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Solution Delivery Capability Creation

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Nokia Siemens Networks:ssä toimituskyvyn luominen (Delivery Capability Creation, DCC) sisältää kaikki koko tilaus/toimitusketjuun liittyvät toimenpiteet, joiden jälkeen tuote on tilattavissa ja toimitettavissa. Käsitteenä se on laaja, ja DCC työ tehdään yleensä määritellyn Delivery Capability Management –prosessin (DCMP) mukaisesti, osana tuotekehitysprogrammeja. DCMP -prosessi ei kuitenkaan tue asiakasratkaisujen (solutions) toimituskyvyn luontia. Asiakasratkaisu on monimutkaisempi käsite, kuin pelkkä tuote.

Tämä raportti pyrkii selventämään, mitä asiakasratkaisujen toimituskyvyn luominen (Solution Delivery Capability Creation, SDCC) oikein on, mitkä toimet ja etapit ovat tarpeen, miten työ voitaisiin tehdä tehokkaasti ja laadukkaasti, perustuen kahteen esimerkkiprojektiin vuosina 2010-2011. Lisäksi valotetaan SDCC prosessia, rooleja ja velvollisuuksia, malleja, esimerkkejä ja ohjeistusta.

Tutkimuksen tutkimusote oli kvalitatiivinen. Tutkimusmenetelmänä käytettiin toiminta-tutkimusta. Koska kyseessä on logistiikkaprojekti, koostuu tutkimuksen teoreettinen viitekehys mukautuvasta projektijohtamisesta ja toimitusketjun hallinnasta (Supply Chain Management, SCM). Ratkaisuliiketoiminta on koko työn perusta, ja käsite on sen vuoksi selitetty varsin yksityiskohtaisesti. Työ on tehty muuttuvassa moniprojektiympäristössä ja osana virtuaalista matriisiorganisaatiota, yhteistyössä useiden eri sidosryhmien kanssa. Nämä olosuhteet tekivät projektista hyvin haastavan.

Esimerkkiprojekteista johdetut mallit painottavat ratkaisujen toimituskyvyn luomisen pääpiirteitä ja tärkeimpiä toimenpiteitä, huomauttaen, että niitä pitää aina muokata ja soveltaa. Suora siirto toiseen projektiin ei tuota vastaavia tuloksia. Siten, tämän projektin tulokset ovat luotettavia, mutta eivät päde kaikkiin SDCC projekteihin. Tuloksia ei voi yleistää sellaisenaan, mutta ajatus ja henki ovat siirrettävissä.

Avainsanat	Ratkaisuliiketoiminta, projektijohtaminen, toimituskyky

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Abstract

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At Nokia Siemens Networks, Delivery Capability Creation (DCC) includes all the operations in a company's whole Demand/Supply Chain that ensure that the product can be ordered and delivered. It is a wide concept, and DCC is usually done according to a pre-defined process, as part of product programs. However, this Delivery Capability Management Process (DCMP) does not fully support DCC for solutions, as solutions differ significantly from pure products.

This report aims at clarifying, what Solution Delivery Capability Creation (SDCC) is, what steps and operations are involved, and how the work could be done effectively reaching quality results, based on experiences with two example SDCC projects in 2010-2011. In addition, SDCC process, roles and responsibilities, models, templates, examples and guidelines are provided.

The research method in this project was action research with qualitative methods. As this was a logistics project, the theoretical framework consisted of adaptive Project Management and Supply Chain Management. Solution concept as such is the foundation for the whole project, and it is therefore explained in detail. The work was done in a changing, multiple project environment and within a virtual matrix organization, in cooperation with several stakeholders. These were circumstances that made the project very challenging.

The models and templates drawn from this project highlight the main aspects and tasks to be accomplished, but at the same time note that there's always a need to apply and modify. To transfer them to another project does not lead to identical results. Therefore the results of the project are reliable, but not valid for all SDCC projects. Results cannot be generalized, but the idea and spirit can be transferred.

Keywords	Solution, Project Management, Delivery Capability

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1 Introduction

1.1 Background, starting point and key terms used

Nokia Siemens Networks (NSN) wants to transform to a true solution company. As the concept of solution business is still relatively new it's implications to Delivery Capability Creation (DCC) need to be examined and evaluated, too. When the project was started in June 2010 it was not clear, how the Delivery Capability (DC) needs to be created for solutions. There was no process, no applicable (as such) templates nor a model for solution DCC work. So Delivery Capability needed to be created but it was not clear, what exactly needed to be done and how.

Right from the start it became evident that the task is challenging; as all solutions are complex entities, and they are all different. The current well-defined and structured product DCC process does not fit to solutions as such. When compared to products, solutions include solution specific issues, gaps and curiosities. The delivery models may differ, when products are delivered as parts of a solution. Thus, a more holistic approach needed to be taken.

There was a need for a solution Delivery Capability Creation process and model that encompasses the "big picture". Definitions, on what solution DCC is and what steps and tasks it includes, as well as to how to run the solution DCC project, were needed. It had to be considered, what makes sense, what's feasible, and what are the minimum requirements and deliverables needed to accomplish the task. The roles and responsibilities regarding solution DCC also needed to be clarified and aligned. Almost from the start it became clear that solution DCC work means stepping outside the traditional Delivery Capability Manager role towards a more active and wholesome Project Manager role.

The following are the key terms used in this report. A full list of all DCC related abbreviations is presented at the end of this report.

- Solution: Solution is an answer to a problem, critical business issue or business opportunity that provides customer value, in the customer's opinion. It is a

customized and integrated combination of products and services that creates value beyond the sum of its parts.

- Delivery Capability: DC is the ability to order and deliver the solution, taking into account all steps and tools in the whole Supply Chain. It is thus a wide concept, and it means more, than just having inventory at hand.
- Delivery Capability Creation: DCC means the setting up of Delivery Capability; taking care of all the actions in the Supply Chain after which it is possible to order and deliver the solution.
- Delivery Capability Manager: DCM is the Project Manager in charge of Delivery Capability Creation.

1.2 Own role and position

Delivery Capability Manager is the main Operations interface towards Business Units of NSN, leading projects covering all Operations activities throughout the whole life cycle of products, solutions and platforms. In this solution DCC project I had a combined role of DCM and Ramp-up and Order Configuration Support (ROCS) specialist, which means that also the more operative issues were taken into consideration. However, most of the tasks and steps described in this document are presented mainly from DCM perspective. As a DCM I was leading the project and alignment work, often in co-operation with other project stakeholders and Solution Kernel team in particular. DCM's practical work aims at successful and concrete (pilot) customer deliveries to take place, in a coordinated and structured way.

1.3 Research questions

The fundamental research questions and their linkages to framework areas are presented in the following table.

Table 1. Research questions and theoretical frameworks.

#	Research question	Framework
1	**What** is solution Delivery Capability Creation and what does it consist of? What parts of the e2e logistics chain need to be taken care of in order to reach Delivery Capability?	Supply Chain Management
2	**How** to manage solution Delivery Capability Creation project efficiently to reach quality results?	PMBoK complemented with the adaptive project management approach and Deming cycle

1.4 Research method

The research method in this project was action research with qualitative methods. The purpose was to clarify and align organization's functions related to solution DCC work. I worked within and as part of the organization, and by leading the project aimed to define a more generic solution DCC working model. I was thus the driver of the change process.

The theories and models explain the subject at hand, and provide guidance for daily work. In practice there was a lot of cooperation, discussions and networking within the company and its' different functions and organizations. The project included a lot of iteration along the way, based on feedback and cumulating experience.

1.5 Corporate objectives, project implementation and measuring

The field in this project covers project management, program management and portfolio management, with mutual project/program dependencies and interrelations. Solution DCC work needed to be done in matrix and in parallel with multiple ongoing projects, such as business change programs and common rack project.

There are already processes, methodologies and templates in use for product DCC, but none of them applies to solution DCC as such. There was a need for (at least) one more template and model. Current processes, structures and tools do not directly support solution deliveries. Other factors affecting the field of this project are strategy

as basis for business change programs, how improved IT may support and enable business better, and what does it really take to lead a project in global virtual matrix organization with virtual working conditions. The corporate targets and objectives, and their expected results and measuring are presented in the following table.

Table 2. Corporate targets, expected results and measuring.

#	Target:	Expected results and measure:
1	To create Delivery Capability for solutions A and B (solution DCC project management in practice). Solution DCC done by modifying the normal product DCC project methodology, but keeping the solution requirements and restrictions in mind. Phase 1: Delivery Capability ensured in the legacy environment Phase 2: Delivery Capability ensured with new structures and tools	Delivery Capability created and verified with a pilot customer delivery Phase 1: 1-2 pilot customer deliveries completed in legacy environment (either solution A or B) Phase 2: 1-2 sub-products have been reproductized, and 1-2 pilot customer deliveries made in new ERP Measure: order in - order out (data from SAP)
2	To create as generic as possible a working model for Solution DCC project management with templates and process description	Templates and processes reviewed and quality approved by Solution Kernel team Measure: documents distributed and stored in IMS, usage followed-up, feedback collected (does it fit or not) for further improvement
3	To define, align and document ROCS and DCM support levels for solutions. Comparison with normal product program DCM and ROCS responsibilities, focusing on the differences.	DCM and ROCS roles and support level aligned and documented as part of ROCS STP 1H2011 Measure: approved document communicated and stored in IMS
4	Share solution DCC project management Lessons Learned and Best Practices	Lessons Learned collected and corrective actions implemented. Best Practices shared within the organization. Measure: Done or not done

There are some definitions and limitations in this project. First, when work was started, there was no DC for solutions A and B. At the project closure, DC must exist. There are indeed two example solutions, referred to as A and B. Both solutions have cross-portfolio and/or cross-Business Unit characteristics, leading to a quite complex solution content, which was bound to affect the nature of the DCC work. Both solutions include

sub-products (a.k.a solution components) with "normal" product DCC process. The project work is based on A and B solution DCC, but the fundamental aim was to generalize. The challenge is to generalize enough, but without losing the accuracy of steps and actions. Additionally, the before mentioned high-level program and project dependencies create an ever changing environment for this project.

1.6 Schedule

The DCC project for solutions A and B was started in June 2010. The very beginning was slow due to summer time frame, and in reality practical DCC project started in September 2010. Solution DCC work continued in 1H2011 with templates, models, best practices and role definitions. Phase 1 implementation (pilot customer delivery in legacy environment) was scheduled for 1H2011 as well. Phase 2 implementation (pilot customer delivery in new environment with changed products structures) was possible from tool perspective after May 2011. Orders and deliveries were expected in the latter part of 2H2011. Solution Guideline was also updated then. Feedback and lessons learned were collected and corrective actions implemented in parallel with the ongoing project, which was completed at the end of 2011. Results were presented in the thesis seminar in January 2012.

1.7 Report structure

There is no separate chapter for the theoretical framework in this report. Instead, the theories are presented and combined with the practice along the way in applicable chapters. However, there are more theories and references in the first half of the report, concentrating on describing and presenting the actual project and the practical issues in the second half.

First, explaining the features of the solution concept is vital for understanding the core and dilemma of the project. Second, the project management aspects need to be illustrated. Third, as this was a logistics project, also the Supply Chain Management with its various aspects needed to be covered. Then presenting the project matrix of

other related projects and programs was relevant for understanding the challenging project environment. All of the before mentioned areas have an effect on the actual solution DCC project and its' results, and that's what the latter part of this report concentrates on.

2 What is a solution?

2.1 General concept

ITSMA (Information Technology Services Marketing Association) is a community that specializes in helping companies market and sell services and solutions, and it consists of industry leading member companies, such as NSN. ITSMA's Solution Council (2010) defines a solution as a combination of products and/or services with intellectual capital, focusing on a particular customer problem and driving measurable business value to the customers. The rise of the solution concept is supported by Christopher (2005, 30) who suggests that the growth is transitioning from volume-based to a more (customer) value-based one, and the order-winning criteria in today's marketplace is more likely to be service-based than just product-based.

Eades (2004, 4-6) defines solutions as answers to a customer problem, critical business issue or business opportunity that provides value to the customer, in their opinion. Solution companies can help their customers to solve their business problems and achieve positive, measurable results, and that is the basis of all internal actions. Eades describes solution sales as a philosophy, which requires a transformation from product selling to solution selling. It means that the whole organization must develop a new philosophy, a new discipline, a new culture, and do things differently than in the past. As solution sales takes place between the customer and the seller, sales people need to dig in to customer's operations, to be able to define and diagnose the underlying problems, and then create visions based on their unique solution offerings and capabilities. Solution is thus a mutually agreed answer to a recognized customer problem, and solving it provides measurable improvement. Bosworth (1994, 14) suggests to use a diagnostic approach, where sales people need to engage in a question-and-answer process to learn potential customer's individual and real needs.

Then the sales person can specify the product or service (or a combination of those), to meet those needs.

McKinsey & Company (2001a) confirm that companies must change their strategies when entering the solution business. They can create high-value solutions by integrating various products and services in order to solve a complete customer problem. Solutions require a high level of customization, and that makes it hard to get them right. McKinsey & Co (2001b) further argue that a solution isn't simply the bundling together of related solution components or merely integrating existing products and services. A true solution is defined by and designed around the customer's need, not around an attempt to find a new use for a seller's current products. What is needed is a more collaborative relationship between the seller and the customer in defining the genuine need, for designing the product and/or service components, and for integrating the unique entity into a distinctive offering. As solution concept is quite complex, it is not easy to set the right price for it, either. As the solution pricing should be value based, the fundamental question to be asked is, what's this answer to the customer's problem worth to the customer.

However, there is clear potential in solution selling. McKinsey & Co (2003) continue that companies can earn higher margins or increased revenues by selling integrated offerings, and suggest that the companies entering solution business can be categorized as ambitious companies and anxious companies. Ambitious ones want to win better margins, get better contracts and access new markets. Anxious ones enter the solution business out of fear. Furthermore, solution transformation may easily fail. Companies merely bundling their existing products, or underestimating the difficulty of solution selling are not likely to succeed. They need to rethink the whole sales team and solution approach. They need to understand that solutions require a high level of integration and customization to turn a bundle of products into a truly integrated package, aiming to handle a problem for the customer or to help it complete a step in its business. Solution elements must be combined in a way that positions them above products or services or bundles of products and services. In the broadest sense solutions are innovative combinations of products and services that create customer value beyond the sum of its parts.

If done right, solution companies may benefit a lot from their new approach. McKinsey & Co (2003) propose that such companies can create extra value, and are able to charge a premium, leading to higher margins for the company, and additional value for the customer. Understanding the customer business may in turn help building long-term and more profitable, partner like relationships. Solutions may open doors to new markets and even reduce or eliminate competition. On the other hand, solutions are not easy to develop, offer or to set up. The initial assessment work meaning the research and analysis of customer's needs and pulling together a solution can be considerable. It can take 3-4 times longer to sell the solution, as complex offerings need to be communicated to, and with, the customers. In addition, solution business requires close cooperation within the seller's business units, and that increases the integration costs. Solution companies need to combine the elements in as economical and efficient way as possible. Solution development is done in cycles that need to be continuously renewed; there's a need to reinvest and innovate on regular basis. Thus it would make sense to consider, if the newly developed solution platform could be sold to others as well. As solution focuses on the result, it is meaningful to broaden the customer base, especially if customers are experiencing similar business problems.

2.2 NSN view

As from 2008 and through 2011 NSN had a strategic target to become a solution company; to transform to a truly customer driven company, focusing on customer needs. NSN wants to solve our customer's business problems. Instead of products, we'll focus on solutions. Instead of monologue, we'll engage in a dialog with the customer. NSN targets to be a strategist, and to see the big picture in the industry. We need to have a macro vision to see our customer's future, so that we can create, instead of just to fix. Instead of reactive, we'll strive to be proactive. The above is emphasized in NSN's mission that states "we help Communication Service Providers build more valuable customer relationships". Furthermore, "Focus on customer" is one of NSN values. This is in line with the ideas of Christopher (2005, 288-289), according to which customer-centricity, building long-term relationships with selected customers

and "demand pull" requiring flexibility are the ingredients of the Supply Chains of the future.

Figure 1. Focus shifting from products to solutions.

NSN operates in the communication network industry and our customers are Communication Service Providers (CSP), that is, the telecommunications operators worldwide. Thus NSN offerings are industrial products and services, defined by Ballou (2004, 65) as those that are directed to organizations that use them to produce other goods or services. In order to transform to a solution company, we need to keep customer centricity and solution mindset based behaviour in mind. We need to understand CSP's strategic targets and help them to reach them. Collaboration across NSN is enhanced with a Solution Mode of Operation, which drives the solution transformation to bring solutions as NSN core business. When thinking of customer's business problems, we'll drive the exploration and resolution of their pain points. We'll help the CSPs define what they need. In practical level it means embracing change as the normal working environment.

It can be argued that solution business has a lot in common with Customer Relationship Management (CRM). According to Turban & Volonino (2010, 384) CRM's basic idea is to treat different customers differently, because their needs, and thus their value to the company may be different. Based on the needs of individual customers a company must be able to change the way its products are configured or its services are delivered. Smart companies encourage active customer participation in

(solution) development. And like solution business, also CRM requires the involvement of almost all the departments in the company.

