.

Sprint reviews are used to record any relevant information from the end of sprint review meeting. These reviews are called by the Scrum Master and are used to document any relevant information collected by the interaction between the team and the end-users. This type of review may spawn backlog items or impediments that are linked to the review.

Sprint retrospective review items are used to record relevant information from the team’s retrospective meeting. These reviews are called by the Scrum Master and are used to document any relevant information collected by the teams review. This type of review may spawn backlog items or impediments that are linked to the review.

### Backlog Item

A backlog item defines a unit of work, focused on tasks such as analysis, design, development, testing or deployment. During the initial planning of the project, the stakeholders define the business case, the vision, the initial product backlog, the initial release plan, the team and the logistics, such as infrastructures, software, etc.

The initial product backlog defines a set of product backlog items, which define functional and non-functional requirements.

### Table 6 – Work Items: State Transitions

<table>
<thead>
<tr>
<th>STATE</th>
<th>… to Active</th>
<th>as … Deferred</th>
<th>… as Completed</th>
<th>as … Obsolete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed</td>
<td>Item is re-opened if it requires further attention, typically from Closed-Deferred state.</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

- 97 -
During the print planning meeting, the team identifies the product backlog items which will be addressed during the next sprint, defining the duration; the team members responsible for the items and whether or not some or all of the items are exit criteria items. Once the product backlog items are assigned to a sprint, they are implicitly converted to sprint backlog items, identifying an individual task and a defined unit of work.

Refer to Empowered Planning, page 85, for a recommended planning process using the concept of poker to ensure that all team members contribute to the planning and that estimates are agreed to by the team.

**Defect**

A defect is a work item that defines a problem in the solution that needs to be resolved. It is imperative that a defect is accurately documented, so that the assigned reader can understand not only the problem, but also how to reproduce the problem, to ensure that the probability of resolution is high and the resolution duration and effort is small.

**States**

![Defect States Diagram]

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active</td>
<td>An active defect defines a problem that needs to be resolved.</td>
</tr>
<tr>
<td>As Designed</td>
<td>A defect which is closed “as designed” defines a problem that is intentional by design.</td>
</tr>
<tr>
<td>Deferred</td>
<td>A defect which is closed as “deferred” defines a problem that will be addressed at a later stage.</td>
</tr>
<tr>
<td>Duplicate</td>
<td>A defect which is closed as “duplicate” defines a problem that is already addressed by another defect.</td>
</tr>
<tr>
<td>Fixed</td>
<td>When a “closed” defect is verified, it is closed as “fixed”.</td>
</tr>
<tr>
<td>Obsolete</td>
<td>A defect which is closed as “obsolete” defines a problem that is no longer applicable to the solution.</td>
</tr>
<tr>
<td>Reopened</td>
<td>A fixed defect can be re-opened if the problem it defines re-occurs in the solution.</td>
</tr>
<tr>
<td>Unable to Reproduce</td>
<td>A defect which is closed as “unable to Reproduce” if the problem it describes cannot be reproduced.</td>
</tr>
<tr>
<td>Wrong Fix</td>
<td>A defect is returned to the active state if the problem it describes was not resolved by the fix.</td>
</tr>
</tbody>
</table>

**State Transitions**

The valid defect state transitions are:

- Active ➔ Closed - As Designed
- Active ➔ Closed - Deferred
- Active ➔ Closed - Duplicate
- Active ➔ Closed - Fixed
- Active ➔ Closed - Obsolete
Closed As Designed → Active – Wrong Fix
Fixed → Active – Wrong Fix
Duplicate → Active – Wrong Fix
Obsolete → Active – Wrong Fix
Unable to Reproduce → Active – Wrong Fix

Closed As Designed → Active – Reopened
Fixed → Active – Reopened
Duplicate → Active – Reopened
Obsolete → Active – Reopened
Unable to Reproduce → Active – Reopened

**Impediment**

An impediment defines a risk, an event or issue that negatively impacts the solution team and that therefore can have a potential negative outcome on the project. Teams that are proactive in risk management and documentation of impediments will be able to successfully identify and address impediments early in the solution cycle, positively impacting the overall ecosystem and delivery of the solution.

