



Critical Success Factor (CSF) Analysis for the Establishment of Home Networks using Plastic Optical Fiber.

Short introduction of a strategic planning method with some examples

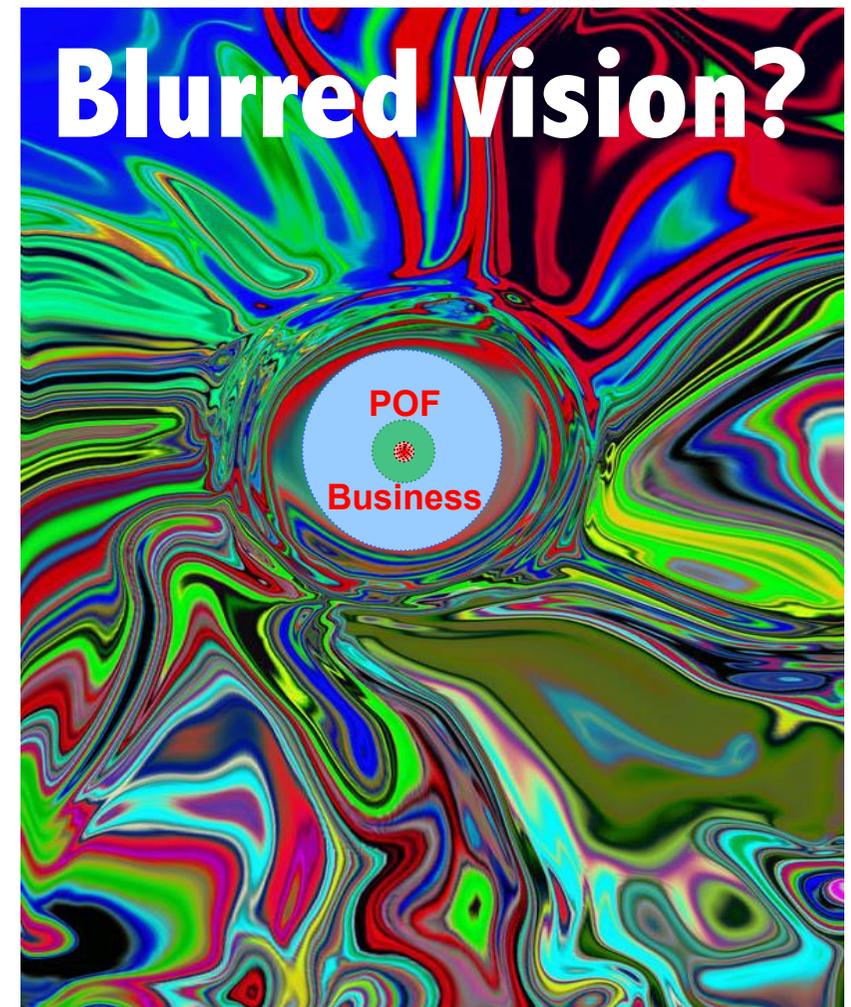
- ▶ **Motivation / Problem**
- ▶ **Definition of CSFs and their presentation**
- ▶ **CSFs for different POFs / Examples**
- ▶ **Analyzing CSFs**

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Motivation / Problem

Why CSF Analysis?

- **A complex business case or project (the development of a new product) needs to be planned strategically in order to be successful. Your strategy needs to be stabilized against internal and external disturbances.**
- **Home networks are used for many reasons! The same is true for POF networks!**
- **The broad range of different applications, technologies, economical and social aspects require some deeper understanding and strategic planning before a business can be started.**
- **Complex projects require:**
risk minimization and success maximization



