

SAP Intelligent Enterprise Architecture (IEA10) - Foundation Training

V3.11 – Release Version

Customer Case Study: N3C

INTERNAL



REVISION HISTORY

Revision	Date	Editor	Comment
0.1	2022-07-04	René de Daniel	Initial creation
0.2	2022-07-05	René de Daniel, Stefan Fassmann	Example company selected (North Carolina Chemicals Corp / N3C)
0.3	2022-07-19	Stefan Fassmann	Reviewed and commented; started with extraction of information into Mural Requirements Analysis sheet
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3.08	2025-07-03	Stefan Fassmann	Updated Baseline Application Landscape with names in sync to LeanIX App Catalog
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INTRODUCTION N3C

North Carolina Chemicals Corporation, N3C, is a world leading global player in the chemical and agrochemical industry. In addition, N3C is highly engaged in Oil & Gas exploration and production business as well as in cosmetics & pharmaceuticals research and manufacturing.

Headquartered in Greensboro, North Carolina USA, N3C employs ~80.000 people in 23 countries all over the world. Main manufacturing locations are in

- Region Americas: Brazil, Mexico, and United States
- Region EMEA: Belgium, France, Germany, Norway and VAE
- Region APJ: Australia, China, India, Japan, and Malaysia

Listed in DOW N3C generates ~43 billion € in annual revenue, which is a growth of 11% compared to the previous year. The current innovation rate (Gross Revenue-Earned of New Products or Services) / (Gross Revenue – Earned) is about 14%.

Company's slogan has been changed recently from "We know Chemistry" towards "Chemistry for everyone, everywhere".

Business / Organization structure

N3C is organized into three business units and 7 divisions

Business Unit: **Food and Nutrition**

- Division: Nutrition
 - Human nutrition
 - Animal nutrition
 - Fertilizer
- Division: Crop Protection
 - Fungicides
 - Herbicides
 - Insecticides

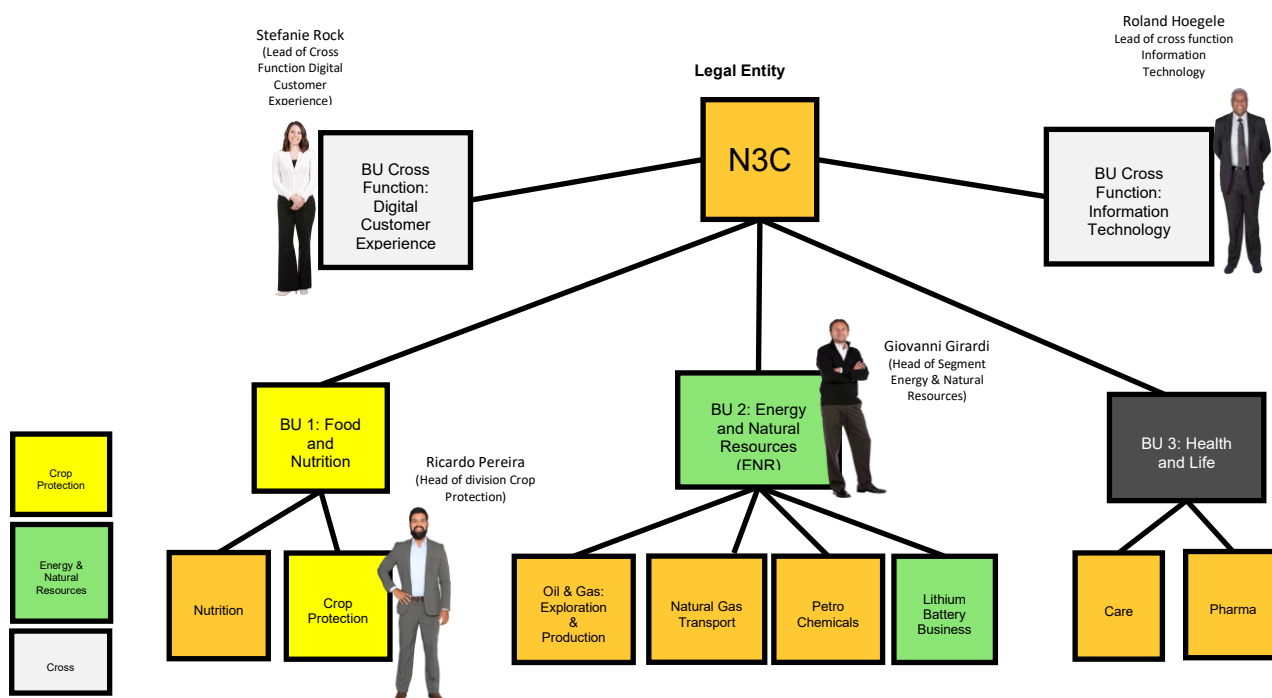
Business Unit: **Energy and Natural Resources (ENR)**

- Division: Oil & Gas: Exploration and production
- Division: Natural gas transport
- Division: Petrochemicals

Business Unit: **Health and Life**

- Division: Care
 - Ingredients for hygiene and personal care
 - home care, cleaning business
- Division: Pharma

High Level Organizational Chart



STRATEGY

Company Vision and Purpose: Chemistry for the World

We want to contribute to a livable world that improves the quality of life for everyone. We do so by providing the best chemistry products and services for our customers and the society while making the best use of available resources.