It can also be stated that as a concept solutions have innovative elements; good ideas are often new combinations! Companies entering the solution business must proactively suggest new ideas and ways of doing business with partner (customer) firms. New ways need to be implemented together with the customers. Even though the solutions are to some extent tailored to the specific needs of a customer, they should be designed with the aim at generic scalable models to make the business profitable. Solution companies can combine or mix and match offerings for even larger deals, and that's the way NSN also sees solutions. NSN targets for better profitability, entering new market segments and reaching for expanded markets. Closer customer engagement with high cross-functional and cross-organizational co-operation is essential. NSN products are still in the key position, but they are driven by, and from, solutions. NSN aims at identifying customer's business problems and scoping the solution, thus creating better business opportunities for the company. Furthermore, NSN wants to support re-use and repeatability. All this requires a mindset change, also within the Operations unit of NSN, as the current working model better supports the traditional box (product) business.

NSN solutions may be categorized in two ways, based on their origin. First, outside-in solutions are initiated by a consultative customer engagement, and second, inside-out solutions that are triggered by innovation or internal idea based on identified or validated customer need. The idea of the NSN solution concept is to combine current and future NSN products in a different manner and to provide new and innovative ways to create customer value. Solution is not simply a combination of existing products, but they often include "something more", something solution specific, to make them genuine solutions. In order for the new business to be profitable, the aim is to be able to repeat the solution offering as (or almost) such. NSN solution concept is summarized in figure A in appendix 2 (confidential).

Another way to categorize NSN solutions is the division to generic solutions and customer solutions. Customer solution is delivered for one customer through a customer project, which may consist of the delivery of a combination of solution blueprints (or their subsets) and additional services, which are agreed between the

customer and NSN. Generic solution, on the other hand, is a so called productized solution meant to improve NSN cost position by repeating solution projects. It comprises a solution blueprint, value-based marketing argumentation, service and delivery capability in place, preferred 3rd party products and services defined, agreed and/or supported, and pricing guidelines being available.

Basically the idea is to move from customer solutions to more generic solutions, from one time level to the replicable level. This solution development work is indicated as the solution maturity levels. However, these S-levels are not milestones. They are decision points describing the solution evolution by maturity level. Solutions are treated with a life-cycle view. The solution maturity model describes the level of experience NSN has for a particular solution. The S-levels start from S0 (solution identified), to S1 (marketing level), to S2 (one-time level), to S3 (replicable level with mass deployment capabilities), and to S4 (generic level). The maturity levels are illustrated in figure B in appendix 2 (confidential). Figure C in the same appendix illustrates the flow from customer engagement to the evolution of generic solution, and the sales gates and S-levels connections in the process.

Building solution capabilities within NSN is one of the foundation blocks of our strategy house. So far most of the activities have been related to customer engagement and solution creation. Each solution has a lead Business Unit (BU) taking ownership of the particular solution. Key BU roles are solution owner and solution architect. There is typically also a solution co-operation team, which is a cross-functional and cross-organizational team lead by the solution owner. What comes to solution Delivery Capability, the specific questions have not been really touched yet. Now is the time for that. From DCM perspective, a solution is actually a way of working. We need to build capabilities on top of our existing good working methods. Solution approach requires more transparency, agility and speed from us as typically solutions are developed and delivered in a short time frame. The fact is that the focus is shifting from product led business to solution led business, and organizations need to transform as well. This requires 1) strategy alignment and renewed Mode of Operation, 2) implementation of an end-to-end solution process, 3) dedicated and capable organization, and 4) tooling capability, in order to reach the solution way of operating.

2.3 Solutions in this project

Solutions A and B in this project are described in more detail in appendix 1 (confidential). However, both of them consist of several solution components. Solution component as a concept may include anything from a single piece of SW to a product or service being part of the solution. This can be for example NSN product or service or a 3rd party (OEM) product or service, solution specific feature(s) in a product, feature belonging to an existing product that can be "used" without the whole product, a component that is not part of any product, or the needed training or training documentation. Both A and B include hardware, software, services and documentation. Moreover, both A and B are the first solutions to take the new common OEM rack into use.

In a way, A and B solutions are "sisters", as they both belong to a higher level "mother" solution blueprint. Solution blueprint is something required for the solution to be considered as generic (S4). It is the architecture description including NSN's own and 3rd party products and interfaces as well as their customization guidelines. Basically it describes how the solution is supposed to work. Components in a solution blueprint are pre-integrated and tested (at least the generic part including interfaces) in NSN labs before customer projects. It is a basis for customer projects, but can be modified based on customer needs and requirements. The final integration is therefore always done in the customer project by balancing the pre-integration and project integration.

3 Managing projects, programs and portfolios

3.1 Definitions, similarities and differences

The term project comes from Latin and it means a proposition or a plan. Ruuska (2007, 18-201) states that project 1) has a target or a set of goals, 2) has a lifespan, 3) is (often complex) independent entity with logical limits and restrictions, 4) has the responsibility centralized to one person, 5) typically has phases and stages, 6) is a

learning process, 7) is unique and cannot be repeated as such, 8) experiences changes during its lifecycle causing uncertainty of what's to happen next, 9) consists of a number of different variables that have logical dependencies, and 10) includes risks and uncertainty, which are part of the nature of the projects. Pinto (2010, 24-28) refers to Project Management Institute (PMI), which is one of the world's largest non-profit, professional membership associations, and advances the project management profession through globally recognized standards and certifications. PMI defines project as "a temporary and resource-constrained (with budget and schedule) endeavor with a specific mission". Projects are customer focused; each project has a customer, and the primary goal is to satisfy the needs of that customer. Pinto continues to make a difference between the project and process. As a rule, process refers to ongoing, day-to-day activities of an organization that use existing systems, properties and capabilities in a continuous and rather repetitive manner. Projects, on the other hand, take place outside the normal process-oriented environment, remaining unique and separate. Pinto states that project work is continuously evolving by establishing its own work rules. It is thus an "alternative to business as usual".

Kettunen (2003, 15-16) states that project is lead by a plan, its' team members have roles and responsibilities and they need to cooperate. Each project has an owner that assumes the project results, once the project is finished. Ruuska (2007, 21) continues this by identifying the Project Manager (PM) being in charge of the day-to-day project management and the related decision making, as well as keeping in touch with project leadership team and other stakeholders. Leadership team monitors the project progress, schedule and the decisions made. Ruuska (2007, 22-24) goes on in defining multiple project management as a situation, when there are several simultaneous projects ongoing. Together they form an entity often referred to as project portfolio. As projects cut organizational boundaries within the enterprise, all projects must be handled and run in a similar way in order to keep in control.

Schwalbe (2006, 12-13) refers to PMI's Guide to the Project Management Body of Knowledge (PMBoK® Guide) which defines a program as "a group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually". PMBoK Guide is a global, widely accepted standard providing guidelines, rules and characteristics for project management. Frameworks for

IT Management (2006, 205) define PMBoK as a document guide gathering knowledge, concepts, techniques and skills of the Project Management profession, and it is recognized throughout the world as a standard for managing projects. When applied consistently, it is generally considered to help organizations achieve professional excellence. PMBoK Guide is referred to in many occasions in this report, also due to the reason that other authors frequently refer to it in their publications. Schwalbe goes on suggesting that it is often more economical to group projects together to help streamline the management, staffing and other work. Each program must have a Program Manager (ProgM) to act as a change agent and to provide the leadership and direction for the Project Managers (PM) heading the single projects within the program.

Cadle & Yeates (2008, 49-51) suggest a program to be 1) a series of projects that together contribute towards the achievement of some overall business objective or organizational change, or 2) a very large project with a number of subsidiary projects involved, or 3) a set of projects which share a fixed pool of resources, or 4) a group of projects undertaken for a single client. Maylor (2010, 59-61) describes Program Management to provide a layer of coordination and direction to implement the underlying projects in order to ensure that higher-level benefits are reached. He suggests that programs may include "something more"; elements of related work outside the scope of the individual projects within a program. Prieto (2010) in PM Hut calls this "the white space", meaning the management of risks, opportunities and activities occurring between the projects. A program is not just the sum of all project management activities. As it is likely to have a life that spans over several years, Prieto describes program management to be semi-permanent in nature, as opposite to a time-limited project management. Cadle & Yeates (2008, 49-51) go even further to suggest program to be a continuing endeavour with no such definite conclusion. Pinto (2010, 24-28) continues the division of a project and a program always not being clear, as terms vary according to organization. In reality large organizations use a blend of them in deploying their strategies. In best case the program layer adds a structure that puts some order to what otherwise would appear chaotic. To summarize, Pennypacker & Dye (2002, 84) define projects as one-time efforts that produce a unique outcome, and programs as collections of projects that have one or more strong, identifiable themes that require a unified management structure. Portfolios, in turn, are collections

of projects or programs that fit into an organizational strategy. This fits to NSN terminology, where a program consists of multiple, interlinked projects with common goals and interrelations.

3.2 Project models, life cycles and processes

The literature knows several project models, usually associated with SW development, which can be applied to other projects as well. They are for example 1) the waterfall model; an uniterative, sequential model with stage-by-stage approach, 2) the incremental model, where the system is delivered in phases called increments, 3) the spiral model, where the same activities are carried out over a number of cycles, becoming more complete each time. More structured and flexible methods, such as Rapid Application Development (RAD), have been developed since. RAD is generally referred to as Agile, and in this approach the requirements and the system are developed via a series of iterative activities. Scrum is a manifestation of the Agile approach. (Cadle & Yeates 2008, 67-82.)

The names of the phases or stages may differ, depending on the author, organization and of course the project itself. Ruuska (2007, 33-40) uses just three phases: 1) start, 2) build, and 3) end. Start includes the feasibility study, setting up the project, and project planning. Build phase includes the definitions, planning, execution, testing and deployment. End phase includes final acceptance, maintenance agreement, project organization dismantling and project ending. Dinsmore & Cooke-Davies (2006, 32) mention concept, feasibility, design, execution, closeout/operations phases. Kyle (1998, 235-236) on the other hand presents genesis, design, execution plan, execution and the review of all the previous steps. Kettunen (2003, 41-44) defines the general project phases to 1) identify need, 2) define, 3) design, 4) delivery, and 5) ending. Project life cycles in Management Extra (2007, 5-8) are also very similar: 1) initiation and definition, 2) planning and project organization, 3) implementing the plan, 4) monitoring and review, 5) closure and evaluation. Maylor (2010, 32-33), in turn, introduces a four-phase project management model called 4-D structure; D1: Define it!, D2: Design it!, D3: Do it!, D4: Develop it!. Pinto (2010, 32) divides project life cycle stages to 1) conceptualization, 2) planning, 3) execution, and 4) termination. Kettunen,

Maylor and Pinto have fairly similar descriptions regarding the project phases, which may be either consecutive/successive (a.k.a. incremental) or (partly) parallel. Berkun (2006, 36-37) suggests that (regardless of the terms used) early planning is followed by one or several phases that each contain planning, execution and testing phases. Depending on the project size these phases may, and in large projects should be, further divided, or combined with each other, if that makes sense. In any case, there should be some amount of time between the phases, for evaluation of the changes taken place in the previous phase.

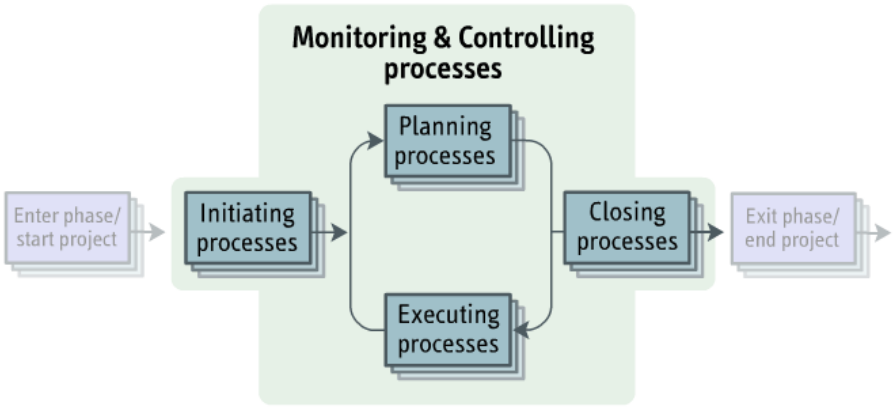

Figure 2. PMBoK project management processes.

Levine (2005, 499) refers to the PMBoK Guide in defining the project management processes (figure 2 above). They are: initiating, planning, executing, controlling, and closing. PMBoK Guide lists the project life cycles as 1) start, organize and prepare, 2) carry out the work and 3) close. The project management process groups go along the project life cycle. Planning means scoping the project and setting objectives and requirements. Execution includes managing the project team and communicating with the stakeholders. Monitoring & controlling refers to the regulation and control of the project progress. Closing means the finalization of all project activities. PMBoK Guide emphasizes these processes to be iterative, and they are typically done several times in each project. Furthermore, the process groups interact with each others, and they are repeated in each project phase.

3.3 Project methodologies

Schwalbe (2006, 65) refers to PMBoK Guide as a standard describing best practices for what should be done to manage a project. This methodology (a.k.a. framework), a customized and formal discipline, describes how, when and by whom things should be done. As different organizations have different ways of doing things, Schwalbe recommends to tailor the project management (PM) skills to the needs of the organization, and thus develop own internal PM methodologies. Murch (2002, 137-146) supports this by recommending not inventing the wheel again, but instead, to use and improve the reusable processes whenever possible. Murch defines a methodology as a group of systematic, repeatable processes including methods, techniques and guidelines, which help to implement projects in the same way. It is "a map that guides the project to its destination"; a standard to follow. In short, methodologies have four basic components: a) guidelines, meaning predefined actions and recommendations, b) methods, meaning detailed process descriptions to support the work, c) tools found useful in earlier projects, and d) models, meaning reusable documents and checklists for guidance and help.

Stanleigh (2011) of PM Hut emphasizes that the consistent use of PM methodologies (processes, tools and templates) by every project (team) in the organization is the way to get consistent results. The PM methodology should be clear, simple and adaptable for all kinds and sizes of projects, so that they can help the project teams to be successful. This includes establishing clear terms of PM governance, training people to apply the methodology and oversee that it is being used consistently. Miller (2010) at PM Hut goes a bit further by claiming that project management is a methodology, and that helps to ensure that the goal of the project is achieved. Shtub et al. (2005, 46-49) summarize the idea of the PM methodology by stating that the methodology is a collection of processes whereby each process is associated with a phase of the project life cycle. The methodology requires clear inputs and outputs, lines of authority, individual responsibilities and clear project objectives to ensure well-coordinated flow of information and good communication within the team.

NSN has its own Project Management Methodology for Business Excellence and IT projects (NSN BE/IT PMM). NSN PMM is a common way of managing process

development & IT projects and programs, and it covers both "traditional" projects and "agile" projects. The figure below illustrates the NSN PMM in a nutshell. NSN PMM has five principles: 1) project steering; clear governance structure, 2) task areas to structure the project work, 3) step-by-step project life cycle, 4) flexible and scalable methodology, which can be tailored, 5) focus on deliverables, as results and output count. As NSN PMM is a common framework for all programs and projects, it provides helpful material and support that enable to execute projects successfully, and in a systematic but flexible, effective and efficient way. Deliverables and milestone criteria are pre-defined and instructed.

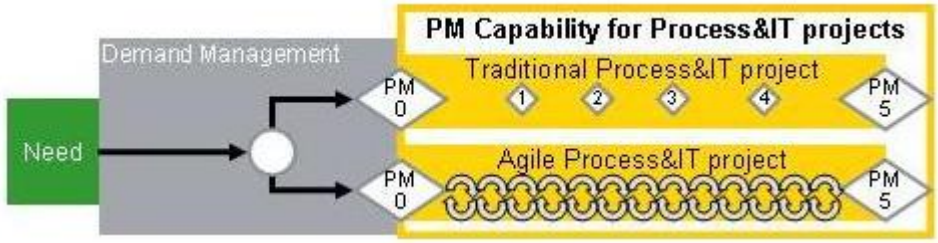

Figure 3. NSN BE/IT Project Management Methodology (PMM).

The traditional NSN PMM path is in waterfall style, each phase succeeding the predecessor. The main stages are Plan, Create and Deploy. The following figure clarifies the phases (Plan, Design, Build, Verify, and Deploy) and the milestones (PM0, PM1, PM2, PM3, PM4, PM5) in traditional projects.

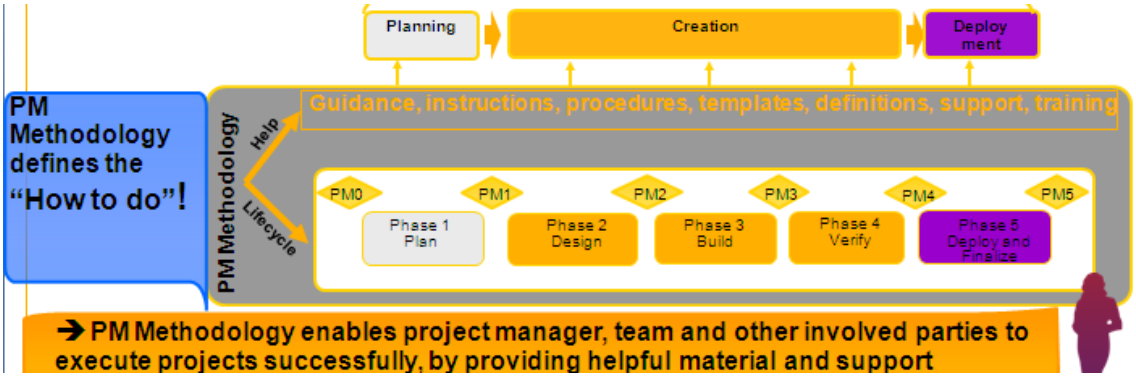

Figure 4. NSN PMM for traditional projects.