Defining CSFs

Definition 1

Definition 1

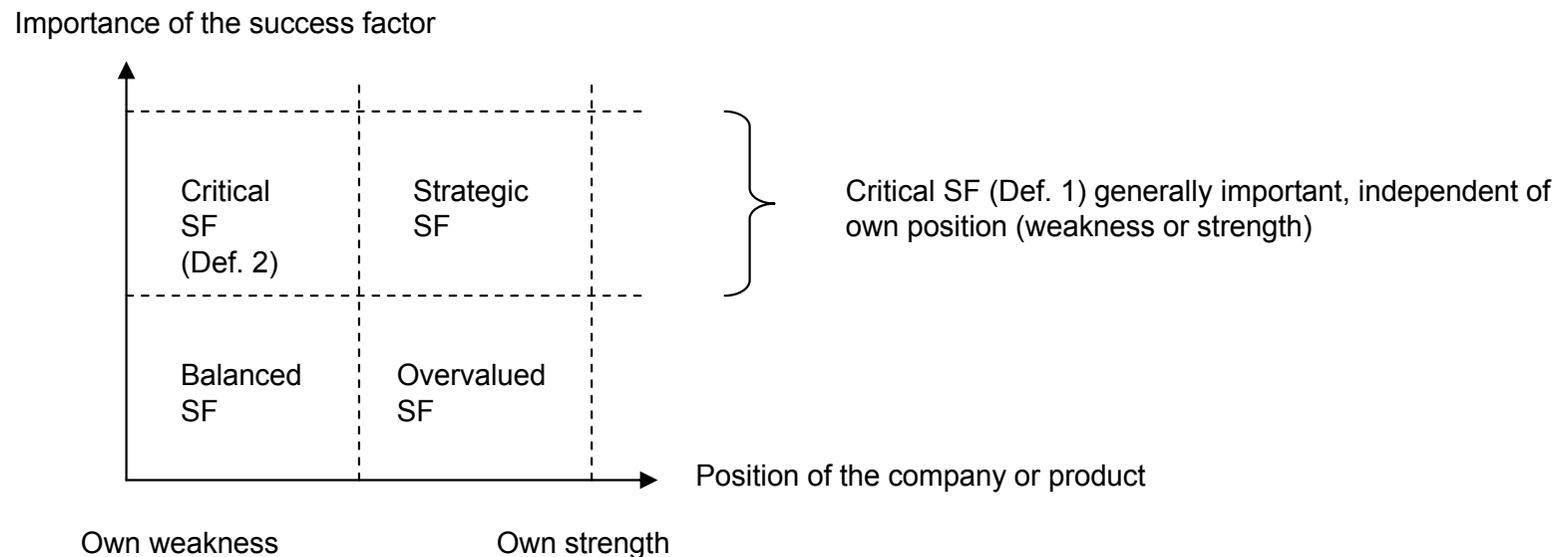
- **Critical Success Factor (CSF) is a business term for an element which is necessary for an organization or project to achieve its mission.**
- **A company (or product designer) may use the critical success factor method as a means for identifying the important elements of their success.**
- **For example, a CSF for a successful POF system design is user involvement.**
- **Strategic factors vs. operational factors:**
 - **A critical success factor is NOT a key performance indicator or KPI. Critical Success Factors are elements that are vital for a strategy to be successful.**
 - **KPIs are measures that quantify objectives and enable the measurement of strategic performance.**
- **For example:**
 - **KPI = number of new installations**
 - **CSF = demanding high bandwidth and easy installation**

Defining CSFs

Definition 1 + 2

Definition 1 + 2

- The term “Critical Success Factor” is used differently, due to ambiguity of the word “critical”, back and forth translations into other languages and interpretation when analyzed in portfolios:
 - Definition 1: “critical” = important, key, determining, vital, strategic, etc.
 - Definition 2: “critical” = alarming, anxious, etc. (as shown within the diagram = top left):