As a global chemical company, we make important contributions in the following three areas:

- Food and nutrition

A growing world population needs correspondingly more food with enhanced nutrition.

- Resources and climate

Dramatically rising energy demand is one of the world's most pressing challenges. At the same time, global warming endangers the future quality of life. Therefore, N3C wants to contribute to the decarbonization of the global economy.

- Health and wellbeing

Human beings are individuals and that applies as well to how they should be treated in case of an illness. The same way a tailor-made suit fits better than one off the rack; precise medication does also

lead to better results than a generic application. N3C wants to make personalized medicine available for everyone, everywhere.

Core Values

- **Innovative**

Have the courage to pursue bold ideas to create new and sustainable solutions. We link our areas of expertise from many different fields and build partnerships to develop innovative, value-adding solutions.

- **Open**

We value diversity – in people, opinions and experience. That is why we foster dialog based on honesty, respect and mutual trust.

- **Responsible**

We act responsibly as an integral part of society. In doing so, we strictly adhere to our compliance standards. And in everything we do, we never compromise on safety.

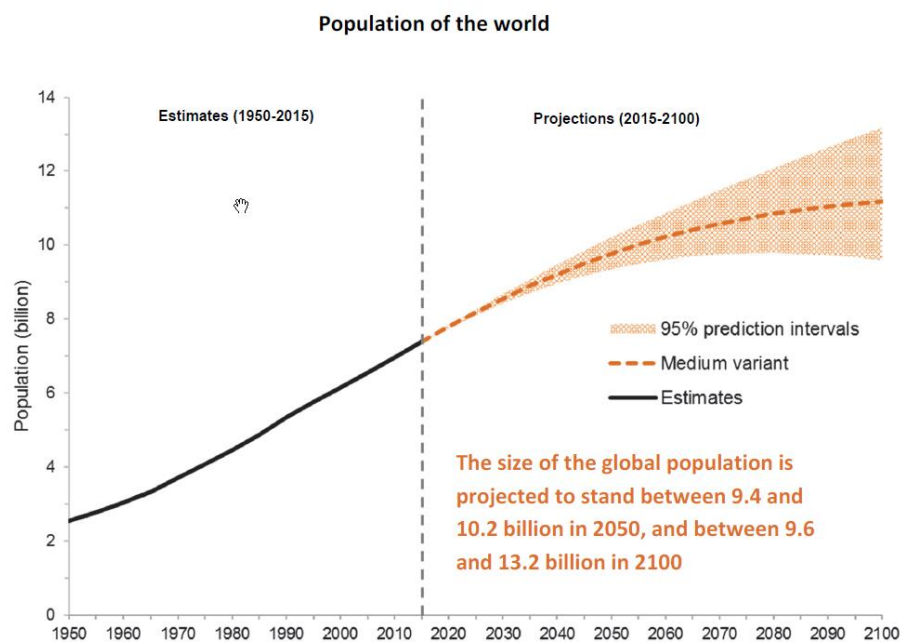
- **Entrepreneurial**

All employees contribute to N3C's success - as individuals and as a team. We turn market needs into customer solutions. We succeed in this because we take ownership and embrace accountability for our work.

Drivers

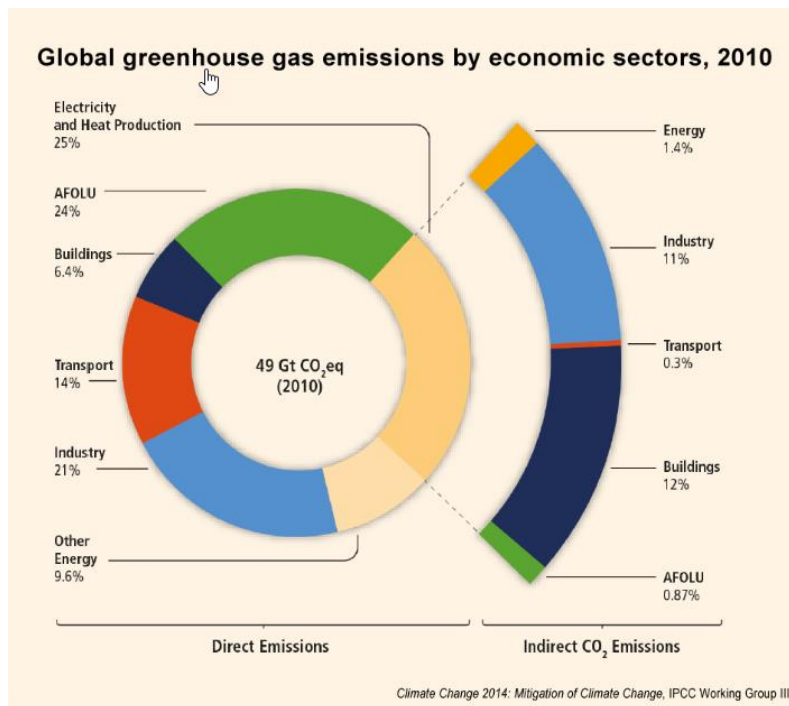
Global Trends

- **Trend #1: Increase of world's population**



Source: United Nations: World Population Prospects – Data Booklet, Revision 2017

- **Trend #2:** Global warming and need for decarbonization of economy



Source: IPCC (Intergovernmental Panel on Climate Change) 2014;
AFOLU = Agriculture, Forestry and Other Land Use