In addition (or in parallel) to traditionally managed projects, NSN uses Scrum methodology for agile managed projects. The lifecycle of an agile Process & IT project

has a starting milestone PM0 and a closing milestone PM5, but no other milestones (PM1-PM4) in between, because of working in iteration cycles called Sprints.

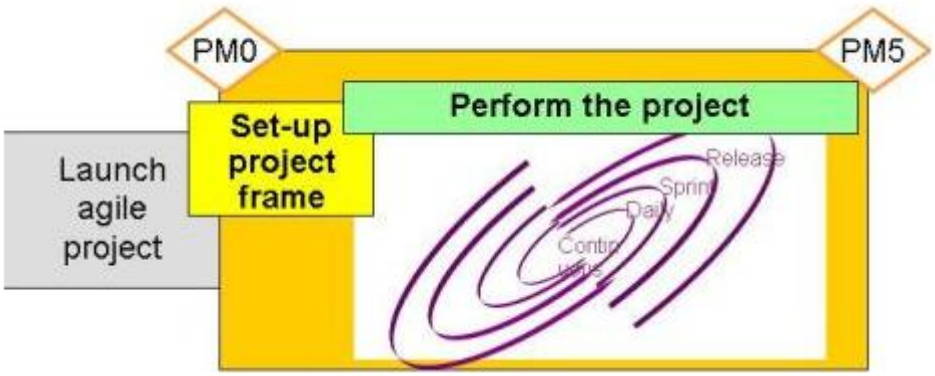

Figure 5. NSN PMM for agile projects.

However, as Dinsmore & Cooke-Davies (2006, 245) declare, methodologies and processes do not deliver projects; people do. Projects are delivered by groups of people working together, not simply by using the techniques, tools, methods, or processes. Thus the human dimension is essential in achieving project success. Furthermore, it is a matter of the right activity mix, and the continuous improvement of all project management related practices and processes (23-24).

Solution DCC project A and B methodology is explained in chapter 6.2.

3.4 Multiple project and program management

Multiple project management refers to an organization where several projects use common resources and specialists. It is a fairly common organizational practice, however demanding from management point of view, as the situation calls for a holistic, integrated and comprehensive management system with common planning and steering practices (Pelin 2009, 162-165). When it comes to multiple projects, also terms program and portfolio management emerge, and various authors use them sometimes with a slightly different meaning. Often program management is considered to be an advanced form of project management. Mittal (2009, 1-2) and Snedaker (2005, 22) for example, state program management being the process of managing multiple projects that lead towards an improvement in an organization's performance;

projects deliver outputs, where as programs create outcomes. Program management is concerned with doing the right combination of projects in right sequence and with the right timing, where as project management is about doing the projects right. So sometimes defining, sequencing and coordinating multiple projects is referred to as program management. According to Pellegrinelli (2008, 3-16), the above is oversimplification. Pellegrinelli states program management to be a distinct discipline to bring about complex strategic initiatives – to transform large organizations and nurture organization-wide capabilities, to implement strategy and to bring about corporate renewal. Programs have a role in shaping the context in which they exist.

In large organizations Project Portfolio Management (PPM) is a major undertaking and requires having a Project Management Office (PMO). Pennypacker & Dye (2002, 15) describe PPM as an ongoing process to align the interdependent projects to a company's master project plan. Levine (2005, 13) claims that "PPM bridges the traditional gap between the projects and operational functions, and delivers maximum value from limited resources". PPM is not the management of multiple projects as such, but more of the management of project portfolio so as to maximize the overall contribution of projects. Schwalbe (2006, 14-15) states PPM to be an emerging business strategy in which projects and programs are grouped and managed as a portfolio of investment. It is the continuous process of selecting, analyzing and managing the optimum set of projects and programs from a strategic perspective, and understanding how they fit into the bigger picture of the organization. Dinsmore & Cooke-Davies (2006, 43-60) support this by stating that multiple project management calls for portfolio and program management processes that allow companies to control and fully resource multiple projects (competing for the same scarce resources), which need to be dynamically matched to corporate strategy and business objectives. Sowden (2007, 3-7) describes the method of Managing Successful Programmes (MSP) in which programs provide an umbrella under which the projects can be coordinated, and which can deliver an outcome greater than the sum of its parts. Program management and project management are thus complementary approaches. Frameworks for IT Management (2006, 181-187) continue to define MSP as a systematic approach to manage programs (that coordinate projects) to achieve outcomes and realize benefits that are of strategic importance. The benefits are

realized both during and after the program, when new capabilities are created through change and transition towards the desired outcome.

Solution DCC project work was done in a multiple project environment along side with a large business change program, which greatly affected the solution DCC project work. This program environment is described in more detail in chapter 5.

3.5 How to be effective?

PMI's PMBoK Guide introduces nine Project Management knowledge areas. Shtub et al (2005, 52) refer to it and list the management functions and processes as follows: project integration management, managing scope, managing time, managing cost, managing quality, managing HR, managing communications, managing risk and managing procurement. Scope, time, costs and quality are considered as the core areas; whereas HR, communications, risks and procurement management are facilitating functions. The project integration management is an umbrella function that affects and is affected by all of the other knowledge areas, and it covers issues like methodology, planning, change control, reviewing and lessons learned. Schwalbe (2006, 16-18) states that project managers must develop their knowledge and skills in all the nine PMBoK knowledge areas. Schwalbe gives some useful hints to 1) delegate, 2) to be a team player, and 3) to think "outside the box". Effective project managers lead by example, are technically competent good visionaries and communicators, and decisive motivators. Pennypacker & Dye (2002, 16), too, emphasize the soft side of project management stating that PMs must be competent in dealing with human beings, to get people to know what is expected of them. The following figure illustrates the nine areas and the processes, as well as represents the skills and practices an efficient project manager should follow (Frameworks for IT Management 2006, 208, ref. PMBoK Guide Third Edition, 2004).

Table 3. PMBoK nine process areas and practises.

1. Project Integration Mgt.	2. Project Scope Mgt.	3. Project Time Mgt.
1.1 Develop Project Charter 1.2 Develop Preliminary Project Scope Statement 1.3 Develop Project Mgt. Plan 1.4 Direct and Manage Project Execution 1.5 Monitoring and Control Project 1.6 Integrated Change Control 1.7 Close Project	2.1 Scope Planning 2.2 Scope Definition 2.3 WBS Creation 2.4 Scope Verification 2.5 Scope Control	3.1 Definition of activities 3.2 Sequence of activities 3.3 Estimation of activities resources 3.4 Estimation of activities duration 3.5 The development of the Chronogram 3.6 The control of the chronogram
4. Project Cost Mgt.	**5. Project Quality Mgt.**	**6. Project Human Resource**
4.1 Estimation of Costs 4.2 Budget of Costs 4.3 Control of Costs	5.1 Quality Planning 5.2 Quality Security Planning 5.3 Quality Control Execution	6.1 Human Resources Planning 6.2 Staff Recruitment 6.3 The development of the Team Work 6.4 The Team Work Management
7. Project Communications	**8. Project Risk Mgt.**	**9. Project Procurement Mgt.**
7.1 Communication Planning 7.2 Distribution of Information 7.3 Reporting Performance 7.4 Stakeholders Management	8.1 Identification of Risks 8.2 Risk Management Planning 8.3 Risk Qualitative Analysis 8.4 Quantitative Analysis 8.5 Risk Response Planning 8.6 The Control of the Risks	9.1 Contracts Planning 9.2 Response Requirement Salesman 9.3 Selection of the salesman 9.4 Contract Administration 9.5 Contract Closing

Ruuska (2007, 29) crystallizes project management to be controlling, monitoring and supervising, requiring project managers to proactively and constantly forecast, on what lies ahead. Kettunen (2003, 29-31) argues that PMs first priority is to make sure the project targets will be reached, the project stays within the budget and the end results meet the targets set. Dinsmore & Cooke-Davies (2006, 227-243) on the other hand emphasize that project management is not just focusing on the triangle of time, cost and quality. In order to deliver robust results, the following five key project management practices are considered crucial: 1) clarify goal and achievable objectives, 2) clarify technical requirements, 3) plan and control effectively, 4) manage the risks, and 5) resource the project fully. Additionally, effective PMs lead, manage and motivate the team, as well as start and finish well. Kettunen (2003, 29-31) offers some qualifications of what good PMs are about. Effective PMs must have an active and strong touch, as well as courage and determination, to genuinely lead the project to its

targets. They are accurate and exact, and monitor team performance continuously. They are confident in conflict situations, and take ownership (and action) of problems, once they undoubtedly emerge. They make decisions. They communicate, assign tasks, motivate and listen. They have good negotiation and presentation skills, which is essential as there are generally lots of project meetings. They are good in multi-tasking; doing several things at the same time and on concentrating on the most essential ones. One of the most important PM skills is the ability to say no; to limit and exclude issues not so relevant. Additionally, PMs must have courage to face failures and embrace them as learning opportunities. Kettunen (39-40) further advices to plan the project well, limit the scope, prioritize and document. Regarding time management (143), he suggests PMs to control the calendar in order to control his/her own work.

Grimes (2009) in PM Hut advice the PMs to focus on the project team itself, and how the members can best work together. Effective project management boils down to seven attributes needed to "keep it all in track". They are: 1) building confidence within the whole project team by regular review meetings, in order to show that the project is on track and to follow through the points raised during the review, 2) managing change by communicating, documenting and adjusting to new requirements with as little pain as possible, 3) planning (detailed and overall) to coordinate the activities during the project, 4) having an effective communication strategy to ensure all members know and understand what should be done, 5) deciding on action taking based on risk analysis, 6) solving problems, preferably with win-win outcome, and 7) controlling quality by paying close attention to the details.

Pelin (2009, 71-72) complements the topic by stating that PM has the overall responsibility over a project, its' design, implementation and task follow-up. PM reports to the Steering Team (also referred to as Management Team). PM is in charge of making a project plan (or having it made), starting the project team work and leading the group, leading the project implementation, assigning and following up tasks and the progress, providing the needed info and training to team members, taking care of sufficient documentation and archiving, and finally, making a final report and ending the project. Project team members' professionalism and cooperation greatly contributes to the effectiveness of the PM. In addition, Pellegrinelli (2008, 151-157) mentions adaptive intent as one of the key characteristics of a great PM. Adaptive

intent relates to how sensitive a PM (or ProgM) is to the work environment and how environmental factors are incorporated in shaping processes, prioritizing efforts, and taking decisions.

Many authors basically agree on what it takes for the PM to be effective in his/her work. The fundamental question is, however, how all these requirements can be incorporated to just one "super-PM". Finding a person to fulfill all the characteristics of an efficient PM is bound to be challenging, as people tend to be strong in some areas, and weaker in others. It is beneficial, however, to be aware of these characteristics and attributes; there's always room for improvement regarding the personal PM skills. More details on this subject are summarized in the Best Practices table in chapter 6.13.10.

3.6 How to find the best mix?

As Shtub et al. (2005, 52) state, the PMBoK processes may not apply to all projects (as such) and they often need to be modified before applying. Furthermore, PMBoK processes (initiating, planning, executing, controlling and closing) go in sequence, whilst often a non-sequential or parallel approach might be needed. Shtub et al. suggest that the application of PMBoK processes in a specific organization requires further customization, the development of supporting tools, and training. Maylor (2010, 391) recommends a lean approach in project management meaning focusing on optimizing the entire flow of projects, open communications, short command chains, trust-based agreements, and wide skill base of the teams. Whenever only possible, Maylor suggests to simplify and/or combine tasks, and if they do not add value, to eliminate them altogether. This correlates nicely with the message of NSN CEO Rajeev Suri in spring 2010, when he basically stated, "If it does not add customer value, don't do it!"

Maylor (2010, 394) continues to present the Agile manifesto, the content of which is summarized in the below table. What strikes the most applicable to solution DCC project work is "responding to change over following a plan". At best, the project plan in this project (AI list) was a fairly loose checklist of the "must be clarified one way or

the other" activities with flexible sequencing. The timing was adjusted continuously, as the DCC project needed to adapt to the changes in higher level programs. Furthermore, an approach was adopted in solution DCC projects, which Jones (2007, 90-91) calls the rolling wave approach. This means that the level of detail for tasks and resource assignments change over time, as the project progresses; in other words, the project plan is detailing progressively. The rolling wave approach implies that the project is only planned in detail to the next milestone/gate, while the further steps are uncertain still, with only a preliminary description, and they clarify with time. Shenhar & Dvir (2007, 176-178) continue the rolling wave approach and suggest using three hierarchical plans rather than one; each of the plans having its own time horizon and degree of detail. The master plan is the highest-level plan outlining the major milestones of the entire project. The middle level plan spans 4-6 months including the events taking place between the major milestones. The detailed work plan is prepared for only a few weeks, and it contains the activities to be done by the team members. As every detail of the work can't be predicted with great accuracy years in advance, only the things not going to change should be planned. This requires continuously gathering information to prepare for the next step of planning, leading to new versions of the plans.

Table 4. The Agile manifesto.

Individuals and interactions	over processes and tools
Working SW	over comprehensive documentation
Customer collaboration	over contract negotiation
Responding to change	over following a plan

Shenhar & Dvir (2007, 9-13) criticize the PMBoK's traditional and formal way to manage projects. They argue that it is based on the assumption (or desire) that changes to the plan should be rare, and if possible, altogether avoided. PMs often see their work successful, if and when projects are completed on time, within budget and within performance goals (requirements). This is referred to as the triple constraint or the "iron triangle" of project management. Deviations from the triple constraint are seen as negative signals that should be prevented or corrected. Furthermore, many managers seem to assume all projects to be the same, and expect to succeed by simply following a standard set of activities without distinguishing among different kinds of projects and selecting the right approach for each. Therefore Shenhar & Dvir

suggest another way to manage the projects flexibly, called the adaptive project management approach, which is based on accepting things as they are. However, the traditional approach needs not to be eliminated, as the adaptive approach builds on it. The following table illustrates the main differences between the traditional and adaptive styles in project management, according to Shenhar & Dvir, 2007.

Table 5. From traditional to adaptive project management.

Approach	Traditional way	Adaptive way
Project goal	Getting the job done on time, on budget, and within requirements	Getting business results, meeting multiple criteria
Project plan	A collection of activities that are executed as planned to meet the triple constraint	An organization and a process to achieve the expected goals and business results
Planning	Plan once at the project initiation	Plan an outset and replan when needed
Managerial approach	Rigid, focused on initial plan	Flexible, changing, adaptive
Project work	Predictable, certain, linear, simple	Unpredictable, uncertain, nonlinear, complex
Environment effect	Minimal, detached after the project is launched	Affects the project throughout its execution
Project control	Identify deviations from plan, and put things back on track	Identify changes in the environment, and adjust the plans accordingly
Distinction	All projects are the same	Projects differ
Management style	One size fits all	Adaptive approach; one size does *not* fit all

Shenhar & Dvir present a diamond-shaped framework to address differences between different projects and develop a set of rules and behaviors for each project type. As each project is unique and dynamic, PM must select the right managerial style to match this uniqueness. Shenhar & Dvir (2007, 161) claim that it is not very difficult to integrate the adaptive and flexible approach into the traditional, well-established project management practices of an organization. Once the concept is accepted, it simply means adding several new steps and activities to the conventional practices. Additionally, it is highlighted (162) that most literature describes the traditional project management phases (define-plan-execute-terminate) as sequential, but in reality, no project is performed as a purely linear process. In real world, project activities reiterate between phases, and often it is needed to go back to the previous phase to repeat or correct an earlier activity or decision, and to revise the plans, definitions and requirements. Plans need to be continuously rewritten, based on the results and

experience so far. Furthermore, it is suggested (187) to improve the organizational efficiency by looking for standard and repetitive building blocks in the project.

The adaptive approach described above, on top of the traditional PMBoK model, provided a flexible framework for solution DCC project work, the "killer mix" of applicable practical hints and methods. In addition, the intention was to not to reinvent the wheel, but to use the already developed material, tools, processes and methodologies as far as possible, and to combine models and templates, so that they could be customized and applied to solution DCC project work. The idea of "reuse" is to save time and effort. The approach can be described as "fast track" project management, with "less is more" attitude. In practice this often means de-scoping, having a holistic view, doing (only) the necessary things, and doing them "well enough". Project plan must be a flexible guide to support the project progress, not to enslave or restrict it. This correlates with having a helicopter perspective; looking at the whole issue from a different angle and from a distance, in order to perceive the entity. Overall, it must be taken care of not to overprojectize, nor to look merely at the deliverables or milestones. Another useful hint from Miller (2010) from PM Hut is to break down the project into smaller, more manageable parts (like AI list in this project). Focus should be kept in achieving the project results, rather than documentation (which is of course important, too). Nothing should be done just because the model says so, but rather because the activity is necessary and will contribute to the overall success of the project. Additionally, solution DCC work progressed in small but frequent steps taking place in parallel (could be referred to as "sprints") that allowed the project direction to be changed flexibly, when it was needed.