**Reporting**

**Queries**

<table>
<thead>
<tr>
<th>Query</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Defects</td>
<td>Lists all defects for the project with a state equal to “Active” and sorts by predefined criteria.</td>
</tr>
<tr>
<td>All Impediments</td>
<td>Lists all work items for the project of type Impediment and sorts by predefined criteria.</td>
</tr>
<tr>
<td>All Backlog Items</td>
<td>Lists all of the work items of type Backlog Item and sorts by predefined criteria.</td>
</tr>
<tr>
<td>All Work Items</td>
<td>Lists all of the work items for the team project</td>
</tr>
<tr>
<td>My Backlog Items</td>
<td>Lists all backlog items assigned to me.</td>
</tr>
<tr>
<td>My Defects</td>
<td>Lists all defect items assigned to me.</td>
</tr>
<tr>
<td>My Impediments</td>
<td>Lists all impediment items assigned to me.</td>
</tr>
<tr>
<td>My Reviews</td>
<td>Lists all review items assigned to me.</td>
</tr>
<tr>
<td>My Work Items</td>
<td>Lists all work items assigned to me.</td>
</tr>
<tr>
<td>My Work Items for All Team Projects</td>
<td>Lists all work items assigned to me in all of the Team Projects.</td>
</tr>
<tr>
<td>Project Checklist</td>
<td>Lists the project checklist.</td>
</tr>
<tr>
<td>Resolved Defects</td>
<td>Lists all of the defects that have the “resolved” status.</td>
</tr>
<tr>
<td>Un-triaged Defects</td>
<td>Lists all of the defects that have not been reviewed for validity.</td>
</tr>
</tbody>
</table>

Table 8 – Artefact: Queries
Reports

<table>
<thead>
<tr>
<th>Report</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burn Down Chart</td>
<td>Lists the project progress in terms of the velocity at which backlog items are closed.</td>
</tr>
<tr>
<td>Remaining Work</td>
<td>Lists the project progress in terms of the remaining work items.</td>
</tr>
<tr>
<td>Tests Failing without Active Defects</td>
<td>Lists all tests that have failed and do not have active defects.</td>
</tr>
<tr>
<td>Tests passing with Active Defects</td>
<td>Lists all tests that are passing and have active defects.</td>
</tr>
</tbody>
</table>

Table 9 – Artefact: Reports

Snapshots – “how to”

Create Team Project using Light Weight Scrum Process Template

1. Create a new team project.
2. Select Light Weight Scrum Process Template, when promoted to select a Process Template.
3. Proceed with the other project creation steps, selecting the appropriate options.
4. Select Finish to confirm the creation of the Team project.
5. The wizard will notify you when the Team Project has been created.

![Figure 67 - Team Project creation: Select process template](image)

6. Proceed as per work items defined by the process template.

![Figure 68 - Team Project creation: Select process template](image)
**Process Guidance Outline**

Locate the process guidance in your team explorer, by selecting `ProcessGuidance.html` under “YourProject\Documents\Process Guidance”.

The process guidance is divided into the following hierarchy of documentation:

![Diagram of process guidance outline](image)

*Figure 69 – Light Weight Scrum Process Template Process Guidance Outline*
Quick Reference Guidelines

**Daily Scrum Meeting**
Daily short meeting, typically time-boxed to 15 minutes, during which the team members synchronise progress and impediments.

**Impediment**
Impediment defines an issue that typically stops a team from meeting objectives and therefore needs to be tracked and addressed.

**Product Backlog**
Product backlog defines a list of functional and non-functional requirements, as well as issues. Each item is estimated based on priority and granularity.

**Sprint Backlog**
Sprint backlog is a list of tasks that defines the “what must be done” during a sprint.

**Sprint Backlog Item**
Sprint backlog item is an individual task that defines a unit of work, which is typically signed up for by team members, not assigned to.

**Sprint Planning**
Sprint planning meetings during which the product owner presents the potential product backlog and the team agrees on items that can be addressed during the sprint.

Typically structured as 2 x 2hour slots, the first used to select sprint items and the second to plan the sprint workload.

**Sprint Review**
Sprint review meeting reviews progress made during a sprint and allows the team to presents demonstrations of progress.

Typically a 4 hour slot.