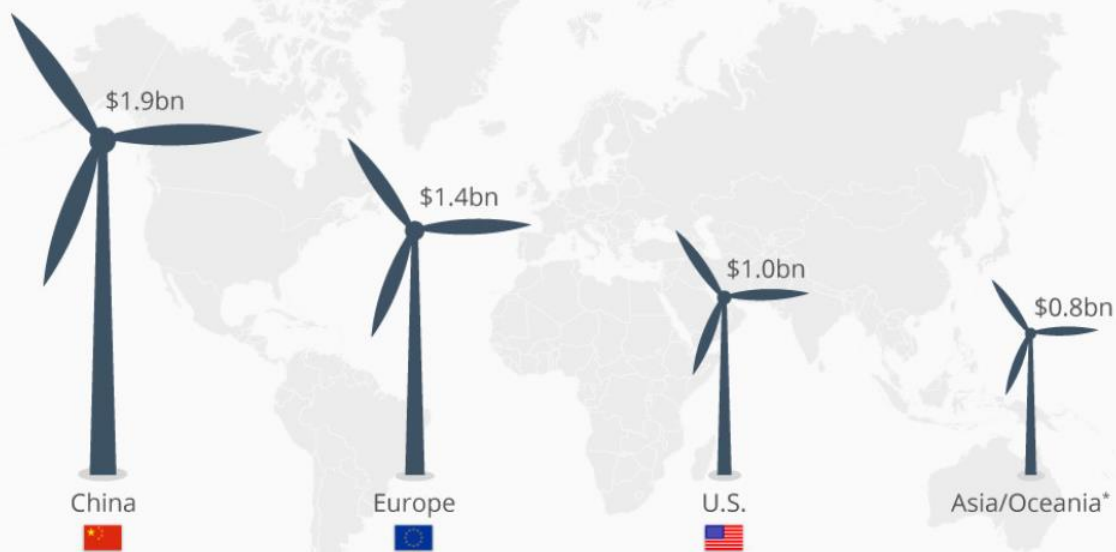
Opportunities

These global trends are external drivers which represent the following opportunities for N3C:

- **Opportunity #1:**
Feeding the world – Agricultural output needs to nearly double over the first half of the century – Natural resources under strain, especially water and land. N3C can play a significant role in both, the increase of productivity while reducing the consumption of scarce resources.
- **Opportunity #2:**
Decarbonization as a macroeconomic trend is expected to take more and more impact on investment decision of both companies and countries. China as example: Worldwide, half of all coal is still burned in China. At the same time China invests 360 US\$ until 2020 into renewable energy (source: World Economic Forum <https://www.weforum.org/agenda/2017/08/how-china-is-leading-the-renewable-energy-revolution>)

The Race for Renewable Energy Domination

Countries/regions with the most governmental renewable energy R&D spending in 2016



* Excluding China and India

Source: Frankfurt School – UNEP Collaborating Centre for Climate & Sustainable Energy Finance

statista

BUSINESS CHALLENGES & STRATEGIC PRIORITIES, GOALS, AND VALUE DRIVER (OBJECTIVE)

Beyond global trends and the resulting opportunities N3C anticipates significant market changes and challenges. N3C has established corporate initiatives in each of the divisions for addressing the specific strategic directions.

Business Unit Food and Nutrition

The Crop Protection division runs the “Farming as a Service” program with the following priorities:

Strategic Priority

- Differentiation from competitors in the Crop Protection business and reduction of product piracy is required.

Challenge I

Empty N3C packaging is being reused and refilled with external piracy products. This leads to both commercial loss and endangering N3C’s reputation.

Goals

- Reduce product piracy (QR Coding, Product Tracking)
 - Provide “original N3C” certificate if packaging is opened the very first time (via QR code scan)
 - Scanning the QR code will register the product under the customer’s loyalty account. Future discounts will be calculated per the customer’s loyalty status.

Value Driver (Objective)

- Reduce product piracy across all products by 90% within two years

Challenge II

Current business model - based on sales of products - is endangered by competitors who provide crop protection with competitive prices.

Strategic Priority**Goals**

- Gradually move from a product to a service-oriented business model for outcome-based crop protection. This includes offering services for efficient use of crop protection on the field. Customers will receive an end-to-end service that determines as well as distributes the ideal amounts of crop protection based on intelligence of the customer's field. The customer will be able to choose whether to pay based on usage or outcome (yield). Strategic partnering with IT industry, drone providers and agricultural machinery manufacturer is required to establish E2E business model.

Value Drivers (Objective)

- Establish digital customer experience by end of next year.
- Generate 10% of crop protection revenue stream from a service business model until end of next year.

Business Unit Energy and Natural Resources

N3C initiated the corporate program "Establish lithium battery business" for expanding into the rechargeable lithium battery business. A newly created lithium Battery Business division runs this program with the following strategic directions:

Strategic Priority

- N3C needs to diversify the Energy & Natural Resources and be less dependent on fossil energy.

Challenge

Currently N3C is highly engaged in the oil & gas sector. The reason for this is that oil is the starting point of the value chain for petrochemicals. However, natural resources are limited, and additional income streams must be established to be less dependent on fossil energy.

Goals

- Become a strategic player in the manufacturing of lithium-based batteries in Europe
- Become leader in the lithium battery business models.