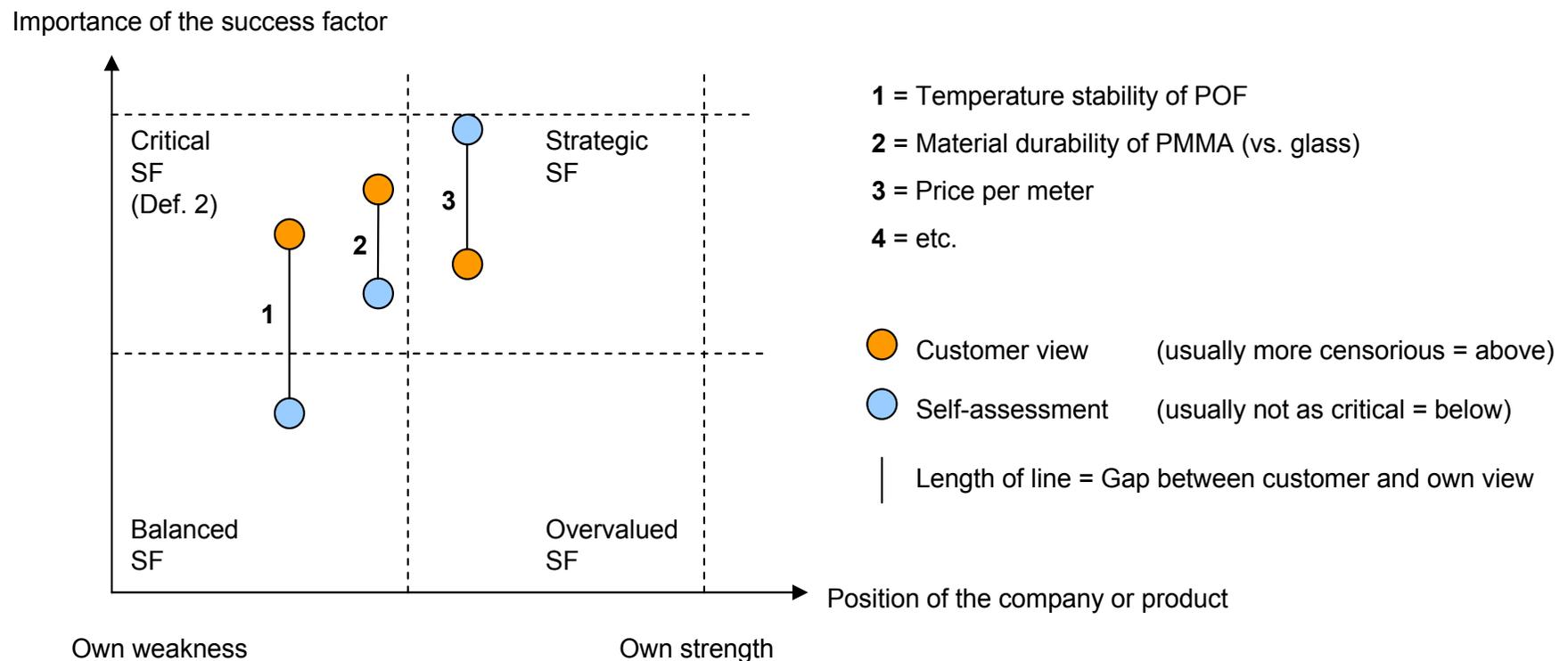


Defining CSFs

Portfolio

Customer view vs. self-assessment

- Such a diagram can also be used as “SF Portfolio Diagram” in order to show the customer view and the self-assessment of different SFs.



CSFs for strategic planning

Mission vs. Goals



CSF Hierarchy

Levels of success

All the different success factors need to be considered top-down and fulfilled in that order.

CSFs for Home Networks:

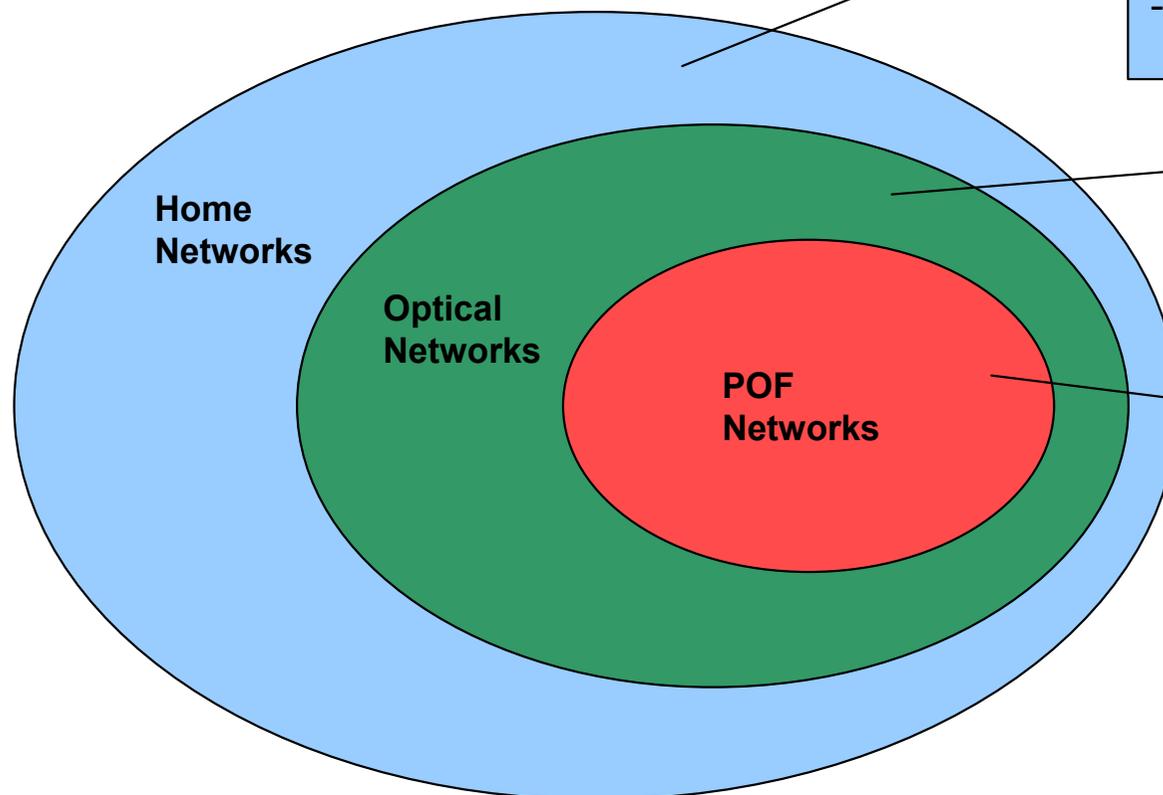
- Focus on applications and customer needs
- Provide open standards for max. interconn.

CSFs for Optical Networks:

- EM interference problems
- Bandwidth x length requirements

CSFs for POF Networks:

- Untrained users (DIY)
- Untrained staff (dealers)
- More economical than glass
- Rough environments
- Small bending radius



Defining CSFs

Verbal expression

▪ CSF as an activity statement:

- A “good” CSF begins with an **action verb** and clearly and concisely conveys what is important and should be attended to. Verbs that characterize actions: attract, perform, expand, monitor, manage, deploy, etc. / (“poor CSF” start with: enhance, correct, up-grade, ...)

Examples: “monitor customer needs and future trends” / “find new POF applications”

▪ CSF as a requirement:

- After having developed a hierarchy of goals and their success factors, further analysis will lead to **concrete requirements** at the lowest level of decomposition (a single, implementable idea)

Example: “develop suitable transceivers for the 120µm PF-GI-POF”

▪ CSF as a key influence factor:

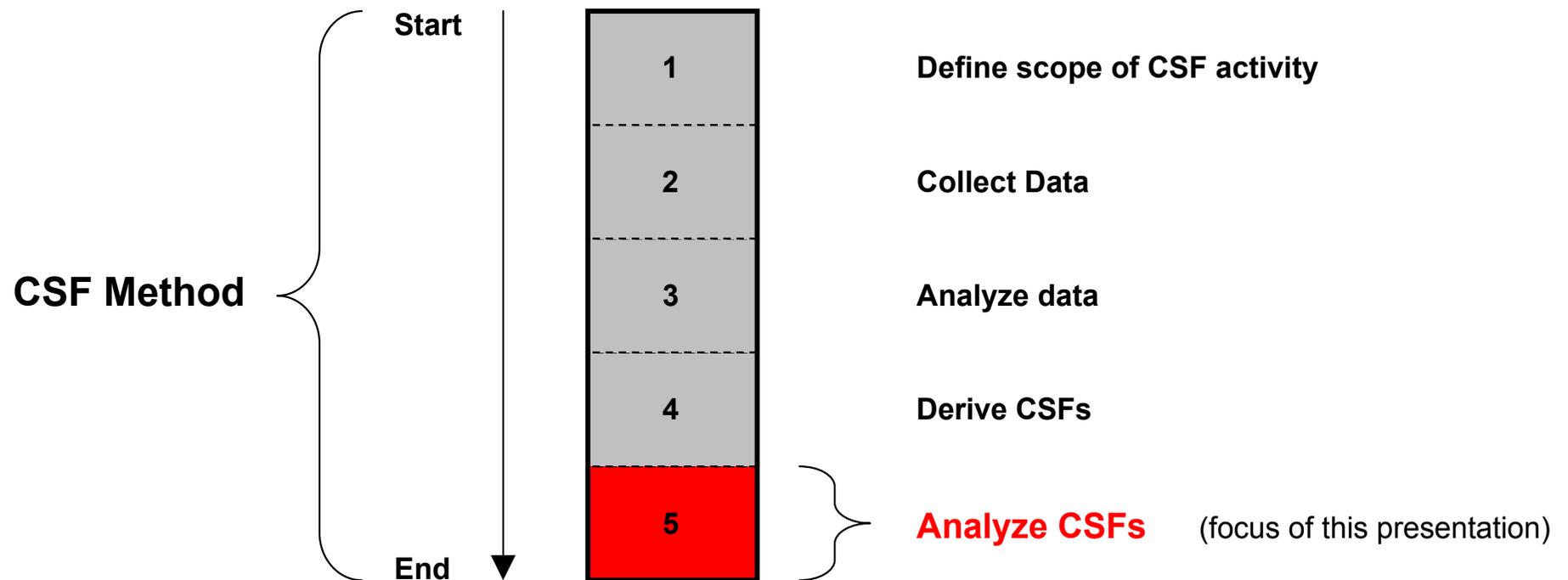
- Some CSFs might influence other CSFs or factors such as markets, technologies, etc. Such CSFs could be rephrased into “**key influence factors**” as known from the cross impact analysis (matrix) which is used in the **scenario technique**.

Example: “core diameter” / “trained staff”

CSF Analysis

Process overview

Definitions: CSF Method = describes the whole process
CSF Analysis = is the final step



CSFs for POF

Introduction

1. As we have seen on the **CSF hierarchy** slide, we have to distinguish between **CSFs for optical networks** and **CSF for POF**, which were organized top-down.
2. The same concept has to be **applied to the POF itself**, because nowadays one can find very different plastic optical fibers:
 - diameter variations from about 1/10 mm up to 1mm
 - different materials, hence suitable for different wavelength
 - different NA
 - different assembly knowledge will be required
 - etc.

Cross Impact Matrix (Analysis)

Influence factors

Influence factors need to be understood first before CSFs can be developed:

- Most advantages and disadvantages are related to the POF's core diameter or bandwidth-length-product. / Therefore the CSFs of a standard 1mm PMMA POF will not be the same as those of a sophisticated 120 µm PF-GI-POF.
- The matrix below is just an **example** and one might argue about the numbers listed: However, it shows us how some **key influence factors (KIFs)** might interact: The core diameter seems to be a very active KIF (AS=14), whilst BxL is just a “passive result” of other factors (PS=9).