3.7 How to ensure quality?

Quality can be understood in various ways, for example, as follows. Quality means acting according to requirements and (customer) needs, and "doing it right" already the first time. It is what customer says it is (VoC = Voice of the Customer); therefore the customer defines the ultimate quality. There must be quality in input, internal functions and output. Quality means delivering as agreed with the customer, acting

and working in an agreed and described way. It is a corporate attitude and mindset affecting the behaviour. Quality basically boils down to money. Internal quality aims at improving the functions and processes, and by that, at reducing the costs. External (customer) quality aims at customer satisfaction, and by that, at increased revenues. They both mean better financial results to the company. Quality must be embraced throughout the organization; everybody is accountable for the quality of their own work. The employees are required to take personal responsibility, saying "I own quality". Constant quality improvement requires a "Q-culture". Basically there are two ways of improving the quality (of processes for example). Firstly, by learning from mistakes and problems, and secondly, by evaluating and developing processes.

There are several methods for measuring and improving the quality of corporate processes. Turban & Volonino (2010, 543) mention Six Sigma, total quality management (TQM) and ISO 9000 as examples, to be often in conjunction with Business Process Management (BPM) initiatives. Six Sigma is a methodology to manage process variations that cause defects, defined as unacceptable deviations from the mean or target, and to systematically work toward managing variation to prevent those defects. Frameworks for IT Management (2006, 61-69) define Six Sigma as a structured, rigorous approach, a tool kit for process improvement focusing on implementing a measurement-based strategy aiming for increase in performance and decrease/elimination in process variation leading to defect reduction. Six Sigma has five phases: define, measure, analyze, design, and verity, which are referred to the DMAIC approach. This is analogous to the earlier (complex) TQM model (with 400 TQM tools and techniques) known as plan-do-study-act. Six Sigma is not a one-size-fits-all methodology. It is best used when the process in question has high volume and/or high risk, when there are large data sets available and/or processes are measurable and repeatable (non-innovative).

The above characteristics do not fit to solution DCC work with small volumes and data sets, making the measuring very challenging. As stated in the Frameworks for IT Management (2006, 66-67), Six Sigma requires measuring the performance of the business process involved. Larson (2003, 58) too, emphasizes the measurement of the performance to goal (=gap) on an ongoing basis. There's another reason for Six Sigma not being suitable for solution DCC process improvement, and that is the concept of

variation itself. Variation is an essential part of any DCC project, especially when it comes to solutions. As they are all different, solution DCC project work must not be defined as too detailed and restrictive, but rather to give general models, guidelines and recommendations. DCC work means applying, and variation is needed and even desired.

The characteristics of solution DCC work being as is, it is justifiable to turn to W. Edwards Deming's Plan-Do-Check-Act (PDCA) cycle to achieve continuous improvement, as presented by Turban & Volonino (2010, 543). This cycle is widely used in organizations that are seeking to improve processes for achieving efficiency and effectiveness. It means continuously repeating the basic cycle of: 1) Plan – establish objectives and processes necessary to deliver results to achieve objectives, 2) Do – implement the processes, 3) Check – monitor and evaluate the processes and results against objectives and report the outcome, 4) Act – take action needed for improvement, as well as to review all steps and modify the process to continue the improvement before the next implementation round. This correlates with the idea of iteration, and has taken place in this solution DCC project, leading to solution DCC process to be described (see chapter 6.13.1). Furthermore, PDCA frame is what the NSN processes live according to, in general.

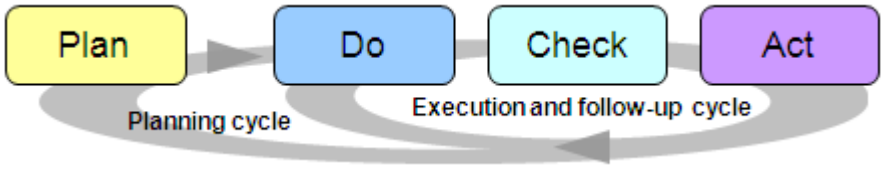

Figure 6. PDCA frame at NSN.

In addition to improving the processes, quality can be improved by learning from the mistakes and problems made in earlier projects or project phases. This quality aspect is covered in Lessons Learned and implementing corrective actions, and Best Practices (chapters 6.13.9 and 6.13.10).

3.8 How to survive in the matrix and virtual working environment?

NSN is a global corporation with a matrix organization including two types of reporting: "solid line" and "dotted line". Solid line (also known as direct line or fixed line) means reporting in the line organization. Dotted line represents the functional reporting utilizing the competences of the line organization. This creates challenges, and opportunities, for the practical day-to-day work and project management, as a lot of activities are carried out in (cross-portfolio and cross-functional) virtual teams. The challenges of teams in the virtual world require important human based skills, such as flexibility, facilitating and leading virtual team meetings effectively.

"Management by Projects" –organizations, such as NSN, are often matrix organizations, sharing common resources. The know-how is split into the 1) line management, 2) project management, and 3) specialists in a "pool" where projects reserve the resources needed (Pelin 2009, 74-79). In matrix organizations teams and individuals do not report to the line manager (LM), but instead, teams are formed around several concurrently run projects including resources from different functional units (Jones 2007, 36). Functional (line) managers assign resources according to the basis of their availability, the project's need, and priority as compared with other projects. Pelin (2009, 74-79) lists the benefits of the matrix organization to be (among others) the possibility to divide work load more evenly, to prioritize projects, to use resources efficiently, and to avoid parallel work (leading to cost reductions). Shtub et al. (2005, 285-288) add that in the matrix organization it is possible to adapt to changes, keeping the organization's "functional skeleton" as-is, while resources can be reallocated and rescheduled as needed. Matrix organizations do, however, have weaknesses as well. First, there's the "dual boss" phenomenon affecting authority, as the functional manager (FM) does not have positional power over the people in the team. Second, matrix organization requires double-reporting and dual-accountability (both to LM and FM) in an environment where simultaneous horizontal and vertical communication channels need to be developed, maintained and managed. Bureaucracy and the number and type of meetings may increase. Third, conflicts between LM and FM may occur, as there may be arguments about resource allocation.

Communication in a global matrix organization with virtual teams is not always easy. Kezsbom (1989, 263-264) states the physical distance and frequently changing organizational structure (which is very common at NSN) as the major reasons for communication breakdown. McKinsey & Co (2010) on the other hand, list five barriers of interaction workers face in their daily work to be physical, technical, social or cultural, contextual, and temporal. When a team consists of people from several countries, challenges involving time, language and culture, are imminent. For example, culture and generation plays a huge role in how people communicate, and that affects the working style. Language too, can be a restricting factor. Even though English is universally accepted as the primary business language, and it is the official language at NSN, not everyone is comfortable with using it.

Pinto (2010, 200-210) describes virtual teams consisting of people with physical barriers or spatial separation, which either make is impossible or impractical for team members to meet in a regular, face-to-face (f2f) manner. Pinto therefore suggests using "alternative communication media" (electronic media including the e-mail, the Internet, and teleconferencing) to link people together and to be productive. According to Pinto, virtual teams present two main challenges: building trust and establishing the best modes of communication. Trust is a key ingredient in turning a group of individuals into an integrated project team with relationships. Physical separation and disconnection can make trust slower to emerge. Communications media can create formal and impersonal settings, which in turn affects the casual banter taking more time to develop. This slows down the process of creating trust among team members. Cadle & Yeates (2008, 383-387) also speak on behalf of using IT (such as groupware allowing people to contribute to the same document) to allow team members to operate in an "information space, where time zones matter more than the physical location". Dinsmore & Cooke-Davies (2006, 76) also stress the importance of remote communication tools, but state that it is the creation of the culture to use them effectively in project work to be "a project in itself". It is not the same to communicate f2f as opposed to via a SW tool. Even with the visual contact of a video call, there's still the absence of the true f2f communication "and that can increase the chance of glitches in the information exchange astronomically".

Pinto (2010, 200-201) goes into details regarding the challenges related to the quality of communication in teleconferencing, saying there's always something missing from both verbal and nonverbal human interaction, when it is conducted remotely. Although teleconferencing creates an illusion of being in the same physical space (shared simulated environment) with the rest of the team, it is still quite formal interaction, as it is impossible to make proper eye contact. With regards to using virtual technology in team meetings, Pinto continues to make some suggestions for improving their efficiency and effectiveness, such as augmenting virtual communication with f2f opportunities, establishing regular communication schedules, norms and code of conduct, and keeping all team members in the communication loop. Despite the new tools, e-mail is still the primary mode of one-to-one and one-to-many communication used in virtual project teams. According to Berkun (2006, 255-261), it is also the most irritating method, as the sheer large number of e-mails creates a pressure to read and answer them quickly. However, it is the way PM influences the info flow and controls it in a project. The challenge is to express oneself in a clear and simple way; to make the messages short, simple and direct, and quite importantly, to distinguish from other messages. If written communication it not clear enough, Berkun suggests "the phone to be your friend".

Maylor (2010, 258-259) also sees plenty of potential problems in managing people in geographically separated teams, in addition to the ones presented already, the feeling of isolation, and everyone having his/her own set of priorities. It is very easy to potter around with other tasks while at the same time being in conference call remotely, often in mute, and just waiting for it to be your own turn to say something. This correlates with McKinsey's (2011) statement of multitasking being counterproductive and distractive. This is a very interesting argument, as multitasking is generally considered quite a virtue in project management! Nevertheless, Maylor suggests the following measures to ease up virtual project management: a formal project start-up meeting, regular video-conferences complemented with at least occasional f2f meetings, and judicious use of informative e-mails not drowning in unnecessary data, to list a few.

The (all) above said well describes the challenges in the DCC project work, as it includes the contribution of different people over geographical distances and time

zones (see appendix 3 (confidential) for DCM landscape) with cultural and organizational differences in ways of working. The language used differs from organization to function, and NSN has employees from 106 nationalities! English is of course the official language used, but is has taken different shapes, often referred to as "finglish" or "globish", not to mention the differences in ex-Nokia and ex-Siemens terminology. Furthermore, work is most commonly done in an open office environment with background noise, leading this to affect the quality of teleconferencing. Strict cost savings have led to a travel ban, meaning that the work is done solely virtually, with no personal contact between the project teams whatsoever.

The situation being as is, it is important to make the optimum use of the tools offered. At NSN they are WebEx (virtual conference tool) and NSN Voice Conference (NVC) with internal IP calls, complemented with occasional Halo (video-conferencing) meetings and desktop video calls (WebEx live video). There are benefits associated with the use of WebEx and NVC, such as being free from time and place, cost savings, being quick to organize (one-click meeting) and access/attend, having a good global reach and good voice quality with IP telephony, and allowing hands to be kept free when using a headset. On the other hand, the user must be logged on to NSN network and to find a suitable time for all attendants taking into account the different time zones. There are occasionally technical challenges with the tools, and very often a "set-up hassle" taking about 5-10 minutes, before everybody is ready for the meeting to start. In the meetings, it is sometimes hard to identify, who is speaking, nonverbal communication is missing, and people do not get immediate feedback. Attendants need to continuously shift between "mute" and "unmute" to guarantee voice quality, which causes delays in making statements, and makes people to formally "wait for their turn" in order to speak up. Someone needs to actively take the lead in group work. Virtual meetings require special attention to be paid to the preparation; calling for a well structure agenda and other written material. Also a detailed memo is needed to capture and document what was discussed and decided. However, WebEx and NVC are sometimes good tools, especially in short ad-hoc type of meetings.

The fact that characterizes the work done in matrix organizations, virtual ones in particular, is that the managers loose the feeling and control of the work details performed by the individuals in the team. The work requires ever so more specialized

expertise, as it constantly changes and renews. However, the "pool" members do not have to tackle the challenges alone, they each are experts themselves, and often network with each others to share information and best practices. It is very common not to delegate problems to the next step of the "ladder", but instead to form a small unofficial group to find the remedy. This requires the employees to be self-guiding and to have an active touch, and these call for the employee to be interested in his/her work and wanting to become better in it. Another factor characterizing the work in a global matrix is the need for the managers to trust the employees. As virtual meetings can take place "anywhere and anytime", they are often participated remotely, from the home office. With home office work increasing, it is increasingly important, even occasionally, to meet the colleagues f2f, preferably in unofficial situations. "Coffee groups" and lunching together encourage the casual banter mentioned earlier, which is the key to creativity. In those occasions it is easier to state something, which would not be said aloud in official meetings due to their inherent nature. This was not possible in solution A and B DCC project, as the team was scattered in different locations. The project was conducted almost purely virtually, and this had an effect on the methods used.

4 The field of Supply Chain Management (SCM)

4.1 Delivery Capability Management organization

Nokia Siemens Networks (NSN) is one of the largest telecommunications infrastructure companies with operations in over 100 countries. The company is headquartered in Espoo, Finland. NSN organization is structured around three key areas (Business Solutions, Network Systems and Global Services), which also form three Business Units (BU). The structure of the Customer Operations unit mirrors these areas. In addition, NSN has an Operations (OPS) unit. OPS is responsible for supply chain management for all hardware, software and OEM products. It includes several units dealing with procurement, supply, logistics and manufacturing. Delivery Capability Management (DCM) is one these OPS units. The other OPS units are Global Logistics (GL),

Integrated OEM and Digital Supply (IDS), Manufacturing Operations (MO) and Global Procurement (GPR).

DCM is the main interface between OPS and the Business Units (BUs), driving operational requirements in BU decision making bodies to influence product and business decisions. It also contributes to the optimization of end-to-end cost, performance and quality. Mentzer et al. (2007, 150-151) refer to this as operations management (OM), meaning the planning, controlling, executing and improving the processes and activities that transform inputs into the products and services that the firm provides to its internal and external customers. Fundamentally, operations management is about designing and consistently executing processes. OM is often synonymous to manufacturing, but at NSN the DCM organization covers the whole chain, including the inbound and outbound logistics. DCM organization manages Delivery Capability projects in product programs with full OPS mandate and accountability.

DCM organization, as the whole NSN, is a global virtual matrix. Work is done mainly as projects and many functions are often included or affected. As Kezsbom (1989, 33-37) states, it is unusual to find an organization that is strictly functional or purely project in form, more often it's a combination of both two. Ruuska (2007, 74-80) supports this hybrid view, which aims to combine the advantages of traditional organizational structure and project management flexibility. DCM project managers are "teamed" in relatively flexible pools of personnel and recourses. The advantage is that the functional manager (Line Manager) maintains supervision and allocates resources across projects while team members can maintain the "home base". Line Manager is the main focal point in HR issues, while the actual project work is reported to Sub-Portfolio Manager in charge of a certain product group. As projects often use the same resources, there are bound to be interdependencies. Sure there are also disadvantages, as this model violates the "one-boss" tradition, and authority (power) and responsibility areas may be unclear at times. There's a great need for an effective communication in such an organization! Furthermore, efficient matrix requires unified project methods and tools. DCM organization is a project organization, but not a pure one, as project managers do not have unlimited power for decisions. Therefore it could be described more accurately as a "light matrix", as DCM project managers are often

more like coordinators and organizers, not real decision makers. As it is challenging to optimize the organizational structure with functions to achieve the targets, DCM has a history of "doing it despite the organization".

4.2 DCM and ROCS roles

Waller (1999, 546) states that projects are often the start of operations, and have similar functions to operations. Once projects get going, there are operations within the project, and many activities and functions are similar to those performed in operations management. Project team may compose of operations related personnel, and once project is terminated, the members often become operators due to their familiarity with the functions from the project phase. Delivery Capability is created as a project (as part of product programs) with a start and a finish, but it is done for the operations, which is ongoing and continuous work. Delivery Capability Manager (DCM) represents OPS in BU decision making bodies, mainly Program Management Teams (PMT). DCM may have 1-3 roles in Delivery Capability Creation: Purchasing Capability, Production Capability, Demand/Supply Chain Capability and often additionally also Ramp-up and Order Configuration Support (ROCS) Specialist role. Alternatively in large product programs these roles may be divided between several persons due to bigger work load. DCM role and tasks are illustrated in figure A in appendix 4 (confidential).

In general, DCM work consists of the following (source: DCM Mode of Operations):

- Manage and control all OPS and in particular Delivery Capability Management activities regarding DC analysis, creation, maintenance, and removal. Manage all necessary activities needed to create DC in Purchasing, Production and Demand/Supply Chain sub areas.
- Declare product milestones and/or decision points on behalf of OPS. Head OPS internal DCC project team.
- Plan and control budget and resources for OPS during capability creation and removal. Manage risks and Design for Excellence (DFx) disciplines.

- Transfer responsibility from Create Process to Delivery Process, once DC has been created. Drive product Change Management from OPS point of view. Manage DC for active products during the maintenance phase until product phase-out.