Value Drivers (Objective)

- Build a lithium manufacturing plant in Europe by end of next year
- Create "Pay per Use" business model for rechargeable lithium batteries in Europe in 2 years
- Establish a process to repurpose used lithium batteries within 4 years

Business Unit Health and Life

Currently N3C is engaged in two divisions: Care (ingredients for hygiene and personal care, home care) and Pharma (pharmaceuticals). The Pharma division runs the “Innovate with Personalized Medicine” program with the following strategic directions:

Strategic Priority:

- N3C needs to increase innovation speed for existing and build IP protection for new recipes.

Challenge

While the care business remains stable the innovations are focused on pharmaceuticals.

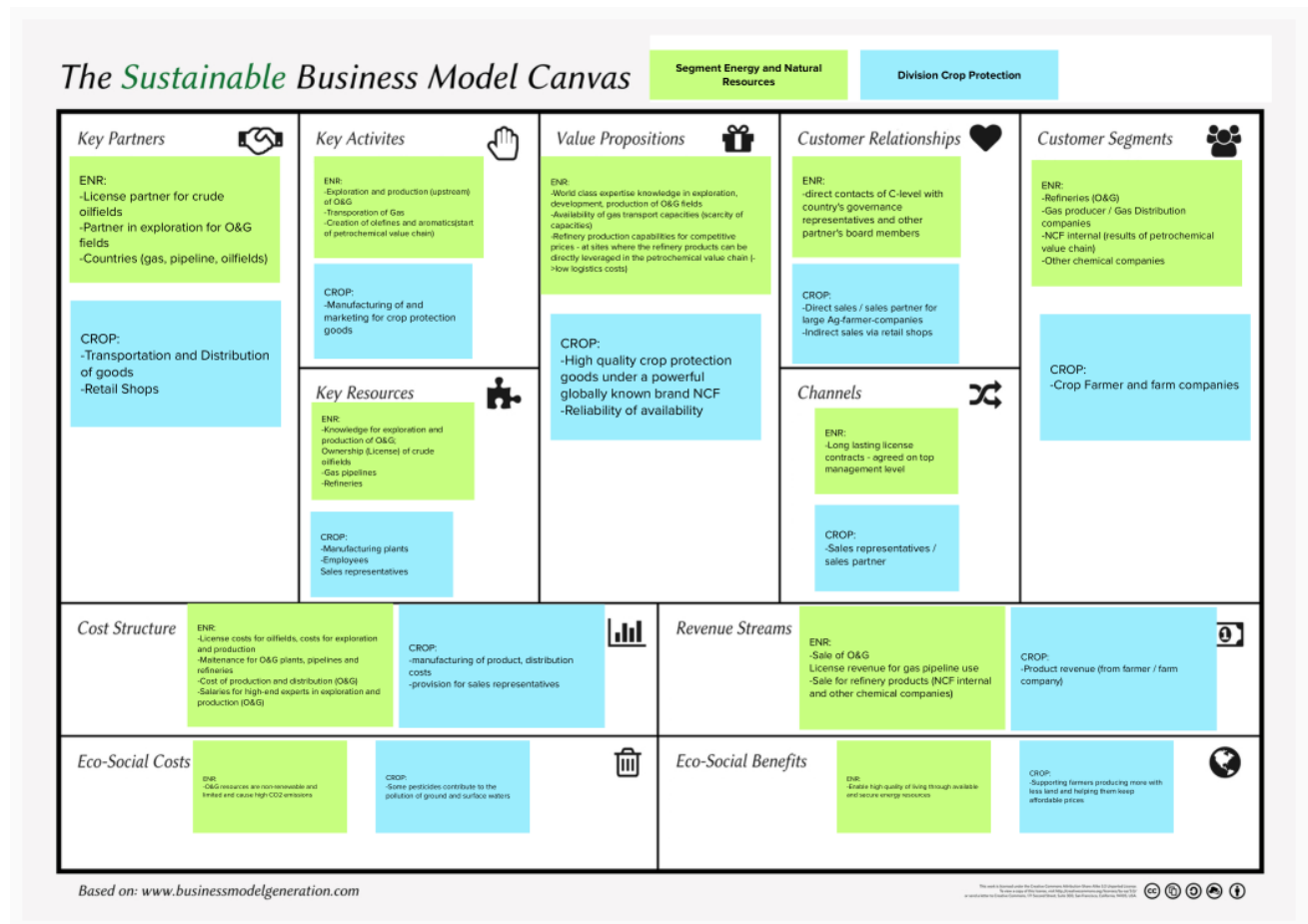
Goals

- Benefit from highly innovative and profitable “personalized medicine”.

Value Drivers (Objective)

- Become one of the top ten players in personalized medicine from a revenue perspective within 2 years.