**Sprint Retrospective**
Sprint retrospective meeting is a discussion of the completed sprint by the team and “how” the team is doing.

Typically a 3 hour slot.
Appendix: A small saclike organ located at the upper end of the large intestine. The appendix has no known function in present-day humans, but it may have played a role in the digestive system in humans of earlier times. The appendix is also called the vermiform appendix because of its wormlike (“vermiform”) shape.\(^{22}\)

---

**Cool Links**

A list of website references which you may find either cool or useful. Please note that due to the dynamics of the Internet, these URLs may rapidly become outdated and you should therefore be prepared to look for alternative sites if the unthinkable happens.

<table>
<thead>
<tr>
<th>ID</th>
<th>URL</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><a href="http://www.nasa.gov">http://www.nasa.gov</a></td>
<td>NASA (National Space Agency)</td>
</tr>
<tr>
<td>2</td>
<td><a href="http://www.scrumalliance.org/">http://www.scrumalliance.org/</a></td>
<td>Agile Manifesto</td>
</tr>
<tr>
<td>3</td>
<td><a href="http://pluto.jhuapl.edu">http://pluto.jhuapl.edu</a></td>
<td>New Horizon NAS mission site</td>
</tr>
</tbody>
</table>

Table 10 - Useful and Cool website references

**Cool Blogs**

A list of blog sites which you may find either cool or useful. Please note that due to the dynamics of the Internet, these URLs may rapidly become outdated and you should therefore be prepared to look for alternative sites if the unthinkable happens.

<table>
<thead>
<tr>
<th>ID</th>
<th>URL</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><a href="http://dotnet.org.za/yah">http://dotnet.org.za/yah</a></td>
<td>BB&amp;D RSS feeds</td>
</tr>
<tr>
<td></td>
<td><a href="http://dotnet.org.za/wil">http://dotnet.org.za/wil</a></td>
<td>James Pereira</td>
</tr>
<tr>
<td></td>
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<td>Jean-Pierre Fouche</td>
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<td>Garret Besser</td>
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<td>Andre Odendaal</td>
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Table 11 - Useful and Cool blog references
### Glossary

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<th>Abbreviation</th>
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<tr>
<td>A•STRA</td>
<td>BB&amp;D Architecture and Strategy Group.</td>
</tr>
<tr>
<td>AU</td>
<td>Astronomical Units which is the average distance between the Sun and Earth, about 93 million miles or 149.6 million kilometres.</td>
</tr>
<tr>
<td>BB&amp;D</td>
<td>Budge, Barone and Dominick (Pty) Ltd. See <a href="http://www.bbd.co.za">http://www.bbd.co.za</a>.</td>
</tr>
<tr>
<td>CMMI</td>
<td>Capability Maturity Model Integration</td>
</tr>
<tr>
<td>MSF</td>
<td>Microsoft Solutions Framework</td>
</tr>
<tr>
<td>SDLC</td>
<td>Software Development Life Cycle</td>
</tr>
<tr>
<td>SMART</td>
<td>Small Missions for Advanced Research and Technology</td>
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</table>
Quick Reference Posters

Poster Extracts
The following posters have been extracted from the collection of quick reference posters:

- Best Practices – Quick Reference Poster Map
- Best Practices – SDLC smartProcess
- Best Practices – SDLC MSF
- Best Practices – SDLC Scrum
Space

The fascinating world of Space Probes

Overview

The Sputnik space probe, launched in October 1957 by the Russian space agency started a space race, which has resulted in phenomenal success stories, under the harshest conditions.

What planning, quality, commitment and patience is required by a solution team that spends years building a space probe. They watch as it lifts off strapped to a Titan rocket and wait patiently for 6 years, then navigate the man made object through the rings of Saturn, only to perform a successful landing on a moon of a distant planet. The mission was concluded with the collection of data that the release a video showing the approach and landing by the probe on the Titan moon.

“Some” of successful probes

The following table summarises “some” of operational deep space probes and their location. Refer to http://www.nasa.gov for detailed information, but we hope that the following list will make all space critics and information technology stakeholders think … remember that all of these probes contain robotics, information technology and that most were constructed a long, long time ago.