DCC work for solution has many similar elements with traditional product DCC work. However, the approach is more holistic, as usually there is no program for the solution. Solution DCM needs to secure the DCC for solutions, which may consist of several products. Figure B in appendix 4 (confidential) illustrates the Solution DCM working field as part of the solution co-operation team. It can be argued that solution DCM has a high-level responsibility of the solution DC as a whole, while product DCM assumes the product or release level responsibilities. Solution DCM covers the possible gaps and solution specific issues, and needs to view the big picture. From project management perspective, solution DCM must step outside the traditional DCM role and responsibilities to an even more proactive approach than before. Flexibility and adaptability seem to be the key role requirements when it comes to solutions. The solution DCM role description is presented in figure C in appendix 4 (confidential).

The same differences from traditional to solution approach apply to ROCS role. As the traditional ROCS role (presented in figure D in appendix 4 (confidential)) includes DC tasks and more operative configuration support activities, they need to be done from solution perspective, which is different from product perspective. In practice it often means making higher level solution ordering instructions and acting as one focal point for any solution ordering related inquiries. It often makes sense to combine ROCS and DCM roles, as there's quite a lot of overlapping. The full solution ROCS roles & responsibilities alignment is presented in file F in appendix 12 (confidential).

4.3 Supply Chain Management and Delivery Capability Creation

Turban & Volonino (2010, 370-372) define Supply Chain (SC) as a set of relationships among suppliers, manufacturers, distributors, and retailers that facilitate the transformation of raw materials into final products. The SC includes all interactions, flows of materials, information, money and services, as well as the processes for developing and delivering products, information, and services to end customers. Supply

Chain Management (SCM) is defined as the efficient management of the e2e processes starting with the design of the product or service and ending when it is sold, consumed, or used by the end customer. In short, SCM is about forecasting, purchasing, distributing, inventory and collaboration (2010, 382) and the goal of SCM is to improve the collaboration in the chain leading to improved customer service and increased profitability (2010, 377). Ballou (2004, 3-7) speaks of business logistics management, when he means SCM. It is an integrated approach; a systematic, strategic and coordinated management and integration of SC related functional activities; and if done effectively, it is possible to achieve a sustainable competitive advantage. Chopra & Meindl (2004, 4-9) formulate SC to be a sequence of dynamic processes and flows, where the end customer has an important role, as the main purpose is to fulfill the customer need. Most SCs are actually networks (terms supply network or supply web are also used), a view supported also by Christopher (2005, 5-6), who further argues to use the term Demand Chain Management instead of SCM to reflect that the chain (or network) should be driven by the market, not by suppliers.

At NSN the SCM (often referred to as Demand/Supply Chain, D/SC) means an integrated approach with regards to planning, organizing and controlling the purchasing management, supplier base management and channel management. SC is an entity that needs to adapt to meet the requirements of the changing business environment (solutions!). SCM at NSN means involvement of all the parties, also the customers, and this is especially visible in solution business. SCM is covered by Delivery Capability Management activities, and as the main bulk of DCM work relates to the start of product (solution) life cycle, it makes DCC a quite a wide concept. For an organization to be efficient in its functions clear processes need to be understood and followed up. Anupindi et al. (2006, 4) mention some examples of generic business processes, such as a) order fulfillment, b) production, c) outbound logistics, d) shipping, e) supply cycle, and f) new product development. At NSN there are five key processes: Create, Sell, Deliver, Care and Operate. All of them have more detailed sub-processes in levels 2 and 3. As an example, Deliver Process is broken down in figure A in appendix 5 (confidential). It is very relevant from DCM perspective, as DCC work is done as part of Create Process, but Deliver Process as a "customer". Figure B in the same appendix illustrates the relationship between the Create Process and Delivery

Capability Management Process (DCMP). Delivery Capability Creation process is one part of DCMP, and it is used in DCC projects.

4.4 Product DCC vs. solution DCC

At NSN the product development is done in product programs, which in fact consist of several projects, DCC project being one of them. Program Manager manages the implementation against the program plan together with the Program Management Team (PMT), where each PMT member represents his/her own function/organization. Each product typically has several product programs (work done for a new release or version) during its' life cycle. Releases overlap; when the predecessor is about to end, new one has already started. When programs end, maintenance phase begins, and several releases can be maintained at the same time. Product life cycle ends with a coordinated maintenance end (phase-out/ramp-down). DCM is in charge of the overall logistics functions, not only as Project Manager during the DCC project, but also during the maintenance and phase-out. Figure A in appendix 6 (confidential) following figure illustrates the relationships between programs, releases and maintenance.

Product programs have their own structure, process, content and milestones from P0 to P9. Program planning is centered in the early program phase, while program control increases with time and progress. At P1-P2 the content and targets of the program are set, P6 ends the testing, and P7 means ready for customer piloting. Declaring P8 means moving to mass production, which is "ready for deliveries". P9 marks the ending of the program. The most important milestones for DCC are P2, P3, PT, P7 and P8. DCC process describes in detail, what Delivery Capability actions need to be done for each milestone, so that the program can move to the next level. Program Management P-milestones (figure B) and C-decision points and P-milestones in product programs (figure C) are presented in appendix 6 (confidential).

In general, DCMP follows the DFDS (Design for Demand Supply Chain) guideline, which is a cross-functional methodology concerning both Create Process and Deliver Process, with principles which aim to get the right products to right place at the right time with the right cost. Demand/Supply Chain can't be separated from a product program, as it

is a sum of all (sub)processes requiring different kind of competencies, integration and facilitation. DCM project manager aims at affecting the early phase program planning and product specifications so that product (or solution) is designed to fit the global efficient (both current and to-be) processes with agreed D/SC targets. This is referred to as "driving the OPS requirements in the programs", and it includes increasing the awareness of the effects of the decisions made, and bringing logistics requirements and targets to programs. In practice all decisions done in a product program have some effect on D/SC performance.

To be noted is that the product program related DCC process does not apply to solutions as such, as there often is no program, nor a PMT for solutions. However, it can be argued that the main elements and project steps are the same, even though P-milestones would not be followed in name. DFDS principles, global cost-efficient models and tools need to be considered anyhow, when securing DC for solutions. NSN Create Process description includes a Solution Mode of Operations (MoO) with some instructions covering general and typical tasks of DCC work for solutions. It includes the minimized number of need based activities, and solution DCC criteria for S-level decisions. The product DCC process is to be applied as far as possible in solution cooperation teams by the OPS representative. However, the DCC for solutions guideline does not go into details. I can be safely said that product DCC and solution DCC work have similarities, as well as fundamental differences in scope, activities, roles and responsibilities. DCM project manager "does what must be done", linking Deliver Process and Create Process with Delivery Capability Management Process, as illustrated in figure D in appendix 6 (confidential).

4.5 Solution DCC key points

Solution DCC work has but one criterion: to secure solution Delivery Capability. In practice it means:

- **S1:** SW & HW delivery capability planned & secured for 1st delivery
- **S2:** SW & HW delivery capability secured for One time Solution
- **S3:** SW & HW delivery capability secured for Replicable Solution

- **S4:** SW & HW delivery capability secured for Generic Solution

The key principles of solution DCC work are:

- Participating (or leading) the solution cooperation team and/or DCM team
- Identifying the differences and gaps between product DCC and solution DCC
- Ensuring correct decision making from OPS point of view
- Promoting the usage of global processes, models and channels, when applicable
- Driving OPS requirements and contribution
- Understanding customer projects, requirements and available components
- Identifying solution components; e.g. existing NSN products, 3rd party (OEM) product and services, and solution specific content
- Clarifying the schedule and critical decision making points (3rd party decisions, delivery model selections, care/maintenance decisions, tools and structures)

When starting the DCC projects for solutions A and B the high level principles above were not as concrete, as I would have hoped for. But on the other hand it gave "free hands", as it was possible to loosely follow the product DCC process, to take out and use what fits and loose what did not, to think for myself what made sense and what is to be done to achieve the final goal; solution Delivery Capability. In a process oriented organization this was quite refreshing, however at times a little stressing.

5 Landscape of related programs and projects

Kettunen (2003, 17-27) describes internal development projects (such as IT tool deployment and process change/development) to start from a development idea or leadership assignment. Such projects are often cross-organizational, and done in addition to employees' normal duties. There are several high level programs affecting the solution DCC projects A and B that fit the above mentioned characteristics. These programs and projects concern process and structure simplification and/or harmonization, as well as IT consolidation. Kettunen (2003, 52) also warns about reasons for project failure, one of them being the change of project environment in the middle of the project. This is indeed a valid point, and must be considered in this

solution DCC project as well, as there are dependencies and interrelations with the higher level programs, leading to rescheduling.

5.1 Common rack introduction in VIPT portfolio

Ballou (2004, 53) states that in order to decrease logistics costs, standardization in production is needed, and it is created through interchangeable parts, modularizing products, and labeling the same products under different brand names. Christopher (2005, 134) speaks of reducing complexity by getting rid of multiple variants. At NSN this is referred to as commonality and it is one of the DFDS requirements. It means the usage of same functional assemblies and units (building blocks of a product) in several different products and even in several product lines. The use of common assemblies and units may affect significantly the D/SC performance. Another important issue is the benefits of scale. As larger volumes can be centralized to certain assemblies, units and manufacturing lines, material costs can be decreased through increased purchasing power. Also the costs of manufacturing and integration can be decreased through increased capacity and the improved learning curve of the personnel. Another DFDS requirement is the minimizing of the number of stock-keeping-units (SKU). All this can be potentially achieved with the new common OEM rack project in VIPT (Voice and IP Transformation) portfolio. The idea of common OEM rack is illustrated in the following figure.

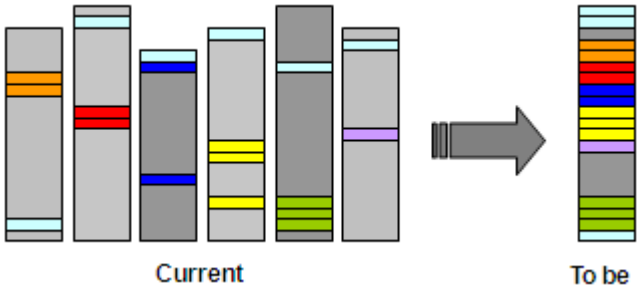

Figure 6. The idea of common OEM rack.

The benefits for using just one type of commercial 3rd party server rack are:

- Cost savings with better purchasing power and reduced rack need

- Customer floor space savings affecting site maintenance costs
- Savings in transportation costs
- Optimizing the number of switches and routers within the rack
- Professional and unified look and feel

The decision to introduce a common OEM rack in VIPT portfolio was made in 1H2010. It was based on a careful study and benefit/risk assessment, after which the supplier was selected. At this stage I collected the Requirement Specification within DCM, listing the OPS requirements for the common OEM rack. It helped to list and clarify the issues to take care of during the rack introduction, as well as to point out to BU, what it really takes (from OPS and BU) to take the new rack into mass use. After the requirement specification was accepted, a DCM team was set up to create DC for the new common rack, as it was planned to be introduced first for solutions A and B. After full introduction of the new common OEM rack in VIPT, the usage is envisioned to expand to other portfolios and BUs. One might wonder why this common rack approach had not been considered already before. Sadly the legacy tool environment does not support solution ordering in one rack. NSN applications and structures were mainly based on the conservative "box mode", creating a clear need for more flexibility. The fundamental business requirement was, how could NSN get tools to support solution business better? Q2C program presented in the next chapters provided the answer to that question.

5.2 Q2C program in matrix with DCC of solutions A and B

Quote-to-Cash (Q2C) program is a horizontal umbrella program with several sub-programs and sub-projects, and it arises from NSN strategy. It is the core of the new NSN; a colossal business change program with a span of years, and it is all about the unified NSN MoO with clear roles and responsibilities, and common IT backbone. It means integrated Master Data, integrated IT tools and integrated processes. It builds a lean supply chain with high operational efficiency and transparency. It covers the e2e chain from "quote" to "cash" and fundamentally alters the way NSN works and does business. Figure A in appendix 7 (confidential) illustrates Q2C in a nutshell. Solution DCC projects A and B must follow-up and adapt (proact) themselves to the changes in

Q2C level, by maintaining the newly achieved DC, or by adjusting the ongoing DCC projects accordingly. DCC projects are highly dependent on Q2C schedules and scope. Q2C is in fact Business Process Re-engineering (BPR), as explained by Cadle & Yeates (2008, 87-88), which aims at gaining real results from fundamentally rethinking about what is done and how it is done, and what systems and processes are needed for that. IT is the key enabler of the change. Also Levine (2005, 261) speaks for unifying and simplifying functions, processes and activities, including the IT resources that support them, but while maintaining a customer-centric focus.

Q2C program arises from the merger of Nokia Networks and Siemens 1st of April 2007. The main idea is to integrate two companies' IT and functions into one common backbone by reducing the number of systems, synchronizing the processes and functions, and harmonizing the structures. Tough decisions were needed during and after the merger planning, on when to leave legacy systems behind and which ones to migrate to the new company. Given the size and multitude of systems in these two companies, the task was not simple, and the change takes quite a while. McKinsey & Co (2011) understand the strategic value of IT in mergers and acquisitions (M&A). Well-planned IT integration strategy can help mergers succeed, and lead to cost savings, as often more than half (50 to 60 percent) the synergies available in a merger are strongly related to IT. The integration of technology and operations often proves to be difficult, so a deep understanding of the two companies' information systems is needed. However, McKinsey states that in some cases it makes sense to hold on to legacy systems. Successful IT departments embrace the concept of flexibility by adopting temporary workarounds when they make business sense. This is how it was done at NSN, too. Business was running from Day 1 with mainly legacy systems, which were integrated with each other. Full integration by introducing (only some) new systems was planned to be done in a controlled and careful manner, with Q2C.

Q2C program contains five separate sub-programs, each as vast as the main program. Sub-programs (ERP, SEC, CSP, DSP and MDE) containing individual phases are presented in the following chapters. What is common to all of them (and programs/projects at NSN in general) is the step-by-step approach according to PM methodology. Target is reached one bit at a time, usually in several aligned waves with inter-dependencies. Sub-programs are run in parallel, and they depend on each other.

They continue separately after Q2C is completed as there are always further and detailed development needs. The sub-programs are summarized in figure B in appendix 7 (confidential). From solution Delivery Capability perspective Q2C is going to introduce new capabilities and operational possibilities. The challenge is to proceed with solution DCC work in parallel with Q2C; first to create, and then to maintain the Delivery Capability in this changing environment.

5.3 Enterprise Resource Planning program

Enterprise Resource Planning (ERP) consolidation is the key program within Q2C. The target is to provide and implement standard e2e processes for NSN supply chain and financials with one integrated SAP transactional backbone called P20. All NSN main processes are in scope. ERP program drives a global platform and one standardized supply chain. The aim is to increase transparency from production till sales, and to use common processes and tools efficiently.

5.4 Supply End Consolidation program

Supply End Consolidation (SEC) is the "other end" of NSN's e2e process, with a mission to simplify the supply chain. It is essential for A and B solution DCC projects, as it is the key for being able to deliver the pre-integrated solutions in new common OEM rack. In short, SEC is about:

- Simplification of the Delivery Process and the tool landscape in general
- Phase-out of legacy order management systems taking all supply operations into one integrated ERP (SAP P20)
- Reduction of complexity in NSN order flow
- Ramp-down of selected IT systems creating significant savings in use costs

5.5 Common Sales Platform program

Common Sales Platform (CSP) program is the "first end" of NSN's e2e process, with a scope to provide a common platform for sales and marketing based on SAP CRM 2007. CSP program creates a standard process for offering, configuring and pricing, aligned with NSN business processes. In practice it means replacing all current offering/ordering tools and processes with just one: web access based CSP platform supporting common ways of working in customer interface. CSP platform includes another tool called IPC (Internet Pricing Configurator). Offering starts in CSP, continues seamlessly in IPC, and is taken back to CSP without user even noticing this. Once customer team has finished the offer in CSP, it can be semi-automatically sent to NELLE tool, which is NSN planning application. Once offer turns into an order, it is taken as such to P20.The migration from legacy configurators to CSP is done product by product. This is challenging from solution perspective, as solutions consist of several products, and some of them have already been migrated to CSP, some are in the process, and some are still to be migrated.

5.6 Demand Supply Planning program

Demand Supply Planning (DSP) Program was launched in February 2007, with a target to enable fast Customer Team (CT) planning, based on one process and common planning tool NELLE. DSP program contained two projects: Demand Planning project and Supply Planning project. DSP program is already finalized and activities are transferred to business. However, it is still relevant to mention DSP program with regards to solution DCC, as the target for it was to finalize the capability to use the same CSP (Common Sales Platform) configurations in both offering and forecasting. Thus DSP and CSP are tightly linked.

5.7 Master Data Excellence program

Master Data Excellence (MDE) program is the key enabler for all processes. It's about selecting and implementing 1) one common product structure, and 2) one common application for product data management (PDM). Legacy product structures needed to be mapped into new structures for contract and order management in P20. This sub-program is called Product Structure Harmonization (PSH) or "reproductization".

6 Solution DCC project

The following chapters aim to describe the topics, characteristics, process and outcome of solution A and B Delivery Capability Creation projects. The operative solution DCC work and project implementation is described in practice. All PMBoK knowledge areas are covered, but it can be stated that Project Integration Management is dominant, as in these DCC projects all the elements of the project need to be coordinated, meaning identifying and defining what work must be done, and managing and coordinating this work. In addition, the aspects of the adaptive project management approach were considered.