-	opt. material	B x L (MHz km)	core diameter	install knowledge	environment	transceiver devi.	activ sum	interrel. AS PS
opt. material	-	3	1	1	0	3	8	56
B x L (MHz km)	0	-	0	0	0	0	0	0
core diameter	2	3	-	3	3	3	14	84
install knowledge	0	0	0	-	0	1	1	4
environment	2	0	3	0	-	0	5	15
transceiver devi.	3	3	2	0	0	-	8	56
passive sum	7	9	6	4	3	7		
activity AS/PS	1,14	0,00	2,33	0,25	1,67	1,14		

CSFs for 1mm SI PMMA POF

1mm POF

- **We have seen from the concept of the CSF hierarchy and now from the cross impact matrix, that we need to organize the CSFs of different POFs.**
- **Therefore, if you want to establish the 1mm POF in home networks you need to develop the CSFs for exactly that kind of fiber only.**
- **Here are some examples for 1mm-POF-CSFs:**
 - **Find new and useful applications within the house, while focusing on the advantages of the 1mm POF**
 - **Find applications where the required data rate will not exceed 100Mbit/s (i.e. home automation, time insensitive file servers - only for uploads to local PC, ...)**
 - **etc.**

CSFs for “thin POF”

Thin POF (page 1)

- Conversely, if you want to establish the **high bitrate POF**, which is thinner by definition, you might lose your advantages in the area of “easy installation” etc., but you might gain advantages in other areas.
 - If you suddenly think that your only advantage is being somewhat more economical than glass, then try to think of other advantages like:
 - Visible light can be seen (security aspects)
 - Smaller bending radius
 - etc.
- ... and focus on those.
- You need to develop the CSFs for exactly that kind of fiber only.

CSFs for “thin POF”

Thin POF (page 2)

- We cannot give a complete list of all CSFs within this presentation, because this will strongly **depend on the type of your business** (cable industry, electronic devices, complete systems, etc.) and many other factors, but at least we can give you some useful advice so that you can think about your CSFs.

- **Here some thin-POF-CSF examples:**
 - **Find new and useful applications within the house, while focusing on rather high bitrates (> 2.5 Gbit/s) / See example on next slide**

 - **Develop even better fibers in order to beat glass**

 - **Find partners who can deliver (develop) suitable transceivers / e-o converters**

 - **Develop a flexible system utilizing universal converters, which are able to transport as many “protocols” as possible: IEEE1394b, Ethernet 100/1000, USB2.0, HDMI-DVI, ...**

Example 1: “thin POF”

Thin POF (page 3)

Most customers do not like **noisy hard drives** (NAS or PCs) in their living rooms, so that **only human interfaces** should be deployed.

Engine / Server room

Wall

Living room / bedroom / kitchen / SOHO / etc.



High bitrate:
2.5 – 5Gb/sec



No PCs !
Only human
interfaces

CSFs for “thin POF”

Thin POF (page 4)

- **Continuation of thin-POF-CSF examples:**

The universal-protocol-CSF conversely expressed: Home networks which are based on just one protocol are probably restricted to only a few applications and will therefore not satisfy most consumer demands.

- **Encourage and monitor the developments of a “universal home network transport protocol” and their “e-o-converters / switches / A&D multiplexers / thin clients / ...”.**



Thin client:
Jack-PC
€ 340 to 570
© Avnet



500m DVI extender
850nm VCSEL
© ihse / OPTICIS

CSFs for “thin POF”

Thin POF (page 5)

- **Continuation of thin-POF-CSF examples:**
 - **If you represent the cable and connector industry, and assuming there are no reasonable and useful “systems” (converters, switches, etc.) available, you might need to focus your activities (CSFs) on a passive optical network (dark fiber) system – preferably in combination with a universal connector system and other advantages.**
 - **Monitor your market segment and your competitors permanently and change your CSFs accordingly.**
 - **Example:** If the incumbent or a huge company launches new products / systems, you need to reconsider your CSFs.

Press release 03/2006: NTT is going to connect 30 million FTTH subscribers by 2010.

NTT decided to employ **hole-assisted fiber** which could achieve the **optical and mechanical characteristics demanded for “DIY in-home optical fibers”**.

The light is “trapped” and can pass through the fiber **no matter how much the cable is bent, folded, or tied, even when it is folded at a right angle.**

Further analysis of CSFs

Comparison Matrix

Comparing any organizational criteria (departments, assets, processes) to the organization's CSFs can expose gaps and problems and provide insight into why the organization is failing to accomplish its mission.