BASELINE BUSINESS MODEL CANVAS

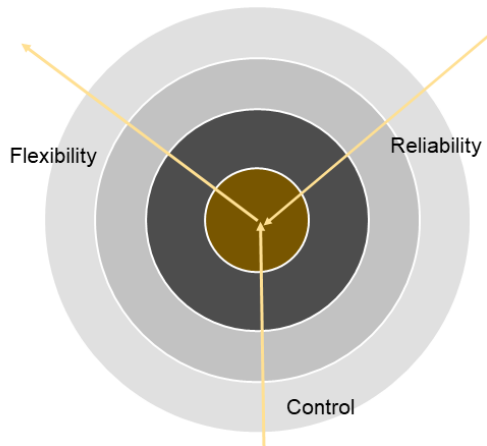


ENTERPRISE ARCHITECTURE

IT Architecture Principles

N3C created a layered IT concept as guidance for architecture:

Layered IT Concept



Individual	• <u>Purpose</u>: Optimum environment for innovation • <u>Value add</u>: Maximum agility for volatile, individual demands
Differentiated	• <u>Purpose</u>: Harmonize commodities and build the basis for differentiated business value in outer layers • <u>Value add</u>: Effects of scale, efficient commodity support
Harmonized	• <u>Purpose</u>: Harmonize commodities and build the basis for differentiated business value in outer layers • <u>Value add</u>: Effects of scale, efficient commodity support
Core	• <u>Purpose</u>: Centrally provide essential corporate functions to make value creation and compliance possible • <u>Value add</u>: N3C act as One Company

By choosing the right governance approach per layer, N3C combine agile, quick solutions with a stable, reliable foundation for execution

INTERNAL – SAP and Customers Only

Cloud first strategy

- Adoption of cloud computing technologies as the primary means of delivering IT services to reduce costs and improve the quality and speed of service delivery.
- Multi-Hyperscaler strategy to be followed to avoid vendor lock-in. Proximity of data center to business operation is the primary decision criteria.

Modular & Agile

- Commodity services
 - as plug and play in a SaaS model
- Differentiated applications
 - Enables agile development in a PaaS model
- Reduced ERP Core (*“clean core” – see below*)
 - Efficient and fast
 - Close to standard
- Data Integration layer
 - Linking of data across all levels

Compliance with Law

Enterprise information management processes comply with all relevant laws, policies, and regulations (in particular GxP).

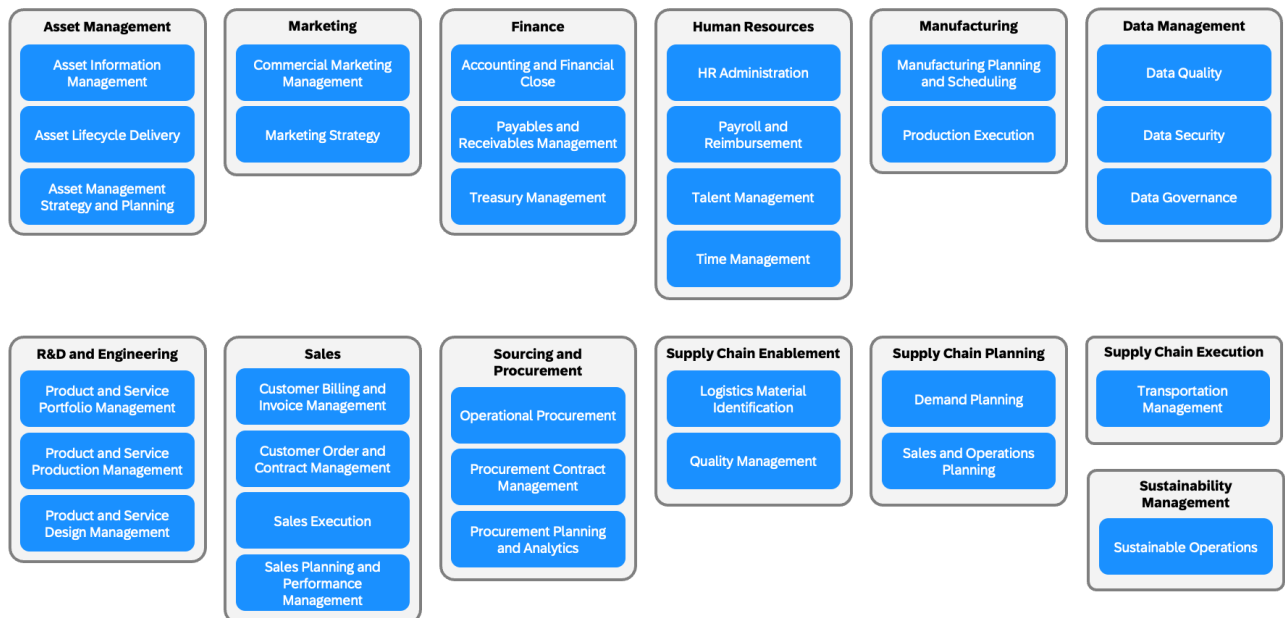
Clean Core

- A well governed clean core strategy will lead to a **less complex core ERP** to increase agility, innovation and ensure cost efficiency and maintainability. 3 major activities are defined:
 - Fit2Standard:
 - Leverage best practices and industry standard processes
 - Replace custom build solutions with market standards where a competitive advantage is not seen
 - Move functionality blocks out of the ERP on dedicated service platforms
 - Delete unused custom objects

Baseline Business Architecture

The N3C Business Capabilities were documented as Business Capability Map.