6.1 Program & project landscape and solution DCC scope

Snedaker (2005, 13-19) states the definition of clear project objectives to be one major factor having an effect on the project success, as the objectives essentially define the scope of the project and the total amount of work to be accomplished. Snedaker points out that the longer the project runs, the less likely it is to be successful. Therefore it is advisable to keep the scope as small as possible, to try to break large complex long-running projects into smaller sub-project or phases, to have shorter schedules and multiple milestones and frequent check points. Clearly defined project management process is also of value. Processes that proved to work can and should be re-used, and the processes that did not, should be rejected. Process for process' sake is a waste of time.

The objective of this project was to ensure and secure the Delivery Capability for solutions A and B, so that the solutions can be ordered and delivered, both in phases 1 and 2. The projects were carried out taking into account the higher level business change programs in Q2C, as well as the applicable aspects of the current product DCC process. Product DCC process was to be considered as a fairly loose guideline, which must be adapted, applied and tailored for solutions, keeping in mind the solution requirements and restrictions. Based on solution DCC work done for A and B, the target was to describe and represent a more generic SDCC process and model, which could in turn serve as a loose guideline for future solution DCC projects. Best Practices identified in one project can improve the project management in other projects to come. The scope and context of this project is illustrated in the following figure; high-level programs on the horizontal axis and the SDCC project in matrix in the vertical axis.

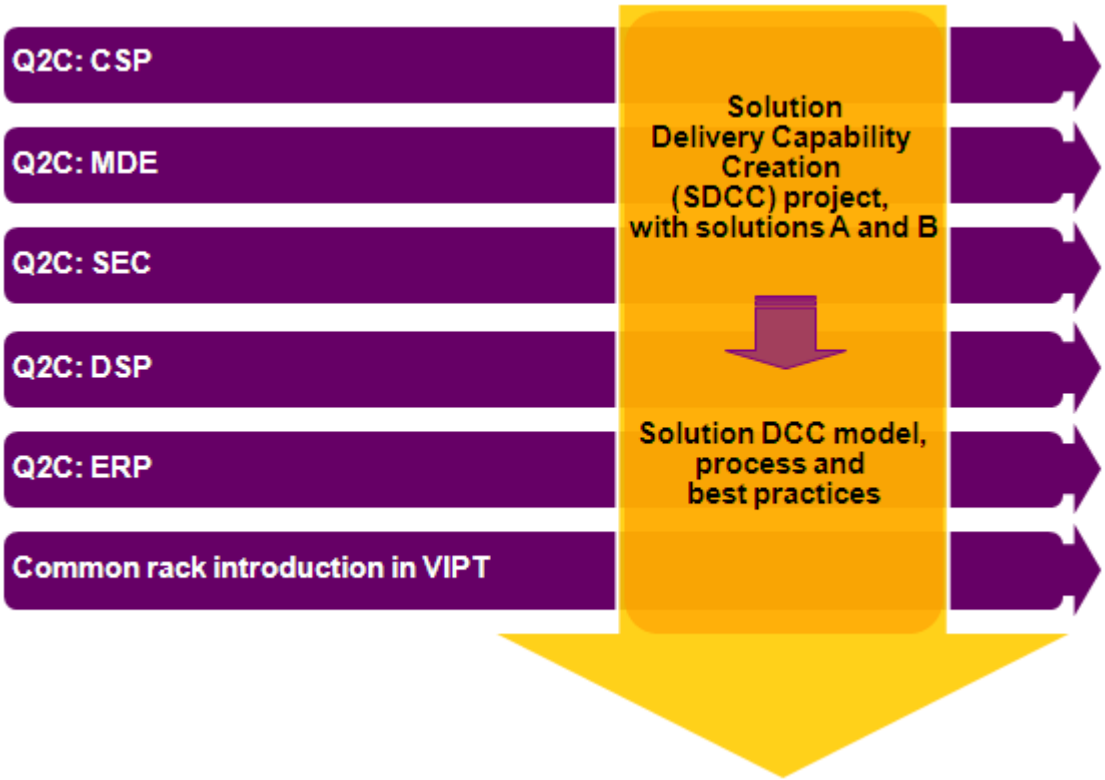

Figure 7. Solution DCC project scope and project matrix.

6.2 Solution DCC methodology, schedule, milestones and control

Berkun (2006, 38-50) declares that project's schedule is usually based on early planning and probabilities, when all aspects are not yet known in detail. The earlier the target dates are outlined, the more inaccurate they typically are. The accuracy improves with time, as the schedule is fine tuned in execution phase, where it must be followed up and checked. Schedules do not have to be perfect, but good enough to believe in. Good estimate is a foundation based on good plans, specifications and requirement settings. Project schedules typically include milestones that represent the completion of a specific phase, evaluate and record the project's progress towards its final deliverables, or offer a point of time to adjust the plans and schedules. According to Snedaker (2005, 252), milestones are checkpoints set throughout the project to help monitor the status, deliverables and/or approvals in a project. Final milestone determines when the project is finished and has accomplished all the objectives. Schwalbe (2006, 111) describes a milestone as a significant event or a marker on a project that project sponsors and senior managers often focus on when reviewing projects. Cadle & Yeates (2008, 173) advice to choose these control points carefully, as if there are too many, they lose their significance, and if too few, then the control is lost.

Solution DCC projects A and B include two phases; to ensure the Delivery Capability with legacy systems in the first and with Q2C setup in the second. SDCC project is, as stated already before, highly dependent on the progress of Q2C program and common rack project, which lead to the continuous project plan updating. The overlapping and interrelated activities in these projects make the detailed planning and scheduling very challenging, if not possible. Therefore the schedule is mainly indicative; a "rough frame".

SDCC project does not follow the normal product program P-milestones or deliverables, nor does it have a PMT to steer it. Then again, it is not an IT project with official PM-milestones either. However, as the P-milestones and PM-milestones are commonly known and used at NSN, I decided to illustrate the methodology in this project using a mixture of those two, and to represent some commonly understood milestones "to speak the same language"; to highlight the project nature. The milestones themselves

are defined "light way" according to the PM-methodology: PM0 (project must start), PM1 (project must have a plan, something to start with), and PM5 (project must end), and complemented by the most common P-milestones, as illustrated in the following figure. The actual project work done in "short rounds" is illustrated as agile iterative "sprints", in parallel for phase 1 and 2, as well as for gathering feedback for adjusting the direction. In a project such as this, it is difficult to determine the actual ending point. It is thus divided into four parts: PM5.1 at the end of phase 1, PM5.2 at the end of phase 2, PM5.3 at the end of the capture of Lessons Learned and Best Practices, and finally PM5.4 when solution DCC project can be stated to be completed.

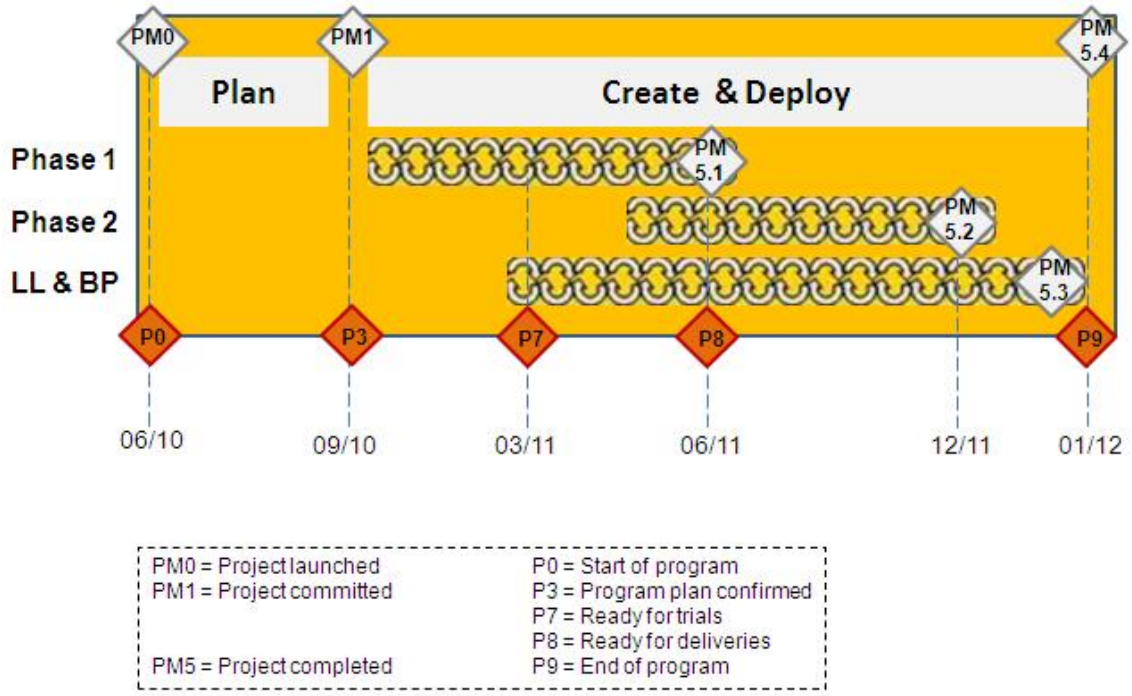

Figure 8. Project methodology for SDCC A and B.

In practice the phases overlap (means savings in time), but a lot of actions were done sequentially and iteratively. The most concrete achievement points identified during the project were:

- Order made in the legacy environment (= ordering capability exists)
- Pilot delivery made in the legacy environment (= Delivery Capability exists)
- Lessons learned identified and corrective actions implemented
- PSH (reproductization) done for 1-2 sub-products; new structures and tools available (= ordering and Delivery Capability exist)

- Deliverables/documentation done (or updated) in each stage.

The schedule and progress of the project was monitored, evaluated and reviewed in weekly or bi-weekly (virtual) project meetings, complemented by status reporting by e-mail. Solution Owner attended the project team meetings for approvals and control. The recurring follow-up meetings served a three-fold purpose:

1. To bond the people to the project, to remind them of their role(s), and to raise team spirit
2. To review the progress in short intervals and fine tune the direction when needed; to provide a feeling of going forward
3. To share info of the achievements and the next steps to be taken; to create a pressure for results

6.3 Risk management

As Jones (2007, 136) expresses it: "Risk management is the continuous process of identifying and categorizing potential risks and then defining actions to mitigate these risks." Pelin (2009, 226-247) states a risk to be "a possible negative deviation from project target, which may become a problem requiring decision making and actions". Richman (2006, 57) notices also the positive opportunities when defining risks as "discrete events that may affect the project for better or worse, and can't be predicted with certainty". At the start of the project, however, it makes sense to assess and analyze the risks on high level; first to identify the sources and types of uncertainty, then to rank the risks in terms of probability (small, moderate or large scale) and impact (low, moderate or high), and to develop an initial list of responses. Cadle & Yeates (2008, 260-271) call this the risk map, and advice to identify the correct actions to each assessed risk. They are: to accept it (if no feasible counter measures, or they are too expensive), to avoid it (if it can be prevented), to mitigate it (steps to be taken to reduce the impact), or to transfer it (making the risk impact fall on someone else). Each risk should have an owner, and the action log (progress made) should be followed up. Management Extra (2007, 31-34) suggests to systematically brainstorm with the project team to find possible responses to risks, and to lower the exposure to

them (such as to develop a contingency plan). SDCC project risks were assessed and followed up during the whole project. Risk map is presented in appendix 8.

6.4 Change management

In general, change is about facts and feelings, and feelings can be guided by facts. Managing feelings or emotions relates to leading people to accept the change. It can also be referred to as an emotional intelligence, or managing resistance; capabilities each PM should possess. Change management (CM) is not rocket science. PMs should not forget the human aspect of managing the changes, so both approaches are needed in effective CM! Turban & Volonino (2010, 549-550) refer to Kurt Lewin's three stage change process of unfreeze, change and (re)freeze (can be referred to as awareness, understanding and commitment). The first stage is unfreezing, meaning determining and managing the level and location of resistance, and addressing it to move people toward the next stage, which is change (sometimes referred to as transition). Change is not a simple step, but rather a journey requiring time in order to cross the chasm between the current state and the desired state. This is usually not done in a single step. The final stage, refreezing, means moving the process to a new place of stability, and this may be slow.

Change is constant in project management, and this fact is emphasized in the adaptive project management approach by Shenhar & Dvir. Tryon (2010) in PM Hut writes about the need of incorporating the new directions into the original project intent and goals, too. According to him, change is a "natural by-product of dynamic business needs". CM provides the mechanism to modify the scope and content of a project in a controlled way. Richman (2006, 170-173) suggests the project manager to serve as a gatekeeper for the change control process, in agreeing, deferring or denying the proposed change, as well as to monitoring and tracking them against the revised plan. In brief, change management involves adjusting the activities of the project accordingly, meaning 1) planning, 2) communicating the plan, 3) following-up the plan (continuously revisiting and revising), and 4) measuring the success. What is extremely important is that someone takes the lead, and leads by example. This would be the PM, who is responsible for the overall project. In this solution DCC project the actions

were followed up in recurring and frequent project meetings, and the direction was continuously fine tuned to reflect the recent changes.

6.5 Solution DCC kick-off

Kick-off is typically a meeting organized by the PM that basically starts the meeting cycle. Snedaker (2005, 322-323) refers kick-off meeting as "meet-and-greet"; as a meeting the sole purpose of which is getting everyone introduced and on board with the project. Pelin (2009, 80-84) sees kick-off meetings to have a wider purpose: 1) to introduce project targets, scope and content, 2) to define roles and responsibilities (R&R) and commit members to their tasks, 3) to introduce members to each others, 4) to clarify rules and ways of working (meetings, documenting, info sharing), 5) to provide skills to plan and steer project, and 6) to start the project. A well prepared kick-off meeting speeds up project start and increases motivation and team spirit.

DCC kick-off meeting for solution B was held 14.9.2010. Key stakeholders joined and introduced themselves. Roles and responsibilities were clarified and detailed. Draft project plan with rough Action Item (AI) list was introduced by the PM, reviewed by the team, AI ownerships were assigned, and high level target dates were set jointly. AI list (explained in more detail in the next chapter) was stored in blueprint solution's program folder in ShareNet IMS (document management system at NSN), and access rights were ensured. Recurring follow-up meeting cycle was scheduled, invitations sent to Outlook calendars, and project work was started. Recurrence created a rhythm, forcing people to come together. Time was reserved in the calendars, but if the meeting was not needed at that time, it was cancelled. Additionally, topic specific and ad-hoc meetings took place.

6.6 Project Plan

Jones (2007, 59-61) and Richman (2006, 65-66) refer to a widely known approach based on the acronym SMART when setting project objectives, according to which objectives are well-defined, clear and exact, when they are:

- S – Specific
- M – Measurable
- A – Attainable/Achievable/Agreed upon
- R – Realistic/Relevant
- T – Time/Cost limited

What comes to the actual tasks and their sequencing within a single project, there are several project network techniques to define dependencies and relationships, such as network diagram, critical path analysis or PERT (Program Evaluation and Review Technique), or Gantt chart (Management Extra 2007, 56-65). Regarding the types of dependencies, Schwalbe (2006, 112-115) differentiates between mandatory (hard logic), discretionary (good practice, soft logic) and external ones. Jones (2007, 124-135) lists different types of dependencies: 1) Finish-to-start (FS): task B can only start when task A has finished, 2) Start-to-start (SS): B will start at the same time as A, and 3) Finish-to-finish (FF): task B cannot finish until task A has finished. Any task can have multiple dependencies and these can be a mix of the different types. There can be predecessors and successors, parallel and consecutive actions, and tasks can be broken down to sub-tasks.

The relationships and dependencies between different project activities need to be determined in order to identify, which activities may be completed at the same time and which must be completed in sequence. Furthermore, it is important to identify the critical path, as if it is done correctly, the figure shows the project bottlenecks (Berkun 2006, 344-345). Each project must figure out which actions and decisions are dependent on other actions and decisions. In solution DCC projects A and B the dependencies and the sequencing of project activities were taken into consideration in Action Item (AI) list's target date setting. Some of the dates were dependent on Q2C program schedules. The AI list is in fact a Work Breakdown Structure (WBS), a list of specific and concrete activities or tasks that describe the work needed to meet the project objectives. Management Extra (2007, 49) calls it the "project menu", and Tobis & Tobis (2002, 4) as a "to-do list". In practice WBS is about breaking the complex, overwhelming tasks into small manageable tasks, and then starting from the first one. Basically WBS can be used, not only for listing the tasks and showing the sequence

and dependencies, but also for reporting, communicating, motivating and establishing accountability.

In short, the AI list for solution DCC project had multiple potential use: it served as a rough project plan with WBS tasks, it was used to follow-up and capture the current progress (agenda and status report), it was used to share information about the project, and to document the action status (meeting minutes). Furthermore, the Excel file included not just the AI list, but the idea was to have "all-in-one". In addition to AI, the file also included Share of Responsibilities (R&R), solution content, project schedule and links in separate sheets. This made the AI list a working document for the PM.