<table>
<thead>
<tr>
<th>Probe Name</th>
<th>Mission</th>
<th>Launched</th>
<th>Location</th>
<th>Distance AU</th>
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</thead>
<tbody>
<tr>
<td>Cassini</td>
<td>Exploration</td>
<td>1997-10</td>
<td>Saturnian Orbit</td>
<td>~8.2</td>
</tr>
<tr>
<td>Mars Global Surveyor</td>
<td>Photographic Mapping</td>
<td>1996-11</td>
<td>Martian orbit</td>
<td>~2.6</td>
</tr>
<tr>
<td>Mars Odyssey</td>
<td>Chemical elements mapping</td>
<td>2001-04</td>
<td>Martian orbit</td>
<td>~2.6</td>
</tr>
<tr>
<td>Mars Reconnaissance</td>
<td>Exploration</td>
<td>2005-08</td>
<td>Martian orbit</td>
<td>~2.6</td>
</tr>
<tr>
<td>Orbiter</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MER-A “Spirit”</td>
<td>Exploration</td>
<td>2003-06</td>
<td>Gusev crater on Mars</td>
<td>~2.6</td>
</tr>
<tr>
<td>MER-B “Opportunity”</td>
<td>Exploration</td>
<td>2003-07</td>
<td>Meridiani Planum on Mars</td>
<td>~2.6</td>
</tr>
<tr>
<td>Messenger</td>
<td>Exploration</td>
<td>2004-08</td>
<td>On route to Mercury</td>
<td>~1.31</td>
</tr>
<tr>
<td>New Horizon</td>
<td>Exploration</td>
<td>2006-01</td>
<td>On route to Pluto</td>
<td>~2.03 (~30.28)</td>
</tr>
<tr>
<td>SMART-1[24]</td>
<td>Lunar Exploration</td>
<td>2003-09</td>
<td>Lunar Orbit</td>
<td>~0.0025</td>
</tr>
<tr>
<td>Stardust</td>
<td>Interstellar dust collection</td>
<td>1999-02</td>
<td>Solar orbit</td>
<td>~1.86</td>
</tr>
<tr>
<td>Pioneer</td>
<td>Solar system exploration</td>
<td>1972-04</td>
<td>Outer solar system</td>
<td>~91.16</td>
</tr>
<tr>
<td>Ulysses</td>
<td>Exploration of Suns polar regions</td>
<td>1990-10</td>
<td>Solar polar orbit</td>
<td>~4.02</td>
</tr>
<tr>
<td>Venus Express</td>
<td>Venus Orbiter</td>
<td>2005-11</td>
<td>Venutian Orbit</td>
<td>~1.44</td>
</tr>
<tr>
<td>Voyager 1</td>
<td>Outer solar system exploration</td>
<td>1977-09</td>
<td>Outer solar system</td>
<td>~81</td>
</tr>
<tr>
<td>Voyager 2</td>
<td>Outer solar system exploration</td>
<td>1977-08</td>
<td>Outer solar system</td>
<td>~65</td>
</tr>
</tbody>
</table>

Table 12 - Deep Space Probes

What we can learn from the space agencies

Although Pioneer is the furthest man-made object in space at a proud 91.865 AUs, Voyager 1 is the furthest still operational in space at 81 AUs … that’s 12,116.6 million kilometres from Earth … and is expected to continue transmission of data until 2020 … that’s 42 years of operational time. The average IT solution age is a mere 2 years, with continuous handholding.

[23] AU (Astronomical Units) is the average distance between the Sun and Earth, about 93 million miles or 149.6 million kilometres. If two figures are specified the first indicates the current position, whereas the figure in brackets() indicates final destination.

[24] Small Missions for Advanced Research and Technology
The Huygens probe successfully landed on the Titan moon on Jan. 14, 2005, 7 years after launch, 4,500 million kilometres from Earth. We implement the typical IT solution on more accessible sites, with 75% of solutions failing or down graded in terms of features or time lines before eventually seeing a “happy” business user.

The success stories of the space missions, the ability of the space probe engineers to design, develop and deploy solutions at vast distances, without the chance to stroll over to a computer and apply a quick patch, is in our eyes a fascinating achievement and one that the information technology software engineers should take note of, analyse and learn.