Baseline Capability Map



Baseline SAP Application Architecture

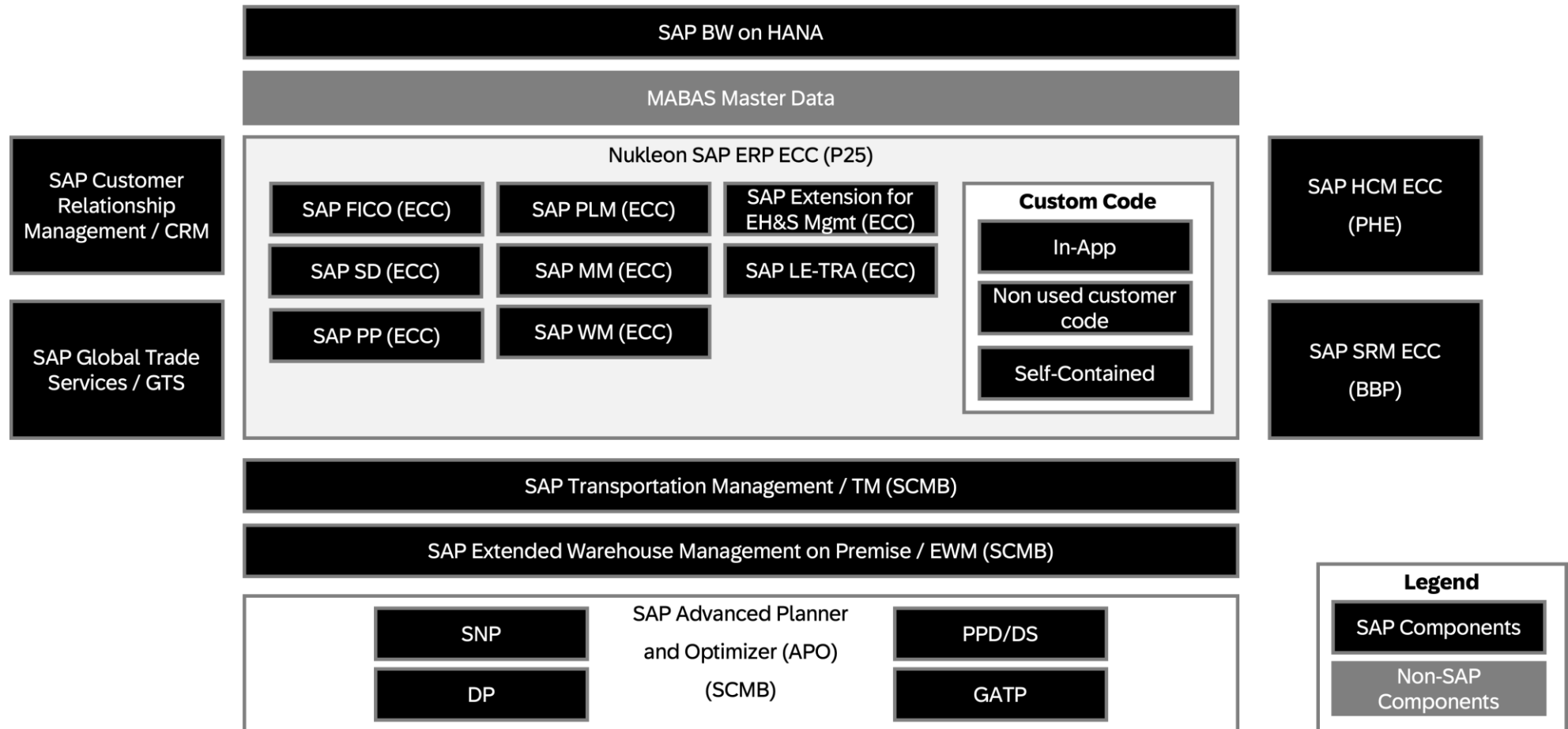
N3C shared with SAP the current architecture:

- Monolithic architecture with single instance SAP ERP called “Nukleon” (P25),
 - Globally standardized to certain extend
 - Far off standard
 - Huge customer code developments, thereof
 - Enhancements, extensions of SAP code line (“In-App”)
 - Non-used code
 - Additional CBTG applications (“self-contained”)
- SAP satellite systems to Nukleon
 - SRM (Supplier Relationship Management)
 - CRM (Customer Relationship Management)
 - GTS (Global Trade Services)
 - TM (Transportation Management)
 - EWM (Extended Warehouse Management)
 - APO (Advanced Planner and Optimizer)
- SAP central systems
 - HCM (Human Capital Management)
 - BW on HANA (Business Warehouse)
- NonSAP satellite system
 - MABAS for master data

In addition, N3C provided the following information for the baseline application assessment:

- N3C wants to keep their own MABAS Master Data Systems for the time being,
- SAP applications like EWM, HCM and Transportation Management are being covered separately and need to be changed in the future (converted/transformed),
- SAP applications like BW on HANA, AM, FICO, MM, PP, CS, CD need to be migrated (converted/transformed). Other applications may need to be sunset and eliminated.

Baseline Application Architecture Overview Diagram



CUSTOMER ROLES

Ricardo Pereira – Head of Division Crop Protection



Name, Age, Hobbies

Ricardo Pereira, 45 years old, married / three kids, lives in Rio de Janeiro, Brazil.

He grew up in Camaquã, the rice and soybean growing area in the south of Brazil before he moved to Rio de Janeiro for studying agriculture. He is a hot fan of the football and in particular the Seleção - the Brazilian football team.

Vita

Following vita aspects are known: After finishing his studies in university, Ricardo first came back into his home area to apply his knowledge at the local. He is now with N3C for 10 years worked himself up through the ranks of the organization. Two years ago, he was appointed to the head of division Crop Protection.