6.7 Stakeholders

Project stakeholders are individuals or groups who are interested in, or affected by, the project and its outcomes. They may be customers, suppliers and project team members, the two most important ones being the project sponsor and the customer. Stakeholders have different levels of involvement and interest, levels of power and influence. Some are active participants, others may be passive. Some are supporters and others are opponents. They have different needs, requirements, expectations and likely impact. They usually define (or refine) the project's requirements. In order to identify the stakeholders, it is necessary to ask questions like, who needs to know about this project, who will use this project, who is impacted by the results or by the operations of this project, who is paying for it, who is delivering it, who needs to be trained, who else should be talked to, who should be known. Stakeholders can be categorized as influential (key or critical), involved (to one degree or another), and informed (from time to time). (Management Extra 2007, 15-16; Snedaker 2005, 221-226.)

In matrix organization the stakeholders typically come from different functional and organizational units working in projects only part-time, and this calls for collaboration (Pinto 2010, 26). Maylor (2010, 251) uses a term "lightweight matrix" to describe a situation, where the PM acts more as a coordinator of the project work and chairs the project meetings. As the PM does not have the authority of the line manager, he/she is

in practice relatively impotent to get real commitment to project success from anyone (else) involved. NSN's organizational structure with regards to DCC is this type of a lightweight matrix. DCC projects typically involve independent experts from several units, who need to be identified and involved.

Each project has a customer (Kettunen 2003, 34; Ruuska 2007, 44). In solution DCC project defining the customer was not straightforward. The final customer is of course the CSP (NSN customer), but project reports to the higher level blueprint solution's PMT as well. Additionally, both A and B solutions have their own solution owners, who are very much interested in reaching the Delivery Capability. The key stakeholders participated in the recurring project meetings. All stakeholders are listed in R&R (Roles and Responsibilities) sheet inside the AI file. Other key stakeholders of SDCC project were: line manager(s), sub-portfolio manager(s), colleague-DCMs and Solution Kernel. Solution Kernel is a small group of DCMs, who all work with solution DCC projects; it is a forum that coordinates and develops SDCC work, and provides an opportunity to:

- "Share the pain"; to discuss challenges, experiences and differences, share information and best practices related to SDCC project work
- Drive the solution transformation understanding in DCM organization
- Increase DCM collaboration discussing the NSN solution management
- Raise concerns, provide input and drive solution related improvement actions in DCM organizational level (STP actions)
- Support cross-functional topics related to SDCC work, such as giving input for process development, and clarifying topics still unclear

6.8 Delivery Model Selection

NSN has pre-defined delivery models (distribution models), and the decision on which one to use is based on the product and customer requirements (country specifics). The primary decision is usually done in the product program based on product complexity, type and volumes. NSN global delivery models illustrated in figures A, B and C in appendix 9 (confidential) are:

- Direct Customer Delivery (DCD) from 3rd party suppliers directly to the customer DOP (Drop-off Point) including installation at customer site
- Consolidation (combining the boxes before delivery to the DOP)
- Pre-implementation in Integration Center (IC)
- Digital deliveries of functional SW, licenses, licence keys and documentation

There were several aspects to consider when choosing the delivery model for a solution. First, the customer delivery requirements and possibilities, as well as supplier specifics were screened. The costs and lead times associated with each option were compared. The current delivery models of each solution component were considered. SW (pre-)installation, testing and network implementation aspects were discussed. Consolidation was clearly seen not to be needed, so the discussion concentrated on comparing DCD and pre-implementation. Pre-implementation is a group of tasks that optimize the project specific deliveries and value-added services. It includes the HW assembly and cabling, SW provisioning and installation, SW customization and testing (parameters set to ensure easy integration into the existing customer network), and additional services such as Putting-into-operation PIO (product implementation: installation, commissioning and integration to customer network). In DCD mode all these actions are done at customer site (or by customer). All the above considered, the project team made a decision to go with pre-implementation mode, the work being done in IC Berlin. The main arguments to support this were the high complexity of the solutions, the majority of sub-products already being in pre-implementation mode, and the fact that the new common OEM rack is delivered via IC Berlin.

Pre-implementation in IC Berlin also gives another benefit related to packaging. Instead of all the sub-products being packed in their own boxes and delivered separately, the solution can be protectively packed to one package only, designed to facilitate the handling and to promote better utilization of transport equipment. The package is sourced from a partner, who also performs the export packing and international transportation. Using middlemen/agents/third-party providers (3PLs) such as international freight forwarders to provide for specialized services often have strategic and operative advantages (Ballou 2004, 183), a fact recognized also by NSN.

6.9 Supplier management

Purchasing involves the buying of raw materials, supplies and components for the organization (Ballou 2004, 446). There are associated activities, like selecting and qualifying suppliers, rating and comparing supplier performance, negotiating contracts, sourcing goods and services, and measuring inbound quality. Anupindi et al. (2006, 298-299) describe the material outsourcing (that is, buying from someone else rather than making) being a flexible alternative, where external suppliers constitute an essential resource impacting product cost, quality and flow time. The lean approach to supplier management calls for choosing only a few capable, reliable suppliers with whom to cultivate cooperative, long-term relationships. Supplier management involves treating suppliers as partners. Chopra & Meindl (2004, 393-394) advice companies to decide whether to use a single source or to have multiple suppliers. Often there are no options available, as the product/component and its suitability is the key factor affecting the supplier selection decision. Price is an important factor, but it must not be focused on, as also lead time, on-time delivery performance, flexibility, transportation costs, pricing terms and so on must be considered. Once the supplier is selected, contracts with the parameters governing the buyer-supplier relationships need to be structured.

NSN often uses components and parts (referred to as OEM) from other vendors in its products and solutions. Therefore supplier management is essential. At NSN the term used is Supplier Base Management (SBM) or 3rd party management. From SDCC perspective these tasks are already taken care of by colleague-DCMs on sub-product level. Supplier selections are in practice done by BU or Solution Owner, and Global Procurement (GPR) takes care of the practicalities as part of SBM. However, there may be gaps to cover, or new solution specific suppliers. Therefore, solution DCM must check (at the very least):

- Do we have valid contracts with all the suppliers (ensure GPR involvement)
- Are the purchasing practices agreed (enable purchasing capability)
- Are there risks related to the planned or already selected suppliers

Supplier related actions are included in the AI list.

6.10 Tool landscape

Order processing includes a number of activities, such as order preparation, order transmittal, order entry, order filling, and order status reporting (Ballou 2004, 131). Such activities in today's business environment are carried out with the help of Information Technology (IT). Tools in the Supply Chain should enable and support efficient actions and organizational processes, and thus they often need to be improved to meet new requirements and business processes. In NSN Supply Chain the tool landscape including all the applications required for ordering and delivery is very diverse and complex. There are currently (too) many parallel and consecutive tools, which must, however, be aligned and compatible (there are integrations). Tools are resources! With Q2C program this tool chain will be significantly simplified and shortened. As we are not quite there yet, the legacy chain with 3 different ERPs and numerous configurator tools still needed to be considered in phase 1. Phase 2 and the Q2C set-up will introduce just one ERP (SAP P20) and Common Sales Platform (CSP), which includes Internet Pricing Configurator (IPC) tool. Q2C related IT projects are typically rolled out is a mix of parallel (old and new systems in live at the same time until graveyard) and pilot (some difficult products pilot first, and the rest follow later) approaches, according to four P's in IT system implementation by Turban & Volonino (2010, 532-538). All NSN products are being migrated from legacy tools to P20 and CSP/IPC. This will make true common rack solution deliveries possible. The current and "to-be" tools are illustrated in appendix 10 (confidential).

6.11 Solution Product Structure Harmonization

Solution Delivery Capability is expected to be reached, at least to some extent, with the full deployment of Q2C program. Once there is a common product structure in place and P20 deployed in Berlin Integration Center (IC), where these solutions are pre-implemented, most of the solution ordering/delivery obstacles currently requiring manual workaround are cleared. However, PSH and SEC programs are done keeping the legacy environment and structures in place at the same time when deploying new ones (parallel approach), in waves as per product (pilot and phase approaches), while

others will follow after the successful go-live (plunge approach), as by Turban & Volonino (2010, 532-538). So this development will still take some time. Anyway, the target with all these approaches is to maintain and secure the Delivery Capability during the change. In practice the old and the new structures are expected to co-exist quite a while, as the decision is done as per product release, whether to take only the new release to P20 environment leaving the maintenance releases to legacy, or whether to take all the versions/releases to P20 at once. This means that in practice both old and new structures need to be updated until the very last product and existing releases are migrated to P20! This is especially valid in solutions, which consist of sub-products having their own individual P20 migration schedules.

One of the first solution components reproductized was the common OEM rack. "Repro" was started in May 2011 with a parallel approach, even though it means double maintenance in P20 and legacy R56/R83. Common rack is needed by products already in P20, or by products migrating to it very soon. Also the legacy structures need to be maintained as long as there are products requiring it in R56/R83 environments. So PSH from solution perspective takes place in steps per each sub-product. This means that whenever there is a new solution order, the current situation needs to be assessed (which products are already in new set-up and which ones still in legacy environment), and order to be handled case by case. Solution DCM needs to follow-up progress in each sub-product, and try to push PSH for the still remaining sub-products, if only possible. In any case, manual support (from ROCS, TOCE, CSSC) is needed during the transition period, which continues until all the existing sub-products have been reproductized to new P20 compatible product structures.

6.12 Solution Demand Supply Planning

Waller (1999, 219-220) states forecasting (estimating) the demand to be the starting point of all operating activities, and emphasizes demand forecasting to be probably one of the most inexact functions in management, being often too optimistic or pessimistic. Forecasting customer demand is an activity that sets into motion the planning and the material flow in the SC. Demand is not stable, but varies over time and place (Ballou 2004, 287). Forecasts can be typically characterized as follows: 1) they are always

wrong, 2) long-term forecasts are less accurate than short-term forecasts, 3) aggregate forecasts are usually more accurate than disaggregate forecasts, 4) the further away from the consumer or up in the Supply Chain, the greater the errors (Chopra & Meindl 2004, 172-173). Channel strategy may be selected out of two possibilities: supply-to-stock (STS) and supply-to-order (STO), according to Ballou (2004, 53-54), or push and pull, according to Anupindi et al. (2006, 292). STS/push suits better for products with large volumes requiring inventories. STO/pull means producing on demand when customer really needs it, thus avoiding inventories. Planning the level of available capacity is relevant in pull process. The concept of just-in-time and the term lean management are often used in the same context with pull, and they require a new way of working with the suppliers including customer centricity and flexibility, and targeting to reduce the lead times (Sakki 2009, 129-130).

Forecasting is not easy; it is often a "guesstimate". It should be an iterative process driven by the realities of the marketplace (Mentzer et al. 2007, 84). It can be based on the history, but more often requires corporate-to-corporate co-operation to be more reliable. Sakki (2009, 129-130) introduces a concept of CPRF (collaborative planning, forecasting and replenishment), and also Ballou (2004, 314-315) recommends collaborative forecasting as "two heads are better than one". Forecasting at NSN is collaborative and takes place in several organizational levels and functions. Customer Teams work with CSPs to figure out estimates for the following (rolling) year. These figures are entered to NELLE tool monthly before the period cut-off. NELLE combines the demand so that it can be centrally modified, balanced and adjusted, keeping in mind a stated set of environmental conditions and probabilities. This process is called the Demand Supply Planning (DSP). The time horizon effect (Waller 1999, 219-220) is also considered; the short-range plan is always more accurate than the medium- or long-range one.

At NSN the purpose of DSP is to understand the future customer demand, to plan the related deliveries accordingly, and to balance between demand and supply to reach business targets. It also provides the basis for one set of numbers, including NSN financial estimates. The Supply Chain activities (in particular regarding solutions and complex network elements) are executed in response to customer orders (=pull), but the need is anticipated with DSP, in order to be able to respond quicker and more

efficiently. In fact it may have a direct effect on the length of the Lead Time (the time between placing the customer order to ERP until Ready-for-Shipment (RFS) date, when the transportation may begin). So DSP is a mixture of producing-to-demand and forecasting. In practice the demand forecast is submitted using Planning Items that represent the average product configuration. From solution perspective this is challenging, as some sub-products are forecasted and some are not. However, in May 2011 a new Demand Planning process was taken into use, making it possible (alternatively to Planning Items) to simply use the same configuration file made for offering/ordering for planning purposes, too. This is also referred to as LoM (List of Material) based or SI (Sales Item) based planning, and it is available after product is migrated to P20 structures and IPC tool.

6.13 Solution DCC project deliverables

6.13.1 Solution DCC process description

Processes are a group of interrelated phases/stages/steps that lead to outputs and valuable results out of certain inputs, making things happen within the company with defined resources. Process chart is a way of outlining and visualizing the way things are done. It usually includes the core (main/primary), support and sub-processes. Process descriptions define, what is important and to what people should concentrate and focus on, and they provide a rough flow and sequencing of steps involved. It is not always straightforward to define a process so that all parties involved agree on it, and see it the same way. Keeping the descriptions short and simple is surprisingly difficult.

To complement the official DCC process, I made a separate solution DCC process description in April-May 2011 to illustrate the SDCC steps and project flow on high level. It is presented in figure A in appendix 11 (confidential). In reality, many of the actions and tasks are done in parallel, however illustrated here in sequence, aiming for clarity and simplicity. The description interfaces with other processes, such as Create Process, Delivery Process, Supplier Base Management and DFx guidelines. Process was reviewed in Solution Kernel core team 2.5.2011, and then sent to D/SC process development the next day for further development (action for 2H2011 STP).

6.13.2 Solution DCC criteria list as per S decision point

I had an action #3 in Solution 2H2011 STP about figuring out what DCM has to do in SDCC projects in practice for each S decision point. This STP action was followed in Solution Kernel core team. My suggestion was approved in October, and then it was also seen to fit to complement the Guideline for Solution Delivery Capability Creation, which in turn complements the official DCMP process. I therefore had the opportunity to modify the existing Guideline based on experiences with real solution projects. My Guideline version proposal was reviewed and approved by Solution Kernel core team and D/SC process owner, and it was then embedded in the official DCMP process in the November 2011 release, and communicated in DCM organization. The materials are presented in part B in appendix 11 (confidential).

6.13.3 Solution DCC Action Item list

Based on A and B projects and their AI lists, I drafted a more generic SDCC AI list, to represent the actions that typically need attention in such projects. The list can be used in OEM projects in general. It was presented and released to DCM organization in January 2011, and was designed to be a template for other PMs in case of similar projects. Using the template is voluntary; it can, but does not have to be utilized. The template file C is attached in appendix 11 (confidential).

6.13.4 Delivery Capability created and verified

Delivery Capability is verified with a customer pilot, which is the first real customer delivery (not an internal testbed or laboratory delivery) in small scale before the full project transfer to operations. Pilot is interesting as a concept, as it for example allows making exceptions to the agreed delivery model, if seen necessary or needed. The delivery related decisions can be revisited based on the experiences of the pilot delivery. Delivery Capability is considered to be created when first customer delivery

has been achieved. Lessons learned need to be collected and actions for improvement implemented to fine tune the points in the delivery chain that were found out to be needing some attention still. There may be more than one pilot delivery, in order to test the offering, ordering, sourcing, production (pre-implementation) and delivery activities. Pilot cases related to solution A and B are explained in more detail in list A in appendix 12 (confidential).

6.13.5 Solution Delivery Capability Plan and Specification

There are normally three types of documentation (templates available) done per each product program in NSN: Feasibility Study (FS), Project Plan and Delivery Capability Specification (DCS). Sometimes FS is skipped, and plan and specification are combined. That's the case in this project as well. However, it is to be noted that the current templates are meant for product programs, not for solutions. Thus they needed to be modified.

For example, I made a draft Delivery Capability Plan and Specification (DCPS) for solution B in 2H2010, and updated it throughout the whole project until the handover. It describes the solution related requirements to Demand/Supply Chain Capability and Purchasing Capability (order/delivery) processes. It also describes the sub-products belonging to the solution that may have their individual Feasibility Study, DCS, ROCS ordering instructions, as well as DCM & ROCS responsible persons. Solution DCPS concentrates on the solution as a whole, and describes the project plan and relations between different Business Units and products, as well as the decisions made and the reasons behind them. The purpose is to identify special needs and characteristics in the solution ordering and delivery pipe. DCPS for the solution B is attachment B in appendix 12 (confidential).

6.13.6 ROCS ordering instructions for solutions A and B

ROCS (Ramp-up and Order Configuration Support) ordering instructions (ppt) are a prerequisite for the handover. I made drafts for solutions A and B in 2H2010 and

published them in NSN intranet. The purpose of these documents is to instruct the Global Logistics on how to order the solution. Ordering instructions are updated continuously. ROCS instructions are attached (C) in appendix 12 (confidential).

6.13.7 DCC summary

DCPS as a Word document is often considered too long and detailed, and thus not very handy for project communication. Therefore I wrote a shorter PowerPoint document, sort of an executive summary, including the high-level description, just the main points in a compact form, with which it was easier to communicate the project scope, schedule and progress to project stakeholders. DCC summary for solution B is presented as attachment D in appendix 12 (confidential).