This book takes a critical look and investigates four solution teams and four vastly different approaches of solution life cycle that we have seen during our 23 years in the information technology industry. To make it slightly more interesting we have transposed the four teams and their ways of operation to four teams of software engineers who are receiving the instruction to build and travel to Pluto and back, using their own space ship. We often make the statement that we do not believe that any software engineer would ever consider crossing a suspension bridge across a 500m gorge, if built the way the industry builds the majority of information technology solutions.

There is no doubt that many projects are complex, based on unclear specifications, unknown and changing requirements, with perplexing human interactions and rapidly evolving and changing technology. However, it seems strange that the space agency is capable of achieving miracles, while the information technology industry normally ends each solution life cycle with bug storms, long hours, stressed team members and compromises on quality, release schedule and/or functionality to meet artificial milestones.

We believe that with effective management, clear specifications, open communication, usage of technology as a tool and not as a complexity challenge, keep-it-simple designs and continuous inspection, analysis and reporting, we can join the success stories of some of the previously mentioned space probes. We can avoid the high failure rate of information technology projects and we can finally deliver the return on investment that business deserves.

Read the remainder of this book like a story based on four enthusiastic solution teams, referred to as T1, T2, T3 and T4, and come to your own conclusion as to which approach you believe is the correct one. Although we are intentionally, not making any reference to life cycle tools or methodologies you should recognise some of the methodologies used by the teams and recognise tools and technologies. As mentioned previously we transpose each team to this hypothetical space program from the information technology age during the past 23 years. Some teams may even recognise themselves and if that is the case, please realise we wrote this book to critically look at the way we work, not at the good, the bad and/or the evil of individual project teams. There are many, many more projects and environments, but due to commercial constraints, we had to pick four main candidates.

To the space agencies and true rocket scientists we extend an apology for probably breaking a gazillion space and technology rules to achieve the near impossible. We are merely trying to use a more spectacular analogy to highlight the challenges of the information technology projects of yesterday, today and probably tomorrow.

Let us return to the year 2104 and start at the beginning … enjoy the journey.
Figure 70 - Artist's concept of the New Horizons spacecraft.\textsuperscript{25}

25 Artist's concept of the New Horizons spacecraft during its planned encounter with Pluto and its moon, Charon. The craft's miniature cameras, radio science experiment, ultraviolet and infrared spectrometers and space plasma experiments would characterize the global geology and geomorphology of Pluto and Charon, map their surface compositions and temperatures, and examine Pluto's atmosphere in detail. The spacecraft's most prominent design feature is a nearly 7-foot (2.1-meter) dish antenna, through which it would communicate with Earth from as far as 4.7 billion miles (7.5 billion kilometers) away.

Credit: Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute (JHUAPL/SwRI).

Refer to \url{http://pluto.jhuapl.edu} for further information.
Remembering Pluto as a planet

August 24, 2006 ... the solar system has shrunk?!?

After much debate, the International Astronomical Union has approved a revised definition that shrinks our solar system from nine to eight planets, declassifying Pluto from a planet to a new class of celestial objects, called “dwarf planets.”

The dwarf planets include objects such as Ceres, orbiting in a belt between Mars and Jupiter, and 2003 UB313, nicknamed “Xena”, bigger and further away than Pluto, discovered by Dr. Mike Brown and his colleagues.

Planets from this date forth have three traits:

- They must orbit the sun
- They must be massive enough that its own gravity pulls it into a nearly round shape
- They must be dominant enough to clear away objects in its neighbourhood

Dwarf planets must have only two of these traits and exclude all of the moons.

Pluto with its small size, distant location and odd orbit, has always been the “odd one out”, with debates raging whether Pluto was a planet or just an icy object.


---

**Figure 71 - Putting Pluto's size into perspective**
Meet the Authors

Willy-Peter Schaub

Figure 72 - The hooligans (from left to right) Alexander, Thorsten, Willy-Peter and Jacques Schaub in Namibia

Bio presented by Peter Searle …

Willy started his information technology (fancy term for bits and bytes) career in the early 1980’s and the “Swiss” working style and strive for quality embedded in the first years working for Burroughs, at the Swiss Banking Corporation, has created a foundation that has strengthened over the years. The quest for quality and especially simplicity has remained a core objective and will continue to fuel his passion for successful business and technology solutions for many, many years to come.