Job description

As head of division Crop Protection, he is responsible for the P&L of his organization. He reports to the head of business unit Food and Nutrition.

He is challenged by product piracy, which endangers N3C's reputation and impacts revenue stream. Solutions to overcome this challenge are of priority. In addition, Ricardo is convinced that N3C can significantly contribute to increase yield – not only in Brazil

Giovanni Girardi – Head of Business Unit *Energy & Natural Resources*



Name, Age, Hobbies

Giovanni Girardi is 48 years old, single, no children. He is born in Milano and lives currently in Oslo, Norway for more than a decade.

He does Yoga, Jiu Jitsu and goes to fitness center quite often.

Vita

Giovanni has an engineering background. He previously worked for ANI. He started with exploration of Oil and Gas in Northern Africa. As of 1999 he was in a leading position for ANI's global exploration activities in Roma.

In 2007 - in consequence of the financial crisis - he moved to N3C responsible for the O&G Division first. 2 years ago, he took over the lead of the N3C's ENR business unit.

Job description

Giovanni is part of N3C's Leadership organization. Although this position seems to be powerful the P&L responsibilities are with the divisions which act quite autonomous in the ENR business unit of N3C.

He loves the Oil & Gas business and now has the challenge to build up the new lithium based battery business.

Stefanie Rock - Lead of Cross Function *Digital Customer Experience*



Name, Age, Hobbies

Stefanie Rock, 38 years old, married / two kids, lives in Los Angeles, United States.

She loves sports in the air with the “extra kick”, for example paragliding and skydiving.

Vita

Following vita aspects are known: Stefanie as granddaughter of German immigrants grew up in San Francisco and studied business administration at University of California, Berkeley. She started her professional career in start-up companies in Silicon Valley. She hired at N3C recently to combine her passion for customer experience solutions with the possibility to connect with her family roots.

Job description

Stefanie is in the headquarters cross function organization and leads an organization of ~80 employees globally dealing with customer experience. Historically solutions like CRM were in the center of this organization. Stefanie strongly moves into the direction of digital customer experience (DCX). Winning data from direct customers connects is in the center of her thoughts.

Roland Hoegele - Lead of cross function *Information Technology*



Name, Age, Hobbies

Roland Hoegele, 55 years old, married / two kids, lives in Greensboro, United States.

Vita

Following vita aspects are known:

Peter studied chemistry master science at Princeton University, United States. After graduation, he started with N3C in 1982 in the moved after a short period in laboratory into the IT department. He was part of the first SAP R/2 implementation project at N3C. His expertise is in the finance and controlling application. Over decades he continued being part of IT projects - recent years in the role of project and program management. In particular, he oversees the recent IT driven consolidation projects in the past decade.

Job description

Roland oversees the internal IT organization and drives IT projects in alignment with the business. Additionally, he coordinates the external service providers.

Roland is responsible for operating IT systems, measured by system availability and costs.

The monolithic architecture is a pain for N3C's need of agility. There are many customer code developments which creates high maintenance in operations. With the new architecture he wants to get out of these chains.



Ricardo Pereira, Head of Division Crop Protection

Ricardo has a major issue with product piracy and a solution for this is a key priority as revenue is decreasing. At the same time, he is excited about the corporate "Farming as a Service" program which will bring this new business model to life. However, this will require collaboration with partners and a differentiated approach on how to sell solutions instead of products.

Key words for answers to be given during Business Strategy Assessment

1. What are the trends and transformation drivers, and which impacts are they going to have on the business model in your area of responsibility?

Answer Key Word: **Grow more from less**

2. What is the competitive advantage and what are the value potentials that can be realized through the transformation in your area of responsibility?

Answer Key Word: **Improvement by Field Crop Monitoring and Insights**

3. How should a suitable (partner) organization look like to ensure the achievement of strategic goals in your area of responsibility?

Answer Key Word: **New efficiency gain by agricultural machine monitoring**

4. What are the business options for the future and how does our vision for the future business model look like in your area of responsibility?

Answer Key Word: **Establish "Farming as a Service" (Pay-per-Use)**

5. Which business capabilities will be required / need to mature to support future business models in your area of responsibility?

Answer Key Word: **Outcome and usage based selling**

6. How is the value chain transformed? Which parts must be optimized in your area of responsibility?

Answer Key Word: **Track and trace for supply chain**

7. Which technological concepts are necessary - what kind of technologies are available in your area of responsibility?

Answer Key Word: **QR code technology**

8. What kind of risks do we have to consider? How can we address them on a strategic level in your area of responsibility?

Answer Key Word: **Product Piracy**



Giovanni Girardi, Head of Business Unit Energy & Natural Resources

Giovanni loves the Petroleum business and suffers emotionally when N3C decided to ramp down this technically challenging business. He sees a challenge as well as an opportunity at the same time in the lithium battery business initiative. As his traditional business was not consumer facing, he strongly depends on the work of his fellow colleague Stefanie Rock.

Key words for answers to be given during Business Strategy Assessment

1. What are the trends and transformation drivers, and which impacts are they going to have on the business model in your area of responsibility?

Answer Key Word: **De-investment in core oil & gas**

2. What is the competitive advantage and what are the value potentials that can be realized through the transformation in your area of responsibility?