6.13.8 Project ending and final report

Projects are terminated upon successful completion of performance objectives (Pinto 2010, 26). Project closure includes checking that all necessary procedures have been properly carried out, and that there are no loose ends. Clean sign off means that 1) requirements, objectives and expectations have been met, 2) results, benefits and possible outstanding issues still needing resolution have been identified, and 3) if something was not achieved, the reasons for this have been understood and documented (Management Extra 2007, 97). Final report, including both project successes and ideas for methodology adjustments, is often associated with project closure (Richman 2006, 176-185). Management Extra (2007, 97) refers to this as the project report, which is to record what has actually been done and achieved (main points), findings (the key issues and options for resolution), and further recommendations (next steps). Ruuska (2007, 271-274) too, emphasizes the importance of experience, so that the organization can learn. He recommends PM to write a comprehensive final report (project's own view on what has happened) right away after the project end, and to focus on what worked well and what needs to be done differently in the future. The purpose is to summarize such information that can

be utilized in the following projects, and with which the project management may be improved in the organization.

Final report associated with project ending is one of the DCC criteria. Also a handover plan (describing the transition from project environment to maintenance phase) is needed. In practice the final report wraps up the DCC project, where as the handover plan includes the steps taken regarding the operational transfer. Snedaker (2005, 531) advices to clearly document this transfer of responsibility, do it at a certain date, and communicate it to all relevant parties. Usually project closure means releasing the staff. In DCC this is not so straightforward, as the key people continue to support the solution(s) also in the maintenance phase. SDCC final report is presented in attachment E in appendix 12 (confidential).

6.13.9 Lessons Learned and corrective actions

Lessons Learned (LL) can be (and often are) included in the project's final report, also in this SDCC project. LL relates to Project Quality Management, because it entails identifying where improvement is needed. Basically LL is gathered in order to prevent repeating the mistakes, to enable others to avoid similar pitfalls, and to help guide the next projects. Abudi (2010) in PM Hut and Snedaker (2005, 409) recommend to gather lessons on periodic basis throughout the whole project while it is still in progress and the information is still fresh, and to share this info to learn as a group. A more comprehensive LL can be developed at the end of the project. LL can be typically captured by tracking the change/risk log, making reviews, interviews, questionnaires, by writing notes during the project, and by gathering together and letting the team to discuss the behaviour, processes, project outcome and problems. The focus should be on the learning aspect, not on people or personalities. Schwalbe (2006, 269-271) additionally suggests having a "post-it note party" to document the LL. This could be fun, but in virtual working environment in practice not possible. LL should include:

- describing the situations or issues occurred during the project
- describing the actions taken and alternatives considered to fix them
- describing what worked well

- describing what could be improved
- describing what could be done differently in future projects

Maylor (2010, 367-373) describes process improvement to take place in two steps; first, learning before doing, and second, learning by doing. Learning before doing means ensuring the necessary knowledge and skills to be available in advance before they are needed in a certain project. This could be some other project's LL. Learning by doing leads to a new set of Lessons Learned based on the experience in the current project, and these results can be used in consecutive projects. Shtub et al. (2005, 71) state that the key to project management success is the exploitation and reuse of the repetitive parts and processes, and the building of an environment that supports learning and data collection. However, they also remind that the ability to learn by repetition is limited due to the one-time and unique nature of most projects. Indeed, LL are sometimes project specific or even personal, and the context, background and previous experience play a big role. What is LL to one person or project is not LL to the other. Learning from others can save time and effort, but it can be argued that Lessons Learned are perhaps most effective to the person him/herself, or for a certain project team, for not making the same mistakes again in other projects to come. Nevertheless, improving processes or functions requires the problems to be identified, immediate actions to be taken once the root cause has been found out, corrective actions to be made, to prevent the problem happening ever again, and measuring the effectiveness of the taken actions.

6.13.10 Solution DCC Best Practices

Best Practices (BP) can be derived from "what went well" of the Lessons Learned. They are often subjective and project specific, but as many people learn best by example (Schwalbe 2006, 67), they could be of use to others struggling with similar projects. It can be argued that in fact all Solution Kernel meetings were BP sharing sessions. However, each project is different, and each solution is different, so BP is always only indicative. Professor Alf Rehn actually had an even tighter approach to BP in his Wellbeing@work lecture at NSN in 27.10.2011, when he stated that BP is "things that used to work", meaning they are already the past. He suggests using "better practice

(for some)" or "improved practice (in some cases)" instead. However, as BP is a well established term, it is still used in the following table that lists the BP of this solution DCC project work.

Table 6. Solution DCC project work Best Practices.

Best Practice	Description	In more detail
Embrace change	Change keeps the project/program alive. As it is inevitable, it must be owned. PM must assume the change manager role; it can't be delegated to anyone else.	Change is interactive, dynamic, repetitive and continuous in nature. It requires communicating honestly, to build trust and credibility.
Team up and take control	Identify team members and gather a detailed R&R list	Organize the team: If PMT or equivalent does not exist, or it does not fully cover the DCC activities required, do it yourself!
Kick-off meeting	Start the project officially, clarify R&R, scope and targets	F2F meeting would be best…
Create follow-up routine: 2H2010: weekly cycle 1H2011: by-weekly cycle	Send recurring meeting reservation to calendars for status and news sharing, prepare a written agenda (or go through AI list) to guide the discussion and decision making into pre-defined direction	Project meeting info flows two ways! Follow-up the project progress, assign actions, monitor and control exceptions, problems and changes against the plan.
Set objectives	Set targets and deliverables, break the AIs into pieces, into easier manageable sub-actions, sequence them, decide what to do in parallel	Use a staged approach in the AI list, which is also a project plan
Feedback & Best Practices sharing during and after project closing	Gather feedback continuously during the project, not only when it has already been finished	Iterate to improve performance

Clarity and reminding	Define R&R and AIs, remind team members of next steps	Be clear also when e-mailing: [Info], [Important info], [Status], [Feedback required fm NN], [Action required fm NN]…
Make decisions	Do not delay the progress by fine tuning endlessly. Make decisions, but know the restrictions, realities and risks.	Prepare yourself to correct the decision later on (that would be deciding AGAIN).
Keep people up-to-date	Communicate and share decisions, memos, reports, documents, status info without delay	Respond to changes! Make sure to speak the same language (terms, examples, stories), explain the importance and effects of if not/if yes.
Flexibility	When options are desired, do not prepare pre-defined agenda to route the discussion	Brainstorm for ideas
Ditch acronyms	Get rid of TLAs (three-letter acronyms) and FLAs (four-letter acronyms), or open them up	DCC project team consists of members from different functions and organizations, so all terms are not familiar to everybody
Ask around	What info, processes or resources can be utilised from elsewhere or be recycled? Use already existing forms, templates and examples	If you do not know something, ask! It's a chance to learn more.
Question	Be critical not to do something just because it has been done always before. Then again do not ditch good practices…	Learn from the past mistakes, done by yourself and by others

7 Results, conclusions and reflecting

Solution DCC was a logistics project for building Delivery Capability for solutions A and B. As projects needed to be managed, the framework was Project Management with PMBoK Guide and adaptive project management approach. SDCC project process, templates and guidance were modeled based on the experience and activities of the practical SDCC projects. In the beginning I thought the main emphasis to be specifically in the practical Delivery Capability Creation of A and B solutions, and their implementation with real customer (pilot) deliveries. But in fact the project content formed to be somewhat different, as the modeling went further than at first envisioned. I am very pleased that the main emphasis was indeed in making a high-level guidance and description, how a typical SDCC project could be carried out, and what activities and deliverables it consists of, although the term "typical" does not really fit into solution business as such.

The following table lists the objectives, measures and results of this project. Upon project closure all objectives have been met, at least to some extent. Delivery Capability for solutions A and B was created, and there were already customer deliveries in phase 1 with legacy tool set-up and product structures (see part A in appendix 12, confidential). For phase 2 there have not been orders or deliveries in such a combination and schedule as originally planned, although new tool environment and P20 structures are in place. We anyhow have the Delivery Capability ready and work is done. Some might argue that the implementation is now missing. I agree that a real customer order and solution delivery in phase 2 would have been "nice to have"; it would have been the icing on the cake. But in real business life it is typical that a lot of work is done and resources are spent, but in the end, there may not be a business case or final implementation. This is the case in the practical side of this SDCC project, too. Phase 2 customer orders are expected later in 2012.

Table 7. Project results.

Action	Result
Delivery Capability created and verified (=logistics project) with a pilot customer delivery for solutions A and/or B both in phases 1 (legacy environment) and 2 (new tool set-up and product structures) *measure: order in – order out, data from SAP	P1: ☑ P2: (☑)
Templates, guidelines and working models reviewed and quality approved by Solution Kernel *measure: ready documents published and stored in IMS, usage followed-up, feedback collected for further improvement	☑
DCM and ROCS roles and support level for solution DCC work defined, aligned and documented *measure: approved documents communicated and stored in IMS	☑
Share solution DCC project management Best Practices *measure: Guideline for Solution Delivery Capability Creation updated and presented in Solution Kernel meeting(s) along with other material, and stored in IMS	☑

Indeed, there was a lot of definition and modeling done based on the practical SDCC project work. This action was carried out further than anticipated. I could argue that this conceptualization is in fact the implementation, and it forms the majority of the work in this project. Solution DCC related process descriptions, working models, templates, examples and role definitions, as well as the modified Guideline for Solution Delivery Capability Creation, have been reviewed, approved, communicated and documents stored in ShareNet IMS. As always, material is already under further development. During the project, SDCC topics and aspects were widely discussed in collaborative Solution Kernel team meetings, and that can be considered as Best Practices sharing on regular basis. Besides the actual project results there were some additional findings made, presented below.

Finding 1: Indeed, all solutions are different. The similarities and differences were widely discussed in Solution Kernel meetings, when trying to find a common ground. I had not earlier realized, just how many different solution variants, from DCC perspective, there really are.

Finding 2: All solution DCC projects are different. This could be stated to be the main finding of this project. It is not possible to make a fully detailed SDCC workflow description that would fit into the whole range of different projects. All solution DCC projects start from the requirements and characteristics of the particular solution in question. Each of them needs to be handled separately, and tasks defined based on "what this solution is all about". What works fine for one project/solution does not necessarily work for another. Common sense is allowed to be used, too.

Finding 3: Some SDCC generalizations can be made, though. The model (process description, templates, examples, instructions) is only a loose guideline that needs to be applied selectively by each DCM in his/her own solution project. The model shows, what should be done "roundabout like this". Based on earlier experience and knowledge, each DCM needs to pick up the applicable parts from the model, and possibly develop some workarounds or fixes to the parts that are not found there. The difficult thing is to identify the parts that fit, so that anything essential is not overlooked or lost. Flexibility in SDCC project management is vital. As different solution projects are not comparable, ultimately each DCM must decide the actions required in his/her own project. Anyway, the idea in the model is that in similar situations it is often possible to function in the same way. In general, when it comes to SDCC, it does not make much sense to try to define the processes and models in too detail. That would be too rigid and constraining. Instead, similar activities can be performed and followed, tasks can be repeated, when they apply to the case at hand.

Finding 4: This project required both learning and unlearning. Solution DCC projects are carried out differently compared to "normal" product DCC project, which are handled as part of product programs. In solution projects DCMs need to learn new things, adapt and modify existing guidance, processes and models, and think out-of-the-box. Sometimes it is necessary to test if something works in practice or not. Trying and failing in an environment that encourages to it is "falling forward"; an excellent opportunity to learn more. Letting go of the normal DCMP and product program set-up is surprisingly difficult, as working methods are based on experiences, views, examples and what has been learned before.

Finding 5: PMBoK Guide is too restrictive as such for solution DCC projects. Yes, all nine PMBoK areas (except perhaps the budget part) need to be considered in

solution DCC project management, but as all solutions and their projects are so different, adaptive project management approach gives better guidance, especially considering the changing project environment.

Finding 6: In this business, everything changes all the time. It is virtually impossible to conduct a (SDCC) project exactly as planned, especially if the project lasts for a considerable amount of time. There may be (and have been) changes in customer needs, market expectations, economical situation, personnel and organization, solution content, and even in Q2C scope. Re-planning is often needed several times. Change is inevitable and unavoidable, and not all undesirable. Quite the opposite, changes may bring new possibilities and improvements, and it may turn out that "time goes by", and something needs not to be done after all. Requirements may become obsolete, when something else has improved the situation and removed the original need.

Finding 7: Virtual matrix organization had a significant impact on the nature of this SDCC project. SDCC boils down to project management, conducted in a global matrix organization, and mainly done virtually. This sort of project environment can be stated to be somewhat challenging.

Finding 8: Q2C business change program dominated and steered this SDCC project. The dependence of this SDCC project to Q2C program cannot be emphasized too much. Q2C aims for simplification and harmonization, but it also provides new tools and possibilities for solution delivery. It was necessary to proactively follow Q2C progress in this SDCC project.

Finding 9: SDCC and PM competencies are centralized to certain persons more involved with these activities. It is possible network and to share this knowhow in teams and between colleagues with dialog and communication, but only to a certain extent. Genuine Competence Development (CoDe) requires own real life experience. However, it can be stated that the overall level of knowledge about SDCC in DCM organization (Solution Kernel and DCM pools) has increased.

Finding 10: SDCC experience is valuable in future DCC projects. Even though the future projects would not be referred to as solution projects, it is evident that the industry is moving towards more and more project or customer specific deliveries. It is

necessary to be ever more flexible and intuitive, when dealing with different product variants consisting of different components. Experience from former (solution) DCC projects allow re-use of models, processes, Best Practices and gathered competencies. This can potentially speed up future SDCC project work. The knowledge of individuals is emphasized.

This solution DCC project cannot be repeated as such. There are no new solutions coming with exactly the same characteristics, requiring exactly the same actions. And in any case all projects are unique. The models and templates drawn from this SDCC project highlight the main aspects and tasks to be accomplished, but at the same time note that there's always a need to apply and modify. There is no one and only correct model. To transfer this model and to use it in other context (project) does not lead to identical results. We can therefore state that the results of this project are reliable, but not valid for all SDCC projects. Results cannot be generalized, or used as such in other SDCC projects, but the idea and spirit can be transferred.

For further consideration I recommend to continue with Solution Kernel to drive common SDCC issues and to share information and Best Practices. I also see that increasing cooperation with IDS Berlin would be beneficial, to reach personal relationships with Order Engineering staff. Deeper cooperation with TOCE team would also be valuable to ensure focus to correct solution content in ordering phase. What comes to project management skills in DCM organization, I think it is essential to continue to develop skills for leading virtual team meetings effectively.

NSN announced a new strategy 25.11.2011, which concentrates on mobile broadband and services. When writing the project conclusions in January 2012 it was not yet clear, what this means with regards to solution delivery. However, there are indications that suggest that this business is moving more and more towards project or customer specific ordering and delivery, which go along with the idea of solutions. In any case, SDCC work for A and B continues towards further customer deliveries and handover to maintenance mode.

Abbreviations

AI	Action Item
BL	Business Line
BSO	Business Solutions (a business line)
BP	Best practices
BU	Business Unit
CLicS	Central Licensing System
CS	Customer Services
CSSC	Centralized Sales Support Center (team)
CSP	Communication Service Provider
CT	Customer Team
DC	Delivery Capability
DCC	Delivery Capability Creation
DCD	Direct Customer Delivery
DCM	Delivery Capability Management (organization)
DCM	Delivery Capability Manager (role)
DCMP	Delivery Capability Management Process
DCPS	Delivery Capability Plan and Specification
DDC	Digital Delivery Center
DEX	Digital Execution
DFDS	Design for Demand Supply Chain (principle)
DOP	Drop-off Point
D/SC	Demand/Supply Chain (=SC)
D/SCM	Demand/Supply Chain Capability Manager (role)
DSP	Demand Supply Planning
e2e	end-to-end
ERP	Enterprise Resource Planning (system) = SAP R/3
F&C	Finance & Control
f2f	face-to-face
GPR	Global Procurement
HR	Human Resources
HW	Hardware
IC	Integration Center
IDS	Integrated OEM and Digital Supply (organization)
IMS	Information Management System (a.k.a. ShareNet)
IRP	Internal Reference Price
IS	Information System
IT	Information Technology
LIC	License (right to use)
LL	Lessons Learned
LoM	List of Material
M&A	mergers & acquisitions
MEX	Material Execution
MoO	Mode of Operation
n.a.	not applicable
NSN	Nokia Siemens Networks
NOLS	Nokia Online Services (tool)
NWS	Network Systems (business line)
OEM	Original Equipment Manufacturer = 3rd party supplier

OPS	Operations (organizational unit)
PD	Product Data
PDM	Product Data Management
PIC	Product Information Center (tool)
PIO	Putting into Operation
PCM	Production Capability Manager (role)
PM	Project Manager / Project Management
PMM	Project Management Methodology
PMO	Project Management Office
PMT	Program Management Team
PPM	Project Portfolio Management
ProdM / PdM	Product Manager
ProgM / PgM	Program Manager
PSH	Product Structure Harmonization
PuCM	Purchasing Capability Manager (role)
Q2C	Quote-2-Cash business change program
ROCS	Ramp-up and Order Configuration Support (role/team)
R&R	Roles & Responsibilities (a.k.a Share of Responsibilities SoR)
RSC	Recommended Supplier Coverage %
RSL	Recommended Supplier List
SC	Supply Chain
SCM	Supply Chain Management
SDCC	Solution Delivery Capability Creation
SPC	Standard Product Cost
STP	Short Term Plan
SW	Software
SWST	Software Supply Tool
TLM	Technical & Logistics Project Management (team)
TOCE	Technical Order Configuration Engineering (team)
TS	Technical Support
WBS	Work Breakdown Structure

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