CSFs \ Org. criteria	Develop thin fiber GI-POF	Find new high bit rate appli.	Develop suitable e/o-convt.
Fiber Department	✓	✓	✗
Electronics Dept.	✗	✓	✗

Analyze relationships:

Finally, look at the relationships between CSFs and the chosen criteria. Ask questions about all intersections, not only those that have been marked ✓. For example,

- If a relationship appears to exist, what does this mean?
- If there is no relationship, what does this indicate? Does a relationship exist that is not marked? Should a relationship exist that has not yet been identified?
- Are there too many or not enough intersections? If so, what does this mean?

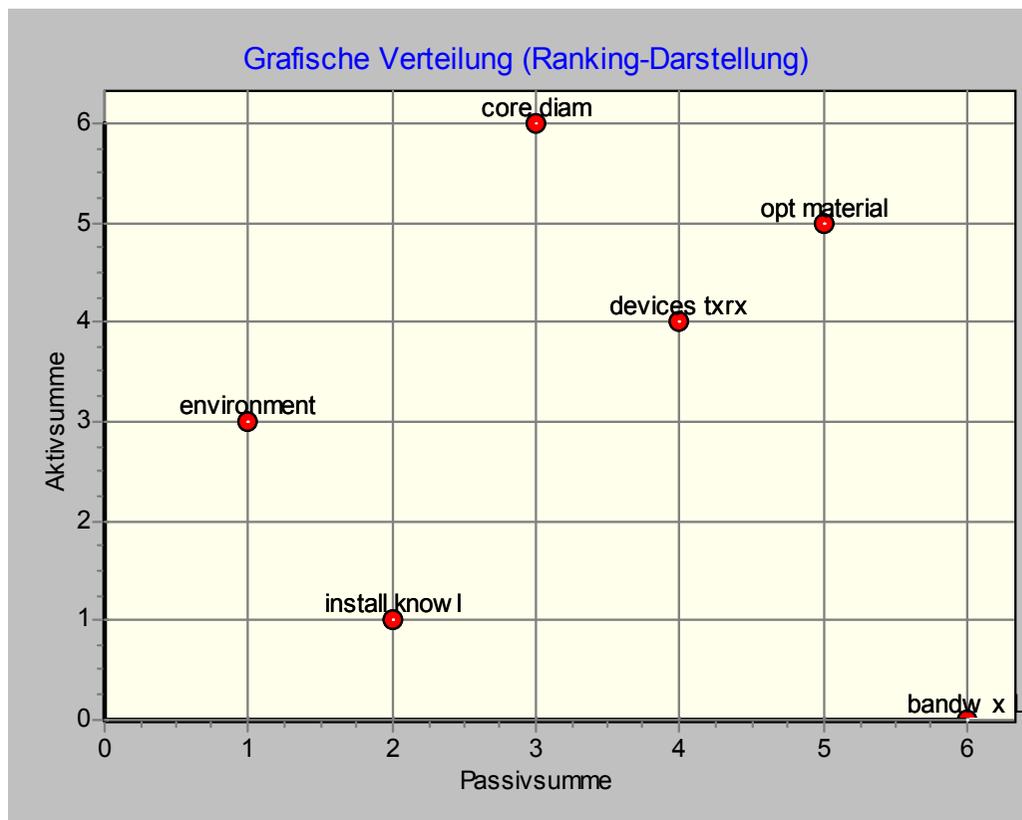
Reasons need to be discussed.
(Maybe no suitable lasers available?)

Further analysis of CSF

System grid

Based on the cross impact matrix shown above, we can also visualize factors which are critical in terms of “ambivalent”, namely those in the top right area.

Active sum
(ranking)



Graphic from
“SzenoPlan”
a scenario software

Top right: material / core diam / TxRx

A critical element is an accelerator or catalyst in the system. It changes many things quickly, but may also create many unexpected and undesired side effects.

Development activities in this sector can be highly uncertain, and impacts may be unpredictable.

Therefore, critical elements have to be treated very carefully. It is particularly important to formulate impact hypotheses for this sector.

Passive sum
(ranking)

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- deliver technical **ideas**
- develop a reliable **strategy**

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Thank you very much for your attention