Answer Key Word: **Establish lithium supply management**

3. What should a suitable (partner) organization look like to ensure the achievement of strategic goals in your area of responsibility?

Answer Key Word: **Consumer focused service business, e.g. subscription business**

4. What are the business options for the future and how does our vision for the future business model look like in your area of responsibility (e.g. subscription business)?

Answer Key Word: **Offer Pay per use model for lithium batteries**

5. Which business capabilities will be required / need to mature to support future business models in your area of responsibility?

Answer Key Word: **Preparation of divestments, service business (see pay per use)**

6. How is the value chain transformed? Which parts must be optimized in your area of responsibility?

Answer Key Word: **Manufacturing of lithium batteries**

7. Which technological concepts are necessary - what kind of technologies are available in your area of responsibility?

Answer Key Word: **Digital customer experience**

8. What kind of risks do we have to consider? How can we address them on a strategic level in your area of responsibility?

Answer Key Word: **Competitive pressure in lithium business**



Stefanie Rock, Lead of Cross Function Digital Customer Experience

Stefanie has a can-do attitude. She is very pushy and willing to take risks. When she joined N3C, she quickly realized the potential to improve the digital customer experience using leading edge solutions and technology. In her opinion, the deployment of software solutions from large vendors like SAP are taking often too long. She does not believe that SAP as a large German software provider can compete with the digital customer experience solutions from the Silicon Valley.

Key words for answers to be given during Business Strategy Assessment

1. What are the trends and transformation drivers and which impacts are they going to have on the business model in your area of responsibility?

Answer Key Word: **Digital Customer Experience**

2. What is the competitive advantage and what are the value potentials that can be realized through the transformation in your area of responsibility?

Answer Key Word: **Customer Insights**

3. How should a suitable (partner) organization look like to ensure the achievement of strategic goals in your area of responsibility?

Answer Key Word: **Flexibility in solutions**

4. What are the business options for the future and how does our vision for the future business model look like in your area of responsibility?

Answer Key Word: **Pay per use, pay by outcome**

5. Which business capabilities will be required / need to mature to support future business models in your area of responsibility?

Answer Key Word: **Customer facing capabilities**

6. How is the value chain transformed? Which parts must be optimized in your area of responsibility?

Answer Key Word: **Service orientation towards customer interaction**

7. Which technological concepts are necessary - what kind of technologies are available in your area of responsibility?

Answer Key Word: **Mobile solutions**

8. What kind of risks do we have to consider? How can we address them on a strategic level in your area of responsibility?

Answer Key Word: **Data and algorithms for customer insight**



Roland Hoegele, Information Technology

Roland is a strong supporter of SAP solutions, and he knows which impact wrong architecture decisions can have on the organization.

- He has a "SAP first" mindset - therefore
- He conflicts with Stefanie - as she prefers a best of breed approach
- He wants to minimize integration challenges to a minimum

Key words for answers to be given during Business Strategy Assessment

1. What are the trends and transformation drivers, and which impacts are they going to have on the business model in your area of responsibility?

Answer Key Word: **Standardization and simplification**

2. What is the competitive advantage and what are the value potentials that can be realized through the transformation in your area of responsibility?

Answer Key Word: **Simplification leads to agility**

3. How should a suitable (IT partner) organization look like to ensure the achievement of strategic goals in your area of responsibility?

Answer Key Word: **Cloud based solutions featuring GxP compliance (private cloud for core ERP)**

4. What are the business options for the future and how does our vision for the future business model look like in your area of responsibility?

Answer Key Word: **N/A**

5. Which business capabilities will be required / need to mature to support future business models in your area of responsibility?

Answer Key Word: **SaaS mindset**

6. How is the value chain transformed? Which parts must be optimized in your area of responsibility?

Answer Key Word: **Paper based activities**

7. Which technological concepts are necessary - what kind of technologies are available in your area of responsibility?

Answer Key Word: **Composable architecture**

8. What kind of risks do we have to consider? How can we address them on a strategic level in your area of responsibility?

Answer Key Word: **Business buy in**

ADDITIONAL INFORMATION

N3C especially asked for your support for developing a target architecture that addresses the Stakeholder's requirements. Also, a transformation roadmap needs to be suggested which shows a possible way from today's baseline to the target architecture.

As Enterprise Architect, you need to ...

- ... document the baseline architecture (business and IT),
- ... develop a potential target business and IT architecture by considering the Stakeholder's requirements,
- ... take two major end-to-end business processes variants into account which address the requirements and provide the context for the identification of the target business capabilities,
- ... develop the target solution architecture,
- ... and suggest a roadmap to the customer which fulfills the Solution Architecture.

N3C is already evaluates possible system conversions of their ECC systems to S/4HANA. For this, separate initiatives are already running that focus on the following enterprise domains

- Finance,
- Human Resources,
- Sourcing and Procurement,
- Asset Management¹.

Therefore, these domains and the responsible applications can be left out of scope for your first design of the target architecture and the transformation roadmap.

You should focus on covering the requirements for the new Lithium Battery business and the new business use cases for Crop Protection. The business capabilities that cover the Stakeholder Requirements should be in scope for your architecture work. The Strategic Importance of the business capabilities are given by the importance of the given requirements.

¹ Note: We are taking these Business Capabilities out-of-scope for being able to execute the case study exercises within the given time.