According to Peter Searle, Director of BB&D, Willy is at worst, passionate about technology and at best, a technological guru.

Currently Willy-Peter is responsible for the research of new Microsoft technologies, developer readiness, mentorship, creation of an internal knowledgebase, sharing of experience and good practices within the BB&D and South-African community.

Documenting the experiences and best practices in MTUPress books such as "NET Enterprise Solutions ... Best Practices for the Connoisseur", "NET Enterprise Solutions ... Interoperability for the Connoisseur" and "Software Engineers on their way to Pluto" has become a hobby shared with his colleagues.

Varied and extreme interests include scuba diving, cycling, science fiction, Star Wars, astronomy (his project code names give this one away) and most importantly his family. Scuba diving, wreck exploration and shark observation is a passion he shares with his wife and sons … according to Willy diving must be the closest thing to spacewalks, with the exception that there are no sharks to admire in space.
I met Geoff in the early nineties when we were both on contract at a local bank. Since then Geoff joined BB&D on a full time basis and has worked on a variety of projects as a software developer and designer. Long before we met as programmers Geoff had started his career as an air radio technician working for the department of civil aviation. His interest in electronics and computers resulted in a transfer to Jan Smuts airport in 1975 (now OR Tambo International) where he worked as a support engineer on their systems programming in Assembler. Next was a job heading up a team working on the weapons and electronics systems for SA Navy strike craft. Following that time Geoff worked as a systems engineer for a Durban company, started a company with friends and developed a DOS based language that was used to write a POS system for a company called React. Which some in BB&D will recognize as the company where BB&D replaced the very old DOS based system in 2006.

I was never really aware of Geoff’s passion for writing until Willy-Peter told me that Geoff was co-authoring what was being called ‘book number 3’. Geoff’s passion for writing has developed over the years he has been at BB&D. How this happened is both sad and inspiring. The youngest of Geoff’s four children, Jonathon, caught encephalitis at the age of 25. This sadly resulted in severe brain damage and a changed man. Jonathon battled on but in the end the damage caused by the disease resulted in his death. Over this time Geoff wanted to help others who had had to face similar challenges and planned on developing a web site. In writing the material for the web site Geoff discovered that the writing in itself was a catharsis for the emotions felt by himself over Jonathon’s time of disease and then death. The web site turned into a novel and Geoff has been writing ever since with the same passion and energy that he puts into his life as a software programmer and designer.
Other Publications

**.NET Enterprise Solutions ... Best Practices for the Connoisseur**

Information technologies change frequently and rapidly, but the principles, experience and best practices of system analysis, design, construction and deployment remain timeless. “This book is a small step towards making the toothpick of experience a reusable commodity”.

Topics covered:
- Fundamentals of technical architectures
- Analysing business requirements and envisioning a solution
- Designing an enterprise solution
- Constructing an enterprise solution
- Testing the solution
- Deploying the solution
- Office Integration
- Java Integration
- Mobile Devices
- Share Point Web Parts

**.NET Enterprise Solutions ... Interoperability for the Connoisseur**

Our new BB&D DRP book 2, entitled “.NET Enterprise Solutions ... Interoperability for the Connoisseur”, ISBN 0-620-34680-9, is complete and currently on the printing press. We thank the authors, the contributors, the coordinators and the reviewers for sharing their knowledge and experience. The book continues the discussion and sharing of best practices we introduced with book " .NET Enterprise Solutions ... Best Practices for the connoisseur, ISBN : 0-620-33013-9", focused specifically on interoperability and integration of similar and dissimilar (heterogeneous) solutions. Rather than specialising on any one concept or technology, this book presents a “broad scan” introduction to a variety of technologies within that scope.

Topics covered include:
- Interoperability decomposed
- Technology chatter,
- Exploring technology used in the space of interoperability and integration
- Interoperability challenges and countermeasures
- Technology journey simplified, looking usage of common technology
- Indigo in easy steps
- Introducing Windows Communication Foundation
- Reference blueprints and building blocks
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<td>Team T4 cruising ... relaxing, while the mother ship maintains control</td>
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